



**Report on the Request for Information,
Inviting Comments and Suggestions on a
Framework for the NIH-Wide Strategic Plan
for Fiscal Years 2021-2025**



Analysis of Public Comments

July 2021

Executive Summary

The previous *NIH-Wide Strategic Plan*¹, covering FYs 2016-2020, was submitted to Congress on December 15, 2015. As part of implementing the *21st Century Cures Act (P.L. 114–255)*, NIH will update its Strategic Plan every five years. The agency developed an updated *NIH-Wide Strategic Plan for FYs 2021-2025*², released in July 2021.

Spearheaded by a working group of representatives from the 27 NIH Institutes and Centers, and 24 offices in the Office of the Director, a *Framework* for the new Strategic Plan was developed and subsequently approved by NIH Leadership. The Framework for the FY 2021-2025 NIH-Wide Strategic Plan articulates NIH's priorities in three key areas (*Objectives*): biomedical and behavioral science research; scientific research capacity; and scientific integrity, public accountability, and social responsibility in the conduct of science. These Objectives apply across NIH. In addition, several *Cross-Cutting Themes* on public health, collaborative science, women's health, health disparities, and data science, were identified to recognize how they span across the scope of these Objectives.

As part of the efforts to solicit input from the public, NIH released a Request for Information (RFI): Inviting Comments and Suggestions on a Framework for the NIH-Wide Strategic Plan for FYs 2021-2025. The RFI was advertised widely in the Federal Register, NIH Guide, and NIH social media accounts.^{3,4} The RFI gathered input from NIH's external stakeholders on the Cross-Cutting Themes, and/or additional Cross-Cutting Themes that may be considered; NIH's priorities across the three Objectives, including potential benefits, drawbacks or challenges, and other priority areas for consideration; and future opportunities or emerging NIH-wide needs. The RFI was open for comment from February 12, 2020 to April 1, 2020.⁵ During this period, NIH received 160 responsive submissions from a range of individuals and organizations.

NIH recognizes that input from external stakeholders—including members of the scientific and health care communities, professional societies, advocacy organizations, industry, other federal agencies, and the general public—provides valuable insight to be considered during its Strategic Planning process. The RFI responses reflected a wide array of perspectives on NIH's priorities outlined in the Strategic Plan Framework. While there was considerable support for the Framework, some respondents suggested changes or additional items for consideration, many of which influenced drafting of the Plan as it evolved. NIH thanks the respondents for their time and effort in preparing responses to the RFI.

¹ <https://www.nih.gov/sites/default/files/about-nih/strategic-Plan-fy2016-2020-508.pdf>

² <https://www.nih.gov/sites/default/files/about-nih/strategic-plan-fy2021-2025-508.pdf>

³ <https://www.federalregister.gov/documents/2020/02/13/2020-02919/request-for-information-rfi-inviting-comments-and-suggestions-on-a-Framework-for-the-nih-wide>

⁴ <https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-064.html>

⁵ The RFI was published in the NIH Guide on February 12, 2021, when the webform became available to collect data, and the Federal Register Notice was published on February 13, 2021.

Report on the Results of the RFI

Introduction

On December 13, 2016, Congress passed the *21st Century Cures Act (P.L. 114–255)*, which requires the National Institutes of Health (NIH) to develop and maintain a Strategic Plan at least every 6 years. According to the *Cures Act*, the NIH-Wide Strategic Plan should be a coordinated strategy to provide direction to the biomedical research investments made by NIH, to facilitate collaboration across the institutes and centers (ICs), to leverage scientific opportunity, and to advance biomedicine. The *Cures Act* provides NIH with critical tools and resources to advance biomedical research across the spectrum, from foundational basic research studies to advanced clinical trials of promising new therapies. Importantly, the *Cures Act* provides NIH with the flexibility and resources needed to accomplish its mission to improve the health of Americans.

The first *NIH-Wide Strategic Plan*⁶, covering fiscal years (FYs) 2016-2020, was submitted to Congress on December 15, 2015, and released publicly on December 16, 2015, to fulfill requirements in the *Consolidated and Further Continuing Appropriations Act of 2015*. This next iteration of the NIH-Wide Strategic Plan will cover FYs 2021-2025 and provide a sampling of accomplishments under the last Plan and new initiatives across NIH, while framing the direction of NIH for the next five years.

The purpose of the NIH-Wide Strategic Plan is to advance the NIH mission to support research in pursuit of fundamental knowledge about the nature and behavior of living systems, and the application of that knowledge to extend healthy life and reduce illness and disability. The goal is not to outline the myriad of important research opportunities for specific disease applications (as that is covered in the Strategic Plans from each of the ICs and OD offices), but to highlight major NIH priorities, particularly those of an NIH-wide nature, and describe how NIH will achieve these priorities.

The NIH Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI) within the Office of the Director (OD), coordinated the development of the *NIH-Wide Strategic Plan for FYs 2021-2025*. At the initiation of this endeavor, DPCPSI developed a timeline for the Strategic Planning process and established an internal NIH-Wide Strategic Plan Working Group, comprised of staff from across NIH, to lead drafting of the Strategic Plan. IC and OD office Directors each nominated a representative to this Working Group, so that members represented the full range of NIH's activities and research portfolio.

Throughout the process of creating the NIH-Wide Strategic Plan, NIH solicited feedback from internal and external stakeholders, including the public, to identify emerging scientific opportunities and gather suggestions for how to improve the draft *Framework*. The Framework for the Strategic Plan was presented to the IC Directors⁷ on October 24, 2019, the Advisory Council to the NIH Director (ACD)⁸ on December 13, 2019, and the Council of Councils⁹ on January 24, 2020. To disseminate the proposed Framework and solicit input throughout the community, NIH posted a Request for Information (RFI): Inviting Comments and Suggestions on a Framework for the NIH-Wide Strategic Plan for FYs 2021-2025. The RFI was

⁶ <https://www.nih.gov/sites/default/files/about-nih/strategic-Plan-fy2016-2020-508.pdf>

⁷ <https://www.nih.gov/institutes-nih/directors-nih-institutes-centers>

⁸ <https://www.acd.od.nih.gov/>

⁹ <https://dpcpsi.nih.gov/council>

advertised widely on the Federal Register, NIH Guide, and NIH social media accounts.^{10,11} Comments were accepted online from February 12, 2020 to April 1, 2020. In addition, NIH hosted a series of webinars on March 9 and 16, 2020, to provide opportunities for external stakeholders to ask questions on the process and become familiar with the Framework.¹² The draft Plan was presented to the IC Directors on October 15, 2020, Council of Councils on November 13, 2020, and the ACD on December 11, 2020. NIH released the *NIH-Wide Strategic Plan for FYs 2021-2025*¹³ in July 2021.

The Strategic Plan Framework identifies NIH's priorities in three key areas (*Objectives*): biomedical and behavioral research; scientific research capacity; and scientific integrity, public accountability, and social responsibility in the conduct of science. These Objectives transcend NIH and exemplify the breadth of IC and OD office missions. In addition, several *Cross-Cutting Themes* on public health, collaborative science, women's health, health disparities, and data science, were identified to recognize how they span across the scope of these Objectives. In the RFI, NIH invited community feedback on several topic areas:

- Potential benefits, drawbacks/challenges, and areas of consideration for the draft Framework
- Compatibility of the Framework with the broad scope of the NIH mission
- Comprehensive trans-NIH research themes that had not been captured in the Cross-Cutting Themes
- Comments on the Framework of NIH's priorities as divided across the three Objectives: biomedical and behavioral research; scientific research capacity; and scientific integrity, public accountability, and social responsibility in the conduct of science
- Future opportunities or emerging research needs

NIH encouraged organizations (e.g., patient advocacy groups, professional member societies) to submit a single response reflective of the views of the organization or membership.

Characteristics of the Respondents

NIH received 160 submissions to the RFI, including seven that were left blank. Thirteen respondents (8 percent) chose to remain anonymous. Respondents reported from 30 states within the United States (U.S.), plus the District of Columbia (**Figure 1**). In addition, the RFI received two international responses from the United Kingdom and Bangladesh. Overall, respondents came from a variety of organizations, including 56 from academic institutions, 29 from professional societies, 27 from advocacy groups, 16 from the public, nine from the private sector, seven from government agencies, six from health professionals, three from research organizations (non-academic), and seven from other types of organizations not listed (**Figure 2**). Respondents were almost evenly divided between submitting as individuals (84; 52.5 percent) or on behalf of organizations (76; 47.5 percent). Respondents who submitted comments on behalf of an organization represented 27 professional societies, 24 advocacy groups, five private sector organizations, four government agencies, three research organizations, three health professionals, three academic institutions, and six other types of groups not listed (**Figure 2**). Respondents represented a variety of roles within their organizations, including mid-level leadership (60 respondents), senior leadership (46 respondents), members of the public (32 respondents), administrative staff (13 respondents), clinical

¹⁰ <https://www.federalregister.gov/documents/2020/02/13/2020-02919/request-for-information-rfi-inviting-comments-and-suggestions-on-a-framework-for-the-nih-wide>

¹¹ <https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-064.html>

¹² <https://www.nih.gov/about-nih/nih-wide-strategic-plan#process>

¹³ <https://www.nih.gov/sites/default/files/about-nih/strategic-plan-fy2021-2025-508.pdf>

Figure 1. Geographical distribution of respondents in the U.S.

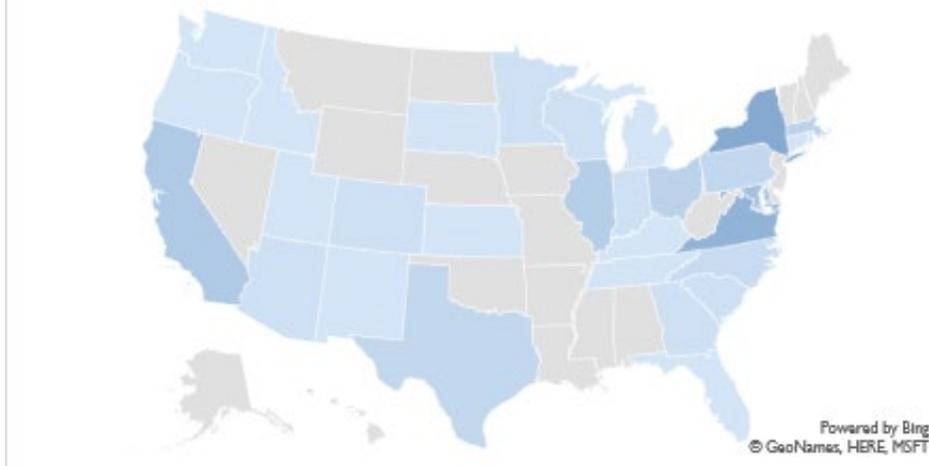


Figure 1. Map chart showing the geographical distribution of RFI respondents in the U.S., where no color (gray) means that there were no respondents from that state, and light to dark color shading represents the least to most respondents (scale of 1 to 31). Not represented on this map are the two respondents from outside of the U.S.

and/or research staff (seven respondents), graduate students (one respondent), and other roles (one respondent). Of the respondents that submitted responses on behalf of their organizations, 40 respondents were from senior leadership, 23 were from mid-level leadership, nine were administrative staff, two were members of the public, and one indicated that they were clinical and/or research staff.

Analysis of the Responses

Respondents were invited to give feedback on the five topic areas outlined in the bulleted list above as free text comments. NIH staff analyzed the content of these responses using a standardized coding structure (see Appendix IV for the coding schema used in the analysis). Codes were not mutually exclusive; response statements could be assigned to multiple codes as necessary. Some respondents provided narrative statements rather than responses to the five topic areas outlined in the RFI. The narrative content was coded according to the same structure as other responses. A subset of responses was deemed too specific for inclusion in the NIH-Wide Strategic Plan, and these were shared with the ICs whose mission most closely aligned with the submitted response.

The Framework for the Plan was developed and approved by

Figure 2. Organizational distribution of respondents

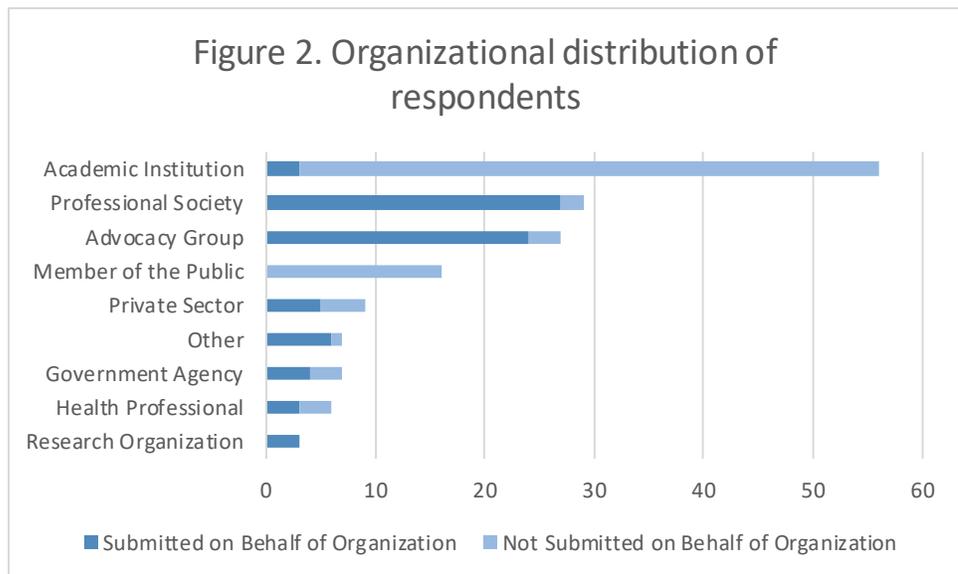


Figure 2. Stacked bar chart showing the organizational distribution of RFI respondents, where light color represents that the respondent did not submit their response on behalf of their organization, and dark color represents that the respondent did submit on behalf of their organization.

leadership in December 2019, prior to the discovery of the novel coronavirus, SARS-CoV-2. Throughout analysis of the RFI, it was noted that a proportion of responses (21/160) referred to SARS-CoV-2 and/or the coronavirus disease 2019 (COVID-19) that it causes. Based on this, responses were mined for the keywords: “coronavirus”, “COVID”, “preparedness”, “outbreak”, and/or “pandemic”. Responses that included these keywords (21/160) were collated and discussed in the section: *Comments Related to COVID-19 and Pandemic Preparedness*.

Comments on the Framework and Compatibility with NIH Mission

Respondents were asked to comment on the potential benefits, drawbacks and/or challenges, and areas of consideration for the Framework, as well as the compatibility of the Framework with the broad scope of the NIH mission. Over half of respondents (109/160; 68 percent) commented on the Framework, while 44 respondents (27.5 percent) provided narrative comments not directly related to the Framework, and seven respondents left the form blank. Of the respondents that commented on the Framework, their comments were rated as follows: very supportive (32 respondents), supportive (54 respondents), critical (14 respondents), and very critical (two respondents).

Of the respondents that submitted on behalf of professional societies (27 respondents) and advocacy groups (24 respondents), the feedback was overwhelmingly supportive of the Framework. Comments on the overall Framework were rated as follows: very supportive (11 and 10 respondents, respectively), supportive (15 and 11 respondents, respectively), neutral (one respondent each), and critical (two advocacy group respondents). For example, one professional society “supports the overall Framework proposed for the FY 2021 – 2025 NIH-Wide Strategic Plan. The proposed Framework builds upon the lessons learned during the development of the current (FY 2016 – 2020) agency-wide Strategic Plan and offers flexibility by emphasizing overarching NIH priorities rather than delineating Institute or Center-specific projects or programming. We also appreciate NIH’s continued active engagement of the research community in the discussion of Planned priorities for the next five years and beyond”.

On the other hand, one respondent from an academic institution commented on the overall Framework, saying that the Objectives “sound like core mission elements... could be more like the ten year missions that have appeared, such as for the genome, biome, etc. ...Missing are more mainstream identifiers of NIH goals, like intervention, prevention, translation, implementation, and so on.” The Framework for the Strategic Plan outlines at a high-level NIH’s priorities for biomedical and behavioral research that will be addressed over the next five years. In addition, each of the Objectives presented in the Framework are further divided into sub-objectives. For example, Objective 1 Advancing Biomedical and Behavioral Sciences is divided into Driving Foundational Science; Preventing Disease and Promoting Health; and Developing and Optimizing Treatments, Interventions, and Cures.

Finally, it was noted by several respondents that there is a need to increase the visibility of behavioral and social sciences across the biomedical research spectrum. In response to these comments, the term “biomedical” has been defined in the Plan to include biological, behavioral, and social scientific perspectives.

Suggestions and Comments Related to the Cross-Cutting Themes

The inclusion of Cross-Cutting Themes is new for this iteration of the NIH-Wide Strategic Plan; thus, NIH was especially interested to hear from the public their thoughts on the value of recognizing cross-cutting themes. Respondents were asked to comment on the five Cross-Cutting Themes and if there were any

comprehensive NIH-wide research themes that had not been captured in the proposed list. The proposed Cross-Cutting Themes in the Framework were: Increasing, Enhancing, and Supporting Diversity; Improving Women's Health and Minority Health, and Reducing Health Disparities; Optimizing Data Science and the Development of Technologies and Tools; Promoting Collaborative Science; and Addressing Public Health Challenges Across the Lifespan. Over half of respondents (101/160; 63 percent) commented on the Cross-Cutting Themes, while the remaining 59 respondents left this field blank. Respondents' comments on the Cross-Cutting Themes were rated as follows: very supportive (35 respondents), supportive (50 respondents), neutral (five respondents), critical (10 respondents), and very critical (one respondent). All of the respondents that commented on the Cross-Cutting Themes liked the inclusion of NIH-wide themes. For example, one professional society "endorses the Framework's Cross-Cutting Themes as representing important considerations spanning the Plan's specific objectives".

While the majority of respondents agreed with the five proposed themes, several additional themes were suggested, including research on ethical, legal, and social issues (ELSI), children's health and well-being, and health inequities. However, respondents also expressed concerns about including more than five Cross-Cutting Themes at the risk of diluting the significance of being highlighted as a Cross-Cutting Theme in the NIH-Wide Strategic Plan. For example, "Although the [organization name] does not seek to increase the number of Cross-Cutting Themes identified in the NIH Framework as the five clearly high priorities, we note several critical NIH initiatives which are not clearly addressed by this list but should be recognized and supported separately". To address these concerns, a call out box on ELSI research was developed and included in the Plan, and the original single theme on Improving Women's Health and Minority Health, and Reducing Health Disparities was been separated into two themes (Enhancing Women's Health; and Improving Minority Health and Reducing Health Disparities) to refine the latter's focus on health inequities. NIH research to advance children's health and wellbeing is discussed throughout the Plan. As further noted by respondents, the Cross-Cutting Themes proposed in the Framework interact with each other and the three Objectives of the Plan, and "represent areas of critical importance for the federal role in the U.S. biomedical research enterprise", hence why these themes were highlighted as overarching ideas and strategies to further the mission of NIH over the next five years.

Addressing Public Health Challenges Across the Lifespan

Respondents were very enthusiastic to see a theme on public health across the lifespan, noting that "the Strategic Plan is an opportunity to lift up the NIH's commitment to age-based inclusion." Many of the comments discussed specific health challenges across the lifespan, such as disordered eating, antimicrobial resistance, reproduction and reproductive health, migraine, myalgic encephalomyelitis/chronic fatigue syndrome, tobacco and nicotine use, and disability and chronic conditions, while some respondents discussed specific health challenges, like children's health and receiving a cancer diagnosis as a young adult, which can exert long-lasting effects on health throughout an individual's lifespan. It was noted that "more research is needed to understand how these transitions affect health and development across the life course." Respondents highlighted that addressing public health challenges, as well as several of the other Cross-Cutting Themes, requires cross-cutting agency action, sustained investments in prevention and preparedness, and investing in workforces to address these issues. For example, one government agency noted that "Healthy People 2030 identifies health disparities, utilizes data science and technologies to promote timely data dissemination, and highlights objectives for which health challenges across the lifespan exist." In response to the RFI comments and working group discussions, the Plan discusses how NIH research must address the prevention, treatment,

and management of public health challenges for people of various ages and in different populations; meet new challenges with fundamental research; and be ready to mobilize cutting-edge science in emergent situations.

Promoting Collaborative Science

Respondents were pleased to see an emphasis on team science. It was noted that “The biomedical research system is currently structured to support individual achievement, but new researchers entering the system often work in teams.” Some respondents questioned or expressed concern with the broadness of the term collaborative science, asking if it included cross-scientific disciplinary collaborations and/or collaboration with non-scientific stakeholders, such as oversight bodies, the public, and research participants. In response to the RFI, this theme has been focused on cross-disciplinary collaborations and those collaborations that bring together scientists and clinicians and recognizes patients and research participants as partners and collaborators. There is also a focus on collaborations that span across NIH and the Department of Health and Human Services (HHS) to promote NIH’s mission to improve health for all.

Improving Women’s Health and Minority Health, and Reducing Health Disparities

Respondents were very supportive of this theme, commenting that “the emphasis on women’s health, minority health and disparity reduction, in particular, is appreciated and greatly needed”. As noted above, respondents made suggestions to help differentiate this theme from Increasing, Enhancing, and Supporting Diversity, including call outs to racial and ethnic minority health as well as sexual and gender minority health, which have been discussed in the text of this theme. Several priority areas were suggested for consideration under this theme, including the development of better models for research into disabilities, research related to trafficking in persons, mental health, the interplay of minority health and behavioral health interventions, and the social determinants of health. Of note, respondents commented that “reducing health disparities and elevating community health research is central to attaining the strategic objectives of preventing disease and improving health and cultivating the biomedical research workforce”. After further consideration of the RFI comments and discussions within NIH, this theme has been divided into two separate Cross-Cutting Themes to better amplify the most relevant issues and discuss them in the proper context. The two new themes are Enhancing Women’s Health; and Improving Minority Health and Reducing Health Disparities. Language on the social determinants of health and structural racism have been added to the theme on Improving Minority Health and Reducing Health Disparities.

Increasing, Enhancing, and Supporting Diversity

Respondents generally were very supportive of this theme, commenting that “increased researcher diversity expands the biomedical research workforce pipeline and reduces attrition over the course of scientists’ education. A more diverse workforce will also ask scientific questions that are meaningful to diverse groups of people, effectively expanding who can benefit from scientific advancements.” Some respondents included comments for how increasing, enhancing, and supporting diversity is a part of their organization’s Strategic Plan to highlight the importance of diversity as essential to innovation and advancement as leaders in their particular field. Respondents thought that important components of this theme included methods for retaining international PhD trainees, who make up a significant proportion of the U.S. research pipeline; acknowledgement of institutions that have shown a track record of diversity in their research workforce; and increased support for women and underrepresented minorities in science

to build on ongoing efforts within the government and across academia. However, some respondents thought that the theme as written lacked clarity to differentiate it from the original theme of Improving Women's Health and Minority Health and Reducing Health Disparities. To make the meaning of the theme clearer, respondents suggested that the title should be revised to include terms such as workforce or specify racial and gender diversity. In response to the RFI comments and further discussions within NIH, this theme has been moved to the Director's Message to highlight its importance to Leadership at the highest level, and refined to focus on NIH's efforts to increase, enhance, and support diversity in the biomedical workforce.

Optimizing Data Science and the Development of Technologies and Tools

Respondents were very supportive of this theme, commenting that "promoting data science as a fundamental part of the NIH scientific research community is the single most important step that the NIH takes to accelerate cures". However, there were suggestions to revise the title of the theme to include data sharing and engineering biology. One respondent noted that "over the next five years, data science and engineering biology will be increasingly used in basic biological research and other areas of relevance to the NIH." Some respondents highlighted current barriers that exist to optimizing data science in the "systems, infrastructure, and routines that keep data out of the hands of data scientists", such as approval processes and decentralized data governance standards. Respondents thought that important components of this theme included enhanced data sharing policies, tools to access data sets, and discussions regarding organizational culture changes needed to realize this theme. To keep the theme broad enough that it was inclusive to the field of data science but also considered the RFI responses, the theme was revised to Leveraging Data Science for Biomedical Discovery.

Suggestions and Comments Related to the Priorities Across the Three Objectives

Respondents were asked to comment on NIH's priorities across the three Objectives articulated in the Framework, including potential benefits, drawbacks or challenges, and other priority areas for consideration. The Objectives in the Framework were: Objective 1: Advancing Biomedical and Behavioral Sciences; Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity; and Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science. Over half of respondents (104/160; 65 percent) commented on NIH's priorities across the three Objectives, while the remaining 56 respondents left this field blank. Respondents' comments on the priorities across objectives were rated as follows: very supportive (31 respondents), supportive (42 respondents), neutral (13 respondents), critical (17 respondents), and very critical (one respondent). Comments specific to each Objective are described more in-depth below.

Objective 1: Advancing Biomedical and Behavioral Sciences

Respondents who were supportive of the Objectives often described how their organization's mission or their individual priorities or research areas fit within one or more Objectives. For example, one professional society "commends the addition of Behavioral to Objective 1", further noting that this inclusion is consistent with the Cross-Cutting Theme of Promoting Collaborative Science. Respondents were pleased with the emphasis on foundational and basic research in Objective 1, noting that they thought NIH's support of basic research had declined and that private sector investments "cannot replace robust, predictable, and sustainable federal support for exploratory research". One respondent highlighted that "NIH's continued support of investigator-initiated research has accelerated scientists' understanding of the biological processes underlying debilitating diseases and uncovered strategies for

treatments and cures”; examples of basic research findings leading to better treatments, interventions, and cures are used throughout the Plan.

On the other hand, some respondents did not see their organization’s mission, or their individual priorities or research areas included in the Framework. For example, several respondents noted that engineers were left out of the high-level Framework even though their role in data science and engineering biology is becoming ever more critical to biomedical research. In some cases, respondents suggested specific content to highlight their priorities or research areas, such as the influence of genetics on behavioral conditions like disordered eating, environmental contributions to disease, the pathobiology of respiratory diseases, critical illnesses, and sleep disorders, inflammatory and autoimmune responses, metabolic disorders, and the microbiome. Most of these examples, or broader research areas that encapsulate them, are now included in the Plan. In addition, respondents commented on the need to acknowledge both the critical role of animal models, from zebrafish to nonhuman primates, and non-animal cell-based experimental systems, such as human-derived cell cultures and tissue chips, in meeting the Plan’s objectives. In response to these comments, figures were included in the Plan on the importance of animal models and to highlight non-animal model systems like tissue chips.

Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity

Respondents’ comments on Objective 2, which is focused on the biomedical workforce and research resources and infrastructure, highlighted the need to support a diverse, equitable, and inclusive biomedical workforce and build capacity in infrastructure to maximize the public’s investment in biomedical research. One respondent noted that “The development and funding of infrastructure is key to any endeavor, whether it is maintaining our national highways, ensuring working energy grids or being able to hit the ground running when pandemics strike”.

To support a diverse, equitable, and inclusive biomedical workforce, respondents encouraged NIH to support a sustainable pipeline of researchers, promote diversity, equity, and inclusion policies and practices, and enhance collaborative training and science. For example, supporting pre-doctoral, post-doctoral, and early-career investigator award mechanisms were highlighted as necessary steps to maintaining progress and forward momentum in research. In addition, several respondents noted that physician-scientists and mid-career investigators need continued support in the areas of mentoring, career development, and grantsmanship. Respondents noted the positive impacts that a diverse, equitable, and inclusive biomedical workforce has on the scientific enterprise, which has also been noted throughout the Plan. Respondents highlighted that a diverse workforce includes diversity in racial and ethnic background, sex and gender, age, physical ability, and scientific and medical expertise. A number of training programs and awards to support researchers with historically underrepresented backgrounds have been highlighted in the Plan as priorities for the next five years. Furthermore, respondents noted that a diverse, equitable, and inclusive biomedical workforce will ultimately require new programs to support it, such as “re-entry” programs for investigators who may have to step away from research due to family needs, or programs that prepare trainees for careers in the biomedical workforce outside of tenure track, academic research.

To build capacity in infrastructure to maximize the public’s investment in biomedical research, respondents noted their support for construction of new research facilities and the modernization of existing research facilities. Comments highlighted specific examples of infrastructure that respondents would like to see additional investment in, such as regional instrumentation centers for single-cell

sequencing, spectral cytometry, and large animal transgenics; biorepositories for cells, tissues, and other specimens; and clinical trial networks that leverage novel models, platforms, and technologies. It was suggested that these investments would drive innovation forward and facilitate scientific collaboration, consistent with the Plan's Cross-Cutting Themes and Objectives. It's noted in the Plan that "In order for the biomedical research workforce to succeed in moving discovery forward, it requires a scientific infrastructure that is expansive, durable, and capable of quickly integrating state-of-the-art resources that are available to all."

Some respondents commented on existing funding mechanisms and suggested new funding mechanisms, which were outside of the scope of this Strategic Plan. These comments were shared with the Office of Extramural Research.

Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science

Respondents' comments on Objective 3 spanned all aspects of research conduct, including stewardship, partnerships, accountability and confidence, and management and operations. Similar to comments on Objective 1, respondents noted where their institutions prioritized the outlined goals of Objective 3, and highlighted details that they hoped to see represented in the full Plan. One respondent noted that "biological research can impact society in powerful ways; therefore, the ethical, environmental, social, political, security, and safety-related issues arising from associated technologies require thoughtful and ongoing consideration".

Regarding scientific stewardship, respondents showed interest across the lifecycle of a research program. For example, several respondents commented that NIH should consider how a research opportunity may impact disease burden and/or prevention of a public health crisis when making long-term funding decisions. NIH's process for priority setting is discussed in the Plan, highlighting a critical part of scientific stewardship that requires balancing disease burden, portfolio balance, scientific merit, and scientific opportunity. Moreover, respondents were interested in how NIH evaluates research programs and how research outcomes are connected to the public's health outcomes. Respondents suggested that NIH strengthen how current and future research leads to changes in health care policy and increase access to evidence-based care for individuals with conditions studied by the NIH.

Respondents appreciated the role that partnerships play in achieving the NIH mission, and suggested that NIH continue to foster, align, and leverage partnerships with academic institutions, industry, private foundations, other government agencies, and international partners. Comments highlighted key areas to focus these efforts, such as maternal health, engineering biology tools, and the nation's blood supply. In addition, respondents requested inclusion of language on the engagement of communities and other key stakeholder groups, noting that this engagement is key to accountability and trust. In Objective 3, there is a sub-section on Public Engagement. Respondents also noted the importance of continuing to collaborate with international partners, while addressing foreign influences and ways to counteract negative impacts on research, such as trainings on best practices for reporting requirements.

Respondents appreciated seeing accountability and confidence outlined in the Framework, noting that it's important to see that "NIH is committed to fostering scientific research and dialog of the highest quality", and that this objective provides opportunities to highlight the impact of agency policies and practices to furthering this goal. Comments touched on many important areas of accountability and

confidence in research conduct, such as research transparency, rigor, and reproducibility; harassment in the research environment; ethics; data sharing and privacy issues; and inclusion of underserved and underrepresented populations in research—all which are discussed in Objective 3 of the Plan.

Finally, respondents recognized that ensuring Accountability and Confidence in Biomedical and Behavioral Sciences requires careful consideration of and balance with management and operations, and suggested ways to reduce administrative burden. For example, one respondent recommended that NIH create a systematic Plan to develop, in collaboration with its scientific stakeholders, standard metrics or best practices on the most efficient policies to ensure regulatory compliance.

Suggestions and Comments Related to Future Opportunities and Emerging Trans-NIH Areas

Respondents were asked to comment on future opportunities or emerging research needs. Less than half of respondents (61/160; 38 percent) provided comments in this area. Some respondents suggested future opportunities in research areas, such as specific diseases (e.g., polycystic ovarian syndrome, migraine, autoimmune disorders, and cancer prevention) or specific populations (e.g., geriatric and women veterans, adolescents impacted by opioids, and youth mental health). Others suggested future opportunities in multi-disciplinary research fields, such as metabolism and epigenetics, nutrition and diet, antimicrobial resistance, geroscience, and artificial intelligence and synthetic biology. Many of which are now mentioned in the Plan. More aligned with Objective 2, respondents suggested future opportunities in scientific resources and infrastructure, such as the establishment of a national laboratory opossum research center or supporting the development of platform technologies. Some respondents suggested future opportunities in the conduct of science. For example, one respondent encouraged NIH to implement sustainability and environmental policies for their grant recipients with a goal of running scientific laboratories as green as possible. Other respondents encouraged NIH to review prior funded research to highlight research that could be reused or translated further, such as behavioral research or new and innovative models of treatment. In addition, respondents requested opportunities to increase engagement between researchers, health care providers, and public health colleagues in public policy, science communication, economics, psychology, and addiction medicine.

Comments Related to COVID-19 and Pandemic Preparedness

In 2020, one of the key emerging trans-NIH research areas was COVID-19. Respondents were not asked to comment specifically on SARS-CoV-2 or COVID-19, however, 21 of the 160 respondents referred to COVID-19 and/or made recommendations for how NIH should respond to the pandemic. Respondents' comments were related to four major areas: pandemic preparedness, setting priorities, workforce and infrastructure, and communication and outreach.

One response endorsed a statement from the FY 2016-2020 NIH-Wide Strategic Plan that the value of eradicating a pandemic should be considered when prioritizing research. Other respondents recommended that NIH develop a “pandemic playbook” to provide guidance on how to rapidly mobilize NIH resources to respond proactively to COVID-19 and future disease outbreaks, with a focus on partnerships with external and non-government partners.

Respondents recommended broad and specific areas of research that should be prioritized in light of COVID-19, including prioritizing vaccine research programs, including continued emphasis on the generation of a universal flu vaccine and improving existing vaccines; conducting portfolio analysis to

identify research that can be immediately applied to optimize responses to the current COVID-19 pandemic, and to also identify important gaps that would help guide future efforts to prevent and mitigate pandemics; and conducting research into crisis preparedness with an emphasis on minority and rural populations and the socioeconomic barriers to care that lead to health inequities. Respondents also recommended increasing investment in several areas, such as emergency and critical care research, behavioral and social sciences research on pandemic preparation and response (e.g., navigating social and cultural factors, science communication, decision-making, and managing stress and coping), human-based approaches for infectious disease research (e.g. epidemiology, human subjects, biospecimens, tissue chips), and research into the use of complementary and alternative medicines for COVID-19.

With regards to workforce and infrastructure, respondents suggested that NIH introduce accelerated funding mechanisms for short and long-term research projects in areas of clear translational potential including virulence and epidemiology, diagnostic tests, vaccines, and other therapeutic development; and establish and/or expand training for health care workers and researchers in infectious diseases.

Summary and Conclusions

NIH recognizes that input from external stakeholders—including members of the scientific and health care communities, professional societies, advocacy organizations, industry, other federal agencies, and the general public—provides valuable insight to be considered during its Strategic Planning process. The RFI responses received reflected a wide array of perspectives on NIH’s priorities outlined in the Strategic Plan Framework. While there was considerable support for the Framework, some respondents suggested changes or additional items for consideration, many of which influenced drafting of the Plan as it evolved. NIH thanks the respondents for their time and effort in preparing responses to the RFI.

Acknowledgements

Special thanks to the NIH-Wide Strategic Plan Working Group RFI Coding Team and the OD/DPCSPI/Office of Portfolio Analysis’s Matt Perkins and Katrina Bibb for their assistance.

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Appendices

Appendix I: Request for Information (RFI): Inviting Comments and Suggestions on a Framework for the NIH-Wide Strategic Plan for FYs 2021-2025

Notice Number: NOT-OD-20-064

Key Dates

Release Date: February 12, 2020

Response Date: April 1, 2020

Related Announcements

[NOT-OD-15-118](#)

Issued by

National Institutes of Health ([NIH](#))

Purpose

This Notice is a Request for Information (RFI) inviting feedback on the framework for the NIH-Wide Strategic Plan for Fiscal Years (FYs) 2021-2025.

NOTE: It is important to read this entire RFI notice to ensure an adequate response is prepared and to have a full understanding of how your response will be utilized.

Background

The purpose of the NIH-Wide Strategic Plan is to communicate how NIH will advance its mission to support research in pursuit of fundamental knowledge about the nature and behavior of living systems, and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.

The current [NIH-Wide Strategic Plan](#), covering FYs 2016-2020, was submitted to Congress on December 15, 2015. As part of implementing the 21st Century Cures Act (P.L. 114–255), NIH will update its Strategic Plan every five years. The agency is currently developing an updated NIH-Wide Strategic Plan, for FYs 2021-2025, and anticipates releasing it in December 2020.

The FY 2021-2025 NIH-Wide Strategic Plan highlights NIH's approach towards the achievement of its mission while ensuring good stewardship of taxpayer funds. It is not intended to outline the myriad of important research opportunities for specific diseases or conditions. Nor will it focus on the specific research missions of each component Institute, Center and Office. Those opportunities are found within strategic plans that are specific to an Institute, Center, or Office, or specific to a particular disease or disorder. (A list of Institute, Center, or Office-specific, topical, and other NIH-wide or interagency strategic plans is available at <https://report.nih.gov/strategicplans/>.)

The Framework for the FY 2021-2025 NIH-Wide Strategic Plan, below, articulates NIH's priorities in three key areas (Objectives): biomedical and behavioral science research; scientific research capacity; and scientific integrity, public accountability, and social responsibility in the conduct of science. These Objectives apply across NIH. In addition, several Cross-Cutting Themes, which span the scope of these Objectives, are identified.

NIH-Wide Strategic Plan Framework

Cross Cutting Themes

- Increasing, Enhancing, and Supporting Diversity
- Improving Women's Health and Minority Health, and Reducing Health Disparities
- Optimizing Data Science and the Development of Technologies and Tools
- Promoting Collaborative Science
- Addressing Public Health Challenges Across the Lifespan

Objective 1: Advancing Biomedical and Behavioral Sciences

- Driving Foundational Science
- Preventing Disease and Promoting Health
- Developing Treatments, Interventions, and Cures

Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity

- Cultivating the Biomedical Research Workforce
- Supporting Research Resources and Infrastructure

Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science

- Fostering a Culture of Good Scientific Stewardship
- Leveraging Partnerships
- Ensuring Accountability and Confidence in Biomedical and Behavioral Sciences
- Optimizing Operations

Request for Comments

This RFI invites input from stakeholders throughout the scientific research, advocacy, and clinical practice communities, as well as the general public, regarding the above proposed framework for the FY 2021-2025 NIH-Wide Strategic Plan.

The NIH seeks comments on any or all of, but not limited to, the following topics:

- Cross-Cutting Themes articulated in the framework, and/or additional cross-cutting themes that may be considered
- NIH's priorities across the three key areas (Objectives) articulated in the framework, including potential benefits, drawbacks or challenges, and other priority areas for consideration
- Future opportunities or emerging trans-NIH needs

NIH encourages organizations (e.g., patient advocacy groups, professional organizations) to submit a single response reflective of the views of the organization or membership as a whole.

How to Submit a Response

All comments must be submitted electronically on the [submission website](#).

Responses must be received by 11:59:59 pm (ET) on April 1, 2020.

Responses to this RFI are voluntary and may be submitted anonymously. Please do not include any personally identifiable information or any information that you do not wish to make public. Proprietary, classified, confidential, or sensitive information should not be included in your response. The Government will use the information submitted in response to this RFI at its discretion. **The Government reserves the right to use any submitted information on public websites, in reports, in summaries of the state of the science, in any possible resultant solicitation(s), grant(s), or cooperative agreement(s), or in the development of future funding opportunity announcements.** This RFI is for informational and planning purposes only and is not a solicitation for applications or an obligation on the part of the Government to provide support for any ideas identified in response to it. Please note that the Government will not pay for the preparation of any information submitted or for use of that information.

We look forward to your input and hope that you will share this RFI opportunity with your colleagues.

Inquiries

Please direct all inquiries to:

nihstrategicplan@od.nih.gov

Appendix II: Individual Responses

Personally identifiable information (PII) has been removed from all entries.

Comments: Cross-cutting themes:

The theme of "improving women's health and minority health, and reducing health disparities" fits our UTHSC campus Quality Enhancement Plan (QEP) on the Social Determinants of Health (SDoH). We have a campus-wide simulation center and we are embracing the SDoH in simulation for healthcare. The emphasis on women/minority and health disparities for the NIH FY 2021-2025 strategic plan is going to call attention to the humanity/social part of the public health and patient care.

Comments: Priorities/benefits/drawbacks:

The third key objective "Exemplifying and promoting scientific integrity, public accountability, and social responsibility in scientific conduct" fits the simulation education and research for health professionals in our center. The interprofessional education (IPE) requires teamwork, social responsibility/professionalism, and scientific integrity. I guess it would be great through research to address some of the benefits/challenges regarding the scientific integrity in interprofessional education and clinical practice.

Comments: Future/emerging opportunities/needs:

Virtual Reality (VR), technology-enhanced simulation for health professionals.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Current NIH grants are focused on short term outcomes (those that can be delivered in less than 5 years) so that investigators can be competitive for grant renewals. In reality, it takes 1-2 years to set up clinical research studies and then data is barely complete by year 4, when the renewal is written. As such, investigators are nearly forced to construct simpler research studies and address less high risk questions, and thus less likely to have the needed impact. Longer grants (10 years) would be most useful, especially for senior investigators. A good example of this problem is the Rare Disease Clinical Research Network run by NCATS

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

All 5 cross-cutting themes are essential and it is very encouraging that NIH is realized this. Diversity should definitely include women, minorities and immigrants. Diversity mostly exists in non-ivy league

and non-highly funded institutions at this time. It will be good to acknowledge institutions that have shown track record of diversity in research workforce, by providing NIH funded institutional support to such institutions.

Comments: Priorities/benefits/drawbacks:

Definitely need to foster research projects developing new therapies. These are high risk. Currently most high risk high reward go to already highly funded and ivy league institutions. NIGMS offers funding to IDEA states, but only supports understanding biology and not new therapies. Suggest NIGMS or other agencies that support IDEA to enhance funding for new therapies. There is disproportionately greater funding to research looking into biomarkers and mechanisms of disease, and very little funding looking into new therapies.

Comments: Future/emerging opportunities/needs:

Please consider increasing early stage investigator timeline to 15 years for women, minorities and immigrants, especially for physician-scientists. Women, minorities and immigrants receive significantly less institutional support and have fewer job opportunities and therefore, need more time to develop the skills to compete for full research grant.

Comments: Cross-cutting themes:

The Office of Planning, Research and Evaluation at the Administration for Children and Families strongly recommends the inclusion of specific attention to child health and well-being as a Cross Cutting Theme. In particular, we would welcome a stronger emphasis on the study of how children's genetic predispositions interact with their early social environments to affect the life course. We are well aware of the science that shows the influence of early experiences on brain architecture, which in turn influences lifetime outcomes in health and behavior. Relatedly, ACF has a special interest in the associations between adverse childhood experiences and later detrimental outcomes in health, well-being, and functioning. We believe the issues of differential susceptibility to stress and adversity as well as other environmental factors, cut across the biological and social sciences and have implications across the various Institutes that make up the National Institutes of Health. Children, especially young children, represent a culturally and economically diverse segment of the population, and a focus on children is likely to yield important insights into prevention and intervention strategies for a range of illnesses and conditions. A focus on child health has direct relevance to each of the elements in your first objective of "Advancing Biobehavioral and Medical Science." The HHS Office on Trafficking in Persons supports the cross-cutting themes in the framework and recommends including research related to Trafficking in Persons under the theme of "Improving Women's and Minority Health, and Reducing Health Disparities." Such efforts should include supporting research into trafficking prevalence, trafficking methodologies and modalities, various roots of trafficking, and other aspects that are deemed as worthy areas of research. These efforts would support the work called for by the president's Executive Order on Combating Human Trafficking and Online Child Exploitation in the United States, which calls on the federal government to convene a working group to, in part, improve methodologies to estimate the prevalence of human trafficking, including by specific sector and region.

Comments: Priorities/benefits/drawbacks:

The Office of Planning, Research and Evaluation were gratified to see an emphasis on “Leveraging Partnerships” under Objective 2 (Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science). We note that several HHS agencies, including ACF, CDC, and HRSA, have robust research and evaluation programs. We strongly support collaboration and cooperation across NIH and other agencies, both within and outside of HHS, to promote the most efficient use of research dollars, to facilitate complementary projects where there are shared goals, and to ensure the relevance of research and dissemination efforts where there are policy considerations. Our own motivation toward strong partnerships arises from our vision of the potential of research evidence to guide us in the most effective use of limited service dollars. Further, the deep understanding of service environments that comes from ACF and other agencies can provide reciprocal benefits to NIH as the Institutes develop priorities in areas such as services research, implementation science, and prevention and intervention research. Working together, we can look more holistically at the needs of children and families, and better address social determinant of health. We believe that the success of any partnerships will be contingent on the development of formal mechanisms for collaboration and cooperation. Agency leadership must be meaningfully involved in, and held accountable for, the outcomes of these efforts. The HHS Office on Trafficking in Persons - Prioritizing the prevention of disease and promotion of health underneath the first objective can possibly further the body of anti-trafficking research to improve screening and identification of human trafficking, address demand, reduce the risk for revictimization, and identify risk and protective factors to inform prevention education efforts. The connection between HIV risk and sex trafficking has been established within literature and NIH-funded studies. As NIH works to eliminate HIV/AIDS, individuals experiencing sexual exploitation and/or trafficking should be considered a key stakeholder group as researchers identify and test treatment and prevention options like vaccines.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Please apply the good practice explicitly specified in section 10 of the GPRA Modernization Act (GPRAMA) as well as more broadly in the OPEN Government Data Act (OGDA) by publishing your strategic and performance plans and reports in an open, standard, machine-readable format, like StratML (ISO 17469-1...

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

- Increasing, Enhancing, and Supporting Diversity; Improving Women's Health and Minority Health, and Reducing Health Disparities There exists a credential diversity disparity that prevents Osteopathic clinicians, basic scientists, and training institutions (medical schools and hospital-based residency training programs) from proportional access to NIH research funding. (Dixie Tooke-Rawlins, Per Gunnar Brolinson, Harold R. Garner, Why Do MDs Get More Research Dollars Than Doctors of Osteopathy?, Scientific American, 2018) DOs make up 11% of the clinician population in the US, and is growing substantially relative to MDs, as 25% of all new medical students are now DO matriculants, but receive only 0.1% of NIH research funds relative to MDs and MD schools. Previously the NIH has invested in programs to address disparities for certain diversity classes (minorities, women, socioeconomically challenged states). Lack of access to NIH research funds and representation in review panels, study sections, council and leadership perpetuates the funding discrepancy between DO and MD institutions. Like what was done for other underrepresented groups, the NIH should develop specific programs to address the disparity based on professional credentials. The diverse faculty and students typical for DO schools have less access to Research Funding, which limits their scientific contributions, underutilizes a substantial portion of the clinician-scientist workforce, and negatively impacts the competitiveness of residency applications from osteopathic medical students. This would enhance the number of clinicians who practice primary care in rural areas. A significant number of osteopathic medical students are recruited from rural and socioeconomically depressed areas and return to practice there in primary care disciplines at much higher rates than allopathic students. These rural and socioeconomically depressed regions have significant minority and population health-based issues resulting in significant disparities in access to health care and research to inform best practices. Thus, access to proportional research funding simultaneously addresses NIH priority areas in the upcoming five-year strategic plan.

- Addressing Public Health Challenges Across the Lifespan A major health challenge is addressing the obesity/diabetes epidemic that is pronounced in rural socioeconomically and disadvantaged areas. It is essential to promote Primary Care Research to address these important health issues. Osteopathic medical schools are pioneering population-based, integrative and complementary approaches which will define best care practices for rural primary care clinicians. Historically osteopathic medical schools have placed high numbers of primary care clinicians in these socioeconomically and disadvantaged environments and are well-positioned to carry out these types of research (Scientific American 2018; US News 2019 rankings primary care residents; AAFP family medicine residency programs). These rural primary care physicians are the first line of providers most frequently in contact with patients in need to address and prevent obesity and resulting medical conditions such as diabetes. There should be specific NIH research programs which support the engagement of rural clinicians with academic research teams to develop effective preventive and treatment approaches for these chronic medical conditions that span all age groups.

Comments: Priorities/benefits/drawbacks:

- Driving Foundational Science; Developing Treatments, Interventions, and Cures Several publications conclude that 30-50% of all medical best practices (MD and DO) have had no rigorous scientific investigation to establish a subsequent evidence-base (We don't know the effectiveness of a 'whopping

50%' of clinical treatments. So why do doctors use them?, Advisory 2019; Why Doctors Still Offer Treatments That May Not Help, New York Times, 2019). We propose there should be new research programs that focus on establishing an evidence-base for primary care treatment and prevention strategies which can be applied to rural and medically underserved populations. Although this general lack of evidence-base exists for both allopathic and osteopathic treatment approaches, it is frequently cited as a reason to not utilize the manual medicine component of Osteopathic medicine. One focus would be the development of pragmatic strategies to conduct treatment trials in a real world personalized clinical environment. Additionally, there is a need for evidence-based research for integrative health approaches and certain osteopathic techniques such as the use of osteopathic manipulative treatment (OMT) for a variety of medical and musculoskeletal conditions. OMT should be further explored as a first line, alternative or adjunct approach to opioid based pain medications for acute and chronic conditions, thus addressing a major healthcare issue. •Cultivating the Biomedical Research Workforce; Supporting Research Resources and Infrastructure In general, osteopathic medical schools are disadvantaged regarding research resources and infrastructure. It will be important to improve the research environment at DO schools to make them more competitive for NIH grants. This could be coupled to a program where this disadvantaged group of medical schools and their clinician-researchers are more engaged in research funded through NIH grants and participate in grant reviews, as co-equals with Allopathic medical schools and MDs. Such support could be in the form of training and translational grants for osteopathic clinical and biomedical researchers, especially at-risk researchers(What's Happening With "At-Risk Investigators?" , NIH Extramural Nexus, February 2019) establishing networks that enhance collaboration between osteopathic and allopathic institutions; and funding directed to improve the general research capacity at DO medical schools including addressing a deeper evidence-base for OMT, integrative, and functional medicine.

Comments: Future/emerging opportunities/needs:

- Fostering a Culture of Good Scientific Stewardship; Ensuring Accountability and Confidence in Biomedical and Behavioral Sciences Predatory journals, publishers and conference businesses are consuming precious resources and negatively affecting the biomedical corpus which erodes confidence in research data and findings. The NIH should fund studies and then establish criteria for what is acceptable use of government dollars (grant and contract funds) for journals, publishers, conferences, and conference organizations. Duplicate funding within the NIH consumes ~2+% of the NIH budget. A study of duplicate and other funding abuses was published in 2013, however there are no indications that the government, including the NIH, has taken any action to address this fraud and inefficiency. As demonstrated in the publication (Harold R. Garner, Lauren McIver, Michael B. Waitzkin, Research funding: Same work, twice the money?, Nature. 2013 Jan 31;493(7434):599-601. doi: 10.1038/493599a. PMID: 23364724), the technology exists to identify and intercept these lost funds and then redirect them to other NIH grantees. We suggest that such technology be implemented by the US government, and this is an opportunity for the NIH to take a leadership position on this issue and free up substantial additional funding for research as described herein. We suggest that the NIH and HHS should expand the funding of research into grant fraud and abuse.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

With regard to the objective of "Preventing Disease and Promoting Health", and given the remarkable increase in the number of academic organizations (and integrative medicine programs) with "Teaching Kitchens" and teaching kitchen related curricula, most of which typically include: (a) nutrition education; (b) culinary instruction; (c) mindfulness training; (d) movement and exercise prescription; (e) motivational interviewing and behavior change (e.g. health coaching); perhaps this line of inquiry can and should become an additional focus for NICCIH?

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

When talking about reducing health disparities, the deaf and hard of hearing (Deaf) community needs to be included in this discussion. The Deaf community is a sociocultural and linguistic minority and should be formally labeled as a health disparity population within NIH definitions. They have health disparities affecting them as well, especially when we are thinking about women's health. Deaf women access preventative screenings (e.g., breast exams, Papsmeas) at rates that parallel uninsured American women (Steinberg et al., 2002). Deaf women are more likely to have fewer prenatal visits and are less satisfied with the prenatal care they receive (O'Hearn, 2006; Chin et al., 2013). They are at increased risk of experiencing a preterm birth, placental abruption, or low birth weight (Mitra et al., 2016; Mitra et al., In press).

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Bold prevention and treatment interventions.

Comments: Priorities/benefits/drawbacks:

Of interest to NIH neuroscience I/Cs, Aging, and perhaps others (music; alternative medicine...).

Comments: Future/emerging opportunities/needs:

1. Good Vibrations and Health. I/Cs may be considering initiatives related to the delivery of particular frequencies/intensities of light, sound, electricity, etc: a) Deep brain stimulation, electrical or sound at particular frequencies and intensities, at particular sites b) Sensory-input lights or sounds: -Anne Tsai. MIT website: <https://tsailaboratory.mit.edu/>. She uses 40 HZ pulsed light and sound vibrations, which mimic some of the frequencies observed during x-brain connections; these seem to improve memory, cognition, and Alzheimer's markers, with good-looking basic work with rodent models, and starting Phase I human trials. Not a local, but there are some supporters of her work, notably in NIA. -Pulsed light. Bruce Tromberg, the relatively new Director of the NIBIB imaging institute, presented an excellent talk on light exposure and assorted (mostly skin or eye) conditions' health diagnosis/treatment at a recent Demystifying Medicine talk. <https://demystifyingmedicine.od.nih.gov/January21>. Likely also a great speaker. -Music. There is some research on music's influence on behavior and other health-related issues, and a speaker with that interest may be feasible. https://en.wikipedia.org/wiki/Music_therapy and <https://sites.tufts.edu/eeseniordesignhandbook/2015/music-mood-classification/> -Vagus nerve stimulation: https://en.wikipedia.org/wiki/Vagus_nerve_stimulation seems good for many conditions. There seem a few related grants.

Comments: Cross-cutting themes:

The NIH needs to consider whether their portfolio of funding is not only balanced by disease prevalence, but also by the CAUSES of disease. For example, the three leading causes of attributable deaths worldwide are (1) poor nutrition, (2) alcohol, drugs, and tobacco, and (3) pollution, collectively accounting for a massive 83% of all attributable deaths (as of 2016). Yet, only about 12% of the NIH extramural budget funds research in these areas. This is so bad that funding allocation is imbalanced and there is no mechanism to make sure that we are funding research that makes the most difference to human health. No wonder we are not saving more lives. The NIH needs to be self-reflective about whether we are investing in research areas that will move the needle for each disease. At the moment, based on funding allocations, I would argue that we are not doing a good enough job.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Objective 2 With ever dwindling NIH budget resources in real terms, we must put grant money where it will have maximum impact. Unfortunately the scientific impact of funded worthy projects can be mitigated or nullified by arbitrary and drastic funding cuts: 45% is not uncommon. past a certain point, the PI cannot staff or equip their lab adequately to perform the assigned tasks. Hence, the cosmetic benefit of having a larger N of PIs is more than erased by the reality that the money is actually being wasted when the scientific work cannot be done. Another undesirable result is that investigators are forced to devote more of their time writing more grants than conducting scientific research, creating fatigue, frustration, and career changes. I urge the NIH to reconsider this well-intended policy of spreading the budget so thinly that much of it is actually wasted, and return to full funding of fewer grants, also painful, but more productive.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The fundamental problem with the current medical model is that it is based only on the visible sources of diseases. There is an over-emphasis on the functions of pharmaceutical drugs that fail to identify the potential real sources of many diseases and fail to provide cures for many chronic conditions. This is a fundamental mistake in the general development of modern medicine. This situation is exacerbated by the high cost of health care, dependence upon large medical providers whose priorities often conflict with best care practices, and a medical system that is focused on disease instead of health and prevention of illness. Iatrogenic disorders cause tens to hundreds of thousands of deaths per year, adverse drug reactions are a leading cause of disease and death, people are frustrated by the inability of mainstream medicine to meet their needs, and even the White House Commission on Complementary and Alternative Medicine Policy stated that conventional medicine is not addressing chronic illness and diseases.

Comments: Priorities/benefits/drawbacks:

There is very strong evidence that the mind-body exercises of Qigong and Tai Chi are health modalities that can cost-effectively be used to prevent disease and promote health. They have been proven effective with chronic conditions and rehabilitation, stress reduction, increasing immunity, reducing muscular system tension, lowering blood pressure, easing arthritis, improving balance and flexibility, improving mental well-being, improving cardio-respiratory and musculoskeletal function, maintaining and improving neuromotor skills, reducing the risk of falls in seniors, building strength, and helping treat a host of chronic conditions. Qigong and Tai Chi should be incorporated into community-based programs in community centers, academia, health clubs, YMCAs, retreat centers, hospitals, retirement centers, libraries, the military, medical schools, the justice system, all levels of formal education starting with

elementary schools, and clinical settings as diverse as cancer care, physical therapy, and chronic pain. Additionally, an appallingly large amount of money that is currently being spent on treating preventable disorders is essentially wasted. Focusing on prevention and education with Qigong and Tai chi could save hundreds of billions, if not trillions, of dollars a year.

Comments: Future/emerging opportunities/needs:

Self-applied health enhancement via mind-body integrated exercises of Qigong and Tai Chi is simple yet powerful. They are effective and safe, low cost, have little if any negative side effects, and can be practiced anywhere at any time by anyone. The potential for health system cost savings through disease prevention and cure is enormous. The ability of Qigong and Tai Chi to deliver basic health care to large populations is significant. The integration of mind and body for healing and health maintenance via Qigong is so profound yet practical that it has the potential to be nothing less than one of the primary medical and social breakthroughs of the 21st century.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

In the past several years, I have noticed that NIH has placed a priority in growing the number of grants awarded even when the total budget has not grown in inflation-adjusted term. This has led to arbitrary severe cuts of grant budgets often of 30-40% that prevents the investigators from achieving the grants' specific aims. The practical result is that investigators are forced to devote most of their time writing more grant applications instead of actually conducting scientific research. Instead of developing scientific research capacity as stated in OBJECTIVE #2, this has the pernicious effect of driving talented individuals from the biomedical research field to seek more rewarding careers elsewhere. I urge NIH to stop this policy of arbitrary deep cuts to grant budgets.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Key insights - - The evidence base on behaviorally based, low cost, self-initiated health enhancement and disease prevention methods like Tai Chi and Qigong demonstrates efficacy and safety. - Between 75% and 85% of disease is preventable according to research agencies. -The funds spent to treat disorders that are clearly preventable, are essentially wasted. -Over \$2 trillion annually could be reallocated if preventable diseases were actually prevented. Therefore, from objective 1 prevent disease and promote health; from objective 2 the research on group based prevention and health enhancement is robust (Tai Chi for example); and from Objective 3 leveraging community partnerships to activate socially oriented prevention - a greater more focused combination across these themes would have huge effects/-

Comments: Priorities/benefits/drawbacks:

The primary frame work for delivering services that support disease prevention and health promotion must be architected in community organizations. In addition to health systems, this is schools, social service agencies, the military and Veterans Administration, first responders, faith based institutions, etc. Unfortunately, the drawbacks are that we are, as a society, addicted to drugs, medical equipment and procedure based health care rather than community based health status maximization.

Comments: Future/emerging opportunities/needs:

Myself, the training and research organizations and non-profits that I work with are already doing this work. The NIH could make a huge difference in not only health status, but socio-economics by focusing on behaviorally based, group implemented, low cost self-care and mind-body oriented methodologies. I am a doctor of Chinese Medicine with over 35 years of clinical practice. The modalities of Chinese medicine are very worthy of your attention. However, I retired from clinical practice because it is so easy and so inexpensive to prevent preventable diseases, that I am now training Life and Health Coaches as well as Mind-Body Practice Leaders. We have trained over 20000 that work in social service agencies, the Veterans Administration, health systems, educational organizations. Please feel free to contact me.

Comments: Cross-cutting themes:

Kaiser Permanente's 20 year study revealed that 70% of all illnesses sending people to their physicians were caused by un-managed stress--not aggravated by stress, but CAUSED by stress. When our organization contacted Dr. David Sobel at Kaiser, he informed us that depending on how the numbers were looked at, that number could go as high as 85% of all illness sending patients to their doctors being caused by stress. Dr. Herbert Benson's of Harvard's research informs that between 60% to 90% of illnesses are best treated by mind-body practices. What is the hallmark of mind-body practices? The brain going into Alpha Brain Wave states for prolonged periods of time. This, research shows, increases a more healthful DNA expression, resulting in boosted immune system (increased Helper T Cell counts); normalizing blood sugar levels, blood pressure, etc. etc. THE PROBLEM: In article after article, study after study, on mind-body practices benefits for a vast array of health challenges ... researchers note (and this has been going on for 20 years), that because the studies are too small they cannot definitively state that Tai Chi, Qigong, or Meditation, or Yoga, can help treat this or that issue. Why are the studies too small. Less than 1/2 of 1% of NIH spending goes to research complimentary and alternative medicine. A UCLA study finding that a Tai Chi group boosted their "Helper T Cell Count" by 50% over the control group. This study alone should garner major interest and research dollars from the NIH, especially as we see the CoronaVirus event unfolding. China is encouraging their population to practice Tai Chi and Qigong to boost immune function. Several years ago our organization was commissioned by Prevention Magazine to provide a Tai Chi Tutorial for their article on boosting immunity naturally with Tai Chi. This lack of NIH research funding for complimentary and alternative medicine is unacceptable, when given the above studies results such as Kaiser's finding that literally trillions of dollars could be reduced in future healthcare spending if scientifically proven mind-body practices like Meditation, Tai Chi, Qigong, Yoga were a core part of public education. Public education should be more than open to this, because

science also shows that mind-body practices like Meditation can increase IQ, creativity, and Gamma Wave multi-dimensional thinking. The few schools that have incorporated mind-body practices have seen dramatically improved student behavior, less bullying, and significantly improved scholastic performance. Research also shows Tai Chi and Meditation are effective treatments for ADD or ADHD. If our goal is to dramatically reduce national health costs, there is no more singularly cost-effective way to do this than to make Mind-Body practices a core part of public education, as a hybrid of physical ed and health science--teaching students not just about hypertension, but how to regulate their own blood pressure, etc. World Tai Chi & Qigong Day has worked for 20 years with Governors of 22 US States, and govt. bodies worldwide to raise awareness of this science.

Comments: Priorities/benefits/drawbacks:

As stated above, the benefits of a national program to make (scientifically proven efficacious) Mind-Body practices part of core public education would potentially save trillions of dollars of future health costs. The research on the boost of immune function from these practices, in an age of CoronaVirus, etc., alone should motivate the NIH to move in this direction. The science shows that educators should be excited about incorporating mind-body tools for the benefit of enhancing student's ability to learn, to behave more calmly, empathetically, and attentively, and able to absorb information more effectively. There are NO drawbacks. The cost of Mind-Body training in public schools nationwide would be minimal compared to the benefits. The only challenge is developing an efficacious national education program involving proven mind-body practices: Meditation, Tai Chi, Qigong (Chi Kung), and Yoga. But a small number of public schools have had effective programs for years, which could be used as a foundational model. Also, Dr. Peter Wayne of Harvard, author of "The Harvard Medical School Guide to Tai Chi," and Dr. Herbert Benson of Harvard, author of "The Relaxation Response," and Dr. Shin Lin of the University of California at Irvine, are among a host of mind-body experts who could work with educators to create a national program, and others such as Effie Chow, founder of the World Congress on Qigong, who served on the President's Commission on Complimentary and Alternative Medicine during the Clinton Administration.. These mind-body practices can be taught at all levels of education, K through university, taught in age appropriate ways..

Comments: Future/emerging opportunities/needs:

World Tai Chi & Qigong Day would be happy to participate in a national effort to create an effective public education mind-body curriculum--and in order to help that become a reality we could provide links to voluminous articles and research on mind-body practices. We have worked with education at all levels, prisons, drug rehabilitation programs, and major medical centers such as the University of Kansas Health System. Our public education efforts have reached tens of millions of readers/viewers of mass media via coverage of our global health education events by the New York Times; Wall Street Journal; CNN; FOX News; BBC Television; Agence France Presse TV; South China Morning Post; China's CCTV Network; Reader's Digest etc. Our efforts have been officially proclaimed or supported by universities, Harvard researchers commemorated World Tai Chi Day with a series of lectures on Tai Chi as a medical tool. 22 US Governors have officially proclaimed World Tai Chi & Qigong Day for their states; many senates and legislatures here and abroad have done so, including: Senate of New York; Senate of California; Senate of Puerto Rico; and the National Congress of Brazil.

Comments: Cross-cutting themes:

I fully support your cross-cutting themes, but I want to point out that I don't think the NIH will be able to address these effectively if it does not diverge from its current structures. For instance, I have found as a faculty member at a minority-serving institution (MSI) with willing partners at larger institutions that the structuring and requirements for NIH funding mechanisms to support opportunities for and the development of my diverse students in the biomedical research field to be real barriers and disincentives for a faculty member such as myself to apply to, participate in, and access these programs. For instance, R25 programs like Initiative to Maximize Research Education in Genomics: Diversity Action Plan and T34 U-Rise programs either require or favor significant NIH research funding for competitiveness, which many of us at MSIs do not have access to for a variety of reasons. While I have willing collaborators at other larger institutions who could offer support with regard to research opportunities for my students, I would have to cede control over the grant to that institution, which both disadvantages my students, my institution and my own professional development. Through programs like our current NIH BD2K program (which is now disappearing), we have been very effective in developing students for graduate/professional careers in the biomedical research field; however, we have found that engagement beyond a few months in the summer is a really important part of this process. Thus, we need to be able to support institutional activities at our home institutions as well as receive proper credit for the efforts we are exerting in these areas for our own Retention, Tenure, and Promotion evaluations. I would suggest evaluating how you have structured activities that you are hoping to use for increasing, enhancing and supporting diversity to ensure that they are really engaging the kind of potential "diverse" workforce and institutions that you would be targeting. I would also add that I find the focus of data science and women's health to be relevant and important. I would add that an emphasis on data science without any consideration of how we generate all of these data scientists from traditional academic programs is an issue.

Comments: Priorities/benefits/drawbacks:

For Objective 1, I find the emphasis on Foundational Science important and am glad it is the first component of this plan. It is the basis off of which we are able to conduct all applied work. As for Objective 2, I would reference my response to cross-cutting theme with regard to diversity and training. As currently structured, academia has made little gains with regard to increasing the proportions of under-represented groups; NSF Earned Doctorate data suggest essential flat proportions of change for under-represented groups over the last 10 years. I see one of the problem here as structural barriers by the NIH to funding efforts that would address this issue directly. I get that NIH is research-focused, but not appropriately valuing the role of training in this process and access to training will not support the long-term goals that these Objectives hope to achieve.

Comments: Future/emerging opportunities/needs:

Support for training of diverse workforces in contemporary (e.g. data science) research fields.

Comments: Cross-cutting themes:

The Society of Nuclear Medicine and Molecular Imaging (SNMMI) appreciates the opportunity to comment on the NIH-Wide Strategic Plan Framework. Molecular imaging and targeted radionuclide therapy are important techniques that cut across numerous health areas, the NIH cross-cutting themes, and all three NIH objectives. SNMMI is supportive of all of the themes listed by the NIH; but particularly optimizing data science and the development of technologies and tools. Nuclear medicine and molecular imaging are technology-intensive and dependent on the continued development of novel imaging tools. The SNMMI is focusing its efforts on data science optimization by advancing the use of artificial intelligence in interpreting diagnostic images, especially of novel agents. The Society supports collaboration, especially in the field of targeted radionuclide therapy. This new cancer treatment paradigm requires collaboration with oncology and radiation oncology to determine the best way to integrate these new agents into the patient care pathway. Additionally, SNMMI supports the development of innovative diagnostic agents that can detect disease in newborns and the elderly, ranging from congenital hyperinsulinism in infants to Alzheimer's Disease and Parkinson's Disease in the elderly.

Comments: Priorities/benefits/drawbacks:

The fields of nuclear medicine and molecular imaging and therapy are a result of advances in biomedical sciences, which continues to evolve with further investments in basic research. Molecular imaging scientists are developing molecules that can label a variety of cell membrane receptor and metabolic pathways enabling one to evaluate physiologic processes on a molecular level. Molecular imaging gives us the ability to detect disease earlier and with higher specificity. The identification of receptor targets allows for the development of new therapies, such as targeted radionuclide therapies, resulting in more patient-specific treatments. Our members, composed of physicians, scientists, pharmacists, and technologists from a variety of backgrounds, are delighted to be part of a highly collaborative community that aims to develop new molecular imaging tools to advance our understanding of disease. Many of the NIH institutes support this research and we encourage an expansion of funding in this area, particularly funding related to early-phase development of novel molecular imaging agents, advancing compounds into clinical trials, and training opportunities. SNMMI is particularly supportive of efforts to grow the biomedical research workforce; the Society has synergistic efforts underway. With the recent advances in the field, the need to train more scientists and physicians in this area is acute. SNMMI applauds the NIH's effort to exemplify and promote the highest level of scientific integrity and social responsibility in the conduct of science, which is also demonstrated in the Society's mission and core values.

Comments: Future/emerging opportunities/needs:

Recent advances in molecular imaging are enhancing our understanding of brain changes in dementia, cardiovascular disease, and the mechanisms of patient response and/or resistance to emerging cancer therapies. These diseases touch several branches of NIH and span across a wide patient population. Additionally, the continuing success of theranostic strategies, where pairs of imaging and therapeutic compounds are used to personalize patient care, is a paradigm shifting advance that should be included as a high priority.

Comments: Cross-cutting themes:

Within the topic of "Improving Women's Health and Minority Health, and Reducing Health Disparities", I think there needs to be greater emphasis on implementing evidence-based treatments and practices in low-resource environments. There is a major disconnect between the environments/personnel where treatments are tested and the environments in which the treatments are most needed. We need to support clinical scientists who are able to fill this gap. This is low-hanging fruit with huge and immediate potential benefit—we don't need new treatments to realize these benefits; we need strategies for implementation so the benefits of NIMH's investments in research are shared widely across our population.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The HHS Office of Disease Prevention and Health Promotion (ODPHP) commends NIH for identifying these cross cutting themes on which to focus in its 5-year strategic plan. ODPHP encourages NIH to use HHS' Healthy People 2030 to support its work to: Improve Women's Health and Minority Health, and Reduce Health Disparities; Optimize Data Science and the Development of Technologies and Tools; Promote Collaborative Science; and Address Public Health Challenges Across the Lifespan. Healthy People 2030 identifies health disparities, utilizes data science and technologies to promote timely data dissemination, and highlights objectives for which health challenges across the lifespan exist.

Comments: Priorities/benefits/drawbacks:

RE: Objective 1. HHS' Office of Disease Prevention and Health Promotion (ODPHP) applauds NIH interest in preventing disease and promoting health. ODPHP encourages NIH to draw on the disease prevention and health promotion objectives set forth in Healthy People 2030. Healthy People 2030 includes Research Objectives that identify research gaps that are considered high priorities for the Nation; ODPHP recommends NIH use the Healthy People 2030 Research Objectives as a basis for its disease prevention and health promotion research activities. ODPHP also recommends that NIH conduct more upstream research that address the social determinants of health. With regard to developing treatments and interventions, ODPHP recommends NIH collaborate with and leverage the work of the US Preventive Services Task Force and the Community Guide to Preventive Services.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Regarding "Optimizing Data Science..." and "Promoting Collaborative Science...", we see a major opportunity in connecting the Computer Science and biomedical academic communities. At most academic medical centers, the CS and School of Medicine departments of the host University are not connected in any way. The most important and challenging problems in biomedical data science require new theoretical CS work, instead of re-positioning methods from the web, ecommerce, and social media industry. E.g. cutting-edge embeddings and pre-trained models are generated on web and ecommerce data because that is what the CS research community has access to. These resources are re-used for machine learning research in the biomedical domain, but may very well underperform new methods that take into account the unique properties of biomedical data. CHOP recently entered into an academic agreement with the Drexel University College of Computing and Informatics (as well as biomed engineering) in part to find ways to integrate the CS, biomedical, and informatics communities. The NSF's AI Institute program is a forward-thinking approach to this opportunity, it would be wonderful if NIH and NSF could join forces to bring expertise together. Many CS researchers want to work on meaningful health problems, but lack the structures and pathways to do so. This is an organizational, cultural, and incentive barrier more than technical.

Comments: Priorities/benefits/drawbacks:

Regarding Objective 2, we see significant opportunity in bootstrapping the computational, statistical and data analysis skill set of the biomedical research community. Especially outside biostatistics, bioinformatics, and computer science, and EHR data analysis specialists. The data and statistical education of non-specialists is not keeping up with the requirements of contemporary science. We have found an almost insatiable appetite for "just-in-time" data science education among our research staff and faculty community. A relatively small investment in a team of 2.5 data science educators has resulted in over 340 individuals engaging in in-person programming, statistics, data manipulation, and visualization educational events over the past 2 years. One measure of appetite is that two educational programs, one for R, one for Python quickly evolved into self-organizing user groups that require minimal moderation by our education team. Content and participation is now coming from the community. Beyond the direct benefit to research projects, we see this education benefiting our diversity and inclusion goals and the Diversity Cross-Cutting Theme. We hope that broadly accessible data science education delivered through non-traditional channels will democratize expertise and promote the careers of diverse individuals, vs concentrating it in legacy silos.

<http://education.arcus.chop.edu> Regarding Objective 3, particularly "Fostering a Culture..." and "Ensuring Accountability and Confidence...". In our experience there is much attention paid to the legal requirements to protect patient privacy in research, but little attention paid to the ethical and social norms of data privacy. The changes to the Common Rule have loosened controls formerly enacted by the IRB, at the same time volume and complexity of data use is skyrocketing. Our perspective is biomedical research is going to take a major hit in credibility and trust in the near future when a data privacy incident that is technically legal results in harm or at best really bad publicity. Our patients do not understand what they are consenting to, and have expressed serious reservations about use of their data that are not taken into account. We may be more sensitive in pediatrics, but the Google-Ascension

issue highlights how research organizations may be on the right side of the law but the wrong side of public sentiment. And this is all before we even get to widespread use of AI and machine learning in health. NIH would do well to promote meaningful, results-oriented privacy, ethics, and safety research in data science. Go beyond what is required by the law. If we get privacy right, we will be allowed to do amazingly impactful work. If we get it wrong, we will be shut down and sent into the wilderness like gene therapy research was.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Optimizing Data Science and the Development of Technologies and Tools

Comments: Priorities/benefits/drawbacks:

Driving Foundational Science:

Comments: Future/emerging opportunities/needs:

I would like to be involved in all trans-NIH opportunities in quantitative understanding of biomedical research including fairly "small" theoretical research projects and large collaborative projects involving multiple skills including ours in multi scale modeling.

Comments: Cross-cutting themes:

* Increasing, Enhancing, and Supporting Diversity We need to engage minority communities to get them more engaged with genetics, genomics, and disease research/clinical studies. There are cultural undercurrents that are not respected when it comes to medical research and the minority communities in the USA, especially among African American communities but this goes to indigenous peoples as well. Simply explaining it's good for the community is not enough. There has to be active engagement in minority communities in order to engender trust and, in order to keep that trust, show ethically transparent data stewardship. There has to be consciously sensitive outreach on health ethics, justice, and community participation. We cannot take the position that if we just explain it the right way,

minorities will jump at the chance to participate in health studies. *Improving Women's Health and Minority Health, and Reducing Health Disparities Let's start with low-hanging fruit. Getting health care to the poor. Asking obvious questions, like why do black women have such a high rate of pregnancy complications and infant mortality? This is embarrassing!

<https://www.heart.org/en/news/2019/02/20/why-are-black-women-at-such-high-risk-of-dying-from-pregnancy-complications> *Optimizing Data Science and the Development of Technologies and Tools Give more grants for data science, and tool development. Grants can be up to 200K for 2 years (big R03s). Data is accelerating faster than tools, and we just don't have resources to develop robust tools that can stay useable and intact through multiple cycles through the originating laboratories. Beware of supporting one or a few packages or environments as it cuts back on innovation. Spread some of the code around outside of big places like Broad or Wash U -- they're great but it's stifling innovation in the majority of the people who are outside of those places. Also fund meta-tools that maintain code standards and methodologies, ontologies, biomedical code repositories -- those are SUPPORTING tools for the biomedical technologies and tools! Examples are: <https://bioconductor.org/> and <http://biopyr.org/> and Monarch <https://monarchinitiative.org/> *Promoting Collaborative Science Promote collaboration with grants specified for collaborations between large and small institutions, or between disciplines. And demand results that show active collaboration. * Addressing Public Health Challenges Across the Lifespan Please fund more molecular and high resolution research on either side of the adult spectrum, including children and older people. Our paper describes some of the perspectives of the children's research angle:

<https://www.sciencedirect.com/science/article/pii/S1534580719301789>

Comments: Priorities/benefits/drawbacks:

*Objective 1: Advancing Biomedical and Behavioral Sciences **Driving Foundational Science Continue to prioritize subcellular sciences. *Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity **Cultivating the Biomedical Research Workforce NIH and the scientific community is failing on this in my opinion. I know of several women who have left the US research community because there were no options for them. They were bullied, harrassed, and generally made uncomfortable. Cultivate new centers for data science that aren't the Broad, WashU, UCSC, UPenn, etc. ** Supporting Research Resources and Infrastructure Cultivate new centers for excellence in data science that aren't the Broad, WashU, UCSC, UPenn, etc. Be open to smaller places with limited resources that can grow with NIH support. There's no reason NIH keeps on going to the Broad or to UCSC etc -- and still wonders how to support growth in data science if you keep putting the money in the same places. *Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science **Fostering a Culture of Good Scientific Stewardship Do this for code and software as well as reproducibility. Do more with GA4GH, or support projects that actively try to improve the quality of research (protocols.io, etc.) *Leveraging Partnerships See above, but partner outside of the usual institutions, it's strangulating innovation. *Ensuring Accountability and Confidence in Biomedical and Behavioral Sciences clinicaltrials.gov is a good start, but we need less academic ownership of government-funded projects. I can't begin to tell you how often I've run into researchers who won't share governmentally-funded project data, even

after a long period of holding it, because it might put them behind someone who could analyze it more quickly. Promote partnerships on older data maybe?

Comments: Future/emerging opportunities/needs:

Don't rehash older projects. Sunset older projects with reusability in mind. Consider the wisdom of adding more money to an older project. Strategically get feedback from councils of younger researchers, early- and middle-stage investigators for ideas, and cycle these people every six months. Find out from them what they believe to be the most important questions in their field and what their roadblocks are. Do this via email or by video conference. Take a massive census on where NIH should be going but make this more than this type of form. Engage more in the younger community. And I will always ask for more precision health based pediatric funding for my colleagues.

Comments: Cross-cutting themes:

No comments.

Comments: Priorities/benefits/drawbacks:

I strongly advocate for Objective 2 - Supporting Research Resources and Infrastructure through continuing to invest in the cloud credits program and partnering with research institutions to encourage the use of Secure Health Research Environments using cloud services, such as Amazon and partnering with STRIDES. These programs are reducing the cost of managing on-premise infrastructure while enabling an ecosystem of tools to researchers. Investment should continue to be made in this area and I am open to having a dialogue.

Comments: Future/emerging opportunities/needs:

No comments.

Comments: Cross-cutting themes:

Promoting collaborative science is critical, along with data sharing. Additionally, the institutes should be collaborating more. As science becomes more collaborative, research proposals have the potential to fall between institute traditional boundaries, meaning that important science does not have a clear home in an institute.

Comments: Priorities/benefits/drawbacks:

I recommend a stronger focus on treatment efficacy broadly across the objectives. I would also like to see a focus on replication science.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

With respect to Objective #1: Preventing Disease and Promoting Health - Despite the current efforts and broadly recognized as a key approach with established benefits for today's health problems, very little has been done. Promoting healthy behaviors would be key to minimize disease burden. Propose to focus more on the biology (i.e., brain biology) of those behaviors and in addition to current approaches at the societal and environmental levels.

Comments: Future/emerging opportunities/needs:

Increasing the number of clinical studies with human subjects, to allow vast majority of findings from animal studies over the last 10-15 years to finally be translated into human health.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Thank you for the opportunity to provide feedback on the proposed framework for the FY 2021-2025 NIH-Wide Strategic Plan. I applaud the time and effort that has thus far been put into developing the proposed Crossing Cutting Themes and primary and secondary Objectives. Objective 1 reflects the core values and mission of NIH and encapsulates the personal values of those supporting NIH-funded biomedical research. I would hope that within this framework the critical role animal models, from zebrafish to nonhuman primates, play in meeting this overall and subsidiary objectives. Objective 2 is a key area of focus to meet the needs of the invaluable animal models making NIH funded research possible. While this may ring true for many facilities, investment in National Primate Research Center infrastructure is a necessity to continue to meet the current demand and growing need for NHP models. Financial support is critical to update these aging facilities currently struggling to keep up with research and breeding demands. Objective 3 aligns with the growing trend towards public outreach and transparency in biomedical research. The European research community has laid excellent groundwork in showing ways to connect to the public, provide transparency within our research facilities and convey the "why" behind animal models to those that benefit from their contributions to human health. NIH's continued strong support for the critical role that all animal models in research play is vital to protect the incredible research our principal investigators, their lab members and the animal care staff conduct and support every day.

Comments: Future/emerging opportunities/needs:

While future opportunities abound, investment in the success of existing nonhuman primate breeding and research programs is critical to ensure the continued use and success of this incredible transplantation model. The recent evaluation of NHP supply and demand was a step in the right direction to characterizing the necessity for successful NHP breeding colonies here in the United States. Whether through expansion of funding to NPRC P51 grants or through continued P51 and U42

supplements and C06 grants, significant financial investment is critical to update aging infrastructure and expand both breeding space and research support housing.

Comments: Cross-cutting themes:

Collaborative Science: Testing evidence based behavioral interventions in clinical service settings, utilizing the EHR and collaborative care between medical and behavioral specialties. (Most evidence-based behavioral interventions have not been tested as they would be conducted as part of health care. Behavioral interventions have the potential to take on care that medical specialists have to do by necessity, at a more efficient, economic, and skilled/scope of practice level. Behavioral interventions have the potential to reduce behavioral and psychological prognostic risk factors in medical specialty populations, thus improving health outcomes with less expensive care.) Testing behavioral interventions with multiple targets (i.e., not just tobacco, not just physical activity, not just depression). (Patients can not engage in separate interventions for each behavioral target, especially if they are burdened with cancer or other diseases. However these targets may improve their disease outcomes.) Interventions should be tested in all practice settings, and represent diversity of the nation *across* studies. Studies that focus on representative regional populations should be encouraged, without penalty for not representing the nation broadly. Diversity within defined health care disparity groups and emerging diversity factors may be better represented by regional studies (e.g., rural).

Comments: Priorities/benefits/drawbacks:

Objective 1 defines full translational spectrum science: We need to increase the relevance (i.e., full translational spectrum) of behavioral and social sciences. Medicine more often has translation to health care as an end goal, and better supports the full translational spectrum. BSS tends to test interventions in academic, non-clinical settings and end dissemination at scientific journals or sometimes apps that are not maintained. We can expect better public accountability, responsibility, recognition and associated government support, if we improve health care and health. Medicine is much better at supporting scientists at all stages of the translational spectrum, from basic to implementation in the clinical setting.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Substance abuse is a large driver of health care costs in the US; especially among the uninsured and particularly in accessing services through the ED. For the last three decades or so, the Substance Abuse Block Grant (SABG) program has stipulated a minimum of 20% of funds be devoted to prevention. The Affordable Care Act of 2010 and the Paul Wellstone and Pete Domenici Mental Health Parity and Addiction Equity Act of 2008 now provide the opportunity for million more people to access funded treatment services. Recently, using the WebBGAS report, State Agency Planned Expenditures by Targeted Activity within Source of Funds, I did an analysis of state by state planned spending of SABG

funds (2018 data). Twenty-seven states and the District of Columbia are still in the 19-20 range. Twenty-two states are in the 20+ - 27.95% range. Two states have decided to plan to raise that minimum amount considerably, with Rhode Island leading the way at 44.47% and New Hampshire next at 35.25%. In the aggregate, states still spent only 22.73% of SABG funds for prevention; and that number reflects the lift provided by the small states of Rhode Island and New Hampshire. It seems to me that a potentially productive area of research presents itself here; where very useful results could be achieved with relatively little expenditure. It would be very useful to see if increased investment in prevention by states has had any effect on incidence of initiation of substance use, reported cases, and ER visits among other things. It would also be interesting to see if the prevention initiatives being pursued are required to be evidence based.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The need to utilize atomic chemistry in the design of clinical treatments . The knowledge of the hypochlorite ion is critical in maintaining healthy oxidation and reduction reactions in the human body! You need to use the chemical reaction of carbonic acid and sodium bicarbonate plus chlorine equals salt and water and creates heat during that chemical reaction . I have devised a treatment that runs this chemical reaction at a speed that causes the body to sweat at rest! This treatment causes the body to sweat at rest .

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

A major concern as I have been learning about the details of the NIH research culture and programs (new areas of interest for me over the past few months), is the angst that many in the osteopathic profession are struggling with over being relatively shut out of NIH research for over a century. You may be aware of this issue already. As I am sure you know, the fundamental framework of the osteopathic approach involves four basic (AND radical!?) precepts: These foundational ideas, simplified by consensus in the middle of last century, remain sublimely profound; (1) recognition of a compositional unity of each human being (mind, body & spirit), (2) reciprocal interaction and relationship of structure & function, and (3) the normal biological impulse toward self healing combined with (4) the clinical

directive to always act with these principles in mind when assessing and treating each patient. These ideas were what relegated the profession to cult status by the the orthodox medical world since at least 1910..... In reality, the osteopathic profession is (and has been) a profession of serious minded physicians dedicated to bringing the best care that they can deliver to their patients. A sample of the lengths that some osteopathic physicians had to resort to accomplish this is succinctly illustrated in Vol 1. No. 1 of Scholar Journal in a three generational story (9 pages) entitled 'A Medical Conspiracy' (the conspiracy is not what you think.) <https://www.scholarcomplete.com/> click on the current issue, the final three articles. These concerns have been presented in great detail in Peppers, et al, June 2018. There has been over a century of conceptually osteopathic focused research, paid for with mostly intramural funding and individual donations and then self published by osteopathic specialty societies as all osteopathic journals save one, the JAOA have been locked out of PubMed.and therefore the work & concepts explored by these dedicated professionals have been invisible to other researchers who have been pushing the progress of today's most interesting and potentially health enhancing fields of knowledge. For instance, the amazing work being done in the area of the glymphatic system, finally showing us a likely glimpse of at least one good reason why humans sleep, these researchers are completely unaware that a subsection (very small to be sure) of the osteopathic profession has been using a subtle but palpable pulsatile rhythm to treat the cranium and face, gently and with often astounding results for at least 80 years. There is also significant amount of work on viscerosomatic, somatovisceral and somato-somato (bidirectional autonomic) reflexes that could contribute significantly to safer assessments, understanding of disease processes and non drug treatment of pain. While the shutting out the osteopathic profession may have quickly evolved into more or less benign neglect than deliberate malign exclusion a half century ago, the profession itself, in its prolonged defensive posture, in response to 'orthodox medicine's' public invalidation, and less adept at self promotion than some other professions, likely have contributed to its own

Comments: Priorities/benefits/drawbacks:

But you cannot get to it as the journal is not part of PubMed. I sent a copy to Dr. Langevin a couple of weeks ago., for review There has been over a century of conceptually osteopathic focused research, paid for with mostly intramural funding and individual donations and then self published by osteopathic specialty societies as all osteopathic journals save one, the JAOA have been locked out of PubMed.and therefore the work & concepts explored by these dedicated professionals have been invisible to other researchers who have been pushing the progress of today's most interesting and potentially health enhancing fields of knowledge. For instance, the amazing work being done in the area of the glymphatic system, finally showing us a likely glimpse of at least one good reason why humans sleep, these researchers are completely unaware that a subsection (very small to be sure) of the osteopathic profession has been using a subtle but palpable pulsatile rhythm to treat the cranium and face, gently and with often astounding results for at least 80 years. There is also significant amount of work on viscerosomatic, somatovisceral and somato-somato (bidirectional autonomic) reflexes that could contribute significantly to safer assessments, understanding of disease processes and non drug treatment of pain. While the shutting out the osteopathic profession may have quickly evolved into more or less benign neglect than deliberate malign exclusion a half century ago, the profession itself, in its prolonged defensive posture, in response to 'orthodox medicine's' public invalidation, and less adept

at self promotion than some other professions, likely have contributed to its own exclusion. With the culmination of the 5 year merger of all physician residencies under the ACGME umbrella, it is past time for the situation to change. On the most superficial level, it is wrong for public funds to be discriminatory in its distribution and the NCCIH is the component of the NIH that appears to me to be best positioned to assist in helping the profession evaluate, sort and select the best of the heretofore undisclosed (privately published) research and concepts of a century of osteopathic thought. More importantly, researchers of today can benefit from the conceptual discussions and research efforts of these dedicated and occasionally brilliantly innovative pioneers. Reaching out to the osteopathic profession to help as it adjusts itself to thrive in the post ACGME merger world will add an additional dimension to the evolution of modern medical research and practice. I am searching for ways to help make this happen in a beneficial, collaborative process. I request that consideration of this issue be integrated into the developing NCCIH 5 year plan. I know you are extremely busy in you position but ask you to take a bit of time to examine this important issue. I am willing to assist in any way I am able. Thank you for what you do.

Comments: Future/emerging opportunities/needs:

Comments: Cross-cutting themes:

Addressing Public Health Challenges Across the Lifespan. Subject - end of life, palliative, and dementia patient care issues that negatively affect fully dependent or immobile patients and their caregivers. The challenge of patient mobility is a central issue in the healthcare industry that is not being addressed. Palliative and home-care patients often face the prospect of becoming bed-bound and subject to a wide variety of medical issues related to immobility (pressures sores, UTIs, blood clots, contractures, kidney infections, depression, etc.). Current mobility devices (sling lifts or patient hoists) that are used to mobilize fully dependent patients require two trained caregivers, considerable space, and the ability of patients to tolerate bending, compression, rolling, etc. during sling-based transfer. Hospice, palliative, and dementia patients often cannot tolerate these common highly invasive transfer methods and are forced into LTC or remain bed-fast in the home. The cost nursing homes often causes extreme financial stress to families. Caring for bedridden patient at home puts great stress on their caregivers, both physical and emotional. The cross-cutting theme is providing adequate transfer and mobility methods and devices when caring for fully dependent patients across all medical environments (ORs, radiology clinics, doctors offices, physical therapy settings, hospitals, home-care, LTC, etc.).

Comments: Priorities/benefits/drawbacks:

When addressing healthcare challenges that occur across the patient's lifespan, less invasive, single caregiver, safe, efficient transfer-mobility devices are needed. Such devices should make bed transfer, toileting, and showering of dependent patients easy, fast, and safe in home-care environments allowing patients with painful or disabling medical conditions to remain at home (age in place). Such devices do not exist in the current medical environment with the most popular (and only) state-of-the-art devices (patient hoists) having been used for the last 60 years. These are unusable in hone care according to SPH

experts at the American Nurses Association. This failure to produce better devices wastes tens of billions of dollars in unnecessary nursing care and caregiver time (\$250B a year is spent caring for dementia patients alone according to the Alzheimer's Foundation). A better transfer-mobility devices should allow for: - Minimally invasive transfer = Reduced patient pain and disturbance - Increased efficiency = Less labor intensive transfer (compared to sling lifts) = Single caregiver, efficient transfer, toileting, bathing, changing adult briefs - Fewer bed-bound patients = Increased patient mobility in home-care (aging in place), long term care - Decreased incontinence = Efficient toileting (less use of adult briefs) - Improved patient safety = Stretcher transfer decreases opportunities for patient falls - Improved caregiver safety = No-lift device minimizes caregiver musculoskeletal stress

Comments: Future/emerging opportunities/needs:

Since inadequate transfer devices affect patients care in such a wide variety of medical environments, entire portions of the healthcare system have become debilitated and depressed. Half of all nurses have chronic back pain from lifting and repositioning patients. Home caregivers and home health nurses are exhausted and depressed as they watch their loved ones and patients waste away in bed. Doctors must turn away patients in their offices because they cannot move them to examining, surgical, and radiology tables. Surgeons and nurses in ORs risk back injury as they drag patients onto OR tables. Families go bankrupt as they pay for expensive LTC because their sick relatives could not be moved from the bed at home. Patients endure pain and confusion as they are hoisted in slings. Caregivers are forced to put their patients in adult briefs because the process of toileting them is so dangerous, painful, and slow. There are many more related issues. These are not "emerging needs" but unmet needs that have been around for decades. The NIH has simply failed across agencies to acknowledge them and sponsor research to address them. Perhaps this will change when the NIH shifts some of its research resources away from the "cure" of disease and towards "care" of patients, and begins to understand that care is an equally important aspect of medicine.

Comments: Cross-cutting themes:

Increasing, enhancing and supporting Diversity - the need to increase the concepts of the "Biology of Manual Medicine" so that the diversity of health can be appreciated from a structural component to enhance the operation of the innate immune system to keep the individual in a state of homeostasis without the use of drugs. To support the use of the human structural components of the body with the increased knowledge from the use of MRI scan converted into the visual capacity of a holographic image through the utilization of public university resources.

Comments: Priorities/benefits/drawbacks:

With the incorporation of the resources from a public university that has massive supporting research tools available through the use of the "Envision Center" at Purdue University to use holographic imaging to study the relationship of the structure of the human spinal column housing the central nervous system that controls the operations of the human body in states of health and disease.

Comments: Future/emerging opportunities/needs:

Establishing the social needs of spinal structural integrity for the health and well being of the individual through the ability of the central nervous system to function without compromise. There are NO major public university's that offer proper training in the restoration of the spinal column through the applications of manual medicine prior to the use of drugs or opioids. Restructure the applications of health care applications so that the first line of defense for the individual is a properly operating central nervous system housed unrestricted within the framework of the human spinal column.

Comments: Cross-cutting themes:

Men's Health, especially minority males is not being adequately addressed in any sphere. Women's health issues have been on the agenda for many cycles now. While few research and funding efforts are addressing men's health issues and young boys are suffering, tremendously. The NIH should not specify a specific gender, just as it does not specify specific ethnicities. More general language here is appreciated: "Addressing issues relating to the health of the underserved" is better...

Comments: Priorities/benefits/drawbacks:

Obj 1: Developing Treatments, Interventions and Cures: The NIH should specifically include language that encourages exploration into non-conventional treatments and therapies, including spiritual, traditional and/or alternative.

Comments: Future/emerging opportunities/needs:

More effort should be made to research, develop and train "layworkers" in the struggle to increase informed decision-making and address disparities for underserved populations.

Comments: Cross-cutting themes:

Promoting and supporting exposure science in the environmental (indoor and outdoor) surveillance monitoring system to provide contaminant hot-zone as well as background exposure level at the residential level, particularly in the areas of higher risk such as communities near the highway and industrial facilities and etc. This will ultimately enhance researchers and the community's capacity to deal with a health crisis or disaster response. These efforts should be coupled with ongoing community training and education to increase environmental health literacy which in result will help the general public to make informed decisions - where to buy a house, work or send their kids to school; for an emergency situation, when to evacuate, to back home.

Comments: Priorities/benefits/drawbacks:

As NIH has been focused on whole-person health - it would be more than biomedical and behavioral science and the "environment (indoor and outdoor, at home and work)" is an important component to influence an individual's health. For both physical, chemical and biological contaminants, the exposure could happen in every aspect of our lives and research to look into all of them in computing "total exposure and total health" would be needed.

Comments: Future/emerging opportunities/needs:

Promoting collaborative science and community partnerships in the research program would require broader expertise on the discussion table, ensuring power balance and equal collaboration among participants. Including scientists, research manager, community advocate groups, community organizers, and leaders who have been actively working to improve the health of their communities can provide the "real" challenges they are facing in the disadvantaged communities and working within the academic research framework.

Comments: Cross-cutting themes:

Excellent current themes

Comments: Priorities/benefits/drawbacks:

Promoting multi-component and adaptive interventions - right now committees are very interested in single, streamlined, interventions that too often do not mirror real-world conditions

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The DNP/PhD (aka DNP-PhD) is a dual degree program that similar to MD/PhD physician scientist programs, prepares nurse scientists who are also advanced practice nurses. At Johns Hopkins School of Nursing, our DNP/PhD program prepares clinical research intervention scientists with the same PhD preparation and rigor as our PhD program. Hence, NINR F30 mechanism should be open for DNP/PhD students. The fit and rigor for DNP/PhD students will be evident in their application. The DNP/PhD differs from other dual degree programs in health professions such as DNP/MPH or MD/MPH that do not offer research science preparation.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

N/A

Comments: Priorities/benefits/drawbacks:

N/A

Comments: Future/emerging opportunities/needs:

Emerging Viruses: Diagnosis, Intervention, and remediation, (treatment). This includes the most recent virus scares of SARS, Coronavirus, and soon TB the drug resistant strains.

Comments: Cross-cutting themes:

Optimizing Data Science and Development of technologies and tools as well as the promotion of the collaboration of science are absolutely the priorities in a community general oncology practice. Because of the recent explosion of research and development, we are treating patients longer and with a variety of possible combinations or mono therapies. This presents quite a challenge for the Oncology RN to competently provide patient education, navigation, administration, and side effect management of mono therapy and combinations of biotherapies, immune therapies, antibody-drug conjugates and additionally to remain aware and of new oral IV and combination therapies. The changes in indication, changes in administration times, administration order have changed in a matter of weeks. In this setting I am literally scrambling to ensure nothing has changed, while simultaneously providing holistic care which includes social, spiritual, emotional, transportation, coordination with other disciplines such as radiation or surgical services. Unfortunately, another challenge that is connected to this is that in the background professionals are spending an exorbitant amount of time managing prior authorizations, doing literature searches, assisting financial counselors with clinical information and writing appeals to ensure insurance companies have adequate documentation. We are finding that the NCCN guidelines have not caught up with FDA guidelines and therefore we are not getting approval from insurance companies who use NCCN compendia as their guideline for approvals. As a Registered Nurse and Manager, my priority must be to advocate for our patients and to ensure the educational preparation of the professional staff in order to provide competent holistic care including patient and family education. The reality is that as a practice we are scrambling to find the resources and tools to not only provide staff with the education needed to understand the science, administer treatments and teach patients and then remain current as to changes in indications, administration order, premedication, side effect management, black box warnings and new oral and IV chemotherapies, biotherapies, immunotherapies. Another very significant need is the complicated genetic mutation arrays and molecular testing that has been added which requires additional education of staff and patients as well. This genetic mutation testing may be done on tissue or on peripheral blood samples and requires another burden for staff to provide prior authorization and ethical consideration of financial burden to the patient. In a community oncology setting where we do not have a dietician or social worker or navigator, infusion RNs are required to multitask and 50% of their time ensuring and limiting patient financial burden while searching for reliable standardized resources to ensure their own understanding of the science and ability to effectively collaborate with other disciplines such as radiation therapy in regard to that science. These drugs, regimens, orals, concomitant therapies are studied for years before approved by the FDA and outcomes are directly related to this research. RNs need the knowledge and need the tools to be able to keep current in order to maximize survival and outcomes goals.

Comments: Priorities/benefits/drawbacks:

The priorities of the NIH regarding the three objectives are very realistic and point to some of the ethical and financial concerns involving patients and definitely impact providers' decisions regarding

care. In the community oncology setting, our patients are referred to a tertiary facility in order to participate in clinical trials and therefore any and all testing and treatment must be first authorized by the insurance companies. The development of treatments and cures should absolutely be a priority keeping in mind that the performance status, provider and patient relationship and willingness and ability of patients to take part in their care plan is variable. There continues to exist many familial, cultural, social and simply their life stage that impacts patients' ability or willingness to take part in their care. The question is less often raised as to how far and how long we should continue to treat patients due to the availability of biotherapies and immunotherapies that are easier tolerated. Unfortunately not all patients are eligible for those therapies. Regarding optimizing operations: Another ethical dilemma has been the lack of tissue available for further testing and the varied "standard" for pathology testing on inpatients vs outpatient initial biopsies. Pathology departments vary from institution to institution as to which molecular tests are performed and definitely vary based on whether they are inpatient or outpatient. Much of this decision is based on reimbursement also which unfortunately results in delay of treatment or providers choose to initiate treatment without all results. An example of this is the absence of KRAS testing on initial biopsy which results in the patient having follow up in outpatient oncology a week or more later and the KRAS is ordered at that time but treatment is started with avastin instead just to get started OR avastin is not started either if had recent surgical procedure due to risk of bleeding. Then KRAS results may or may not be back by next visit. Regarding mutation testing, the three-fold ethical dilemma is 1) doing an array of mutations of 40-150 possible mutations that may or may not reveal any actionable outcome 2) the cost of these mutation arrays often is a deterrent on the part of the provider and/or the patient. Many companies presently are providing assistance with payment and/or authorization but our fear is that this is short-lived until these companies become more financial lucrative and have less of a need for "business" 3) our office is inundated with calls and visits from multiple companies who are offering a "better" product or process or testing method. We presently have 15 possible companies who are essentially providing the same service. Physicians do not often have a preference and in our practice we are using the company who takes care of insurance investigation, prior auth, provides patient assistance but may still require our staff to do the above or go with another company if out of network. All of these logistical issues should be considered in NIH objectives.

Comments: Future/emerging opportunities/needs:

I believe the goals and the implementations of such is on target. The logistical impact of this very hopeful explosion of research and development of new treatments and cures is something that has been overlooked and may not have been anticipated. The workload and increased need for more human resources, staff education and specifically just an increase in numbers of clinical staff in order to competently provide these more complicated treatments to a population who is being treated longer, have become more chronically ill, and the older adult is more likely to be treated and treated with multiple regimens. Needs include 1) Parity with FDA approval and NCCN compendium so that NCCN guidelines are up to date with FDA approval (to avoid insurance company denials and unnecessary request for appeals by office staff) 2) Improved communication with community oncology clinics regarding indication changes 3) Resources and tools that are updated regarding recommendation of administration Order, drug time administration, premeds . Many regimens do not have

recommendation of order of administration and drug administration time is variable which provides a practice concern for RNs, who by law should have accurate labeling of drug with dose, drug, volume, administration time . 4) standardized Patient education media resources (NCI has electronic paper resources presently) 5) standardized Patient education resources for immunotherapy 6) recommendations by NIH for media resources for nursing and patient education (presently any animation is developed best by pharma)

Comments: Cross-cutting themes:

The cross-cutting theses are fine. In particular, the promotion of collaborative science and the public health across the lifespan are quite important. What has been missing from these over the past decades is the inclusion of child abuse and neglect -- as a health, mental health and public health issue. Child Abuse and Neglect have significant influence on later health issues that NIH has spent billions of dollars on over the past 50 years (inflammatory disease, alcoholism, substance abuse, obesity, eating disorders, depression, suicide to name a few). Yet nearly every institute has ignored this relationship-- it has been true Gaze Aversion (see Krugman, RD Health Affairs, October, 2019).

Comments: Priorities/benefits/drawbacks:

The objectives are fine -- open everyone's eyes to the impact of child abuse on their problem and help build the scientific community that can address these comorbidities.

Comments: Future/emerging opportunities/needs:

Our approach to child abuse and a medical specialty is hampered by 40 years of its being treated as a "social issue" and not the health, mental health and public health issue it is. Being 40 years behind means that trying to catch up with the rest of the pediatric and adult specialties will take the collaboration of many institutes, not just NICHD (which has ignored it also for far too long).

Comments: Cross-cutting themes:

Police officer walk on the justice system they have for many years over the past 15 years people have turned against them causing shootings hate ,fear, Like a cop that that got fired from ... like 4 years after he lied on me , tried to break my leg ,bunch me in face in handcuffs but over time he got caught by the right sheriff and got fire and was hired by ...Police dept ,the man he beat was cell on cot he now in hospital with a titanium plate and screws in face and more surgery's to come. They no safty in cops we need more background why would a sheriffs dept hire a convicted Felony ... did and he is prison for sex assault . The system is not working in ... and ... does as ... tells him . We need a system . People would agree we got towns going to sanctuary because of ... and ... the system is dividing people . You got men going to women bathroom that should laid on desk and past and made illegal because we got children , little girls and child molesters take advantage of that and it needs to stop men don't belong in women bathrooms it private . Workplace is other safety hazard and low class for women working inside a a factory not in office they to lazy to and been their so long they could tell when it was built but women inside compared to men work twice as hard and never get finished and get pushed to lower job and

have to build back up i have seen it men standing women going in rush USDA behind marking everything. I have seen women with hurt hands , wrist , fingers ,soaking in hot wax to help with pain some had to in early leave after 7 years cause they could not use their hands , fingers bent , arm shake ,go on disability for 786.00 a month 78 SSI women who work inside the plant like ... ,and other places that use chemicals to wash down during break down time it hard on them and the high pressure hose on 120 pound women is like fight women love the job but and pay but they tell you they hurt and that normal but it comes with long term injuries and ... other company's never pay out for them injuries ,they pay some for doctor visit or give 8000.00 and send you on your way but you never work again ... and had to stop work and today she can't hold or close her hands . her payout 6000.00 and 1000.00 in medical bills and she was left paying for the two surgery's... so i no they so many many more women don't got equal rights in work force or Medical

Comments: Priorities/benefits/drawbacks:

Better rehab center for disability, mentally challenged , depression , mental disorders, brain injuries , when you got to a center in ... any rehab it is same no names ... has brain injury and depression and some mental problems from something that happen to her they treat you same each person everyday.... counseling maybe once a day for hour , the rest you walk around medication the doctor comes into room and you line up and he hands it to says you doing better today . that it ? they no reform in any of these rehab centers just tax dollars and fraud and it not because of daughter it other places like In ... ,that place is biggest scam in government and it shame .

Comments: Future/emerging opportunities/needs:

Our future needs reform in Police , and Police and safety get people to trust in police again they be reform . safety more inspection at company's cut down on job injuries see if people are qualified for the job bring women's rights back into the work force it been pushed back so far for they end up with early retirement and have to have someone help them from injuries ,hands ,wrist ,arms ,legs from standing ,back ,for long hours . need better changes in jail system , people come out their everyday with with staph infection because the 309 use the same mop bucket for ever cell it looks sewage water and people set on floor in it .costing the state millions over lazy prisons inmates ,pull up doctor visit on ... sheriffs office ...on staph infection at Hospital or nearby doctors some had to go to ICU it was that bad

Comments: Cross-cutting themes:

I appreciated seeing an emphasis on women's and minority health as a cross-cutting theme. In addition, I think a cross-cutting theme of support for geographical diversity is needed. The vast majority of research funding continues to go be along the coasts with much of the middle United States underrepresented, despite high quality research and researchers in these areas. One of the challenges for smaller institutions and rural areas is the lack of a critical mass of expertise in a given area. Oftentimes, we need to collaborate with those outside our institutions and sometimes our collaborators are quite a distance away. This is often reviewed unfavorably due to perceived 'lack of direct engagement.' Given the ease in video and tele-conferencing, we have found great success in applying the principles of team science, even at a distance. a concerted effort by NIH to support and include

research and researchers from often overlooked areas of the country and institutions would go far to helping improve diversity, ensure more representative samples, and provide more opportunities for junior investigators. Thank you for considering this additional cross-cutting theme.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Indigenous I need Help

Comments: Priorities/benefits/drawbacks:

Tell my Dentist to do as there told sorry

Comments: Future/emerging opportunities/needs:

I seek Information about Dental Health properly.

Comments: Cross-cutting themes:

Increasing, Enhancing, and Supporting Diversity Improving Women's Health and Minority Health, and Reducing Health Disparities Optimizing Data Science and the Development of Technologies and Tools Promoting Collaborative Science Addressing Public Health Challenges Across the Lifespan (National Institutes of Health 2020)

Comments: Priorities/benefits/drawbacks:

NIH's priorities across the three key areas (Objectives) articulated in the framework, including potential benefits, drawbacks or challenges, and other priority areas for consideration Future opportunities or emerging trans-NIH needs NIH encourages organizations (e.g., patient advocacy groups, professional organizations) to submit a single response reflective of the views of the organization or membership as a whole. Responses to this RFI are voluntary and may be submitted anonymously. Please do not include any personally identifiable information or any information that you do not wish to make public. (Lawrence A. Tabak,2020)

Comments: Future/emerging opportunities/needs:

highly decentralized organization may be generally appropriate for a research organization because research and creativity often prosper through a bottom-up approach that encourages the flow of ideas from the widely dispersed scientific community and does not impede the role of individual investigators in choosing productive avenues of research. (2003, National Academy of Sciences.Enhancing the Vitality of the National Institutes of Health: Organizational Change to Meet New Challenges.)

Comments: Cross-cutting themes:

Thus far your studies have left out people who are either disabled in bad health different from everyone or have different research altogether in mind that can help make mankind better for all intents and purposes as well as help advance science and cure many maladies that affect us all while effectively ignoring the fact that people have differing needs and desires that could radically change medicine forever. My reason for contacting you is that your paying people who are already rich financially to undergo your studies and only performing your genetic tests on the healthy with no real desire to help people like me. What studies I'm interested in and maybe you would be too is the following,healthwise finding the genes that control growth and healing as well as the God Gene and the aging and the sex genes and activating them in ways the patient wants.

Comments: Priorities/benefits/drawbacks:

Testing should be open to all people regardless of health race sex ability to pay or other such and not just for the healthy and wealthy among us who have no desire to help but whose only goals are to obtain money. You should as stated do your tests but only the ones the subjects want without discrimination and should also provide online enrollment and mail out enrollment forms as well as provide transportation and finances to those who need it in exchange for gathering valuable knowledge that could change the face of medicine forever.

Comments: Future/emerging opportunities/needs:

Do genetic studies on everyone not just a privileged few and advance science in many ways by utilizing the very people who will benefit from it in the future.

Comments: Cross-cutting themes:

Emphasis on rural health, health equity, climate changes and practice application of research is much needed.

Comments: Priorities/benefits/drawbacks:

Community based nursing interventions.

Comments: Future/emerging opportunities/needs:

Practice and research collaboration.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

I would hope that NIH, once they have the framework identified, would then articulate and provide opportunity for comment as to how the objectives are looking to be achieved. My primary concern is with Objective #3, particularly the goal on accountability and confidence. As a former Chair of an IRB, I am constantly concerned with the relative laxity of scientists (especially social/behavioral and those purporting to be doing QI) toward compliance, IRB regulations and oversight. The notion of benign behavioral intervention takes on a whole new meaning. I would hope to see NIH address this, especially in their strategic plan. I would like to see ethical needs associated with research addressed as prominent.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

The NIH should make every effort to find (creative?) ways to maintain the funding of mid-career, productive PIs. I believe this falls under Objective 2, i.e. to cultivate and maintain the research workforce. Many previously well-funded mid-career PIs who have run into difficulty procuring new grants can no longer continue their research unless they belong to the upper echelon of established scientists (who have many resources at their disposal). These mid-career scientists (15 or so years of independence) have made important and significant contributions to the biomedical research endeavor and can continue to do so if given the opportunity. The lack of funding is not because these mid-career

PIs do not have exciting and meaningful research proposals. Due to budget constraints they seem to be largely ignored/unfunded because they are neither junior or elite PIs who are given a preference. In the long-term this is a problem. Eventually, the elite PIs will retire and the junior PIs will become mid-career. The cycle will continue...

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

I feel that the NIH should prioritize funding research that utilizes alternatives to animals, or no animals at all.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Please consider devoting research funding to the study of polycystic ovary syndrome and it's connection to diabetes as well as fertility. Help to determine a standard of care from diagnosis to treatment.

Comments: Priorities/benefits/drawbacks:

Priority needs to be given to education for prevention as well as management, education to be provided by RN's, RD's and other credentialed professionals able to provide evidence-based education and exclude non-registered individuals unless under the supervision of a registered and credentialed individual.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

women's health and minority health benefits.

Comments: Priorities/benefits/drawbacks:

stop listening to tweets

Comments: Future/emerging opportunities/needs:

global concerns, cholera increase as flooding increases

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

I feel the lack of focus on implementation science within NINR unfortunate. So many nursing scientists are leading in this field but we are generally funded via other institutes. I think that nurses are the key to making results from implementation science actionable, thus our role in the development of the science is crucial. I having been funded as PI or co-I in this space via NINDS, NHLBI, NIAID, NIMH, NICHD, but not NINR.

Comments: Cross-cutting themes:

Yes

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

A sheriff deputy told me this week that my friend who has IED and heroin addiction cannot be helped unless she wants it. Is that true? I think want is a bad word here. There is fear; there is stigma; and there are financial, social, and transportation barriers etc. She (my friend) is working very hard on recovery with methadone maintenance therapy. What can we do about police locking people in jail for being mentally ill?

Comments: Cross-cutting themes:

No comment.

Comments: Priorities/benefits/drawbacks:

No comment.

Comments: Future/emerging opportunities/needs:

No comment.

Comments: Cross-cutting themes:

I suggest the Population Health to be part of conversation for public Health: 1. Healthy living, 2. Prevention 3. Preparedness 4. Outreach and Intervention

Comments: Priorities/benefits/drawbacks:

1. While longevity is an important issue for the NIH in physical health, quality of life issue needs to be part and parcel of the conversation in behavioral science.

Comments: Future/emerging opportunities/needs:

1. Applied research needs to be part of the conversation 2. Commercialization of technologies and solutions should be considered. 3. While long term priorities are important , midterm and short term needs to be considered.

Comments: Cross-cutting themes:

Concerning Cultivating the Biomedical Research Workforce, I hope the NIH will drop gender parity as an objective. Noting that the class of species we belong to (Mammalia) was so named in recognition of the special and essential dependence our offspring have on their mothers, I think women's efforts towards bearing and raising children should be praised, not "fixed" by NIH pressure or policies. All people, men and women, every culture and race, etc. should be able to participate in science as they wish, on a level playing field.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

I would suggest adding something about promoting replicable science as a cross-cutting theme. Psychology, public health, behavioral medicine are all facing replication crises. To be honest, I am not sure that stake-holders should trust anything coming out of NIH-funded research. The pressure to publish, strong push for biological measures, and preference for novel findings that are inherent in grant-funded research undermine replicable science. It would be nice to see NIH try and counter this.

Comments: Priorities/benefits/drawbacks:

It would be nice if Objective 3 explicitly mentioned replicable science or open science. As it is now, it reads a little vaguely: "Ensuring Accountability and Confidence in Biomedical and Behavioral Sciences".

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Describing the Human Body A detailed description of the amounts of every protein, its modified states, every metabolites and ions and their interactions (kinetic parameters) as biochemical reactions in every cell, tissue and organ of the human body. Such an quantitative encyclopedia of the constituents of human cells, tissues & organs will drive biomedical research for several decades. Such a program will nicely complement the qualitative spatial picture being developed by the HUBMAP initiative

Comments: Priorities/benefits/drawbacks:

Driving foundational science - such basic science effort should include funding mechanisms that encourage collaborative science at different levels and provide funding in a flexible manner such as 3 plus 3 (6yr) or 3 plus 5 (8yr) where initial efforts are critically peer reviewed by extramural panel and support is provided for an extended period for project that are feasible and potentially high impact.

Comments: Future/emerging opportunities/needs:

If possible please raise the \$500K cap to \$ 750 or \$ 1million for high-risk/ high impact projects. Also for the high impact project implement a two phase funding .

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

I have been funded by NIH and NSF since about ... and been an NIH grant reviewer since Recently I reviewed an R15 from a southern state. I became curious about the history of R15s there and compared 3 year blocks from 1999-2001, 2009-2022 and 2017-2019. I was dismayed to see that the number of recipient institutions and the number of grants had shown a steady decline. Certainly it was not because there is less need to expose undergraduates in that state to research experiences. It made me wonder if those grants were receiving less funding or if the grants were being syphoned off by more "competitive" PIs in states with better scientific infrastructure. Regardless of the cause, I think it would be wise for NIH to devise strategies to distribute grants of this sort uniformly across the spectrum of undergraduate institutions. I am aware this is an unpopular idea with the largest academic institutions with excellent lobbying skills.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Promoting biomedical science is important for the society. I am most passionate about elevating the scientific integrity and public accountability for biomedical research.

Comments: Priorities/benefits/drawbacks:

These are all important areas, but I think Objective is the most important: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science.

Comments: Future/emerging opportunities/needs:

Science is carried out by people. People need to be given the right incentives to best promote the integrity of our scientific enterprise.

Comments: Cross-cutting themes:

Please consider adding a theme focused on sustainability or sustainability planning, especially in regards to awards/activities/programs that build research, training and mentorship capacity of both domestic foreign institutions and individuals. Too often once funding for these programs, or people, cease important training and mentorship activities fall by the wayside. This is very evident in lower resourced institutions, where there might not be as many available financial, human, or other resources to continue certain activities.

Comments: Priorities/benefits/drawbacks:

Overall these objectives are good. Please consider adding to Objective 3 specific language around the engagement of communities and other key stakeholder groups. There can be little public accountability without a commitment to engage communities in research. There can be little impact without appealing to the communities in which we serve. Additionally, tying prevention to disease in Objective 1 bullet 1 unnecessarily limits the interpretation of prevention in this bullet point. Prevention is more than just disease prevention it can also be injury prevention. There are also different levels of prevention (primary, secondary, tertiary).

Comments: Future/emerging opportunities/needs:

Public health is moving in the direction of optimal, sustainable, and rigorous cross-disciplinary collaborations to meet the myriad of health challenges today. Opportunities to engage with NIH in these types of collaborations should be promoted. Ways of engaging with colleagues in public policy, economics, psychology, addiction medicine should be enhanced and promoted by NIH.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

I suggest that you add the following priority so that it gets the full attention that it deserves: Protect the value of American research, trade secrets and intellectual property.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Toward fostering a culture of good scientific stewardship and optimizing operations, the NIH should consider ways to enhance participation of highly respected, established scientists in the peer review process. While early career scientists should be afforded opportunities to gain experience in the review process, participation of seasoned reviewers with deep experience and perspectives on relevant fields is often lacking. Availability of anytime submission for permanent members of study sections is not sufficient to maintain participation of these important contributors. Either greater incentives should be considered, and/or the NIH should consider whether participation in peer review should more properly become a requirement of receipt of NIH support.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Metabolism play a key role in epigenetic changes that are associated with normal physiology and disease. However, the major pathways underlining metabolism-mediated epigenetic changes and their impact on physiopathology remains largely unknown. Previous studies focus on a few popular pathways, such as histone acetylation, methylation, and DNA methylation. However, emerging lines of evidence clearly suggest that other metabolism-mediated epigenetic pathways exist, but have not yet studied carefully in the past. Thus, I do consider that metabolism-mediated epigenetic mechanism is a foundational area in biomedicine and represent an area that is not sufficiently studied and should be promoted.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

NIH should consider a re-evaluation of how well funds expended match health/disease priorities in the US and for international programs. HIV, while an important disease, receives funding that is out of scale with its impact, while other non-infectious disease or non-HIV associated disease research is not well funded. The "bottom-up" approach to science at NIH (i.e. primarily investigator initiated research) might benefit from retooling by encouraging research into categorical areas of health needs. At the moment, well funded, well established researchers in well funded areas crowd out applications for science in emerging areas or less well developed fields. As a result, innovation and building knowledge in areas of greatest need for the Nation and globally are at the discretion of Institute Leadership who approve or disapprove special funding announcements. Therefore, if NIH really believes in the best science, it should provide opportunities for novel research in health categories, rather than for specific diseases (i.e. vaccines for infection X versus - vaccine development for infectious diseases of greatest concern). Also, since research publications are necessary but not sufficient to impact the health of nations, there should be a greater attempt to include pharmaceutical or biotech, and other product development partners, in research programs, as well as a stronger emphasis on implementation science to facilitate transition into application. National Institutes of HEALTH, when looking at extramural programs (and intramural, minus clinical center) are more National Institutes of Basic Science. To get to health, connections between fundamental research data and transition to application should be much more aggressively pursued. This would also get NIH out of the ivory tower status it currently occupies and mandate outcomes focused research with the \$40+ billion budget.

Comments: Priorities/benefits/drawbacks:

Objective 3 - Optimizing Operations. 80+ % of NIH' budget is spent in the extramural programs that necessitate a significant extent of oversight conducted by well trained personnel. Therefore, one of the biggest assets of NIH are its administrators and program officials. However, the heads of the Institutes/Centers/Offices, other senior leadership and middle management are not required to be trained in leading or managing people and their performance is not evaluated with respect to how well the ORGANIZATION is functioning. This is due to the fact that what should be a qualified manager in extramural is hired on the basis of his/her academic credentials, not their ability to manage operations and people. This leads to inefficient operations, disinterest in helping build human capital, inefficient communication and collaboration across the Institutes and with "Building 1". Given the vast budget of NIH, the ICOs should be required to operate according to good management principles, leadership should be evaluated based on how well they establish and run the organization, their ability to delegate work and empower their managers (without micromanagement), and mechanisms should be established whereby staff has an opportunity to review and provide evaluation of managers (currently, evaluations only go downward and managers/leadership is not evaluated by staff). NIH should evaluate the use of resources for extensive travel by leadership to further their academic careers or relationships and leadership should be held accountable for their conduct and to what extent they contribute to inefficient operations. Overall, a reassessment of the role of Institute Heads, their responsibilities to the

organizations they lead and their qualifications as CEOs may likely lead to less waste, greater morale and a more professional organization.

Comments: Future/emerging opportunities/needs:

NIH ICs should be required to engage in more trans-disciplinary research to understand health and diseases. At the moment, each IC has its own mission which leads to grant applications that span multiple disciplines not fitting clearly within an IC, and consequently also often not being reviewed well. Diseases do not occur in isolation and the current structure of the NIH makes it difficult to initiate research programs (outside the common fund) that address complex biological systems in a manner that involved multiple ICs.

Comments: Cross-cutting themes:

concept disorder : METABOLIC BODY/BREATH MALODOR. results in either : 1. person being a burden to the workplace. or 2. unemployed / suicidal / mental health risk / healthcare burden etc. Most cases of Met-BO are likely due to gene FMO3. But can smell of many FMO3 substrates (sulfides etc). FMO3 oxidizes sulfides, amines and phosphates. TMAU is a misdiagnosis and trimethylamine is a small player. Severe is rare, but mild may be common. More likely volatiles to blame : dimethylsulfide, methanethiol, sulfides ... TMA a small player. So ... Create the correct biochemical diagnosis test (a sulfide urine test) So that METABOLIC Body/Breath Malodor can be correctly documented This is the starting point. You will be surprised at the numbers affected [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(05\)77067-7/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(05)77067-7/fulltext) <https://digitalcommons.library.tmc.edu/dissertations/AAI1450285/>

Comments: Priorities/benefits/drawbacks:

Most people with MetBO : cant smell themselves its a transient problem smell of bowel smells starts in teens relatives cant smell

Comments: Future/emerging opportunities/needs:

1. Develop correct urine test to identify METABOLIC Body/Breath Malodor Most likely volatiles : sulfides, such as dimethylsulfide 2. Make it a self-pay order-direct test (no taxpayer cost ... win/win) ... as well as a traditional clinical test (most would ideally self-pay and order) 3. develop a Consumer Esensor fit for those with FMO3 Malodor (sulfide based). Most cant smell themselves. Longterm ... why not a USA Body Odor & Halitosis treatment and RESEARCH center ? Save taxpayer money by properly documenting METBO

Comments: Cross-cutting themes:

Chemical Biology, Chemistry of human behavior, intercellular communication, hormones and neurotransmitters, GPCRs, Drug Design for peptides, molecular pharmacology, what is life?, What is disease?, why are most of our drugs toxic?

Comments: Priorities/benefits/drawbacks:

NIH is doing an increasingly poor job of promoting basic science

Comments: Future/emerging opportunities/needs:

New Leadership is needed

Comments: Cross-cutting themes:

It is almost universally believed that "The Greatest Risk Factor for All Age-Associated Diseases is Aging." Why has NIH/NIA virtually ignored promoting research on the etiology of aging when differences at the molecular level between those found in young cells in a lineage, or in molecules that turnover in non-dividing chronologically young and old cells can now be determined. Many technologies exist to do this especially using cryo-EM. It is predictable that all age-associated diseases could have a common etiology in the molecular milieu to be found in old cells and not in young cells. Why is this essential research ignored?

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

This comment is focused on Objective 2 (Developing, Maintaining, and Renewing Scientific Research Capacity), but has implications for other aspects of the Strategic Framework (e.g., diversity, collaborative science, scientific integrity). The proportion of funds going to a small group of investigators is hindering scientific progress and innovation. NIH should aggressive seek tiered funding thresholds to maximize the number of DIFFERENT investigators with at least one active R01/R01 equivalent award. This should be an absolute top priority, even if it takes time to implement. Such an approach would also greatly improve the diversity of funded investigators, and reduce pressure on investigators to secure grants (because of higher paylines). This in term might also have a positive impact on scientific rigor and integrity (again, due to a culture more focused on science and less on paylines). One idea could be something along the lines of: 0 active R01s: Payline for additional R01 = 20% 1 active R01: Payline for additional R01 = 6% 2 active R01s: Payline for additional R01 = 2% This would make a reasonable payline available for everyone seeking at least one active R01, while also allowing those seeking higher funding levels to achieve their goals if their applications reach increasingly higher review scores. Research in essentially every field (science, consumer goods, business strategy, space exploration, automotive, and so on) demonstrates innovation is driven most effectively by the greatest number of ideas. We are currently hording the majority of funds with a small group of individuals, and thus ideas. One common

argument against the strategy above is that investigators with the largest funding pools have those funds because they have the best ideas or are best suited to advance the work, drive toward the clinic, publish in high impact papers, etc. Whether that is true or not, having a much larger pool of other investigators pursuing new ideas and publishing/presenting these ideas. These ideas will influence other researchers, including pursuit by current highly-funded (and perhaps more effective) investigators. This cascade of impactful new directions is stifled when a disproportionate level of funding resides with a small group (current situation). Additionally, many studies also demonstrate that productivity (e.g., per dollar spent, per lab member) does not increase proportionally with lab size, and sometimes decreases. Trying to play devil's advocate, I can think of no argument against the general idea of more equitably distributing funds across a broader number of high quality applications, unless there is a shortage of such grants; we know that is not the case. It may be politically unpopular (recall the "Grant Support Index") and will take some time to transition (especially for large labs), but is well worth the effort and conflict. As an investigator with 5 active R01/R01 equivalent grants, I strongly support this approach, even if it means reduced future funding for me. I think it's an investment in our next generation, in diversity, in research culture, and most importantly, an investment that will drive the most impactful science and translation.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Just as one of the top-line charges for the NIH AI Working Group was to identify ELSI (ethical, legal, and social implications) of AI, it seems that objective 3 should specifically call out at least the ethical implications of biomedical research at the same level as stewardship, partnership, accountability and optimizing operations. It is just as important, if not more so than each of those that are listed.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

* "diversity" in what? scientists? research subjects? Scientific topics studied? data considered? * "collaborations" with whom? You seem to be cutting out Chinese scientists from all fields * "public health"??? Isn't that the CDC? You make no mention of their role in public health. It seems to me that there has been no satisfactory answer to the media-generated coronavirus panic., no putting it into context of the thousands of flu deaths each year in the US.

Comments: Priorities/benefits/drawbacks:

a more balanced stance on the role of social and behavioral science, especially in the PREVENTION of medical problems. E.g. understanding WHY couples don't use contraception, in addition to funding the development of "new" methods. A scientific response to political pressures not to fund research on gun deaths, or on the role of abortion in assuring that all children are born WANTED.

Comments: Future/emerging opportunities/needs:

It's the integration of public health, and the evaluation of public health interventions . E.G. that drug education program that is proven ineffective but continues to be supported. Or the role of TV commercials for drugs in driving up demand for more expensive and marginally more effective medication.

Comments: Cross-cutting themes:

Release your retired experimental cats, dogs and apes to re-homing organizations waiting to take them. Stop dithering and stalling while they suffer. You are the worst of the DC/gov't agencies to do this. Others have moved forward, you are stuck. Get a move on.

Comments: Priorities/benefits/drawbacks:

Release your retired experimental cats, dogs and apes to re-homing organizations waiting to take them. Stop dithering and stalling while they suffer. You are the worst of the DC/gov't agencies to do this. Others have moved forward, you are stuck. Get a move on.

Comments: Future/emerging opportunities/needs:

Release your retired experimental cats, dogs and apes to re-homing organizations waiting to take them. Stop dithering and stalling while they suffer. You are the worst of the DC/gov't agencies to do this. Others have moved forward, you are stuck. Get a move on. You need an action plan for any future animals you are done torturing.

Comments: Cross-cutting themes:

1. More things like Blueprint Translational Devices, NIH BRAIN, and need a BIG boost to re-engage physician scientists across the early to mid career stages. These are great examples and please continue these "cross cutting" disciplines etc. Health is too big and too many sub-specialists. 2. NIH needs to double it's funding from 1% of the US GDP to at least 2%. If you trend these over the last 30 years vs inflation, it's flat. Health care is a 3 trillion dollar industry now and NIH needs a bigger budget. This message needs to go all the way up and unite ALL scientists, physicians, etc.

Comments: Priorities/benefits/drawbacks:

1. More grants to young physician-scientists, and earlier in their training. NIH is losing physicians who comprise a critical part of the NIH- National Institutes of Health. Physicians are absolutely critical to health care discovery, translation, and application at all phases. Right now, due to increasing pressures, physicians see the time involved in preparing a grant compared to other scientists less "effort vs return".

2. Representation of physician-scientists on peer review is another similar challenge. While foundational research is great in animal models, a lot of these grants never cross the chasm to the translational Phase II, and Phase III and into the bedside. 2. Include data science and Machine Learning, and AI grants need to be included and sharing these tools publicly like NLM (National Library of Medicine), PHAROS and other tools to help scientists across many sites, across the globe. Google and Data

Comments: Future/emerging opportunities/needs:

1.) The complexion of NIH reviewers needs more clinicians since NIH = National Institutes of Health and there is a growing gap of those who actually have time to write grants vs those who are actually caring for them. 2. More funding to young/early/mid investigators. The R01 club is hard to break psychologically in peer review " they've never been funded so we won't fund them". 3.)The "effort vs reward" of work put into writing grant applications is diminishing for young investigators compared to industry and others. Further, if their grant doesn't get reviewed it's really hard academically to "pick up the pieces" for young and mid-career investigators 4. There needs to be a positive feedback loop system (Donella Meadows "12 leverage points") not a negative one for young/mid investigators especially physicians who are seeing more patients per time unit than 30 years ago. This must be recognized and addressed. 5. The timeline for NIH cycle feedback is very long (months to sometimes a year before you know from submission to funding or various levels.). Yes it happens. By the time you get feedback, you've lost energy and focus on that particular project and without funding it's a negative feedback loop. The senior funded people know the system but the young/mid ones and those who haven't been funded we are losing touch with.

Comments: Cross-cutting themes:

It's unclear what "Increasing, Enhancing, and Supporting Diversity" really means. I am wary of these terms being left to the discretion of individuals in today's current political climate. Many folks tend to default to these terms relating to race, sex, etc.: i.e. physical characteristics that people are born with and which *ideally* have no bearing on one's success or approach to the world. I think an institution such as NIH should promote thought, curiosity, & passion. Don't let science get political! Promoting Collaborative Science: again, what does this mean? I think we need better systems in place for how people disseminate knowledge, incentivize discovery, foster career development. Ultimately, people don't collaborate when they have financial interests (i.e. CRISPR patent battle), or are vying for ultimate credit for an idea (i.e. CRISPR use in genome editing). We need better ways for investigators to get funding, to get jobs.

Comments: Priorities/benefits/drawbacks:

Objective 1: I agree with an emphasis on driving foundational science. It is important to fund good science, and good candidates, without necessarily placing a huge emphasis on topics that are directly related to curing disease. The reality is that good science flows naturally from good people with adequate funding, and it's impossible to predict which discoveries will ultimately translate into seminal knowledge. Objective 2: we really need to get people jobs that aren't beholden to private industry (i.e. pharma). Universities need funds to expand lab spaces and expand faculty hiring. There should be a goal

that all universities increase their faculty sizes by a decent percentage per year within these 5 years. Many key universities are in big, expensive cities (New York, Boston, San Francisco, Washington DC, to name a few), and the reality is that the salaries paid to scientists are just not sufficient to keep investigators in science when the opportunity costs of private enterprise are so high (i.e. the droves of physician-scientists to opt for private practice).

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Nutrition and diet sciences are woefully misunderstood and under-funded. If we are to effectively prevent disease, treat disease and improve health, NIH needs nutrition and diet as a factor that crosses all spans of health and disease. No longer can we assume a diet or nutritional environment is not relevant to health. This means, that like gender and other cross-cutting themes, diet and nutrition needs to be addressed (even if not studied) in every funded proposal. Period. Further, acknowledgment that diet and nutrition are worthy, or even leading factors that should be tested in randomized controlled trials and pre-clinical studies needs support. This means earmarking funding for diet and nutrition interventions is a must.

Comments: Priorities/benefits/drawbacks:

Other than clean water and clear air, high quality diet and optimal nutrition are perhaps the most influential factor in preventive medicine. Funding nutrition-relevant grants as 6% of NIH portfolio is shameful.

Comments: Future/emerging opportunities/needs:

Nutrition. Diet.

Comments: Cross-cutting themes:

The term minority health seems long out of step with current nomenclature for understudied, marginalized and underprivileged groups. Open science could be aligned with collaborative science. The need to integrate health research collaboratively with contexts like schools, businesses and military is important. NIH needs to maintain its footprint in leading health research but also find new ways to move faster and be more dexterous with other communities.

Comments: Priorities/benefits/drawbacks:

These do not sound like objectives to me. They sound like core mission elements. As written, these make me think that the authors of the plan are very inwardly focused. Objectives could be more like the ten year missions that have appeared, such as for the genome, biome, etc. Much of the language begins to sound indistinguishable from NSF mission elements. Missing are more mainstream identifiers of NIH goals, like intervention, prevention, translation, implementation, and so on. The word health appears

only twice and in neither case prominently. Medicine never appears. Biomedical and behavioral appear only in the context of accountability.

Comments: Future/emerging opportunities/needs:

Would like to see more about AI. I was a strategic planner for years prior to graduate school and have been involved in NIH based research intermittently for years. Perhaps I could help with this.

Comments: Cross-cutting themes:

We are missing the boat on 1) men's health, 2) fathers' health especially during the transition to fatherhood, and 3) understanding the ways that child health and family health (maternal and paternal) are interrelated. This is even more important with the continued disparities in male life expectancy compared to females in the US as well as the growing evidence of the role fathers play in family and child outcomes. Additionally, we have established evidence that men's health is effected by the transition to fatherhood. One innovative approach is described here:

<https://ajph.aphapublications.org/doi/10.2105/AJPH.2018.304664>

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

APS supports NIH's list of cross-cutting themes. We encourage NIH to draw on the expertise of psychological scientists, and behavioral and social scientists broadly, in pursuit of these themes. There are psychological scientists who specialize in every cross-cutting theme mentioned: Increasing and enhancing diversity, improving women and minority health and reducing health disparities, optimizing data science and developing methodologies and tools, promoting collaborative science, and studying public health across the lifespan.

Comments: Priorities/benefits/drawbacks:

Most of the leading public health issues facing our nation—including cancer, addiction, heart disease, mental illness, diabetes, violence, and AIDS—are rooted in individual and social behavior. Especially for this reason, APS thanks NIH for prioritizing the advancement of behavioral science in Objective 1 of its strategic plan framework. APS recognizes that NIH funds over \$5 billion of behavioral and social science research annually. However, APS's view is that behavioral science is too decentralized across NIH's institutes, and as such NIH's ability to manage and directly fund this important research is limited. To fulfill this important Objective, NIH must strengthen both its investment in and management of behavioral science research and training. Further, to meet this Objective, APS urges NIH to ensure that psychological science and the other behavioral and social sciences are fully represented throughout NIH.

Psychological science or other behavioral sciences should be represented within the Advisory Committee to the Director, for example, and also, per federal statute, within individual institute advisory committees. APS also encourages that psychological scientists be fully represented within NIH peer review panels, working groups, and other important standing and ad hoc groups at NIH. The underrepresentation of the behavioral and social sciences at NIH results in adverse outcomes for NIH and scientific research generally. As a key example, NIH's decision to classify basic experimental research with humans as clinical trials has been widely objected to by the behavioral science community. APS's view is that if behavioral science were fully represented within NIH's leadership, these inappropriate policy changes would not have been enacted. On a broader note, underrepresentation of behavioral and social sciences at NIH means that NIH is less equipped to address the public health issues mentioned above that have human behavior at their core. Therefore, to recognize the contributions that behavioral science can make to improving human health, and to fully realize NIH's Objective to advance health research, NIH must recognize behavioral science as an equal partner in this shared endeavor. With regard to Objective 2, APS also encourages that the subcomponent reads "Cultivating the Biomedical and Behavioral Research Workforce" rather than "Cultivating the Biomedical Research Workforce" to align with the terminology used within Objectives 1 and 3.

Comments: Future/emerging opportunities/needs:

A robust foundational behavioral science enterprise—research which may lead to discoveries that prevent disease and promote health, or to the development of treatments, interventions, and cures—requires a research process which minimizes costly or lengthy administrative burdens on researchers while enhancing both (1) necessary protections for participants consistent with potential risks and (2) research transparency of value to all stakeholders. NIH's current classification of basic experimental research with humans as clinical trials upends this balance, increasing red tape and costs that are unnecessary to meet shared goals of participant safety and research transparency and oversight. APS strongly urges NIH to not classify basic experimental research with humans as clinical trials and to work with the behavioral science community to find alternative ways of meeting these goals. NIH knows that over 3,500 individual scientists, 35 current and former members of NIH advisory councils, and Congress have expressed similar concerns over the last year. On a broader note, to meet the objectives described earlier in this response, APS requests that NIH convene a special advisory panel of behavioral scientists and other community experts, from both within and outside of NIH, for the purpose of providing recommendations on how to better integrate and realize the benefits to overall health from behavioral research at NIH. This panel should determine whether NIH's current infrastructure will allow full support of NIH's objectives to advance behavioral science, cultivate the behavioral science workforce, and ensure accountability and confidence in behavioral science, in addition to NIH's objectives that are science-wide. This panel should also evaluate the benefits of a more centralized organizational structure with grant making authority as opposed to the current structure which only funds behavioral research as it is incidental to other research initiatives.

Comments: Cross-cutting themes:

Everything looks good. I would also like to suggest better and more medical intern training, more Nurse, DR, PA, LPN and Medical Aid training Schools. There are hundreds of people that want to be part of the medical community, but because of education and money - they can not be part of it. I would like to see NIH start a program to direct a step by step training program starting in junior high school for student to start training to become part of the team. The homosexual assault on males being nurses needs to be stopped! A ladder system of training must be developed so that a CNA can train to be an LPN, an LPN can train to be a 2 year RN, a 3 yr Rn can train to become a 4 yr RN, a 4 yr Rn can train to become a PA and a PA can train to become a DR. Right now there is little cross over. America is short of ALL OF these levels of training and now its going to bit the American People in the... The colleges and medical schools have NO way to help those dedicated students that fail to get up to speed to obtain the level of medical training they want. There are thousands of dedicated Navy Corpsman and Army Medics that would love to train to become better medical personel - develop a military training system to retrain and certify these men and wemqñ. What a waist to lit them out of the militrtary, so they can work at WallMart! What a waist! ...

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

Training new personel!

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Behavioral Health

Comments: Future/emerging opportunities/needs:

I would like to see NIH do research on the need to involve family in psychiatric therapy

Comments: Cross-cutting themes:

metabolic diseases that causes body olor

Comments: Priorities/benefits/drawbacks:

enzyme FMO3

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

i do not support increaed diversity. we have more than enough diversity at the present time. such increase in diversity in fact makes getting along harder and harder. diversity increases arguments over everything. some people want to eat cats and dogs. otehrs thinks that is the epitome of crass evil.... we cannot continue to fracture our society with this knid of everyday disagreement on how to live every day lives. i think is encourages deaths and suicides. we do need some homoegenity. i think so much diversity is kililing america. secondly, the whites are dying at greater rates, they were going for long l ives, but since 2017 they have been dying at younger and younger ages. do you think constantly being called names hurts their health. i do. i think these are issues that are hurting american health. the long time citizens of this country are in fact being murdered by some of these govt practices. this commetn is for the public record. please receipt.,

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

I'm writing in with respect to "developing treatments, interventions and cures" in the world of an insidious condition called ME/CFS. ...has been suffering from ME/Chronic Fatigue Syndrome for the past 6 years and no treatment currently exists. He has seen many many doctors and has tried various treatments, but nothing has made even a slight improvement in his condition. His main symptoms are post-exertion malaise and "brain fog" along with persistent low-grade headaches.

Comments: Priorities/benefits/drawbacks:

My hope certainly is that NIH can help provide the necessary funding to research and develop effective treatments for ME/CFS. It's a real travesty that so many suffer from this insidious and debilitating condition and currently there is so little being invested in research directed towards coming up with treatments and cures.

Comments: Future/emerging opportunities/needs:

Please focus on ME/CFS!!!! Thank you.

Comments: Cross-cutting themes:

I would like to request the NIH to focus its efforts on post-viral fatigue research. ... health has been affected deeply for six years and he looks to the NIH to lead the research that may find a solution. Thank you.

Comments: Priorities/benefits/drawbacks:

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Comments: Future/emerging opportunities/needs:

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Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

Post viral fatigue research (me/cfs). As a patient of 5 years, I have been perplexed as to why the research dollars don't match the severity and population size of this disease. This would be synergistic with other research into immune dysfunction. Thanks, ...

Comments: Cross-cutting themes:

Branding reminds that work at a low cost for preventive and research studied treatments for possible cure. (FDA) regulations. Combined compounded capsules/powered convenience packs.

Comments: Priorities/benefits/drawbacks:

Main objective as a temporary and permanent solutions for the treatment and prevention for pre or newly onset viruses ,such as corona virus and or pneumonia .

Comments: Future/emerging opportunities/needs:

NIH and the conversation of healthcare ,as a whole to search and make available a temporary on sight remedy for Carona Virus, covid 2, mers antiviral over the counter cost friendly combination packets that are safe and have little known side effects. And are readily available to the public.

Comments: Cross-cutting themes:

Promoting Collaborative Science 1. The former Fogarty International program that supported individual foreign postdoctoral scientists to conduct research in a US lab was a major asset to the promotion of international collaborative science. Many of the postdoctoral scientists maintained long-term collaborations with US scientists after they returned to their home countries, and those collaborations sometimes led to new collaborations between scientists in the respective US and foreign labs. This

program was a major asset in the cross-fertilization of science in the US with science in other countries, and in the internationalization of scientific programs. It also brought new ideas to US labs and greatly enhanced their scientific productivity, at little cost. The reinstatement of this program would be an important asset in promoting collaborative science, at minimal cost. 2. The ORIP Comparative Medicine Division plays a major role in promoting collaborative science through its support of national animal research and resource centers, such as the National Primate Research Centers. That role would be strengthened if additional such centers were established for key species that are not yet represented. A species for which a national research and resource center is badly needed is the laboratory opossum (*Monodelphis domestica*), which is used in research that is critical to the missions of several NIH institutes. The species is unique as a laboratory animal in that the animals are born at the developmental stage of a 5- or 6-week-old human embryo, and they can be easily manipulated experimentally as extra-uterine embryos and fetuses. Some of the recent publications with this species have been important in advancing research on spinal cord regeneration, melanoma, cholesterol metabolism and hyperlipidemia, non-alcoholic fatty liver disease and steatohepatitis, AIDS, Rickettsial and viral diseases (including Zika virus disease, submitted manuscript), X-chromosome inactivation, control of limb growth by molecular signaling, teratogenesis, resistance to snake venom, and immunobiology. Currently, individual investigators try to maintain small breeding colonies of this species to support their research, but they cannot produce age-matched animals in sufficient numbers for major research projects, and their colonies are frequently lost (after having been established at great expense) during hiatuses of research grant funding. This species does not often appear in titles, abstracts, or key words of NIH grants because it is most often used along with other species in comparative approaches to understanding biological mechanisms (and no species names appear in Research Resources Reporter for those grants). The establishment of a national laboratory opossum research center, which would function similarly to a National Primate Research Center but at a fraction of the cost, would promote collaborative science among investigators who accessed the resources of the Center and between those investigators and investigators based at the host institution of the Center. It also would greatly increase the efficiency and reduce the costs of using this species in biomedical research, and would make it readily accessible to all NIH-supported investigators.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

As suggested in my comments under Cross-Cutting Themes, the establishment of a national laboratory opossum research center is an emerging trans-NIH need. Recent results that depended on this species have been published in fields that are directly relevant to NCI, NHLBI, NIAID, NIDDK, and NIGMS. The number of publications that used this species is limited because of lack of accessibility of the species to most investigators, but there is broad interest in using this species to advance the missions of those institutes. This species has unique characteristics that can be harnessed to address questions that can not be readily addressed, if at all, with other laboratory animals. The constellation of recent publications that used this species indicates that it can fulfill emerging trans-NIH needs, if it can be made readily and economically available to investigators.

Comments: Cross-cutting themes:

Within the theme, "Addressing Public Health Challenges Across the Lifespan", it would be beneficial to ensure that there is a focus on supporting research into young adult cancers, specifically the rise in early age onset colorectal cancer. This would also support reducing health disparities, as this age group faces unique challenges including the loss of jobs, financial toxicity, fertility, and other psychosocial issues.

Comments: Priorities/benefits/drawbacks:

We are in alignment with all three objectives and think they are notable goals. An opportunity that can be leveraged as it relates to "Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science" is ensuring and providing recommendations for reporting clinical trial results. Although there have been major attempts both in the US and globally, the NIH has an opportunity to ensure that they are setting the precedent and providing guidance for others to do the same.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The proposed cross-cutting themes highlight areas of critical importance for an agency charged with seeking fundamental knowledge about living systems and applying it to the enhancement of human health and wellness. Specifically, FASEB appreciates NIH's continued emphasis on increasing, enhancing, and supporting diversity, both through more inclusive research activities as well as development of a scientific workforce representative of the nation's broader population. We are also pleased by the emphasis on data science and the development of technologies and tools, as both are critical to advancing scientific progress. Technological advances have expanded the ways investigators collect, utilize and share data, and federal agencies such as NIH play an important role in establishing expectations for data curation, management, and sharing.

Comments: Priorities/benefits/drawbacks:

FASEB supports the overall framework proposed for the FY 2021 – 2025 NIH-wide strategic plan. The proposed framework builds upon the lessons learned during the development of the current (FY 2016 – 2020) agency-wide strategic plan and offers flexibility by emphasizing overarching NIH priorities rather than delineating Institute or Center (I/C) specific projects or programming. We also appreciate NIH's continued active engagement of the research community in the discussion of planned priorities for the next five years and beyond. We are pleased with the emphasis on NIH's role in driving foundational science within Objective 1, Advancing Biomedical and Behavioral Sciences. NIH's continued support of investigator-initiated research has accelerated scientists' understanding of the biological processes underlying debilitating diseases and uncovered strategies for treatments and cures. Foundational research efforts supported by NIH are critical for guiding the development of clinical applications to

prevent disease and enhance public health. Therefore, as content for this objective is developed, we urge inclusion of key examples of findings from foundational research studies that have contributed to clinical advances. Similarly, it is important to highlight NIH's role as a key sponsor of foundational research efforts. While private sector investments can aid in furthering the translation of preliminary findings, they cannot replace robust, predictable, and sustainable federal support for exploratory research. FASEB appreciates NIH's recognition of the importance of research resources and workforce development outlined in Objective 2, Developing, Maintaining, and Renewing Scientific Research Capacity. During the past decade, Working Groups of the Advisory Committee to the Director issued numerous reports highlighting challenges facing the biomedical research workforce. While we appreciate the increased transparency and discussion of challenges faced by Early-Stage and Midcareer Investigators, the biomedical research workforce pipeline remains unstable and fragile. Therefore, we welcome inclusion of goals that take meaningful steps towards addressing the diversity and sustainability of the U.S. biomedical research workforce. NIH support of research infrastructure, including centralized repositories and centers and technology development, complements investments towards individual research teams. Strategies that synergize staff talent, reduce duplicative services, improve user access, and increase overall capacity of the biomedical research enterprise maximize infrastructure investments. Expanded support for regional instrumentation centers with additional technological capabilities such as single-cell sequencing, spectral cytometry, and large animal transgenics represent investments that will drive innovation forward and facilitate scientific collaboration, consistent with the Strategic Plan's cross-cutting themes. Objective 3 – Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science – is appreciated given the sustained interest among lawmakers on the rigor and transparency of federally funded research. NIH is committed to fostering scientific research and dialog of the highest quality. This objective provides opportunities to highlight the impact of agency policies and practices – many put in place prior to the adoption of the current strategic plan – to furthering this goal. In addition, we encourage continued emphasis and commitment to the elimination of harassment in research environments including the laboratory and home institution as well as field work and scientific conferences.

Comments: Future/emerging opportunities/needs:

Development of the FY 2021 – 2025 NIH Strategic Plan corresponds with a unique time as research stakeholders navigate uncharted territory amidst the COVID-19 crisis. In light of these current challenging circumstances, we encourage inclusion of language regarding rapid mobilization of NIH resources to respond proactively to this and future pandemics.

Comments: Cross-cutting themes:

We support the idea of cross-cutting themes and major objectives. In considering the specific cross-cutting themes, we have the following suggestions: · Bullet #2 to read “Improving Women’s Health, Child & Adolescent Health, and Minority Health, and Reducing Health Disparities”, capitalizing on the opportunity to embrace the newly formed Trans NIH-Pediatric Research Consortium and emphasize child health research and also recognizing the importance of health disparities among children and

adolescents. · Bullet #3 to read “Optimizing Data Science, Including Development of Technology and Tools,” thereby clarifying the relationship between development of technology and tools for the purpose of optimizing data science.

Comments: Priorities/benefits/drawbacks:

With regard to the three Objectives, we suggest the following: Objective 1, we suggest: · Expanding bullet #3 to read “Developing and Optimizing Treatments, Diagnostics, Interventions, and Cures for all age groups and populations.” Addition of the word “optimizing” highlights the importance of minimizing long-term sequelae of treatments. Addition of “for all age groups and populations” underscores the importance of developing trials that include all ages, all ethnic and racial groups, and all gender groups, a clear priority for the NIH and for the biomedical research community in general. When the plan to address this objective is developed, we are hopeful that the NIH will make a concerted effort to address the urgent need for research on behavioral and mental health conditions in children (e.g. autism, depression, attention deficit hyperactivity disorder, anxiety), in particular given that these conditions have an overall prevalence in the pediatric population of roughly 20%.¹ Objective 2, we suggest: · Bullet #1 to read “Cultivating the Biomedical Research Workforce and Establishing an Adequate Pipeline” We recommend that this objective include a focus on the pipeline of pediatric physician-investigators. As highlighted in a recent publication by Good et al., among the R01 equivalents awarded by the NIH to MD or MD/PhD pediatric investigators during the period between 2012 and 2017, approximately 60% were awarded to individuals at the rank of professor, underscoring the need to cultivate a larger pool of early and mid-level pediatric investigators.² The Trans NIH-Pediatric Research Consortium represents an ideal vehicle to strengthen the pipeline of pediatric physician-scientists. For example, support from institutes beyond the NICHD for the highly successful Pediatric Scientist Development Program (PSDP) would be a logical approach to restore funding for this program after the 40% decrease in funding from 17 positions to 10 positions 3 years ago. In particular, consideration should be given to the number of PSDP fellows pursuing work relevant to NIDDK, NIAID, NCI, NINDS, and NIAMS, among other institutes.³ Similarly, support from other institutes for the successful Child Health Research Career Development Award K12 program, which experienced a cut from 21 to 12 participating departments of pediatrics over the past several years, would have an important impact on the pipeline of pediatric investigators.⁴ Objective 3, bullet #4. The term “Optimizing Operations” lacks clarity.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

As the NIH develops its 5-year strategic plan to advance its mission, the National Anti-Vivisection Society strongly recommends that one major theme be integral to your objectives: more emphasis should be placed on the development and use of human-relevant, non-animal alternatives, and less emphasis be directed on experiments involving non-human animals. Having this premise in mind will enable the NIH to achieve significant progress across all objectives, and advance efforts to enhance health, lengthen life and reduce illness and disability, in line with the mission of the NIH. There are

serious scientific flaws in thinking animals can accurately mimic human biology: • Differences between species make extrapolation of data across species highly unreliable. • Small genetic differences between humans contribute to health, disease prognosis, progression, prevention, and response to treatments, so which humans are we expecting animals to model? • It is not justifiable, ethical, or scientifically valid to continue to use animals as stand-ins for humans when researchers could instead be encouraged to develop and work with human-relevant models. In reviewing the specific areas of concern, listed below, the adherence to a culture that does not rely on animal models as the default for a vast majority of research and testing will improve many of the outcomes. Cross Cutting Themes Optimizing Data Science and the Development of Technologies and Tools: This is key to the advancement of 21st century science, where many innovative and predictive developments are already in the works. Better funding for the development of human-relevant technologies and tools for data assessment that do not rely on animal models would result in a leap forward in our understanding. Other federal agencies, such as EPA, have already set out to make the reduction and replacement of animal use a priority, by recognizing the value of human cell lines, stem cells and tissues and computational models as powerful research tools. Last September, the EPA indicated its goal is to eliminate all routine safety tests on mammals by 2035. Likewise, NIH should consider ways it can achieve the reduction and replacement of animal use in the near future by using more sophisticated human-relevant research models. Promoting Collaborative Science: Biochemistry, cell biology, bioengineering, microbiology and so many other disciplines have made contributions towards ongoing issues in human health. Having researchers from diverse specialties coming together to work on a common goal, such as the development of more human-relevant scientific models, would be synergistic and advance science at a rapid pace, and would help reduce reliance on animal models that lack predictive value.

Comments: Priorities/benefits/drawbacks:

Objective 1 Driving Foundational Science: NIH is devoted to bettering human health and should prioritize programs focused on humans—men, women and children from many ethnic and geographical backgrounds. The search for a better understanding of human health is ill served by the continued practice of looking for “human-like” findings in animals. NIH must instead invest in research focused on the development of human-relevant models. Developing Treatments, Interventions, and Cures: Animal experiments do not accurately predict human response. Approximately 90% of promising drugs in preclinical animal models fail in human clinical trials because of lack of efficacy or toxicity. If 90% of drugs don’t work in humans after animal testing, how many potentially effective treatments didn’t advance to humans because they didn’t work in animals? To help the millions of people who need new and better treatments, scientists cannot afford to work with ineffective models. As our country is gripped in the COVID-19 pandemic, the need to work quickly to determine treatments for humans is clear. There are efforts underway globally to develop methods of detection and treatment that are not first going to an animal model. Why are animal models still a default means of scientific inquiry when we are not faced by pandemic conditions? The future of human health research cannot be based upon mouse or primate biology. NIH must take decisive steps to ensure that efforts to better human health are rooted in human-relevant research. Objective 2 Supporting Research Resources and Infrastructure: The development and funding of infrastructure is key to any endeavor, whether it is maintaining our national highways, ensuring working energy grids or being able to hit the ground running when

pandemics strike. To upgrade this infrastructure, NIH should allocate resources to the most innovative and productive research areas. Current funding prioritizes projects that follow traditional (and often unproductive) research methodologies. This costly reliance could be better invested into innovations and infrastructure that support non-animal methodologies. Objective 3 Fostering a Culture of Good Scientific Stewardship: Good scientific stewardship is a difficult standard to achieve with millions of animals used in experiments annually and the welfare oversight agency failing to report a significant number of violations. How can the public have confidence in scientific conduct when there is little accountability? Moreover, the deficiencies in the process for approval to conduct animal-based projects further erode public confidence. Deficiencies include failure to: -Document the ability to conduct the research without animals; -Adequately ensure analgesic and anesthesia use for painful procedures; -Adequately account for animal disposition after research is complete; -Ethologically house most animals used in research. Ensuring Accountability and Confidence in Biomedical and Behavioral Sciences: The validity of animal experiments is in question. The results of many animal experiments are never published, causing researchers to duplicate experiments, cherry-pick findings, and waste time, money and animal lives. Reproducibility issues resulting from lack of bias-reducing measures, poorly planned experiments, inappropriate statistical tests, among others, plague animal research. Rather than fix this flawed system, NIH should support development of human-relevant, non-animal approaches.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Our work is driven by our commitment to promote mental health as a critical part of overall wellness, including prevention services for all, early identification and intervention for those at risk, integrated care, services, and supports for those who need it, with recovery as the goal. Consistent with this mission, we would suggest revising one of the cross cutting themes from “addressing public health challenges” to “advancing national public health” because the agency should be proactive, not reactive in its efforts to improve public health. Moreover, we would strongly suggest moving this to an objective because there are specific activities that are not otherwise reflected which will need to happen for NIH’s research to improve public health. For example, further collaboration is needed within the federal government to impact public health and have NIH’s findings reflected in quality metrics, as well as program and funding priorities throughout the Department of Health and Human Services, especially at the Centers for Medicare and Medicaid Services. It would also be helpful if accrediting organizations incorporated scientific findings in their requirements. We strongly support the cross cutting themes to enhance diversity and reduce health disparities. MHA strongly believes in the need to increase, enhance and support diversity. We note that a focus on diversity will lead to research that is particularly impactful for women and underserved populations. NIH should also lead a concerted effort to include diverse research participants and diverse researchers in all NIMH funded activities. We applaud the emphasis on improving women’s health and minority health and reducing health disparities. In commenting on NIMH’s strategic plan, MHA has noted the need for additional research on safety of medications in pregnancy and maternal mental health. MHA has also seen disproportionate screening

and indications of depression in LGBTQ persons, especially youth, and would recommend research as to the underlying causes and effective interventions. This category should include racial and ethnic minority health as well as LGBTQ health. With respect to African American youth, the Congressional Black Caucus has called for substantial research into the causes of the disproportionate increase in suicidal behavior in African American youth and MHA strongly supports this recommendation. As NIH works to reduce health disparities, it is critical that mental health conditions be included in the factors to be examined. Research indicates that people with serious mental illness die at least 10 years earlier than those without these conditions, often of preventable physical health conditions. Moreover, efforts by the State of Oregon to separate out outcomes in emergency rooms by those with mental illness and those without these conditions indicated substantial disparities.

Comments: Priorities/benefits/drawbacks:

With respect to the objectives, MHA strongly supports the emphasis on preventing disease and promoting health. MHA believes in preventing and intervening “before stage four” to address mental health conditions early as we do other health conditions. We strongly support and urge continued emphasis on research that will identify new paths for intervening with treatment and supports before a health condition develops in childhood or worsens. MHA strongly supports a greater focus and more specificity with respect to youth. For example, rates of depression and anxiety are precipitously increasing along with suicide rates for this population. The Congressional Black Caucus recently released a report to Congress noting that the suicide death rate for black youth is rising faster than any other racial group and also emphasizing that black adolescents are significantly less likely to receive care for depression, a risk factor for suicide. The first recommendation of the report is to increase the amount of research into topics relating to black youth mental health and suicide through NIMH funding and the second recommendation is to increase funding and resources for black researchers focused on these topics. As noted, MHA strongly supports these and the other report recommendations and urges attention to these issues in the strategic plan. As NIH considers the cross cutting theme of collaborative science, it should place greater emphasis on consistent data collection and transparency. The mental health community has a desperate need for new treatments and we fully support collaboration to develop new ideas. However, we have been very concerned about the lack of uniform data collection and transparency with academic research paid by NIH dollars. NIH should ensure that its grantees adhere to consistent data collection methods or be ineligible for future grants. In addition, other disease states have been able to benefit more from collaborative science than mental health. We know there have been recent efforts to secure an Advancing Medicine Partnership (AMP) for schizophrenia and applaud these efforts while seeking expansion to other mental health conditions. Finally, we recommend adding a bullet in the last objective to reflect the need to have patient centered research. We would strongly urge adopting the practices of the Patient Centered Outcome Research Institute, which requires involvement of patients at every stage of the research. We have seen from our own work that individuals with health conditions and their providers often value different outcomes from treatment. It is critical to have patient input integrated into study design, outcomes and planning. In addition, people with health conditions can provide useful input into the questions to be studied in the research as well as how and what will be communicated back to the participants in the study.

Accordingly, we urge adding “Inclusion of the Patient Voice in All Aspects of Research” as an additional bullet.

Comments: Future/emerging opportunities/needs:

We suggest that advancing public health will require research into some of the major trends in our nation that are impacting health, such as the long-term effects of high brain stimulation due to technology use from age 0-3. Research on the relationship between tobacco and cancer led to widespread public health efforts to reduce teen smoking and research on nutrition and school lunches has had a similar effect on obesity. NIH should continue to spearhead research in these major areas of impact, including researching the effect of internet and social media use on youth mental health. MHA notes that treatment and interventions are included within one objective, but they are different and may benefit from different sections in the plan. We need new medications to treat mental health conditions and see continued need for substantially investing in studying the brain. We also would benefit greatly from further research in effective intervention in such public health areas as reducing suicide. Further research on implementation protocols in emergency rooms and standardization of practices could be very helpful in moving to universal screening. Research on interventions should include both in person and online. Online, approximately 50 percent of MHA’s 500,000 annual screeners for depression report having thoughts of suicide. Most report thinking about death and suicide daily. MHA is aware of little to no research on what protocols to follow after implementing a suicide screen online and the most effective interventions to support people struggling with suicidal thoughts in an online space. The most frequently used protocols inform people to call the National Suicide Prevention Lifeline, or Crisis Text Line. Our research shows that some people will use these resources, but a majority will not. Asking people to call 911 or go to the emergency room is also not a viable solution for most people. The research should focus on interventions for people who are struggling with their symptoms online, who wish to remain anonymous, and are interested in digital-based supports.

Comments: Cross-cutting themes:

Considering the current global development with COVID-19, we now see the lives of our vulnerable and ill population being in the hands of our leaders. The moment is so critical that the discussions are to sacrifice 2% of the population (ill, disabled, elderly) or save economy stability. Thus, if we got to this point, it is partially our fault as scientist. We fail to show the importance of a diverse and inclusive community to our constituents. Diversity is everyone not only people from racial and varied ethnic backgrounds. We need to develop healthy/positive models of research for individuals with disabilities and the elderly. The research with these groups tends to carry a negative tone and express burden. We need to change this deficient public view of the problem by supporting, designing, and implementing innovative and value disruptive research.

Comments: Priorities/benefits/drawbacks:

As previously noted, the priority areas should include Functional Wellness and Positive Models of research for groups who are usually marginalized.

Comments: Future/emerging opportunities/needs:

Multigenerational and across the lifespan opportunities.

Comments: Cross-cutting themes:

There is a great need for more research related to improving health in minority populations and reducing disparities. Many of the diseases that minorities have a higher risk for (i.e. hypertension and diabetes) are preventable and could possibly be caused by generational unhealthy habits. We need studies across the lifespan to determine the root cause of minorities having higher risks for certain diseases. Current practice does not put a lot of focus of preventing diseases by healthy lifestyles, but instead focus on treating diseases after they already exist. Preventive care generally focuses on testing individuals for chronic diseases to detect them early. However, individuals are not effectively taught how to live a healthy lifestyle during preventive visits. We need evidence to support the need for more preventive measures (i.e. seeing nutritionists), as a health promotion activity, not as a result of a chronic disease diagnosis. An additional cross-cutting theme that can be considered is addressing the link between the physical world and the spirit realm. There is an increasing amount of literature about the physical signs from the spirit realm; however, there is a lack of scientific evidence supporting the literature. Although there is a clear link between the physical and spiritual world, it is usually based on experiences from religious leaders and psychics. Understanding the signs from the spirit realm could possibly improve the field of mental health and equip healthcare professionals to address spiritual health. I believe sometimes mental health and spiritual health are confused with one another. Furthermore, spiritual practices have shown improvements in mental health far more than medication, but there is limited evidence showing the difference. More studies can also help healthcare professionals disassociate spirituality from religion and better care for individuals spiritual health needs without imposing on religious beliefs. In nursing school, nurses are taught the importance of holistic health and meeting patients' spiritual needs; however, there is limited information on how to meet spiritual needs besides understanding how to respect people of different religions and beliefs.

Comments: Priorities/benefits/drawbacks:

The priorities across the three objectives are fit well into the cross-cutting themes and provide a good foundation for meeting research needs.

Comments: Future/emerging opportunities/needs:

An additional cross-cutting theme that can be considered is addressing the link between the physical world and the spirit realm. There is an increasing amount of literature about the physical signs from the spirit realm; however, there is a lack of scientific evidence supporting the literature. Although there is a clear link between the physical and spiritual world, it is usually based on experiences from religious leaders and psychics. Understanding the signs from the spirit realm could possibly improve the field of mental health and equip healthcare professionals to address spiritual health. I believe sometimes mental health and spiritual health are confused with one another. Furthermore, spiritual practices have shown improvements in mental health far more than medication, but there is limited evidence showing

the difference. More studies can also help healthcare professionals disassociate spirituality from religion and better care for individuals spiritual health needs without imposing on religious beliefs. In nursing school, nurses are taught the importance of holistic health and meeting patients' spiritual needs; however, there is limited information on how to meet spiritual needs besides understanding how to respect people of different religions and beliefs.

Comments: Cross-cutting themes:

Pressure injuries continue to be a multifactorial and pervasive problem that transcends all age groups regardless of gender, race, ethnicity or care setting. At the same time, the influence is disparate, with men and African Americans experiencing pressure injuries at greater rates.^{1,2} Despite advances in technology and in our understanding of pressure injury etiology, as well as the associated intrinsic and extrinsic risk factors, pressure injury rates continue to escalate. In fact, recently reported rates of hospital-acquired pressure injuries have been trending upward in the U.S. with an increase from 3.6 cases/10,000 hospital encounters to 4.8 cases/10,000 hospital encounters reported between the years 2013 and 2016.³ Notably, 24.6% of these encounters demonstrated an increase in more severe hospital-acquired pressure injuries (Stage 3, Stage 4, unstageable) between the years 2015 and 2016.³ Associated costs reported for pressure injuries have reached a staggering 26.8 billion dollars annually.⁴ The treatment of one pressure injury can range from \$20,900 to \$151,700 per patient and equates with poor patient outcomes including mortality.^{5,6} The mortality rates in the U.S. for patients with pressure injuries are estimated at 60,000 annually, which is on par with deaths related to drug overdose and higher than annual death rates from suicide rates or influenza.^{3,7,8} Thus, despite our advanced knowledge, it is imperative that pressure injury research initiatives increase and continue, with a specific focus on the underlying anatomic and physiologic concepts that address pressure injury occurrence, treatment and on sustainable preventive initiatives. Recently, there has been development of emerging technologies that can detect the early presence of pressure injuries. This technology promotes earlier preventive interventions that may mitigate worsening of a pressure injury. However, these promising technologies are still in the early stages of translation and implementation due in part to a lack of rigorous research conducted to evaluate success in improving clinical outcomes. Furthermore, data science is emerging as a valuable tool to identify individuals at risk of pressure injuries and will lead to earlier preventive care. Future risk assessment models, developed with big data, will facilitate personalized interventions, but this work is still early and needs greater effort and investment. The National Pressure Injury Advisory Panel (NPIAP)⁹ is an independent, not-for-profit professional organization dedicated to the prevention and management of pressure injuries. It is composed of leading experts from different health care disciplines who share a commitment to the prevention and management of pressure injuries. As pressure injury experts, we fully recognize the significant health care burden of pressure injuries and support robust research endeavors aimed at the accurate determination of predictive pressure injury risk factors, the use of emerging detection and treatment technologies as well as research initiatives that will advance the science regarding the pathophysiologic changes that contribute to pressure injury development. Additionally, we advocate that pressure injury research be an interprofessional collaborative effort due to its complexities and negative outcomes. We

strongly encourage the NIH to consider including pressure injuries, a debilitating and costly condition, as a funding priority.

1. <https://www.ncbi.nlm.nih.gov/pubmed/32058440>; 2. https://internationalguideline.com/static/pdfs/Quick_Reference_Guide-10Mar2019.pdf; 3. https://journals.lww.com/journalpatientsafety/Abstract/publishahead/Adverse_Effects_of_the_Medicare_PSI_90_Hospital.99331.aspx#pdf-link; 4. <https://onlinelibrary.wiley.com/doi/abs/10.1111/iwj.13071>; 5. <https://www.ahrq.gov/sites/default/files/publications/files/putoolkit.pdf>; 6. <https://www.ncbi.nlm.nih.gov/pubmed/25558764>; 7. https://chapterland.org/wp-content/uploads/sites/13/2017/11/US_FactsFigures_Flyer.pdf; 8. <https://www.cdc.gov/flu/about/burden/index.html>; 9. <https://npiap.com/>

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Promoting Collaborative Science and Addressing Public Health Challenges Across the Lifespan are two critical themes that may be applied to scientific discovery and treatment strategies for complex diseases affecting large numbers of the US population.

Comments: Priorities/benefits/drawbacks:

Advancing Biomedical and Behavioral Sciences is an objective that will focus the arc of basic, translational, and clinical research on improved outcomes for patients with complex disorders.

Comments: Future/emerging opportunities/needs:

We present a new opportunity for a trans-NIH Initiative titled “Interprofessional Approaches to Treatment of Disease”. Most diseases involve multiple body systems and there are usually significant comorbidities attached to these diseases. Many disorders have difficult diagnoses and complex treatments. With the introduction of new precision medicine approaches and advances in data science, we now have an opportunity to identify multiple systems/body components affected by disease and manage complex treatments in a more deliberate, broadly focused manner leading to improved outcomes for patients. This will require interprofessional care. Multiple levels of expertise are needed for high-quality care and ideal patient outcomes. Results from fundamental basic and clinical research discoveries will drive the initiation of novel, collaborative care for these complex diseases. Some examples where interprofessional care could be applied are: heart failure, substance abuse disorders, HIV/AIDS, and temporomandibular joint disorders. Interprofessional approaches to care are practiced in the hospital usually involving the interactions of doctors and nurses responsible for patient care. This proposal expands beyond those interactions to focus on the health care community where patients interact with medical professionals in the office. Interprofessional care includes professionals from

different backgrounds (medicine, dentistry, nursing, physical therapy, pharmacy, etc.) and specialties working together and participating with patients, families, and communities to obtain optimum care. No one silo of expertise can possibly address the complexities of disease in patients. This proposal goes beyond just data sharing and efficient communication, but includes novel training in interprofessional care approaches, integration and sharing of disease expertise and patient responsibility among professionals, and a collective program on treatment approaches. NIH currently encourages multidisciplinary and interdisciplinary research to advance the health of our nation. But this proposal specifically recommends an Interprofessional approach to complex disease treatment and discovery, where silos of research and especially health care will morph into integrated professional teams focused on the whole patient, his/her disease(s) and comorbidities, and ultimately their improved health. This topic addresses two Cross Cutting Themes: Promoting Collaborative Science and Addressing Public Health Challenges Across the Lifespan; and fits in Objective 1: Advancing Biomedical and Behavioral Sciences.

Comments: Cross-cutting themes:

Initiatives for the cross-cutting theme, 'Optimizing Data Science and the Development of Technologies and Tools' would be enhanced by incorporating geospatial science and technologies (i.e. GIS, GPS, remote sensing, spatial statistics, and geoAI). Geospatial theories, methods, and technologies provide for spatial data capture, data synthesis from disparate sources, and analysis in gene-environment interaction, exposomics, life course epidemiology, interconnectedness of human and human-actor networks, and mobile health research. NIH would benefit from stronger collaboration of health researchers with geospatial scientists.

Comments: Priorities/benefits/drawbacks:

Geospatial technologies are key to investigating the interrelated effects of the built and natural environments on accessibility to healthcare, health behaviors, disease prevention, and treatment outcomes, particularly as they relate to chronic diseases in which lifestyle plays an important role. Health workforce development would benefit from stronger integration of geospatial science and technologies in biomedical training.

Comments: Future/emerging opportunities/needs:

NIH would benefit by leveraging geospatial science and technology capacity across NIH divisions, thereby reducing infrastructural and functional redundancies, increasing geospatial data sharing and collaboration, and enhancing interdisciplinary health research.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Will the NIH Tribal Health Research Office be involved in the strategic plan? If so, in what capacity?

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The Alzheimer's Association encourages NIH to continue to promote coordination across all institutes and centers (I/Cs) with regard to aging, cognition, and dementia. We applaud the National Institute on Aging and the National Institute of Neurological Disorders and Stroke on their joint efforts to host research summits on Alzheimer's disease, related dementias, and care and support. The Association is grateful for the opportunity to participate in these, and we would be pleased to work with other I/Cs that are likely to play an important role in the coming years. There is a growing body of evidence that suggests that both modifiable and non-modifiable risk factors can affect cognition across the lifespan. This will be true for other diseases and conditions as research expands and we learn more. It will be important for I/Cs to recognize how they can collaborate with those that lead, regardless of disease or condition. Similarly, we encourage NIH personnel who work with studies at all levels to identify opportunities for collaboration to facilitate sharing and the pace of research to expand knowledge about aging and diseases across the life course. We also commend NIH on its leadership in integrating a better understanding of health disparities and how to address them across diseases and conditions. As the research community learns more about risk factors, we encourage NIH to continue to prioritize learning more about risk in minority populations and those disproportionately affected by diseases and conditions like Alzheimer's and related dementias. Most studies indicate that older blacks/African Americans are about twice as likely to have Alzheimer's or other dementias as older whites and older Hispanics/Latinos are about one and one-half times as likely to have Alzheimer's or other dementias as older whites. Variations in medical conditions, health-related behaviors, and socioeconomic risk factors across racial groups likely account for most of these differences in risk. This is likely true in other diseases and conditions, and a better understanding of these differences should be emphasized in clinical trials.

Comments: Priorities/benefits/drawbacks:

The Alzheimer's Association supports NIH's proposed objectives of Advancing Biomedical and Behavioral Sciences; Developing, Maintaining, and Renewing Scientific Research Capacity; and Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science. We would be pleased to support NIH in its pursuit of these objectives and their priorities.

Comments: Future/emerging opportunities/needs:

We encourage NIH to expand budget mechanisms that facilitate collaboration across I/Cs in order to address diseases that have increasing impact on our society. The Alzheimer's Association also recommends that NIH use funds to target diseases that are affecting increasing numbers of people and that significantly complicate other health conditions. For example, NIH should continue to use Program Announcements (PAs) and Requests for Applications (RFAs) for a more targeted approach to areas in

which experts have identified specific unanswered questions that underpin new advances. The use of PAs and RFAs can be targeted in their design and can help to accelerate advances in promising, high-impact fields. Thanks to NIH dedicating Alzheimer's funding to PAs/RFAs, progress continues toward the achievement of Alzheimer's and dementia milestones. This approach can be applied across disease areas and I/Cs. With strategic, targeted funding for these diseases, NIH can much more effectively enhance Americans' health, lengthen lives, and reduce illness and disability.

Comments: Cross-cutting themes:

Heart Valve Voice US is a patient advocacy organization focused on improving the diagnosis, treatment and management of heart valve disease. Thank you for the opportunity to contribute to the development of the 2021-2025 NIH-Wide Strategic Plan. Our comments at this time are limited to Cross Cutting Themes. Addressing public health challenges across the lifespan We understand that NIH encourages its various Institutes and Centers to identify areas of common interest in order to develop impactful, efficient research projects. We recommend that NIH identify and publish a list of priority cross-institute projects as part of its strategic plan. This need not be a specific list but rather express general themes that are common to two or more Institutes. For instance, heart valve disease fits neatly into NHLBI but is especially prevalent among an older population. Nearly 10% of those age 70 or older will experience some form of mitral valve disease, creating a large burden not only on patients but on the health care system. For these reasons, we envision long-term cooperation between NHLBI and NIA. Surely there are numerous examples across many disease areas. A public list would ensure the public that NIH is thinking broadly and allocating resources efficiently to meet significant unmet medical needs. Developing technologies and tools Heart Valve Voice US last year convened a meeting of stakeholders to discuss and prioritize research topics of importance to our community. We understand that NIH is not seeking specific research recommendations but the general findings of this exercise should serve instructive and are likely applicable across many disease areas. We found a significant need for improved screening and diagnostic tools. While our examples are specific to heart valve disease, they are generally applicable to many disease areas where access to proper diagnosis is difficult. The identified needs fall into the following categories: • Risk factors – identifying risk factors and how could this knowledge inform screening and prevention efforts? • Screening Tools – What tools are most effective (including biomarkers and imaging) and how often should they be repeated for patients with or without a prior diagnosis? • Scope of screening – Should screening effort be focused on specific patient groups or deployed more broadly across the population? How do we determine “at risk”? • Consequences of screening – Would improved screening create patient anxiety or improve satisfaction, impact procedural volumes, effect survival or quality of life? • What tools may be developed to improve the accuracy of diagnosis (imaging, biomarkers, other tools)? Thank you for the opportunity to comment.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The Society of Toxicology is supportive of the NIH-Wide Strategic Plan and notes several overlaps between the plan and the Society's own, recently developed five-year strategic plan. Although there has been much progress in advancing diversity in the sciences, there is much more that can be done, and as such, it is appropriate that enhancing and supporting diversity is listed as a cross-cutting theme. Achieving diversity and inclusiveness increases the breadth of ideas and perspectives that can be brought to bear in problem formulation, thereby optimizing creativity.

Comments: Priorities/benefits/drawbacks:

Health problems facing us today are complex and multifactorial in nature. Optimizing data science and the investment into new technologies and tools offers a unique opportunity for both discovery and solutions to these complex problems. In addition, an emphasis on collaboration and, more importantly, transdisciplinary collaboration wherein multiple disciplines are brought together as early as possible to work on a health challenge, often is highly beneficial in identifying solutions for complex problems. Thus, the Society of Toxicology also is highly supportive of collaboration and data science as cross-cutting themes. However, recognizing that environmental factors are increasingly recognized as significant contributors to disease and public health challenges, the Society of Toxicology urges NIH to consider the specific inclusion of the environmental sciences in Objective 1 (i.e., "Advancing Biomedical, Environmental and Behavioral Sciences"). Doing so would highlight the importance of considering environmental contributions to disease, the existence of environmental science expertise within the National Institutes of Health (National Institute of Environmental Health Sciences), and, importantly, the opportunities for collaboration between the biomedical, environmental, and behavioral sciences in achieving the Objective 1 goals.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

My name is ... and I am a member of the National Eating Disorders Association (NEDA) Research Advisory Council. NEDA's Feeding Hope Fund for Clinical Research supports pilot research studies which yield data for a larger NIH RO1 grant. Eating Disorders (ED) affect 30 million Americans during their lifetime (including people of all genders, ages, races, religions, ethnicities, socioeconomic levels, sexual orientations, body shapes, and weights), have the second highest psychiatric mortality rate, and the highest psychiatric treatment cost. We urge NIH ICOs to increase funding for ED research incorporating the recommendations below. Recommendation 1: Incorporate Co-Morbid Behavioral Health Research Within Biomedical Research, Ensure Peer-Reviewers and Relevant ICOs Understand Behavioral Health Co-Morbid Occurrence with Biomedical Health, and Broaden Outcome Measurements for Co-Morbid Research As research advances and we learn more about the behavioral-biomedical co-morbid

connection, we can no longer responsibly separate behavioral from physical health in our efforts to understand the foundational science, prevention of diseases, health promotion, and development of treatments for diseases/disorders. NIMH has noted this correlation between chronic illnesses and depression, where the risk of developing one is higher when you have the other condition. EDs can cause many medical conditions, including cardiac disability, starvation, kidney failure, esophageal cancer, osteoporosis, seizures, infertility, Type II diabetes, and permanent de-calcification of teeth. We urge NIH to ensure that ICOs and Peer-Reviewers understand the co-morbid connection between behavioral and biomedical health in their review of applications, and encourage broader co-morbid outcome measurements to have the highest impact/return on investment from NIH funding.

Recommendation 2: Share Behavioral Health Findings and Collaborate Further with Health Research Agencies/Programs Within/Outside of the U.S. Department of HHS We recommend that NIH increase its collaborative science across agencies to share research findings on co-morbid conditions. For example, NIH could build upon the CDC findings on obesity and ED prevention/treatment. The U.S. DOD's PRMRP conducts research on behavioral health, including EDs, that can help with translational research for the NIH civilian population. NIH's in-depth research on nutrition, obesity, and EDs can further the USDA's ARS' nutrition research and FNS program development in nutrition education and obesity prevention.

Recommendation: Increased Intersectionality of Behavioral Health Research, Minority Health, and Reducing Health Disparities The lack of diversity among those researched with EDs leads to data that is not representative of the full range of persons affected. We urge NIH to enhance research on the intersectionality of minority health for behavioral health conditions, and interplays with health promotion/treatment (e.g., racism related to weight stigma, marginalized communities such as low SES/food insecurities, diverse research samples, culturally sensitive treatments). We also urge NIH to retain diverse researchers to address this ED area.

Recommendation: Need for Longitudinal Behavioral Health Studies We urge NIH to fund longitudinal studies on EDs to help clarify course, outcomes, and predictor variables. For example, there is a gap in understanding how prevention/treatment may differ in older adults vs. younger populations.

Comments: Priorities/benefits/drawbacks:

Objective 1: Foundational Science Recommendation: Enhance Behavioral Health Research on Genetics and Influence of the Genes on Co-Morbid Conditions The field of eating disorders has benefited greatly from researchers involved in genetics research and we commend the NIH's support of these investigations through NIMH. This is especially true for findings related to anorexia nervosa. Our organization strongly encourages NIH to support efforts by researchers seeking resources to conduct genetics research on all other eating disorders referenced in the DSM-5 (or any revision thereto), other behavioral health conditions, and look towards the influence of the genes on co-morbid conditions as discussed above.

Objective 1: Preventing Disease and Promoting Health and Objective 3: Developing Treatments, Interventions, and Cures Recommendation: Increasing Implementation and Dissemination of Behavioral Health Research to Medical Community at All Levels and Public Health Professionals During the March 9, 2020 webinar, we were pleased to see NIH include implementation and dissemination research as part of both "Objective 2: Preventing Disease and Promoting Health" and "Objective 3: Developing Treatments, Interventions and Cures". Particularly in the behavioral health research of eating disorders, the biggest area of need is for further implementation and dissemination of

research to the medical community, especially as it relates to developing evidence-based curricula and disseminating it to health professionals in medical education, training, and practice. For example, despite research funded by NIH on early identification of eating disorders, only 20% of medical residency programs offer elective rotations on eating disorders. Additionally, in looking towards the implementation and dissemination of behavioral health information, we recommend NIH collaborate with other federal agencies that may be positive dissemination conduits to preventing disease, promoting health, and intervention. For example, behavioral health research about prevention in schools could be better disseminated to the U.S. Department of Education and nutrition education and disordered eating prevention and intervention to the USDA's FNS activities within schools and communities. Objective 1: Developing Treatments, Interventions and Cures Recommendation: Increasing Research on Managing Co-Morbid Conditions Regarding biomedical conditions that are co-morbid with behavioral health conditions like eating disorders, we also recommend a renewed focus on research targeted to managing these co-morbid medical conditions within treatment, intervention, and cures. While we have a wealth of research on co-morbid behavioral health and biomedical diseases and conditions, there is a gap in research for treatment providers and public health experts on how treatment may need to be altered to address these conditions. For example, with treatment of eating disorders, more research is needed on how to manage conditions like osteopenia and osteoporosis. It is also essential that research focus on the impact weight cycling, chronic dieting, and weight stigma have on the mental and physical health of those with and without eating disorders diagnoses. Additionally, for co-morbid behavioral health conditions, we would recommend NIH include a focus on increasing transdiagnostic treatments and treatment decision making. For example, with co-morbid eating disorders, transdiagnostic treatment for substance use, trauma, and anxiety disorders should be considered.

Comments: Future/emerging opportunities/needs:

We applaud NIH's past efforts to make "a few bold predictions" surrounding the science being researched and developed through NIH. We pose a new challenge for NIH's prediction, particularly as NIH refocuses its strategy to include behavioral health: (1) Increase the federal government's return on investment by disseminating and implementing past NIH research for behavioral health government and nationwide, and (2) targeting research that addresses both co-morbid behavioral health and biomedical research.

Comments: Cross-cutting themes:

...Comments: Priorities/benefits/drawbacks:

...Comments: Future/emerging opportunities/needs:

...

Comments: Cross-cutting themes:

There are opportunities within the following cross-cutting themes to reduce the use of animals and modernize biomedical research. •Optimizing Data Science and the Development of Technologies and Tools: NIH must increase funding in these areas only where the data, technologies, and tools are based in human biology, without the use of animals. •Promoting Collaborative Science: Where investigators lack the capabilities to conduct human-based research, NIH must help pair these individuals with others who have expertise to assist them in a transition away from experiments on animals. •Addressing Public Health Challenges Across the Lifespan: Diseases primarily affecting individuals in early and late life are often studied using crude experiments on animals, despite an abundance of evidence that these methods are failing. NIH must prioritize non-animal research for these conditions. An additional cross-cutting theme should be added: Eliminate Reliance on Non-Human Animals. NIH reports that novel drugs fail in 95 percent of human studies, even though they appeared safe and effective in preclinical experiments using animals (1). A 2014 analysis published in The BMJ found that—contrary to public perception—studies using animals largely have not furthered knowledge in the field of human health or led to the development of treatments for conditions affecting humans (2). Experiments on animals lack both internal and external validity, meaning they are usually poorly executed, but even if the experimental methods were improved, the results would not translate to humans. The difficulties in applying data derived from animals to human patients are compounded by confinement and unnatural conditions of laboratory life, which thwart animals' ability to engage in natural behaviors. This deprivation contributes to their stress and alters their physiology and neurobiology, causing them to exhibit various psychopathologies. Importantly, the fact that animals in laboratories have altered physiology and neurobiology means that they will never be good “models,” even for members of their own species who are free-roaming. Along with mounting evidence that experiments on animals do not reliably translate to humans and the increasing development and implementation of technologies that can supplant animal use in laboratories, our society has witnessed growing moral concern regarding animal experimentation. An August 2018 poll conducted by the Pew Research Center found that a majority of U.S. adults, the taxpayers who fund the NIH, oppose the use of animals in scientific research (3). If the public were fully aware of the mountain of evidence that studies on animals may very well be hampering the development of effective treatments, opposition would likely grow substantially. If our finite public funds are to be used responsibly, they must fund research, whether basic or applied, that leads to effective treatments for humans. The evidence that basic and applied research involving animals is impeding the development of treatment and cures for human ailments has not heretofore prompted NIH to rethink research and funding priorities sufficiently. However, such a paradigm shift is crucial. 1. <https://ncats.nih.gov/files/NCATS-factsheet.pdf> 2. <https://doi.org/10.1136/bmj.g33873>. 3. <https://www.pewresearch.org/fact-tank/2018/08/16/americans-are-divided-over-the-use-of-animals-in-scientific-research/>

Comments: Priorities/benefits/drawbacks:

Objective 1 can only be achieved by prioritizing human-based research and eliminating the use of animals. One of the efforts that NIH must take to fulfill this objective is to ensure that study sections are comprised of individuals with ample expertise in non-animal research and not dominated by those vested in the use of animals. Objective 2 can be achieved, in part, by providing additional financial assistance to investigators who wish to switch from animal-based to human-based methods; and by

ceasing funding to train young investigators in animal methods. Regarding Objective 3, animal experiments lack internal and external validity and are in direct conflict with Scientific Integrity, Social Responsibility, and Good Scientific Stewardship. An additional objective should be added: Using Evidence-Based Methods to Improve Human Health Research. We propose a step-wise approach. 1. Immediately Eliminate Animal Use in Areas in Which Animals Have Been Shown to be Ineffective “Models” for Humans and Their Use has Impeded Progress: Multiple reviews have documented the failure of animal use to benefit human health in specific disease areas. Animal experiments in these areas should be ended as soon as possible and replaced with more effective and efficient non-animal research methods. 2. Increase Funds for Non-Animal Studies and Decrease Funds for Animal Studies: As long as part of the NIH budget goes to experiments on animals, the U.S. will be stalled in developing effective treatments for human disease. Forward-thinking scientists, some funded by NIH, are advancing and implementing methods for studying and treating diseases and testing products that do not entail the use of animals and are relevant to human health. Researchers have created human cell-derived skin models, “organs-on-chips,” in silico models, and other methodologies that can replicate human physiology, diseases, and drug responses more accurately than experiments on animals do. Indeed, in its most recent five-year strategic plan, NIH announced that it would reduce and replace animal experiments. NIH must now take the next step and end the funding of experiments that have failed to provide effective treatments and cures. With greater investment in exciting and innovative non-animal methods and bold policy initiatives, far more promising cures and treatments for humans can be developed. 3. Conduct Critical Scientific Reviews of Previous Animal Studies to Identify the Areas in Which the Use of Animals Can Be Immediately Ended: For those areas of investigation where there is still some question as to whether the use of animals is beneficial, a thorough systematic review should be conducted to determine the efficacy of using animals. The National Academy of Medicine, formerly the Institute of Medicine, completed an examination of the scientific necessity of using chimpanzees in behavioral and biomedical research. That effort revealed that harmful studies had been approved, funded, and conducted for years, even though there were alternative methods in virtually every area in which chimpanzees were being used. Institutional oversight bodies and funding agencies had given their stamp of approval to these protocols. However, as we now know, the review processes in place were simply inadequate.

Comments: Future/emerging opportunities/needs:

In addition to an overall paradigm change in NIH’s reliance on the use of non-human animals, there are a number of areas of NIH intramural and extramural research which should be ended immediately. NIMH must end its support and conduct of psychological and other poorly-designed studies. Elisabeth Murray, an investigator at NIMH, carves out a section of a monkey’s skull, injects toxins into the brain, suctions out portions of it or burns them, causing permanent and traumatic damage. She then repeatedly terrifies the monkeys with realistic-looking, animated artificial snakes and spiders. When Murray has finished with them, they may be killed or recycled into other experiments, to be further tormented. NIH has thrown \$36 million to Murray’s laboratory in the past 13 years, but not one treatment or cure for humans has come out of it in 30 years. NIMH Director Joshua Gordon has voiced his support for cruel experiments on animals that are notoriously poor models for studying human disease. Gordon has indicated he intends for the Institute to continue to fund the forced swim test, tail

suspension test, foot shock, and social defeat experiments, where small animals are made to swim to keep from drowning, taped up by their sensitive tails, subjected to electric shock, and where experimenters incite some animals to attack and intimidate others, respectively. Nothing about these tests “models” complex human neuropsychiatric disorders and reliance on them is consistently cited as a leading reason why so many neurobehavioral drugs fail in human trials. Another area of NIH funding that must end immediately is support for the use of non-human animals in sepsis experiments. Numerous peer-reviewed publications have described the inability of mice and other non-human animals to function as appropriate experimental models of human sepsis due to inherent genetic and physiological species differences, the disconnect between methods of experimental sepsis induction in non-human animals and the way that sepsis manifests in humans, and significant animal-welfare concerns that further confound study results. More than 60 clinical trials have been undertaken to test novel treatments for sepsis. However, all have failed to yield any benefit for humans. Clinicians cite unconstructive tests on animals as a primary reason for these failures and call for human-relevant methods to be adopted. For NIH to continue to spend taxpayers’ dollars on experiments it has long known to lack translatability to sepsis in humans baselessly disregards the statutory and regulatory criteria that govern NIH’s funding authority. Additionally, NIH must reverse its plans to support centralized infrastructure for experiments on marmosets, which have less to do with good science and everything to do with convenience. Marmosets are complex, unique, social individuals with the capacity to experience a wide range of emotions. In captivity, they are susceptible to many infectious pathogens—and they can also succumb to painful and potentially deadly marmoset wasting disease. Thus, the experimental use of marmosets introduces additional ethical concerns. By ramping up funding to increase the supply of marmosets for laboratories, NIH is doubling down on a failed enterprise.

Comments: Cross-cutting themes:

- Promoting collaborative science. If we're serious about collaborations, we need to allow serious percent effort for the PIs. Collaborative science is exhilarating and produces innovations. But it increases the faculty/postdoc ratio, and most programs don't increase the budget to accommodate the additional number of faculty salaries. The result is that the project contains either: a) few postdocs, or a shared postdoc; b) PIs having only 5-10% effort; or c) one PI per year, who rotates in different years. None of these options creates a thriving project.

Comments: Priorities/benefits/drawbacks:

500 word limit doesn't permit justifications; if you want them, just email. Advancing Science • Driving foundational science. 1. If PIs and postdocs think about a particular scientific problem 8 hours a day, especially a difficult one with a non-obvious solution, rather than administration, we might do something foundational (ultrahigh impact and leading to new directions). Let a grant support 1/3 or 1/2 of a PI's salary. Fewer grants will reduce NIH's costs. Stop cutting grant budgets each year, forcing a postdoc onto two projects. Require universities to cover 20+% of faculty salary (one less grant) as 'institutional commitment' for hosting grants. 2. Make it easier to say 'yes' to Significant or Innovative projects that are not perfect. Any project innovative enough to be important will have gaps in the plan. Foundational science must avoid competing with standard science or it will lose. Allot separate, equal

funding set-asides for foundational, basic, translational, and clinical research. This is a food pyramid, having many foundational and basic science studies that mostly do not progress to application. Costs per project increase as one goes up, so funding allotments are roughly equal. A first review panel evaluates Specific Aims, Premise/Background, and Preliminary Data for Significance & Innovation, with only the most significant and innovative grants getting checked by a second panel for Approach. Administratively fund an R01 judged to have high Significance and Innovation but gaps in the Approach as an R21 for 2 years. Divide flaws in Approach into blunders vs omissions that just need advice. 3. Analyze why two NIH Institutes found that the optimum grant size for impact was at the smallest dollar amount and then declined. The current NIH review system would not fund any of the foundational discoveries Pasteur is known for. Research Capacity • Cultivating the biomedical research workforce. The current NIH/NSF-supported science career is a non-starter for bright undergraduates. We lose our science majors over Christmas of freshman year after they've seen their professors' lifestyle. Promoting Scientific Integrity and Accountability • Ensuring Accountability. Forms are not the solution. Honest PIs are so busy filling out forms, and NIH reading them, that dishonest or sloppy PIs can work unnoticed. A decade ago, the Federal Demonstration project estimated that PIs spent 40% of their time on grant-administration tasks. This percentage has increased since then (with 20 training courses at my institution). In law enforcement there is a saying, "Certainty of punishment is more effective than severity of punishment." Irreproducibility may not be the PI's fault. Manufacturers are changing their products over time, without notice and without making old lots available for comparison. • Optimizing Operations. Define 'key' personnel; ask whether NIH really needs yearly updated Other Support and Biosketches of people other than the PI. Make it clear that universities are not subject to audit for interpreting vague federal directives. Any grant score ranking within the 5-25th percentile group is imaginary with respect to eventual scientific output, so finer score assignments force CSR to overlook its own scientific integrity.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

AGA applauds the NIH on drafting a comprehensive and ambitious strategic plan. The emphasis on women's health, minority health and disparity reduction, in particular, is appreciated and greatly needed. Addressing public health challenges across the lifespan: AGA recommends that this proposed cross-cutting theme be expanded to include preventative challenges in addition to public health challenges. In gastroenterology and specifically digestive diseases, prevention is the pinnacle to positive clinical outcomes and would support the institute's efforts in broadly addressing public health challenges. AGA also recommends the following for consideration as a cross-cutting theme for FY 2021-2025: Reduce cross-agency regulatory burdens for clinical trials. While AGA appreciates the NIH's high standards for research, we would like to ensure that regulatory procedures in place aren't reducing patient safety and negatively impacting study outcomes and progression.

Comments: Priorities/benefits/drawbacks:

Objective 1 (Enhancing biomedical and behavioral science): AGA is greatly supportive of this objective, and appreciative of NIH's high standards and innovative vision for future research. However, we urge you to consider the following recommendations for enhancing biomedical and behavioral science: • Include specific language under this objective that prioritizes research performed with a broad diversity of participants (e.g., race, ethnicity, gender). Based on AGA member input, many clinical trials are conducted with solely Caucasian participants and therefore impacts the study's generalizability. • Add explicit language to include health disparities, health services and global health and technology research fields under this objective. Objective 2 (Scientific Research Capacity): We urge you to consider the following recommendations for enhancing biomedical and behavioral science: • Ensure this objective is a top priority for the NIH to ensure a successful future of American research. • Develop a clear plan to increase the number of grants lead by women and minorities, particularly in areas where they are historically underrepresented (technological, biomedical engineering, etc.). • Consider increasing funding mechanisms available for international trainees being trained at US institutions. Due to the large pool of international researchers and the limited K99 opportunities, supply does not meet demand and causes a barrier for international trainees to progress their career development. Objective 3 (Enhance scientific stewardship): We urge you to consider the following recommendations to enhance scientific stewardship: • Under leveraging partnerships, universities and research institutions: Expand language to include institutions with high minority populations. • Under accountability and confidence in biomedical and behavioral sciences: Ensure confidence in results by adding "inclusion of diverse populations" and broaden language to prioritize diverse and inclusive research teams.

Comments: Future/emerging opportunities/needs:

We urge you to consider the following opportunities and emerging trans-NIH needs: Increasing, Enhancing, and Supporting Diversity - • Develop programs to increase and encourage an increase in women and under-represented minorities in subspecialty training programs. The number of women in subspecialty training programs is low and more research is needed in this area to understand why women and minorities do not go into the field of gastroenterology, specifically, so solutions can be developed to increase the number of women and minorities in subspecialty training programs. • Conduct research to understand why trainees who are women and under-represented minorities chose not to go into subspecialties, like gastroenterology, building on current studies (<https://doi.org/10.1038/s41575-019-0216-9>) • Offer more opportunities for leadership and training for women and under-represented minorities and better education about how they can become involved in NIH and what NIH wants researchers to prioritize in their grant proposals. • Increase focus on getting funding and grants to early career physician-scientists. Early career physician-scientists perceive that funding and grants go primarily to very senior scientists, which can discourage them from applying. • Increase representation of women and under-represented minorities in NIH and national medical organizations. • Facilitate dialogue between subspecialties that have greater numbers of women and under-represented minorities and those that do not to encourage co-learning that may lead to increased diversity. • Teach researchers how to grow and maximize research infrastructure (e.g., how to successfully run a lab or a research team).

Comments: Cross-cutting themes:

Dear Director Collins: On behalf of over 34,000 orthopaedic surgeons and residents represented by the American Association of Orthopaedic Surgeons (AAOS), we are pleased to provide comments on the National Institutes of Health (NIH) Request for Information (RFI) on the fiscal year (FY) 2021-2025 Strategic Plan Framework (NOT-OD-20-064) published on February 12, 2020. Given the current strain on the health care system caused by the ongoing COVID-19 pandemic, AAOS would like to highlight the need for research into crisis preparedness that uniquely influences minority populations. Although everyone is affected by a public health emergency, like the one we are presently facing, minority populations face a compounded threat from both the acute impact of a pathogen as well as the chronic conditions and socioeconomic barriers to care that diminish health over time. The AAOS commends the NIH for prioritizing the role of diversity in musculoskeletal research. Indeed, the AAOS Strategic Plan highlights the importance of diversity as essential to innovation and advancement as leaders in musculoskeletal care. Specifically, we believe in the need to include a diversity of perspectives, experiences, cultural perceptions, and approaches to development in the research of musculoskeletal diseases. This may be achieved through the designation of research funding for orthopaedic residents and fellows who themselves represent the diversity of our national and global community. Further support of building a diverse generation of researchers includes acknowledging and mitigating implicit bias, particularly as it relates to the peer-reviewed research process. Recommendations for facilitating this include engaging researchers and the NIH staff in diversity training, recognizing the value of grant applicants with non-traditional resumes or backgrounds, and promoting the availability of mentorship among early-stage researchers with diverse experiences. Likewise, AAOS support efforts to improve the musculoskeletal health of women and minority populations through the reduction of health disparities. According to a report from the Agency for Healthcare Research and Quality, from 2009-2013 Hispanic populations were less likely than White populations to report seeing a physician for joint symptoms. Furthermore, data from the National Osteoporosis Foundation highlights the differences in prevalence rates of osteoporosis risk factors between women of different ethnicities. For example, although 1/5 of both White and Asian women over age 50 are estimated to have osteoporosis, just 15% of White adults are lactose intolerant whereas 90% of Asian American adults are lactose intolerant. It is essential to prevention and treatment that these differences in risk factors are understood. AAOS has advocated for the use of Patient-Reported Outcome Measures in the clinical setting. We request that the NIH consider the value of such measures in framing research into musculoskeletal diseases as well.

Comments: Priorities/benefits/drawbacks:

To fully understand and address the variety of musculoskeletal diseases that impact quality of life, AAOS believes that the NIH should consider how to leverage both patient-facing and research-focused initiatives to develop treatment and interventions. To that end, AAOS supports a family of registries that collect data on several musculoskeletal issues that range from joint replacement to musculoskeletal tumors. While historically this data has been used in educational and quality settings, the opportunity exists to bridge the divide between clinical and research-driven goals. In our own pursuit of organizational excellence, AAOS has recently developed comprehensive definitions of quality and value in orthopaedics. Quality is defined as the successful delivery of appropriate, evidence-based

musculoskeletal health care in an effort to achieve sustained patient-centered improvements in health outcomes and quality of life. This is exemplified by a physician-led musculoskeletal team focused on the individual patient's preferences in the delivery of care that is safe, accessible, equitable, and timely. AAOS believes that this fosters evidence-based innovation essential for the advancement of professional and scientific knowledge. Value is defined as the relationship of a patient-centered health outcome to the total cost required to reach that outcome, given that care is: evidence-based, appropriate, timely, sustainable, and occurs throughout a full cycle of musculoskeletal care for a patient's condition; and that cost of musculoskeletal care is an investment and includes consideration of greater lifestyle and economic impacts. We encourage the NIH to consider these definitions vis-à-vis the research priorities considered for inclusion in the 2021-2025 Strategic Plan.

Comments: Future/emerging opportunities/needs:

In 2019, AAOS announced a strategic investment in the field of biologics. The overlap of scientific innovation, patient treatment, and advocacy regarding biologics and biosimilars is rapidly evolving. Much literature has been released concerning the use of these treatments for musculoskeletal diseases and injuries. We encourage the NIH to consider the impact of these new treatments as it pertains to collaborative research between the National Institute of Arthritis and Musculoskeletal and Skin Diseases and the National Institute on Minority Health and Health Disparities. Thank you for your time and consideration of the American Association of Orthopaedic Surgeons' suggestions. We commend the NIH on their continued efforts to research, collaborate, and treatment musculoskeletal diseases. ...

Comments: Cross-cutting themes:

Addressing Public Health Challenges Across the Lifespan Antibiotics underpin modern healthcare at all stages of life, from cancer treatments to surgeries to childbirth. With rising levels of antimicrobial resistance (AMR), these procedures carry grave risk of untreatable infections. To combat this threat, we need a comprehensive approach that includes prevention, stewardship of antibiotics, surveillance, and discovery & development of new products to treat and prevent numerous multi-drug resistant pathogens. NIH should continue to play a critical role in the foundational, translational, and clinical research to support the development of new antibiotics and nontraditional therapeutics to treat serious bacterial infections. Specific priorities relevant to the proposed NIH Objectives are described below. Promoting Collaborative Science Momentum for broader scientific knowledge sharing continues to grow. As such, NIH's leadership in promoting data sharing is paramount in combating antibacterial resistance. With the current state of market instability (i.e. pharmaceutical companies shuttering their antibiotic R&D programs or filing for bankruptcy), decades of valuable R&D knowledge is at risk of being lost. To the extent NIH can facilitate or require that grantees share data, this would foster increased collaboration, prevent unnecessary repetition of previous research, and even potentially promote new discoveries. The scope of data sharing should not be limited to a single development phase, but rather expand across from early discovery through clinical development. A particular area where data sharing can provide considerable impact is NIH's support for collaborative efforts to generate conditional guidelines for discovery of antibiotics that evade a pathogen's defense mechanisms (e.g., efflux). Encouraging NIH grantees to publish all data, including negative results, will bolster data available to

conduct in silico experiments, informing in vitro experimental approaches and supporting formulation of conditional guidelines. Platforms such as The Pew Charitable Trusts's Shared Platform for Antibiotic Research and Knowledge (SPARK) serve as a virtual repository for these data, enabling scientists to share data and insights, learn from past research, and generate new insights into how molecules enter and stay inside of Gram-negative bacteria. NIH has prioritized collaboration by establishing the Combating Antibiotic-Resistant Bacteria (CARB) Interdisciplinary Research Units, and continued support is critical. Connecting partners from different disciplines to design and execute research to address gaps in basic scientific research is a significant development in the fight against AMR. In addition to foundational research, NIH should prioritize translational work, bridging the gap between discovery and early clinical work. Collaboration among those with diverse backgrounds in computational biology, microbiology, immunology, clinical medicine, etc. could provide opportunities to approach problems across the antibiotic pipeline from different angles and promote new ways of thinking. Pew commends the leadership of NIAID in the formation of the CARB IRUs and encourages NIH to support long-term sustainability of such collaborative scientific efforts.

Comments: Priorities/benefits/drawbacks:

Objective 1: Advancing Biomedical and Behavioral Sciences Research innovative nontraditional therapeutics to address AMR, including development of Chemistry, Manufacturing, and Controls (CMC) protocols. Current Good Manufacturing Practice (CGMP) of clinical material for nontraditional approaches to treat or prevent serious bacterial infections requires analytical development and process development quite different from those of small molecules. NIH should continue to facilitate opportunities for grantees to leverage research resources, particularly those provided under "Biopharmaceutical Product Development Services": 1.) Assay development and product release testing, 2.) Process development and formulation, 3.) GMP manufacturing, 4.) Regulatory CMC documentation support. Continued and sustainable support of the Chemistry Center for Combating Antibiotic-Resistant Bacteria (CC4CARB). Finding new antibiotics depends on scientists' ability to explore new chemical space—through novel screening of diverse and differentiated compound libraries, targeted synthesis or modification of compounds with better physicochemical properties, phenotypic assays, and other methods that are explicitly tailored for bacterial pathogens. Once libraries are established, conditional guidelines for drug entry and efflux avoidance for Gram-negative pathogens can be applied more broadly to build a curated resource of diverse chemical material for use by the broader scientific community. Pew commends the leadership of NIAID in the formation of the CC4CARB and encourages NIH to prioritize the growth of this endeavor. NIAID should also ensure public access to the outputs of this initiative (e.g., structure-activity relationship data), thereby promoting data sharing and collaborations. Pew's Shared Platform for Antibiotic Research and Knowledge (SPARK) should be considered for depositing data generated from screening compounds generated by CC4CARB. Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science Leveraging partnerships to accelerate antibiotics discovery and development. NIAID should continue partnering with external research organizations (industry, academia, non-profits, etc.) to identify and develop promising technology platforms, enabling robust pipeline of antibiotics targets, chemical libraries, and ultimately viable clinical candidates. Partnerships

with other funding organizations and charities (e.g., Bill & Melinda Gates Foundation, Wellcome Trust) should continue to be evaluated.

Comments: Future/emerging opportunities/needs:

Further work stemming from the Human Microbiome Project (HMP), specifically characterizing the microbiome in response to severe bacterial infections and other diseases. We applaud NIH's efforts to continue and expand the work of the HMP, including in the investment of internal and extramural microbiome research. Related to combatting serious bacterial infections, NIH has supported development of vaccines and microbiome-based live biotherapeutic products which target *Clostridioides difficile*, an opportunistic pathogen deemed an urgent threat by CDC. However, we encourage further study on the interactions of human microbiome commensal microorganisms and multi-drug resistant Gram-negative pathogens that are also CDC priorities. Furthermore, recent studies have shown potential causal links between an unhealthy gut microbiome with other ailments and diseases. Continued support for studying host-microbial interactions as related to cancer, mental health, Parkinson's disease, diabetes, inflammatory bowel diseases, etc. is also vital, for innovative prevention and treatment within those specialties.

Comments: Cross-cutting themes:

Under the third cross-cutting theme, the Population Association of America suggests NIH expand "Optimizing Data Science and the Development of Technologies and Tools" to include "Data Sharing." This change would be consistent with the agency's efforts to encourage and enhance data sharing. To ensure research across the life continuum, the Population Association of America suggests NIH consider expanding the fifth cross-cutting theme, "Addressing Public Health Challenges Across the Lifespan," to include "Adolescence, Young Adults and Early Middle Age (i.e. 20-40s)." More research is needed to understand how these transitions affect health and development across the life course.

Comments: Priorities/benefits/drawbacks:

Under Objective 1, the Population Association of America asks NIH to consider expanding the title, "Advancing Biomedical and Behavioral Sciences" to include "Social" sciences. The term behavioral does not capture the social sciences, such as demography, sociology, and health economics--disciplines that the NIH mission, and certainly the mission of specific ICs, support. Social sciences are currently excluded from the plan's framework. Further, under Objective 1, the Population Association of America asks NIH to expand the first to include "foundational behavioral and social science." Under Objective #3, the fourth bullet, "Optimizing Operations," may also be an opportunity to address future data collection, dissemination, sharing, and management practices.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Increasing, Enhancing, and Supporting Diversity. Setting tangible goals realizes ambitions when it comes to making diversity and inclusion a priority within an organization. The NIH should set bold diversity goals they expect the organization to achieve by 2024 and beyond. Research finds that goals regarding diversity are successful when they are communicated clearly, measure inclusion alongside diversity, and are designed to hold leaders accountable. We recommend the NIH make a goal to increase the number of women and underrepresented minorities to 50% of all director-level roles across the organization. Out of the 27 different institutes and centers, only nine are led by women, and even fewer led by a people of color. By setting a goal to increase diversity at the top, the NIH would make it clear to current and future employees that diversity and inclusion are a top priority for the organization—and that paths to leadership are attainable by all. In addition, the NIH should (1) set bold but achievable diversity and inclusion targets across all levels, (2) measure progress and hold leaders accountable, and (3) widen the pipeline of diverse leaders through more thoughtful recruitment and matriculation practices.

Promoting Collaborative Science. When it comes to promoting collaborative science at the NIH, one major impediment is the drive for recognition through publication. We believe the publication construct creates a disincentive for collaboration among researchers by favoring one, or a few, authors versus many. While most researchers and leaders across the NIH share the vision for a more collaborative scientific community, many feel that current recognition-based incentives—resulting in researchers keeping data close—are too strong and familiar to generate momentum in promoting better collaboration. The NIH should create new kinds of benefits, recognitions, and rewards that would meaningfully motivate researchers to share and collaborate. Whether it be priority reviews for collaborative work, promotion of research on Capitol Hill, or even monetary rewards, the NIH can make more meaningful movement on helping researchers see the benefit of sharing data to elevate and enhance insights by rewarding collaboration.

Optimizing Data Science and the Development of Technologies and Tools. As seen in promoting collaborative science, optimizing data science is less a technical challenge as much as an organizational challenge. Promoting data science as a fundamental part of the NIH scientific research community is the single most important step that the NIH takes to accelerate cures. To fully realize the return on investment, the NIH must empower data science through enhanced data sharing policies and tools to access data sets that will enrich discoveries. While many leaders have embraced the theory of data sharing across the NIH, sharing is impeded by strict approval processes and decentralized data governance standards. Our research shows that data science flourishes when access to data is democratized. The NIH will need to conduct a review of not only its data-governing policies, but also the systems, infrastructure, and routines that keep data out of the hands of data scientists.

Comments: Priorities/benefits/drawbacks:

Advancing Biomedical and Behavioral Sciences. To truly advance biomedical and behavioral sciences, the NIH must find ways to make research subjects more diverse and make the practice of recruitment and participation more inclusive. A review of 50 years of NIH-funded clinical trials found that, in two-thirds of trials, the average age of study participants was younger than the actual age average for patients with the diseases. Racial and ethnic biases are certainly at play, but research points to inability of researchers to recruit a diverse population for trials given constraints in access between researcher and patient. In today's rapidly evolving technical environment, many healthcare institutions have

worked to close the gap between provider and patient. This could be a lesson for research as well. With a priority centered on minority and women's health, investments in technology could help the NIH reach new and vulnerable populations by reducing the burden on researchers for recruitment, as well as the burden on patients for protocol completion. One suggestion would be to leverage telemedicine, wearable technology, or mobile devices to track patients who cannot take part in a trial that requires on-site travel. In addition to technology, the NIH could also work with non-traditional partners in states and local communities to reach new populations through an enhanced service network. By working with local non-profits who serve these underrepresented populations, the NIH could tap into the expertise, trust, and relationships they have with potential patients. Developing, Maintaining, and Renewing Scientific Research Capacity. The NIH's Data Coordinating Center (DCC) for multi-site and large-scale studies and trials uses a collaborative model; however, the one-stop shop approach often evolves into a gatekeeper for providing overall project, administrative, data management, and biostatistical support. To circumvent laborious processes, many organizations resort to creating data registries for ongoing studies, therefore limiting overarching model effectiveness in reducing data silos. If we could reimagine the DCC model and registries of the future, we envision repeatable processes that would enable quick stand-up by projects of all sizes, providing the ability to scale and enable interoperability between other trial and study data sets. This renewed model would enhance the NIH's scientific research capacity by enabling access to data sets needed for progressing insights and discovery—connecting unique, niche data and technology innovators to provide inputs and new ways of leveraging technology. Novel data ingestion techniques and interoperability between data sets will change the pace across the research ecosystem to enable faster cures.

Comments: Future/emerging opportunities/needs:

Enhance Global Health Readiness & Resilience. In view of recent events surrounding the spread of Coronavirus and COVID-19, now is a good time to consider the role that the NIH plays in United States—and globally—to tackle the next global health crisis while preserving their day-to-day functions. As we've seen over the last several weeks, the NIH has been called upon as a leader, communicator, myth-buster, and champion of science for the American public. The role that NIH leaders have played make it possible to curtail exponential growth of a virus that puts millions of Americans at risk. That said, as with many global crises, many organizations are quickly pivoting to address growing concerns and needs across the Federal and commercial ecosystem. We've seen how challenging it can be for agencies and organizations to access the funds, skills, and capabilities necessary to address rapidly evolving crises. A playbook can prepare the NIH to be more resilient and agile in global crises with specific, tactical steps for leaders and staff to take in preparation for the next COVID-19. Beyond preparing the organization, the NIH should consult with external and non-government partners to discuss lessons learned and ways to move faster in the face of a growing global pandemic. Zoom Out / Zoom In Strategy. A major trend in the marketplace today is a redesign of how strategy is developed and created given our highly unpredictable and fluid world. With how quickly global events change the landscape and implications for the role it plays, the NIH must consider ways to future-proof the organization to ensure it remains a relevant player moving forward. Zoom out / zoom in strategy is a way for organizations to look beyond the typical five-year plan, focus on two different time horizons in parallel, and iterate between them. While zooming out focuses on 10 to 20 years in the future, zooming in prioritizes milestones in two to

three key initiatives that will start the journey to achieving results in the next six to 12 months. A review of the NIH Strategic Plan for FY 2016-2020 indicates that many of the cross-cutting themes and objectives are still relevant strategic priorities for the next four fiscal years. It begs a question: What impact was made in achieving these goals? The NIH should refresh their strategic planning approach to boost immediate impact and momentum in preparing for the long term. Research shows that leadership teams who leverage this approach are constantly in learning-mode: reflecting on what they have learned in executing against both time horizons and continuously refining approaches to achieve more impact in a less predictable world.

Comments: Cross-cutting themes:

Suggested Theme Revisions: 1) Increasing, Enhancing, and Supporting Racial and Gender Diversity 2) Optimizing Data Science and Engineering Biology for the Development of Technologies and Tools 3) Promoting Collaborative, Cross-Disciplinary Science

Increasing, Enhancing, and Supporting Racial and Gender Diversity The EBRC supports this theme, but believes that it should specifically identify the groups that the NIH plans to support during FYs 2021-2025, stated as, "Increasing, Enhancing, and Supporting Racial and Gender Diversity." There are many aspects of diversity that are important, but increased support for women and under-represented minorities in science will build on ongoing efforts within the government and across academia. Increased researcher diversity expands the biomedical research workforce pipeline and reduces attrition over the course of scientists' education. A more diverse workforce will also ask scientific questions that are meaningful to diverse groups of people, effectively expanding who can benefit from scientific advancements. Furthermore, efforts to support diversity should also consider methods for retaining international PhD trainees, who make up a significant proportion of the US research pipeline.

Optimizing Data Science and Engineering Biology for the Development of Technologies and Tools This theme should be expanded to include engineering biology, reading, "Optimizing Data Science and Engineering Biology for the Development of Technologies and Tools." Over the next five years, data science and engineering biology will be increasingly used in basic biological research and other areas of relevance to the NIH. Importantly, many areas where data science is used already overlap significantly with engineering biology. Data science plays a key role in engineering biology, helping to build better models, automating and streamlining experimental pipelines, and creating new methods for rapidly processing and accessing large sets of genomic information. Rephrasing this Cross-Cutting Theme reflects the fact that engineering biology is many data scientists' first entry point into biological research as a whole.

Promoting Collaborative, Cross-Disciplinary Science This theme should emphasize cross-disciplinary collaborations, not just collaborations between research groups in the same discipline, being written as, "Promoting Collaborative, Cross-Disciplinary Science." The nature of science has changed significantly since the first NIH institutes were founded, and as a result the process of conducting scientific research should also change. Groundbreaking advancements often require diverse groups of experts, and the current NIH structure provides very few avenues for the cross-disciplinary collaborations that are best-suited for the evolving world of science.

Comments: Priorities/benefits/drawbacks:

Objective 1 The first bullet point should be rewritten as, “Driving Foundational Science and Engineering.” In the near future, engineering biology will contribute significantly to both clinical biotechnologies and the underlying tools that support biomedical research. The suggested change improves the objective by recognizing the increasing intersection between traditional biomedical research and engineering biology research. Many of the most exciting biotechnologies discovered in the past decade must still overcome significant engineering challenges in scaling up production, in order to benefit society to their fullest extent possible. Traditional biologists and chemists, on the whole, are not proficient in the skills and expertise necessary to solve these challenges. Therefore, the NIH would benefit from creating programs and Objectives specifically aimed at recruiting more engineers and computer scientists to biomedical research. Objective 2 The NIH should ensure that “Cultivating the Biomedical Research Workforce” includes the positive impacts of diversity on the biomedical workforce as a whole. Increased support for early to mid-career women and under-represented minorities will help maintain and expand the training pipeline for biomedical researchers. The NIH has started a series of initiatives designed to support these groups, but explicit, continued support is needed. Under the point “Supporting Research Resources and Infrastructure,” the NIH should recognize that diverse organizations have developed tools and technologies that are broadly applicable to NIH research. Multiple engineering biology tools have been developed by the Department of Energy, and they are directly applicable to several challenges in biomedical research. To address this, the NIH would benefit from increased collaboration between institutes and with other departments in the US government. Embedded in this idea is a recognition that the NIH will always be the leader in, but does not need to be the exclusive owner of, biomedical resources and infrastructure. Objective 3 The EBRC fully supports “Fostering a Culture of Good Scientific Stewardship” in research. To that point, we are developing an ethics statement to help scientists consider the implications of their work. As with other science and engineering disciplines, biological research can impact society in powerful ways; therefore, the ethical, environmental, social, political, security, and safety-related issues arising from associated technologies require thoughtful and ongoing consideration. Understanding such issues are a necessary part of research and should be considered at any project’s outset, continuing through deployment and management of new technologies. As an organization, EBRC has also been very active in building and leveraging diverse partnerships both within and outside the engineering biology field. One example of this is the EBRC’s technical research roadmap, “Engineering Biology: A Research Roadmap for the Next-Generation Bioeconomy” (roadmap.ebrc.org). The writing process leveraged an interdisciplinary group of scientists from academia, industry, and government to create a comprehensive document assessing the current state of the art in, and long-term goals for, engineering biology. The NIH could benefit from using a similar approach, building a cross-agency, cross-disciplinary network of expertise to understand the most pressing problem in biological research and propose creative solutions to the problem.

Comments: Future/emerging opportunities/needs:

Increased support for engineering biology: Engineering biology is a growing research area that applies engineering approaches to biological research, and aims to harness the capacity of biological technologies to benefit society. Many engineering biology sub-disciplines have the potential to significantly improve human health, from genetically engineered crops with improved nutrient content to engineered microbes that prevent obesity. As such, better support for engineering biology across the

National Institutes of Health (NIH) can directly benefit human health. Engineering biology research has been primarily handled by the National Institute of Bioimaging and Biotechnology or the National Institute of General Medicine Sciences, but much of the cutting-edge research in engineering biology is fundamentally distinct from traditional biomedical engineering. The next five years will see a significant expansion of technologies developed from engineering biology research and tools, many of which will be useful to treat many different diseases. Cell-based technologies derived from engineering biology are expected to become a central pillar of next generation medicines and rapid diagnostics. Clinical tools utilizing artificial intelligence and other computational methods are already entering the clinic, but expanding their use will require large data sets that are most effectively generated using engineering biology approaches. A significant trans-NIH need is increased engagement with the engineering biology and synthetic biology communities. There is a perception that the NIH is not committed to supporting engineering biology even though technologies such as chimeric antigen receptor T (CAR-T) cells and CRISPR-based gene therapies are directly applicable to the NIH's research interests. As we begin to understand the molecular basis of many diseases, it is likely that the NIH's disease-oriented focus will become less and less practical. Research has identified cellular markers that are shared between numerous different cancers and blood disorders, and it is likely that the future of medicine will use a multi-disciplinary approach that could help predict the onset and outcome of many different diseases. Increased engagement could take several different forms from a new Integrated Review Group for engineering biology grant applications, to a new NIH institute dedicated to advancing tools and technologies in engineering biology to improve health. This institute would be conceptually similar to the National Human Genome Research Institute and the National Institute of Biomedical Imaging and Bioengineering, in that they focus on advancing technology within a discipline which can then be applied across the NIH. Broadly speaking, EBRC believes greater investment in interdisciplinary research can help increase diversity, promote collaborative science, and expand the biomedical research workforce, addressing multiple NIH goals all at once.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Please develop non-animal models which are human relevant. Please also utilize humane alternatives to using animals that already exist. Animals should not have to suffer in laboratories when there are many other options available. Besides, animals have differences to humans, and often animal research is inaccurate, wasteful and especially cruel to the poor animals. So many experiments have been done before, at the expense of millions of animals. All animals feel pain, fear, sadness at loss of companions, and many more emotions just like humans. A lab is a stressful place for wild animals such as monkeys, and domestic animals like dogs and cats. Mice and rats and fish and birds all deserve respect and compassion, as well.

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Comments: Cross-cutting themes:

Section A, Recommendation 1: 1. I strongly agree with the following "...as it incorporates both biomedical and behavioral sciences..." and would consider specifying neurobiology within the broader "biomedical" term. 2. I would recommend specifying the importance of identifying causal and maintenance mechanisms in the section including: "...and urge increased funding for research that addresses the comorbid occurrence within foundational science, prevention, and treatment" as well as in the following paragraph. Section B 1. I strongly agree with the importance of weight stigma; relatedly, atypical anorexia nervosa has been neglected because of misunderstanding of the complexity of weight in eating disorders. Also, consider specifying the importance of inclusiveness of males in eating disorder research.

Comments: Priorities/benefits/drawbacks:

Section 2, Objective 1: Consider specifying epigenetics along with genetics to ensure inclusion of that research area. Throughout document, consider specifying psychiatric comorbidity including mood disorders, substance use disorders, anxiety disorders, trauma, and OCD. Understanding the complexities of these co-occurring disorders with eating disorders can inform causal/maintenance mechanisms as well as treatment.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

PRIM&R endorses the framework's cross-cutting themes as representing important considerations spanning the plan's specific objectives. We are especially pleased to see NIH's commitment to supporting and enhancing diversity, broadly, and to addressing health disparities, as these commitments are key to ensuring that the benefits of science are widely, and fairly, shared. With respect to the cross-cutting theme of "promoting collaborative science," however, we hope it is intended to go beyond scientists collaborating with other scientists to include additional stakeholders in the research enterprise, such as oversight bodies, the public, and research participants. Not only are partnerships with these other groups crucial to driving science forward, leveraging them is also key to meeting the framework's third objective. The scientific enterprise will not succeed or advance without the trust of

the public, as consumers of, funders for, and potential participants in, that endeavor. To that end, we urge NIH in further iterations of its strategic plan to make clear that accountability is to not only the principles of good science but also the populations whom science is meant to serve and on whom it relies. As a global leader in advancing the scientific enterprise, the NIH is to be commended for elevating issues of integrity, accountability, responsibility, and diversity in its next strategic plan. The suggestions we have made here are offered in the spirit of helping NIH deliver on its commitments to these important values. PRIM&R stands ready to provide any further assistance or input that might be useful during this process. Please feel free to contact me at 617.303.1872 or ehurley@primr.org.

Comments: Priorities/benefits/drawbacks:

We appreciate the NIH's willingness to take heed of community input as it charts its course for advancing the best possible science over the next few years. When NIH solicited comment on its 2016-2020 strategic plan framework, PRIM&R urged the agency to ensure that the plan "emphasizes the centrality that ethics plays in the research enterprise by elevating ethics to a unifying element within its framework." We are therefore very pleased that Objective 3 of the new framework takes a step in this direction by emphasizing scientific integrity, public accountability, and social responsibility in the conduct of science. Elevating these issues to an overarching objective represents a clear sign of NIH's commitment to the idea that good science is responsible science. While this commitment is commendable, we believe it will be substantially strengthened by elaborating on some key elements of responsible and accountable science, and the role of various stakeholders, beyond scientists themselves, in ensuring that science is responsible. We elaborate on some ways to achieve this emphasis below. First, we urge the NIH to clarify what is involved in "a culture of good scientific stewardship," as mentioned under Objective 3. We assume the NIH means at least in part the attitudes and practices that foster responsible stewardship of the many types of resources required to conduct good science. We therefore believe that NIH's strategic plan should articulate, under the umbrella of stewardship, an explicit commitment to the protection of the rights, interests, and welfare of the human beings who contribute their selves, their bodies, and, increasingly, their data to the advancement of science. Furthermore, as data becomes one of the most valuable contributions a participant can make to science, it is critical that the enterprise recognize it as such. To that end, NIH should explicitly include the stewardship of data as an element of good scientific stewardship, and in the full Strategic Plan, committing to responsible, respectful use and handling of participant-contributed data. We have previously submitted comment about how this vision for data should be operationalized. We also urge NIH to make clear that fostering a culture of good scientific stewardship intersects with ongoing efforts, within NIH and elsewhere, to advance rigor and reproducibility in preclinical research involving animals and animal models, while maintaining the highest standards of animal welfare.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Since 2013, NEDA has awarded over \$1 million in research grants through our Feeding Hope Fund for Clinical Research, addressing issues such as preventing binge eating disorder among black women in primary care and virtual reality intervention adaptation to a real-world clinic setting. As a nonprofit organization, we strive to prevent eating disorders and fund as much research as possible; however, we rely on the National Institutes of Health (NIH) to advance the field of eating disorders research through foundational science, preventing disease and promoting health, and developing treatment, intervention, and cures for this serious mental illness.

Eating disorders affected 30 million Americans during their lifetime and have the second highest mortality rate out of any behavioral health condition, second only to opioid use. Eating disorders affect people of all genders, ages, races, religions, ethnicities, socioeconomic levels, sexual orientations, body shapes, and weights, and new studies have shown that treating an eating disorder has the highest cost out of any psychiatric illness. In turn, it is of the utmost concern to our community of individuals and families experiencing eating disorders that the National Institutes of Health (NIH) and its Institutes and Centers (ICOs) invest in behavioral health research across all ICOs to increase eating disorders research, incorporate the recommendations below, and work towards increasing collaborative behavioral health research including eating disorders.

A. Promoting Collaborative Science

Recommendation 1: Incorporate Co-Morbid Behavioral Health Research Within Biomedical Research, Ensure Peer-Reviewers and Relevant ICOs Understand Behavioral Health Co-Morbid Occurrence with Biomedical Health, and Broaden Outcome Measurements for Co-Morbid Research We applaud the work of NIH to increase collaborative science and have noted the immediate difference in this 2021-2025 NIH-wide Strategic Plan as it incorporates both biomedical and behavioral sciences into the overall strategic plan, whereas the 2016-2020 plan was limited to primarily biomedical research activities.

As research advances and we learn more about the behavioral-biomedical co-morbid connection, we can no longer responsibly separate behavioral health from physical health in our efforts to understand the foundational science, prevention of diseases and health promotion, and development of treatments, interventions, and cures for diseases and disorders. As the National Institute of Mental Health (NIMH) notes this correlation for chronic conditions like cancer and diabetes, "It may have come as no surprise that people with a medical illness or condition are more likely to suffer from depression. The reverse is also true: the risk of developing some physical illnesses is higher in people with depression." This is also true of other behavioral health conditions and co-morbid medical conditions. For example, some medical conditions that can emerge as a direct result of an eating disorder include: cardiac disability, starvation, hepatitis, refeeding syndrome, cognitive dysfunction, kidney failure, esophageal cancer, osteoporosis, fractures (hip, back, etc.), hypoglycemia, seizures, amenorrhea, infertility, high and low blood pressure, Type II diabetes mellitus, edema (swelling), high cholesterol levels, gallbladder disease, decalcification of teeth, severe dehydration, chronically inflamed and sore throat, and inflammation and possible rupture of the esophagus.

While we recognize NIH's first steps towards incorporating behavioral health within the NIH Strategic Plan, we urge NIH to take this effort a step further and ensure that ICOs and Peer-Reviewers understand the co-morbid connection between behavioral health and biomedical health in their review of applications, and urge increased funding for research that addresses the co-morbid occurrence within foundational science, prevention, and treatment.

Over the years, NIH and its ICOs have begun funding research that addresses some of these co-morbid behavioral and biomedical research conditions. For example, since 2015 over 16 ICOs have incorporated eating disorders research within co-morbid condition research on diseases such as diabetes and kidney failure. However, researchers have indicated that when a behavioral health research proposal is submitted outside of ICOs directly relating to behavioral health, outcomes must often be conformed to address the co-morbid biomedical condition instead of both the co-morbid behavioral and biomedical condition. While we are starting to see a gradual improvement within some ICOs, we urge NIH to encourage broader outcome measurements to allow researchers to follow the science within these studies in order to have the highest impact and return on investment from NIH funding for all co-morbid fields.

Recommendation 2: Share Behavioral Health Findings and Collaborate Further with Health Research Agencies/Programs within the U.S. Department of Health and Human Services (HHS) and Outside of HHS
During the March 9, 2020 webinar, we were pleased to hear a positive discussion on NIH's work to collaborate with other federal agencies, centers, and institutes outside of NIH. Particularly around the area of obesity and eating disorders/disordered eating prevention and treatment, we find a gap in knowledge and NIH-funded research amongst other federal actors such as the Center for Disease Control and Prevention. We recommend that the NIH increase its collaborative science to share its research findings in areas of co-morbid conditions.

Additionally, while we are pleased to hear the desire to collaborate with other research arms of HHS, we also encourage NIH to conduct collaborative science education with other departments' research arms such as the U.S. Department of Defense's Congressionally Directed Medical Research Programs Peer Reviewed Medical Research Program (PRMRP) and the U.S. Department of Agriculture's Agricultural Research Service (ARS). The PRMRP conducts a wealth of research on behavioral health, including eating disorders, that can be utilized to help with translational research for the NIH civilian population. Additionally, NIH's in-depth research on nutrition, obesity, and disordered eating/eating disorders can help to further USDA's ARS' nutrition research and Food and Nutrition Services' (FNS) program development in the nutrition education and obesity prevention space.

B. Increasing, Enhancing & Supporting Diversity and Improving Women's Health and Minority Health, and Reducing Health Disparities

Recommendation: Increase in Intersectionality of Behavioral Health Research as it Relates to Minority Health and Reducing Health Disparities

Regarding intersectionality within behavioral health, there is a critical need for further inclusivity of minority populations and the reduction of health disparities. Particularly with eating disorders that have long held the stigma of affecting only young, Caucasian women, a part of breaking that stigma, promoting public health changes, and treating those in need is to break the bounds of current research limits. The lack of inclusion and diversity among those researched within the behavioral health, and particularly eating disorders, field leads to data that is not representative of the full range of persons affected. We urge NIH to enhance research on the intersectionality and social determinants of minority health for behavioral health conditions, and how these interplay with health promotion and treatment. Some areas to consider are racism as it relates to weight stigma, as well as clinical presentation, risk factors, and testing of existing models within marginalized populations such as low income communities, food insecurity, culturally sensitive treatments for diverse populations, and diversity in

studies including diverse samples based on race, ethnicity, gender, body weight, and medication exposure.

As it relates to the research workforce, we are hopeful that NIH's focus on prioritizing inclusion and diversity among researchers, including the retention of researchers from underrepresented groups, will ensure that the dearth of research regarding eating disorders in underrepresented and marginalized populations will be addressed.

C. Addressing Public Health Challenges Across the Lifespan

Recommendation: Need for Longitudinal Behavioral Health Studies

We support NIH's directive to target public health challenges across the lifespan. We find a significant missing component in behavioral health research, particularly for eating disorders, is a lack of longitudinal studies across the lifespan of a research participant to help clarify course, outcomes, and predictor variables, amongst other items. For example, while we are beginning to see more research on eating disorders amongst individuals fifty years and older, there is still a gap in understanding how prevention and treatment may differ from the typical adolescent and young adult research populations.

Comments: Priorities/benefits/drawbacks:

Objective 1: Foundational Science

Recommendation: Enhance Behavioral Health Research on Genetics and Influence of the Genes on Co-Morbid Conditions

The field of eating disorders has benefited greatly from researchers involved in genetics research and we commend the NIH's support of these investigations through NIMH. This is especially true for findings related to anorexia nervosa. NEDA strongly encourages NIH to support efforts by researchers seeking resources to conduct genetics research on all other eating disorders referenced in the DSM-5 (or any revision thereto), other behavioral health conditions, and look towards the influence of the genes on co-morbid conditions as discussed above.

Objective 1: Preventing Disease and Promoting Health and Objective 3: Developing Treatments, Interventions, and Cures

Recommendation: Increasing Implementation and Dissemination of Behavioral Health Research to Medical Community at All Levels and Public Health Professionals

During the March 9, 2020 webinar, we were pleased to see NIH include implementation and dissemination research as part of both "Objective 2: Preventing Disease and Promoting Health" and "Objective 3: Developing Treatments, Interventions and Cures". Particularly in the behavioral health research of eating disorders, the biggest area of need is for further implementation and dissemination of research to the medical community, especially as it relates to developing evidence-based curricula and disseminating it to health professionals in medical education, training, and practice. For example, despite research funded by NIH on early identification of eating disorders, only 20% of medical residency programs offer elective rotations on eating disorders.

Additionally, in looking towards the implementation and dissemination of behavioral health information, we recommend NIH collaborate with other federal agencies that may be positive dissemination conduits to preventing disease, promoting health, and intervention. For example, behavioral health research about prevention in schools could be better disseminated to the U.S. Department of Education and nutrition education and disordered eating prevention and intervention to

the USDA's FNS activities within schools and communities.

Objective 1: Developing Treatments, Interventions and Cures

Recommendation: Increasing Research on Managing Co-Morbid Conditions

Regarding biomedical conditions that are co-morbid with behavioral health conditions like eating disorders, we also recommend a renewed focus on research targeted to managing these co-morbid medical conditions within treatment, intervention, and cures. While we have a wealth of research on co-morbid behavioral health and biomedical diseases and conditions, there is a gap in research for treatment providers and public health experts on how treatment may need to be altered to address these conditions. For example, with treatment of eating disorders, more research is needed on how to manage conditions like osteopenia and osteoporosis. It is also essential that research focus on the impact weight cycling, chronic dieting, and weight stigma have on the mental and physical health of those with and without eating disorders diagnoses. Additionally, for co-morbid behavioral health conditions, we would recommend NIH include a focus on increasing transdiagnostic treatments and treatment decision making. For example, with co-morbid eating disorders, transdiagnostic treatment for substance use, trauma, and anxiety disorders should be considered.

Comments: Future/emerging opportunities/needs:

A Few Bold Predictions for America's Future Recommendations:

We applaud NIH's past efforts to make "a few bold predictions" surrounding the science being researched and developed through NIH. We pose a new challenge for NIH's prediction, particularly as NIH refocuses its strategy to include behavioral health: (1) Increase the federal government's return on investment by disseminating and implementing past NIH research for behavioral health government and nationwide, and (2) targeting research that addresses both co-morbid behavioral health and biomedical research.

Comments: Cross-cutting themes:

We strongly support NIH's proposal to prioritize "diversity", "improving women's health and minority health", and "reducing health disparities" as cross-cutting themes in the framework. Minority populations have historically been excluded and underrepresented in research. Additionally, investment in women's health research has remained disproportionately low in comparison to other areas of research at NIH. Consequently, there remain significant gaps in our understanding of women's unique health conditions. An NIH-wide focus on improving women's health will support our shared goal of addressing women's health conditions and conditions presenting differently in women including rising maternal morbidity and mortality rates, rising rates of chronic debilitating conditions in women, and stagnant cervical cancer survival rates. Prioritizing women's health and minority research will improve health outcomes for women and ensure a sufficient workforce of physician-scientists to study and care for them. Further, having more information on evidence-based interventions to eliminate health disparities is incredibly important for physicians to best help patients achieve health goals. "Addressing public health challenges across the lifespan" should prioritize reproduction and reproductive health, including research into new and innovative contraceptive methods. Professional associations, like the

American College of Obstetricians and Gynecologists (ACOG), use NIH-funded research to inform the development of evidence-based clinical recommendations for physicians.

Comments: Priorities/benefits/drawbacks:

We believe the priorities identified, viewed through the lens of the cross-cutting themes, will ensure NIH remains well-positioned over the next five years to accelerate the basic, translational, and clinical science needed to address challenges and opportunities in women's health. In furtherance of NIH's objectives, ACOG urges NIH to continue to support, sustain, and build on the networks at NICHD that fund and support research in obstetrics, including the Maternal-Fetal Medicine Units Network, and the networks that fund and support research in gynecologic health, including the Contraceptive Clinical Trials Network, Reproductive Medicine Network, National Centers for Translational Research in Reproduction and Infertility, and the Pelvic Floor Disorders Network. The work of NICHD-funded networks and projects inform clinical obstetric and gynecologic practice and improve evidence-based care for women. In addition, in an effort to apply the cross-cutting theme of "improving women's health" across the three objectives, ACOG recommends that NIH convene a consensus conference to include representatives from the Office of Research on Women's Health (ORWH), the Eunice Kennedy Shriver National Institute of Child Health and Human Development, and the National Cancer Institute, as well as any other relevant NIH Institutes and Centers and public stakeholders, to evaluate research currently underway related to women's health and identify priority areas for additional study to advance women's health research, including reproductive sciences.

Comments: Future/emerging opportunities/needs:

Health Literacy: Health literacy has been found to underlie many of the disparities in health and health care outcomes. This is particularly important as health literacy essentially applies to all centers. Future research into the effects of health literacy on health care and the development of tools to help physicians recognize health literacy as a significant contributing factor in health care provision, as well as development of resources to counter the negative effects that health literacy has on outcomes, will be important in the NIH strategic plan. **Postpartum and Interpregnancy Care:** There is a lack of evidence-based studies on optimal maternal and infant postpartum management, leading to practice recommendations primarily reliant on expert opinion and observational studies. Additional research is needed to determine how to most effectively address the unmet needs of mothers during the transition from childbirth to motherhood, to optimize maternal health during the postpartum and interpregnancy periods. This is especially important given the rising rates of maternal mortality, particularly in the postpartum period up to one year after the end of pregnancy. **Genetics:** The field of genetics, including technology and the application to health care, is exploding and far outpacing research to define its use in clinical medicine. Considering the existing technology, as well as the continued development and decreasing costs of whole genome sequencing, it is imperative that the NIH strategic plan consider research to establish the applicability and incorporation of genetics-based technology in the provision of health care, to include cost-effectiveness analysis. **Telemedicine:** Telehealth is increasingly used in nearly every aspect of obstetrics and gynecology. Evidence suggests that telehealth provides comparable health outcomes when compared with traditional methods of health care delivery without compromising the patient-physician relationship, and it also has been shown to enhance patient

satisfaction and improve patient engagement. A recent systematic review found telehealth interventions were associated with improvements in obstetric outcomes, perinatal smoking cessation, breastfeeding, and schedule optimization for high-risk obstetrics. Further research is needed to help clinicians determine how to integrate telemedicine into practice in ways that improve patient care.

Comments: Cross-cutting themes:

“Improving Women’s Health and Minority Health, and Reducing Health Disparities” encompasses issues that are not usually addressed systematically in either research or training related to prevalence of disease and appropriate medication therapy. In the discovery and development of treatments, health disparities are often either not considered at all or are simply accepted rather than investigated. Insufficient attention is paid to social determinants, such as access to healthcare or exposure to stressors, that may affect the natural history of a disease and/or effectiveness of treatment. This constrains innovation in developing solutions to disparities. Addressing disparities effectively will require greater integration of implementation science and community-based research into the translational pipeline to ensure treatments and their delivery are effective for all populations. New approaches to disparities may also bolster efforts at “Increasing, Enhancing and Supporting Diversity” in the research workforce. Paradigms that account for the whole patient experience when addressing disparities may prove to be more welcoming and encouraging to trainees and researchers from affected communities. There is also evidence that researchers who choose to investigate the social or environmental causes of disparities now may find themselves at a disadvantage. Research by the NIH Office of Extramural Research found that NIH review panels underscored proposals on topics that “include research at the community and population level, as opposed to more fundamental and mechanistic investigations” (Sci Adv. 2019 Oct 9; 5(10);eaaw7238), potentially accounting for more than 20% of the funding gap for African American researchers. This suggests NIH’s current model may be inherently unsupportive of disparities research and a diverse workforce. NIH’s strategic plan should include efforts to counter the devaluation of community-based and disparities research, such as focused funding and career development opportunities, peer reviewer education, and programmatic policies that balance reviewer bias. Reducing health disparities and elevating community health research is central to attaining the strategic objectives of preventing disease and improving health and cultivating the biomedical research workforce. “Promoting Collaborative Science” will be essential in all avenues of research aimed at the objective “Advancing Biomedical and Behavioral Sciences.” Modern pharmaceutical science is already highly collaborative and multidisciplinary, with advances in personalized medicine and predictive diagnostics driven by application of tools and techniques from data and computational sciences and engineering to biological sciences and pharmaceuticals. To match this continuously evolving drug development landscape, research training and career development should be adaptive and focused on development of overarching research competencies (e.g. hypothesis generation, study design) and personal competencies (e.g., self-direction, entrepreneurship) (Am J of Pharm Educ. 2017 Oct; 81(8): S11.) At the same time, “Preventing Disease and Promoting Public Health” calls for increased involvement of community health practitioners and public health experts in the biomedical research ecosystem, to identify the highest priority challenges to be addressed in cures

development and ensure that effective interventions move more quickly into practice. Increased support for hybrid investigations that simultaneously study effectiveness and implementation can be an important lever for advancing this objective.

Comments: Priorities/benefits/drawbacks:

As NIH considers how to achieve “Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity, Cultivating the Biomedical Research Workforce,” it should recognize the value of the distinct training and unique contributions made by practitioners in different health professions, including pharmacy. Pharmacists are medication experts, comprehensively educated in the diverse facets of drug development and delivery, including medicinal chemistry, pharmaceuticals, clinical pharmacokinetics, pharmacology (including adverse effects and drug interactions), toxicology, law and ethics, drug information and evaluation, and pharmacotherapy. Pharmacists and scientists trained at colleges and schools of pharmacy bring this foundational knowledge of medications to their research investigations and professional practice, in both clinical and community settings. Their expertise is particularly valuable in the study of medication therapy for populations, such as pediatric, obstetric and lactation, and geriatric patients, which have special considerations regarding pharmacology and drug interactions. Eligibility requirements and program goals for research, training and career development awards should enable pharmacists, student pharmacists and residents to successfully compete for these awards, recognizing that their training and career development trajectory may differ from those of basic scientists or physicians.

Comments: Future/emerging opportunities/needs:

Ongoing and serious concerns about the safety and security of America’s drug supply chain suggests a greater investment is needed in the development of new methods and technologies for pharmaceutical manufacturing and enhanced pathways for approval and production of generic drugs. Increased engagement of academic research centers is an opportunity to create and advance new approaches to production of medications, including generics and biosimilars.

Comments: Cross-cutting themes:

The Infectious Diseases Society of America (IDSA) supports the prioritization of cross-cutting themes in the NIH 2021-25 Strategic Plan framework. In particular, we appreciate the agency’s commitment to increasing, enhancing, and supporting diversity. Compensation disparities and historic underrepresentation of women and minorities in biomedical research have necessitated robust strategies for increasing inclusion efforts across the workforce. Equity in the physician-scientist workforce should ideally be an inclusive effort that focuses on metrics for a variety of underrepresented groups. A formal process to strategically address gaps is important, with an expectation of transparency and flexibility that allows for constant reevaluation. This includes reviewing policies and practices related to leadership and committee composition. We also appreciate the framework’s promotion of collaborative science. The biomedical research system is currently structured to support individual achievement, but new researchers entering the system often work in teams. As multidisciplinary science advances, diversifying funding sources for ID physician-scientists and developing inclusive funding

mechanisms that foster team science will become increasingly important. The NIH Fogarty International Center Global Health Program for Fellows and Scholars provides a model for using university consortia to provide collaborative, mentored research training opportunities in low- and middle-income areas. IDSA recognizes that addressing the unique challenges faced by physician-scientists as they fulfill the dual roles of investigator and clinician will require close cross-sector collaboration. Advocacy and engagement continue to be at the forefront of our society's efforts, and we stand ready to aid our federal, university, and research partners in securing the pipeline for the next generation of ID physician-scientists. Regarding additional themes, co-morbidities are an important cross-disciplinary research consideration. For example, patients who have undergone transplantation, are being treated for cancer, or are suffering from heart disease are more prone to other diseases, including infection. Improved treatments for infections can decrease the disease burden for these patients who are most at risk. In addition to prioritizing research that aims to directly address diseases with a heavy public burden, we urge the NIH to consider the value of research that may lead to treatments that indirectly improve other diseases. Diagnostics are also essential to improving other areas of the healthcare spectrum, such as antimicrobial stewardship and public health. Since common diagnostic technologies can improve testing for multiple disease burdens, IDSA urges NIH to prioritize cross-cutting diagnostic research. Preparedness in the face of major disease outbreaks can save thousands of lives: rapid deployment of effective diagnostics, treatments, and vaccines may even stop diseases from potentially exploding into a pandemic. IDSA also recommends prioritizing vaccine research programs, which hold great potential to eradicate or significantly reduce the risks of pandemics. In addition to ongoing seasonal influenza vaccine research, the development of a universal influenza vaccine that can generate multi-season protection should remain a NIH priority. IDSA also recommends that NIH consider the value of research that improves existing vaccines. Given the unpredictability of outbreaks such as COVID-19, we support the previous NIH Strategic Plan statement that the value of eradicating a pandemic should be considered when prioritizing research.

Comments: Priorities/benefits/drawbacks:

Advancing biomedical and behavioral sciences: NIH should strategically consider which research opportunities have the highest impact on the many diseases facing patients. For example, while threats such as antimicrobial resistance may currently only incur a moderate disease burden in the U.S., without sustained investment into improved treatments they can escalate into major public health crises. Infectious diseases also know no boundaries. While antimicrobial resistance is already a well-documented problem in the U.S., new and even more highly resistant bacteria, such as those containing MCR-1, continue to be imported into the U.S., significantly worsening the impact of resistance on patients. As the recent outbreaks of Zika, Ebola, and COVID-19 have illustrated, new and emerging infectious diseases may pose high public health risks. Strong research investment is essential to address these global threats before they can incur a heavy disease burden to the American public, and IDSA urges the NIH to ensure they remain high priority for research investment. Developing, maintaining, & renewing research capacity: IDSA is pleased to see the NIH prioritize the recruitment and retention of an outstanding biomedical research workforce as integral to the biomedical research enterprise. As the agency moves to more cross-disciplinary research, the unique perspectives of physician-scientists, who sit at the intersection between basic and translational/clinical research, will only become more valuable

to biomedical research. The COVID-19 pandemic has also highlighted the critical need for a well-trained research workforce with expertise in infectious diseases that can adapt to emerging challenges and collaborate across disciplines. We urge NIH to prioritize the strengthening of the physician-scientist workforce to enable the cross-cutting research the strategic plan framework endorses. Mechanisms to fortify the pipeline include increased training budgets for early career researchers and additional support for the K-to-R transition to independence; the facilitation of interdisciplinary team science; and the application of incentives to target critical research gaps. In 2018, IDSA, the HIV Medicine Association, the Pediatric Infectious Diseases Society, and the Society for Healthcare Epidemiology in America published Policy Recommendations for Optimizing the Infectious Diseases Physician-Scientist Workforce (https://academic.oup.com/jid/article/218/suppl_1/S49/5073087), which outlines key areas for increasing collaboration, supporting the early career pipeline, and expanding support for team and multidisciplinary research. IDSA appreciates the opportunity to provide additional recommendations to the NIH as it further develops its strategic plan to strengthen the biomedical research enterprise. Promoting scientific integrity, public accountability, & social responsibility: IDSA has strongly supported NIH public private partnerships (PPP) such as the Accelerating Medicines Partnership (AMP) and CARB-X. We urge the agency to consider similar PPP models for prioritization. To reduce administrative burden, IDSA recommends that NIH develop a systematic plan to develop, in collaboration with its institutes, centers, and scientific stakeholders, standard metrics or best practices on the most efficient policies to ensure regulatory compliance.

Comments: Future/emerging opportunities/needs:

Antimicrobial resistance (AR) remains a major problem for patients and threatens to undo decades of medical advances. A 2018 report published in the Journal of Infection Control and Hospital Epidemiology found that as many as 162,044 people die annually in the U.S. because of infections caused by resistant pathogens, making AR the third leading cause of death. Given the impact of AR across many areas of medicine, including cancer chemotherapy, transplantation, complex surgeries, and care of the immunocompromised, IDSA recommends that NIH increase funding mechanisms and programs for AR research. While great progress is underway in implementing stewardship in inpatient settings, more research to inform and support the implementation of stewardship in a variety of outpatient settings is needed. Outpatient settings are where the majority of antibiotic prescribing occurs. Given the fragility of the antibiotic pipeline, the need for new antibiotics, and the challenges in attracting private investment to antibiotic R&D, IDSA also encourages NIH to prioritize new antibiotic R&D with a focus on new classes, novel mechanisms of action, and oral options. When new antibiotics are brought to market, NIH should fund post-approval studies to inform their optimal use, particularly for indications with the greatest unmet medical need. We also encourage further study and development of rapid diagnostic tests to guide more rapid pathogen-directed therapy and reduce overuse of broad-spectrum antibiotics. IDSA further urges NIH to consider ways to streamline bureaucratic processes for AR research that can hamstring interventional clinical trials and drive away critical sponsors. We encourage alignment with practices employed by networks such as the NICHD Pediatric Trials Network, NHLBI heart failure networks, and the Antibacterial Resistance Leadership Group (ARLG) to provide greater efficiencies for research. IDSA believes a more extensive clinical trials network, built upon the foundation of ARLG, will help leverage resources to study new and existing antibiotics efficiently in well-designed trials. Such a

network should be developed in cooperation with FDA and international partners. IDSA appreciates the continued opportunity to work with NIH to enhance opportunities for early stage investigators, promote collaborative science, and protect the future of biomedical research.

Comments: Cross-cutting themes:

Migraine disables more Americans on a daily, yearly, and lifetime basis than any other neurological disorder and the pathophysiology of headache disorders involves fundamental pathways of every aspect of nervous system function. By addressing the longstanding inequities in funding and tackling the science of headache disorders head-on, the next NIH-wide Strategic Plan would better address its own priorities, such as:

- Improving Women’s Health and Reducing Health Disparities_by promoting studies of migraine—affecting 3 times more women than men—and a disease currently underfunded relative to the burden on Americans.
- Optimizing Data Science and Supporting Research Resources and Infrastructure_by developing nationwide registries combining clinical, functional, and genetic data, capitalizing on information available from the most common and disabling neurological condition.
- Promoting Collaborative Science_by establishing migraine and related disorders as priorities for researchers in neuropsychiatry and promoting basic and translational research
- Developing Treatments and Addressing Public Health Challenges Across the Lifespan_by highlighting the prevalence of migraine in children and adolescents as an unmet treatment need and by prioritizing studies of post-traumatic headaches related to sports injuries, motor vehicle accidents and military service.

Comments: Priorities/benefits/drawbacks:

The Alliance for Headache Disorders Advocacy (AHDA) represents 13 nonprofit organizations who promote the interests of Americans with the most disabling neurological disorder, migraine, and related conditions. The AHDA hereby requests that NIH review the persistent, dramatic and unjustifiable underfunding of headache disorders research in the US. The NIH-Wide Strategic Plan (Fiscal Years 2016-2020) included the statement that the “relative burden that various diseases place upon human health and wellbeing will serve as a crucial, but not the only, consideration in aligning NIH’s research priorities with public health needs”. There is no reasonable way to argue that current funding of research into migraine and other headache disorders reflects their disease burden as a “crucial” consideration—migraine is funded at a level ten times lower than other neurological disorders with far lower disease burdens. It is notable and instructive that the word “migraine” does not appear in the NIH-Wide Strategic Plan (Fiscal Years 2016-2020). By promoting scientific studies of migraine and related disorders and by advancing treatments for these conditions, the NIH will meet its own goals more effectively, such as:

- Driving Foundational Science_by elucidating neurobiological mechanisms mediating the Protean manifestations of migraine and related disorders, and their myriad co-morbidities.
- Preventing Disease and Promoting Health_by optimizing early intervention and preventing conversion to chronic forms of disease and by eliminating the use of opioids in treating these diseases.
- Cultivating the Biomedical Research Workforce_by recruiting young scientists to study the most disabling of all neurological disorders.
- Promoting public accountability_by pursuing treatments for a disease that reduces productivity more than any other pain condition among working Americans.

The NIH Research, Condition, and Disease Categories (RCDC) website reports that FY2019 NIH research funding coded for

“Headaches” was \$39.7m, and the subset of grants coded for “Migraines” was \$28.4m. While funding for “Headaches” research increased 24% over the \$32.1m FY2018 level, this apparent rise is misleading; 60% (\$4.6m) of the increase is attributable to just two grants, which are arguably only marginally related to headache research (i.e. malaria transmission-blocking drugs and pancreatitis pain). Without inclusion of these two grants, NIH “Headaches” research rose just 4% as a percentage of the overall NIH budget. Furthermore, HEAL Initiative grants to date may provide all funds to investigators immediately, rather than amortized over three to five years, thereby further exaggerating the apparent increase in NIH funding from FY2018 to FY2019.

Comments: Future/emerging opportunities/needs:

Addressing the opioid crisis by promoting targeted pain treatments: Since the emergence of the HEAL initiative, migraine has received less than 1% of the first tranche (\$945m) of set-aside funding to date. This inattention to establishment of specific migraine and headache disorders research programs stands in contrast to the specific language of the statute that authorizes the HEAL Initiative appropriations that cites disease burden as a “crucial” consideration. Opioid use is contrary to accepted clinical practice guidelines for migraine, as opioids may increase migraine frequency and severity. Despite these guidelines, patients with migraine were treated with opioids during more than 700,000 US Emergency Department (ED) visits in 2010. ED visits likely have led to thousands of avoidable cases of opioid use disorders, since 2% of all patients introduced to opioids in US EDs, will still be taking them a year later. 16% of Americans with migraine are active opioid users. To address these disparities, both the House and Senate Appropriations Committee Reports for FY2020 included statements that “strongly urge” NIH to issue HEAL Initiative Request for Applications (RFAs) specifically targeting research on migraine and headache disorders. NIH has refused to do so. NIH has justified its decision to not issue HEAL Initiative RFAs for headache disorders research on the basis that it has issued specific RFAs for back pain and hemodialysis pain research because these disorders “are associated with high rates of opioid prescribing”--the implication being that migraine is not also a major potential pathway to opioid use disorders. As noted above, this is certainly a misperception. NIH further states that the infrastructure of “essential research resources” for back pain or hemodialysis pain lags behind that of headache disorders research. NIH does not explain why such a distinction, if true, should obviate Congress’s principal argument for prioritizing NIH research programs for migraine – its persistent underfunding relative to high burden. Data science: given the enormous number of Americans affected by migraine (>45 million), there is opportunity to capitalize on Big Data mining beyond what is possible for almost any other disease. One such initiative is the American Registry for Migraine Research (ARMR), a database initiated with private funding by the American Migraine Foundation (AMF), that has already collected clinical and brain imaging data as well as blood samples on more than 2700 patients. While private and corporate donations have funded the creation of this database, federal funding will be needed to maintain and expand it and to analyze its results. There are opportunities for synergy and cooperation between ARMR and the NIH All of US, Precision Medicine initiative, which NIH should develop and support with strong funding. Over the past decade, more than twice as many PIs funded for “Headaches” have left the field as remained in it. The consistent inattention of NIH to programs for migraine research has likely contributed to major challenges in recruiting, and especially retaining, talented research scientists to this field.

Comments: Cross-cutting themes:

AACOM stands ready to collaborate with the NIH on the implementation of language provided in the fiscal year 2020 appropriations law, which recognizes the importance of enhancing NIH research funding for osteopathic medical schools, as osteopathic medicine is one of the fastest growing health care professions in the country, and plays a vital role in treating our nation's rural, underserved, and socioeconomically challenged populations. In this effort, AACOM encourages the NIH to develop specific programs to address disparities based on professional credentials. AACOM believes that increasing diversity in the physician workforce is important to meet health care needs. This can be addressed in the recruitment and retention of a diverse student body and by providing training in diverse settings, such as in rural areas, and to diverse populations, such as veterans and the underserved. Osteopathic medical education (OME) plays a key role in training the future physician workforce. Currently, nearly 31,000 future physicians, approximately 25 percent of all U.S. medical students, are enrolled at the nation's 36 osteopathic medical schools – at 57 teaching locations in 33 U.S. states. Many current osteopathic medical students will pursue careers in primary care, and many of these students will practice in rural and urban medically underserved areas; these are areas that already face shortages of primary care providers. According to AACOM's most recent data, 32 percent of graduates indicated their intent to specialize in the primary care specialties of family practice, general internal medicine, or general pediatrics. As research indicates that medical students who train in community-based institutions are more likely to practice in these areas, AACOM recommends that the NIH support research opportunities for and partner with community-based institutions. Colleges of osteopathic medicine (COMs) have a standing commitment to and focus on training primary care physicians, which mirrors the special commitment osteopathic physicians have in providing primary care, particularly to the nation's rural and underserved populations. Also, accreditation requirements for osteopathic medical schools mandate that each school provide medical care to the community where its students train, and the current OME model links the osteopathic medical schools' training to the communities where they teach students, especially important as our nation faces a growing physician workforce shortage. Moreover, AACOM encourages the NIH to support initiatives that facilitate communication among patients and health professionals to help ensure culturally competent care. The AACOM Council of Osteopathic Researchers supports and coordinates medical education research efforts, focusing on teaching/learning issues as well as institutional research at osteopathic medical schools. AACOM has established the Undergraduate Medical Education – Graduate Medical Education Digital Resource Library to serve the osteopathic medical education community and beyond and provide information about osteopathic training, osteopathic recognition, accreditation, evaluations, and many more topics. The library also offers information on upcoming osteopathic courses, lectures, and events, often available for continuing medical education credits.

Comments: Priorities/benefits/drawbacks:

AACOM recommends that the NIH support evidence-based research for integrative health approaches and recognize the important role that osteopathic manipulative treatment (OMT) or osteopathic manipulative medicine (OMM) can play in serving as a critical approach to addressing medical and

musculoskeletal conditions. AACOM continues to support pain education at pre-and post-graduate levels for all practitioners whose patient populations face pain-related conditions. Medical students training to become osteopathic physicians receive extra training in the musculoskeletal system and learn the value of osteopathic manipulative treatment (OMT) as a non-pharmacological alternative to pain management. When appropriate, OMT can complement, or even replace, drugs or surgery. In this way, OMT brings an important dimension to standard medical care. Importantly, because of osteopathic medical education's distinctive training in OMM, its focus on the whole person, the number of graduates training and practicing in areas hard-hit by the opioid crisis, and the high proportion of osteopathic physicians practicing in primary care and other fields that are on the "front lines" of treating pain and caring for those with substance use disorders (SUDs), osteopathic medical education is poised to make a difference in treating these patients. AACOM encourages the NIH to partner with the osteopathic community as it seeks to develop treatments for addiction and other chronic medical conditions. AACOM believes it is imperative that NIH prioritize programs and initiatives that help to enable patients to get the most from new discoveries in basic and clinical research by improving health care delivery. AACOM urges the NIH to continue to support the Extramural Loan Repayment Programs, designed to recruit and retain highly qualified health professionals into biomedical or biobehavioral research careers by helping alleviate some of the debt burden that drives many health professionals away from research activities. Similarly, the Lasker Clinical Research Scholars Program is especially important to independent clinical researchers early in their careers, as it offers a unique bridge between the NIH intramural and extramural research communities. In addition, AACOM encourages the NIH to maximize funding available through the Small Research Grant Program as it works to encourage small-scale research projects and enables researchers to test pilot and feasibility studies, which can lead to more advanced and in-depth research in the future. Additionally, AACOM strongly recommends that the NIH increase its enhancement efforts and partnerships with COMs located in Institutional Development Award (IDeA) states, as this funding stream would be beneficial to enabling COMs access to research infrastructure funding as they work to build their research capacities. AACOM strongly supports strategies to hire and retain a diverse and high caliber workforce to support and achieve the NIH mission. We also stress the importance of working collaboratively across the federal government to document and implement best practices related to administrative and operational functions as well as employee engagement, performance, and accountability.

Comments: Future/emerging opportunities/needs:

AACOM recommends that the NIH strive to streamline communication and coordinate across its institutes between prospective grantees. AACOM encourages the NIH to bolster its resources for applicants and appoint additional staff across NIH who provide on-the-ground support to assist OME partners throughout the process to complete the necessary administrative and documentation requirements. The NIH should consider providing increased support for training opportunities that seek to enhance collaboration between osteopathic and allopathic institutions and other health professions institutions, since interprofessional team-based care is a major consideration in the future of quality patient care. As an inaugural partner of the Interprofessional Education Collaborative (IPEC), which was formed to promote and encourage constituent efforts to advance interprofessional learning experiences to help prepare future health professionals for enhanced team-based care of patients and improved

population health outcomes, AACOM has worked with IPEC members to develop a widely accepted set of competencies in interprofessional education. We encourage the NIH to utilize these IPEC resources as the strategic plan is developed. AACOM looks forward to partnering with the NIH as it continues to implement policies and programs to strengthen academic partnerships to build a health care system that enables current osteopathic medical students and future osteopathic physicians to provide the necessary care to meet the needs of our nation's veterans and beyond.

Comments: Cross-cutting themes:

As a membership society focused on aging across the life course, GSA commends NIH's selection of "across the lifespan" as a cross-cutting theme. This theme aligns well with NIH's new Inclusion Across the Lifespan (IAL) policy for clinical research. In the same spirit, GSA suggests that NIH consider the extraordinary heterogeneity across the older adult population as an aspect of diversity, especially in programs and policies it implements to support underrepresented populations. As we age, we become more different, not more alike. GSA further recommends that NIH maintain age and IAL as criteria for research funding under the cross-cutting theme, "Improving Women's Health and Minority Health, and Reducing Health Disparities." We hope this will help elevate areas of research that have historically received less public funding (e.g., research on the effectiveness of interventions for incontinence). Finally, under the cross-cutting theme, "Promoting Collaborative Science", GSA recommends that NIH consider the important role of interdisciplinary research and its value to translating evidence into policy and practice. While Institutes such as NIA have taken deliberate steps to actively promote multidisciplinary research, GSA recommends that interdisciplinary research serve as a future goal for all Institutes.

Comments: Priorities/benefits/drawbacks:

Under Objective 1, GSA recommends that NIH consider geroscience as a priority area for "Driving Foundational Science," which would be consistent with NIH's past efforts on the topic. We focused an entire issue of our journal, *Public Policy & Aging Report* (2019, Vol. 29, No. 4) to this emerging field. The premise of geroscience is that the same processes can be targeted in humans to slow the emergence of disease, and both proposed and ongoing human clinical trials are seeking to test whether targeting aging biology can benefit human health (Stephen B Kritchevsky). The trans-NIH Geroscience Interest Group, along with similar initiatives, can help NIH staff and scientists at each Institute to understand the important role that biological aging plays in their diseases of interest (Matt Kaeberlein). Under Objective 2, "Supporting Research Resources and Infrastructure", GSA recommends adding language around increasing accessibility to the grant application process for both early-stage investigators (ESIs) and at-risk investigators. GSA commends NIH's efforts to date on implementing recommendations from the "Next Generation Researchers Initiative" and recommends continued strides be reflected in the Strategic Plan. Under Objective 3, GSA recommends including that publication of negative results is a key part of accountability. As was noted during Day 2 of the December 2019 Advisory Committee to the NIH Director meeting, it is as important and beneficial for the scientific community to have evidence on what interventions do not work, as it is to have evidence on the ones that do. This is especially important since positive results tend to be overrepresented in academic publications.

Comments: Future/emerging opportunities/needs:

GSA has been pleased to support NIH's geroscience-focused initiatives over the years. We co-convened a geroscience interest group for our members in recognition of the important purpose of the NIH Geroscience Interest Group to the aging field. Most recently, GSA participated in NIA's Geroscience Summit in Fall 2019. The Summit was building on recent research success in healthy aging, including non-drug interventions for diseases and conditions affecting older people, falls prevention and supporting the health needs of diverse populations of older adults. To further the mission of NIH, GSA recommends that the Strategic Plan place a priority on maintaining and even increasing participation of geroscience as a trans-NIH priority.

Comments: Cross-cutting themes:

FABBS applauds the addition of the cross cutting theme in the NIH-wide strategic plan. In particular, FABBS supports the themes 'Increasing, Enhancing, and Supporting Diversity' and 'Promoting Collaborative Science.' Both themes support the quality, rigor and potential impact of NIH research. Behavioral scientists, included those funded by NIH and other federal agencies, have long studied how to most effectively achieve diversity in the scientific work force and also how to most effectively collaborate.

Comments: Priorities/benefits/drawbacks:

FABBS commends the addition of "Behavioral" to Objective 1 – "Advancing Biomedical and Behavioral Science Research". Including "Behavioral" clarifies that NIH leadership encourages institutes to engage all disciplines and approaches to best accomplish the mission of NIH. This explicit mention of behavioral is consistent with the cross cutting theme of 'promoting collaborative science.' The behavioral sciences are centrally important to the goal of 'Preventing Disease and Promoting Health.' To this point, FABBS encourages NIH to support research to increase knowledge about healthy normal development across all institutes and centers. Recognizing the autonomy of individual institutes, NIH leadership has the opportunity to set a strong example by prioritizing attention to understanding health and normal development in addition to disease and atypical development. Currently, support for research to better understand healthy functioning and normal development varies dramatically across institutes and when overlooked, is to the detriment of best supporting health.

Comments: Future/emerging opportunities/needs:

The BRAIN Initiative, a trans-NIH study, has produced tremendous findings. However, it has not made enough progress on 'measuring real-time cognition, emotion, perception and behavior' - despite it being a stated goal. Examples could include human navigation, measurement of facial and bodily affect concurrent with neurophysiological recording, perception of extended naturalistic events, and combining measurement of motor behavior with electrophysiological recording in naturalistic behavior. The initiative would benefit from the development of measurement tools for ambulatory assessment. Linking techniques such as ecological momentary assessment, life-logging, camera-based tracking and GPS-based tracking with neurophysiology would enable qualitative leaps systems neuroscience. The

initiative would benefit from the development computational tools linking brain and behavioral data. To date, the vast majority of BRAIN initiative computational initiatives have focused at the cell and circuit level, with no connection to behavior. Current developments in deep networks, Bayesian models, and machine learning provide excellent opportunities to link neurophysiology to behavior.

Comments: Cross-cutting themes:

America's Blood Centers (ABC) is North America's largest network of FDA-licensed, independent, non-profit community-based blood centers. Our members collect, process, and distribute nearly sixty percent of the blood supply in the United States. It is imperative that the responsibility, recognition, and promotion of blood donation expand far beyond blood collection centers. Blood transfusion continues to be the most common hospital procedure yet is not fully recognized within the healthcare system or among policymakers. Blood can only come from the selfless donations of millions of individuals each year. However, demographic challenges threaten the U.S. donor base with approximately 60 percent of blood donations being made by individuals over 40 years old. Of those, three-quarters come from people over 50 with younger donors failing to donate at similar rates. Availability of blood components is key to supporting patient care and current and future treatment innovations at NIH and throughout the nation. This can only occur through a robust donor base. Although patient blood management has decreased the demand for red cell transfusions and has reduced overall collection goals, new donor recruitment strategies must be examined on three fronts: prosocial behavior in younger individuals must be encouraged, a higher proportion of group O Rh negative donors must be recruited, and the currently inadequate ethnic diversity in the donor base must be corrected. ABC applauds the 2021-2025 NIH Strategic Plan Framework cross-cutting theme of "optimizing data science and promoting collaborative science". Social science research has been identified as a research priority in the 2021-2025 NIH Strategic Plan Framework. We believe that this cross-cutting theme must include optimizing social science information on the motivations and barriers to blood donation through research in order to support a robust donor base. Collaboration between the blood industry and NIH in this type of research would produce a partnership that yields needed data related to strategies to attract new donors, thereby supporting a robust donor base now and in the future.

Comments: Priorities/benefits/drawbacks:

ABC supports NIH's priorities across the three objectives, in particular Objective 1: "Advancing Biomedical and Behavioral Sciences". This objective includes fundamental science research with behavioral and social science research as an example of an area for prioritization in the 2021-2025 NIH Strategic Plan Framework. ABC has worked to highlight the need to better understand individual motivations and barriers to donation, both in current donors and non-donors. The need for social science research was highlighted in the recent ABC Annual Meeting session "Where are Our Donors? Examining the Need for Increased Social Science Research." The speakers examined the current social science research efforts in relation to the blood donor base, current efforts to increase social science research, and potential additional directions of needed research into the donor base. The need for federal support for social science research was examined as well, with partnership opportunities discussed that would ensure the long-term resiliency of the blood supply by attracting younger donors.

While blood centers are able to gather data on current donors, research into non-donors requires different methods of data collections. Questions surrounding deferred donors that do not return after a temporary deferral ends, the changing role of civic duty and altruism, and misinformation are all issues of interest to ensuring the blood supply remains robust. Additional social science research will help the blood community answer these questions and develop alternative recruitment programs to ensure availability for patient treatment protocols, whether at NIH or other healthcare facilities. Objective 3 of the 2021-2025 NIH Strategic Plan Framework “Exemplifying and Promoting...in the Conduct of Science” includes “Leveraging Partnerships” as a strategy. Identifying challenges and solutions to the recruitment and retention of blood donors continues to be a key area of work for ABC and ADRP, an International Division of ABC, the premier organization for donor facing blood banking professionals. ADRP is calling for a new, unified voice in promoting the need for blood donors. This effort will leverage public/private partnerships in supporting social science research and unite stakeholders in the vein-to-vein impact of blood donation.

Comments: Future/emerging opportunities/needs:

ABC encourages NIH to foster a partnership between the blood community and NIH in social science research to address the challenges of ensuring a robust blood supply now and into the future. A robust blood supply is essential to the health care system and this collaboration is an important component of developing solutions to promote adequate blood donations for patient care and the sustainment of advanced patient treatments and interventions.

Comments: Cross-cutting themes:

The NIH should carefully assess disease burden and match amount of funding with the actual disease burden. Historically, NIH funding has been disproportionate to disease burden (both over funding and under funding certain disease processes). Injury research is perhaps the best example of disproportionate funding and the NIH needs to focus on injury funding for both the pediatric population and more importantly the elderly. Injury in the elderly is quickly becoming a major issue and cause of morbidity and mortality but little NIH funding exists. The NIH should carefully focus on emergency care research. As highlighted by the current COVID-19 pandemic, the United States needs to ensure that emergency care is best prepared for what it is faces. In 2006, the Institute of Medicine identified substantial and widespread issues with emergency care in the United States. The lack of research funding was one of the main contributors to the poor emergency preparedness.

Comments: Priorities/benefits/drawbacks:

The NIH should specifically focus on developing emergency care researchers in all specialties that intersect with emergency care. This focus should start early in the pipeline (medical school) and extend to faculty (K awards).

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

The Michael J. Fox Foundation for Parkinson's Research (MJFF) is supportive of the NIH cross-cutting themes and suggests consideration of the following: MJFF applauds NIH's focus on increasing diversity and inclusivity in research and would advocate for continued and expanded funding for studies that seek insight from diverse populations as well as in supporting grants to more diverse researchers/scientists. These initiatives expand disease understanding by studying all groups affected and advance evidence-based medicine in testing treatments in real-world populations. There is a direct correlation between knowledge of research and willingness to participate in research. People who are more informed about clinical research generally express more positive views and want to be aware of clinical studies being conducted in their own communities. We recommend NIH promote more public education about research, particularly in underserved communities that are underrepresented in trials to increase research participation, reduce clinical study recruitment delays, diversify research participants and ultimately accelerate and improve drug development. In addition, as NIH gains knowledge of recruitment strategies for inclusion of under-represented communities (e.g., through NIH's All of Us study), NIH should maximize the value of these efforts by publicizing and publishing learnings from these recruitment efforts that could be adopted by other disease organizations. There is a need to better understand how factors such as gender, ethnicity, socio-economic status, level of education and geography impact personal health and research participation decisions. This focus is not only important in the work of the NIH, but it signals to the broader scientific community that they should also treat this as a priority. NIH should put more investment in research exploring these areas as it will benefit across disease areas and conditions. NIH should seek to address physician biases that can lead to diagnosis, treatment and research participation disparities, particularly in underserved communities. This could be accomplished by supporting education opportunities to medical professionals about biases and health inequity as well as supporting greater links between research activities and clinical care. MJFF is supportive of prioritizing data science initiatives that can accelerate all biomedical research and are grateful for NIH contributions to many data resources and tools. In support of this cross-cutting theme, we encourage NIH to support critical areas: Training programs and fellowships for researchers interested in pursuing data science careers or investigators seeking to apply data analytics approaches to their area of research Policies that protect data privacy but encourage data sharing so that society and the research community can benefit from discoveries using NIH-funded data. These include ensuring consent language allows for deidentified data to be shared for research purposes, fostering the generation and sharing of high-quality and standardized data, and research funding to analyze these datasets. We cite the Accelerated Medicines Partnership (AMP) in Parkinson's disease as a model for a successful initiative Data sharing platforms that democratize data and foster use of NIH-funded datasets Tools for analytics serving many different use cases from a computational scientist, basic laboratory scientist, or clinician.

Comments: Priorities/benefits/drawbacks:

MJFF supports NIH priority areas as important and essential for accelerating new treatments and cures. Along these lines we offer the following comments and guidance around specific priority areas: Advancing biomedical and behavioral science research MJFF is supportive of all three areas within this

priority area: driving foundational science, preventing disease and promoting health, and developing treatments, interventions and cures. That being said, one of its greatest roles is in support of strong Foundational Science and we encourage NIH to ensure funding to this area remain strong. Developing, maintaining, and renewing scientific research capacity Cultivating the Biomedical Research Workforce NIH should continue to be a strong leader in supporting the next generation of researchers through pre-doctoral, post-doctoral and young investigator award mechanisms. These newer scientists are essential to maintain progress and momentum in future research. Supporting Research Resources and Infrastructure ClinicalTrials.gov is an important and impactful resource for increasing awareness of clinical research opportunities. NIH should seek to address usability challenges with the tool to make it more useful and impactful, such as providing smarter filtering of research opportunities and more lay-friendly descriptions to better connect potential volunteers to trials that need them. In addition, NIH should take stronger role in reviewing and confirming listed trials meet essential ethical criteria to reduce inclusion of potentially misleading or harmful studies (e.g., 'pay-to-play' trials, etc.) NIH should consider ways to expand and support infrastructure for doing clinical trials with an eye toward leveraging novel models, platforms and technologies to increase capacity, capability and efficiency for accelerating testing of novel interventions. This could be done through leveraging existing clinical trial networks and infrastructure and looking at ways to optimize and reduce unnecessary delays in trial start-up, data collection and outcome reporting. Exemplifying and promoting the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science Fostering a Culture of Good Scientific Stewardship Although we appreciate that members of NIH Advisory Councils include more diverse members of the communities NIH serves, we encourage NIH to also consider more direct inclusion of affected disease community members (patients, non-scientists, under-represented groups) in the peer review system. Inclusion may depend on the particular program and these additional reviewers may be tasked to comment on different aspects of a proposal but doing so offers opportunities for insight on proposals and priorities that may not normally come up within a traditional scientific review. NIH should promote greater collaboration between researchers and the patient and care partner communities. The result will be better designed studies that truly serve the needs of patients. For example, NIH could consider requirements for some grant proposals to include demonstration of community member involvement as a requisite for funding. Leveraging Partnerships No single funder can support all needs for all stakeholders. NIH should seek to build bridges by being a leader in connecting other strategic funders (public and private) to ensure best use of resources to solve common challenges and connect activities across diseases.

Comments: Future/emerging opportunities/needs:

NIH should consider launching and expanding programs that seek to better connect research across diseases that may share similar biology, research or societal challenges. This may require greater linking of programs across NIH agencies (e.g., NIA and NINDS) where related disorders may currently be managed separately. The need for robust and rigorous science is essential for making good, data-driven decisions and policies. NIH should strive to be a leader in efforts to promote replication and reproducibility in research it supports and to ensure data are accessible and that results are made available in timely fashion through adoption of current best practices in open-access and pre-print archive publishing trends. We are grateful for NIH's role in making its funded research publications

available through repositories such as PubMed Central. We encourage NIH to remain a leader in pushing for open access publishing models, including thinking about novel methods for support of open access publishing fees and shifts toward immediate open access policies vs the 6-12-month embargo models currently used by NIH. NIH should recognize the valuable contributions of other funding partners and seek to recognize these others funding sources within databases such as PubMed. More inclusion of other funders' contributions to research also offers opportunity to increase transparency about funding sources within the scientific literature. This information could be easily made as a requirement from journals to have papers indexed in PubMed and provided as an open and searchable field in PubMed. Addressing public health challenges across the lifespan NIH should explore funding opportunities that take disease progression into account, looking at ways to address unique challenges patients face at early, middle and later stages of disease. With an eye toward greater disease prevention, NIH should also explore ways to screen people at greatest risk for disease who could benefit from closer monitoring and potentially earlier preventative treatments. NIH should consider the critical burden to care partners on supporting those with progressive, disabling and chronic diseases. By supporting greater collection and inclusion of data on care partner burden as part of decision-making factors associated with economic, societal and health issues, we can gain a clearer understanding of true disease burden and priority funding needs to address these challenges.

Comments: Cross-cutting themes:

Emergency care research encompasses treatment provided by multiple types of providers across a spectrum of locations (prehospital to intensive care unit). Annually, over 140 million patient encounters occur in United States' Emergency Departments (as compared with 39 million inpatient hospitalizations) and span the entire lifespan. Furthermore, 30 million of these visits are from children aged 18 years or younger with nearly 1 million of these admitted to the hospital. Forty million people over the age of 65 years visit the Emergency Department annually for care, and the Emergency Department accounts for half of all hospital geriatric admissions. In addition to providing care spanning the lifespan, the Emergency Department provides investigators access to a racially and ethnically diverse population as well as those individuals marginalized by society. The Emergency Department represents the most common pathway for patients to be admitted to a hospital. Rapid diagnosis, risk stratification, treatment, and determination of the need for hospital admission represent core emergency medicine activities. In addition, the decisions made in the Emergency Department have far-reaching consequences – in terms of patient morbidity and mortality as well as healthcare costs. By focusing on accurate diagnosis and treatment of patients with emergency conditions, enormous steps may be made toward risk stratification and improved population health. Support for emergency care research will ultimately reduce health disparities. The Emergency Department has been centrally involved in all the recent major United States' health crises (hospital overcrowding, opioid epidemic, mental health crisis, and the COVID-19 pandemic). In all of these crises, the United States was ill-prepared, in large part due to limited research from the emergency setting. The NIH should specifically incorporate emergency care research into its strategic plan. Academic Emergency Departments have also been at the forefront developing the methods and metrics for the emergence of Implementation Science, despite the relative

paucity of NIH funding opportunities. Transforming research into routine practice involves a complex interplay of dissemination, behavioral adaptation and often de-implementation, and contextual awareness.

Comments: Priorities/benefits/drawbacks:

The NIH should additionally focus on matching funding with disease burden as all too often NIH funding is disproportionate to the burden of the specific disease. For example, injury is the leading cause of death in those ages 1 – 44 years. Injury research, however, has been historically underfunded by the NIH. The estimated 2019 Fiscal year expenditure by the NIH on childhood injuries is \$89 million. This is exactly half of what will be spent on childhood leukemia (\$178 million), despite the number of deaths from injuries being 3.4 times more than the number of deaths from childhood leukemia. A similar discrepancy exists between injury research in the elderly and the burden this population now suffers from traumatic events. Injury has the largest difference between the proportion of NIH funding and disease burden of any disease condition (Moses, JAMA 2015). A specific research theme in the NIH strategic plan to address this critically important issue is needed. Finally, more detailed understanding of how best to operationalize and optimize care for patients with emergency conditions is needed as emergency care research has been chronically underfunded. Emergency Department encounters involve multiple health care records and often lack interoperability. Downstream effects of emergency care become even more opaque as the patient may be transferred to any number of settings such as rehabilitation, nursing facilities, or home. Future work in data science should identify scalable solutions to reduce this fragmentation and promote data exchange between systems or data aggregation across platforms, as well as ways for clinicians to easily view this information during patient care. Although a substantial increase in the number of emergency care researchers has occurred over the last twenty years, further need remains. The NIH should specifically focus on the development of emergency care researchers in all specialties such that the future needs are met and the ability to address future crises in the United States is developed. This development focus should begin early in the career pipeline. Development and funding of targeted K-level training grants beyond the K01 mechanism will be required to develop researchers in data science. This data scientist workforce must be capable of both creating data science methodology and applying data science approaches to the acute care setting. Application of data science approaches should include both traditional bio-informatics and clinical health informatics and public health informatics. Programs should also be developed to train a new type of emergency clinician in data science. For success, emergency clinicians have to be intimately involved in curating data, choosing outcomes to predict, and ultimately building and rigorously testing algorithms to ensure data science research remains firmly rooted in the realities of emergency care.

Comments: Future/emerging opportunities/needs:

The NIH must recognize that traditional research paradigms for many conditions does not apply for all disease process, especially in the emergency setting, where both consent and therapeutic options are often time-limited. Research operations in the emergency setting frequently require unique protocols. For example, the mental health crisis is a major issue needing urgent discovery to improve this vulnerable population's care. It is extremely difficult to obtain consent for, or have adequate time to conduct, for instance, genomic testing or fMRIs on acutely, mentally ill patients. Yet these patients are

the ones who would be best served by improved diagnostic and treatment options. We strongly encourage the NIH to work with leaders in emergency psychiatric research, including emergency physicians, psychiatrists, and psychologists working in diverse communities and populations, to improve our nation's ability to conduct the research necessary to better diagnose and treat mental health issues in the emergency care setting. Such methods will also help to test novel interventional programs. A significant need exists for facile methods to advance data management including the ability to seamlessly load de-identified patient-level data into systems for open access by the scientific community. Privacy, ethical, and legal challenges need to be surmounted. While the NIH has required public reporting of data for several years, there has not been a mechanism to do this easily and track when it is completed. Moreover, there is no simple, shared portal or method to homogenize NIH funded data from disparate sources. While the framework for such an approach exists in the NIH supported genomics, proteomics, and metabolomics central repositories, sharing clinical data and linking disparate sources would build capacity to study complex disease states, long-term outcomes, and rare diseases that cannot be adequately studied with current methodology. Increasingly, biometric data are accumulated by machines and recorded in an automated fashion. This can generate long streams of intensively sampled longitudinal data. Examples pertinent to emergency care include long electrocardiographic recordings, ventilator supported respirations and sequential blood pressure, heart rate, or hemodynamic or biometric measurements. Increasingly, patients arrive with their own personal self-monitored data (e.g. heart rate from a wrist monitor). Standard methods and formats are needed to aggregate, synchronize, and annotate these time-varying data from multiple platforms. Methods to move, visualize, and analyze these data are also not well established. Future work should examine data management and analysis for this intensive longitudinal data. There also should be an exploration of the meaning, significance, and reliability of patient self-monitoring data for making treatment decisions. Lastly, the connection of the emergency department to population health efforts in a community, based on public and private resources, should be part of any project.

Comments: Cross-cutting themes:

We are in agreement with all of the Cross-cutting themes articulated in the current framework. In addition, we encourage NIH to consider Social and Behavioral Science as an additional cross-cutting theme for the framework for strategic planning. It impacts and plays a key role in all of the objectives in the framework, including how interdisciplinary teams of researchers, as well as patients and community partners work together to advance biomedical and behavioral science and promote health, how best to develop and maintain research capacity and to study these efforts for their effectiveness, and how to leverage social and behavioral research to promote scientific integrity and public accountability.

Comments: Priorities/benefits/drawbacks:

We strongly support the three Objectives put forward by NIH. We are pleased to see that the first Objective articulated in the framework is Advancing Biomedical and Behavioral Sciences. Related to the Objective 1 focus area 'Driving Foundational Science', we encourage NIH to prioritize funding for basic science research, specifically through the Program Project Grants/Center Grants or P-series, and in specific targeted areas, as mentioned in the trans-NIH comments below, through the Centers for

Excellence Program. NIH-funded Center grants have been extremely effective on our campus in advancing biomedical research, bringing groups of faculty together to tackle problems that could not be addressed through individual research grants. Two of the NIH-funded Centers on our campus have been supported by NIH for 20 or more years, resulting in generation of new tools for proteomics, molecular modeling and bioinformatics analysis, training of thousands of users over the award period, numerous discoveries relevant to health including providing new targets for HIV therapy, revealing details of how diseases result in lethal conditions, and linking opioid over-use to chronic physical conditions. In addition, these Centers have enabled numerous collaborations and the interdisciplinary training of many graduate students. Based on the benefits of NIH-funded Centers on our campus, we suggest NIH increase funding through these mechanisms. We also encourage NIH to continue the Clinical and Translational Science Awards Program to advance Objective 1, expanding opportunities for new Program Hubs at additional campuses. This would enable research teams to build on discoveries made through Research Grants and Program Project Grants mechanisms, and would also facilitate successful partnering between academic researchers and clinicians to advance clinical and translational research. We concur that developing, maintaining, and renewing scientific research capacity, Objective 2, is critical. In particular, we encourage continued funding for training programs to enable the development of a diverse, interdisciplinary workforce with training and skills to advance health and health-related research through a wide array of careers within and beyond academia. We also strongly support strengthening and increasing funding through the RO1 to develop and maintain research capacity. It is critical to increase RO1 funding to relieve the burden of intense competition for federal funding that has led, in part, to the loss of investigators from careers in academic research in the U.S. We also encourage NIH to consider developing additional strategies to strengthen the RO1 funding mechanism and address the declining rate of young scientists who receive funding through this mechanism. We suggest NIH consider including a fourth Objective in the framework to accelerate development of research discoveries into commercial products to improve patient health. Although Objective 1 includes a focus area to advance the development of treatments, interventions and cures, the strategies and challenges surrounding commercialization of health technologies are sufficiently distinct from translational research to necessitate a separate Objective. To accelerate development of discoveries into commercial products, we encourage continued or increased NIH support through programs including the trans-NIH Research Evaluation and Commercialization Hubs (REACH) program and the NIH Centers for Accelerated Innovations (NCAI) program.

Comments: Future/emerging opportunities/needs:

We encourage NIH to build on its existing trans-NIH initiative on the microbiome by investigating the potential for funding Centers of Excellence for microbial research. A substantial knowledge base has been generated through NIH funding in this area since 2007, totaling more than \$880M in awards to more than 1000 investigators by FY2016. Funding for Centers of Excellence in Microbiome research would allow the growing field of microbiome researchers to leverage the knowledge base established largely (88%) through NIH funding of single investigator grants. This mechanism would also provide shared resources and longer-term funding for large scale projects, enabling teams of biologists and engineers to coalesce and develop new tools and technologies to address the knowledge gaps in the field, identified by the NIH Human Microbiome Portfolio Analysis Team. We also encourage NIH to build

on its existing trans-NIH initiative for brain research by allocating funding for this area through Program Project and Center grant mechanism. This would capitalize on the research and discoveries generated through the NIH Brain Initiative, and is in alignment with the recommendations by the BRAIN 2025 Report by the BRAIN Working Group. The Program Project/Center grant funding mechanisms would enable interdisciplinary teams of biologists, chemists, physicists, and engineers to come together to develop innovative neurotechnologies and transform research on the brain. We await the NIH response to the recommendations from the AI working group in December of 2019. We encourage NIH to develop a new trans-NIH initiative focused on building a knowledge base and standards for AI research in the area of biomedical research, specifically emphasizing health analytics and health technologies. Funding mechanisms that would include training interdisciplinary teams including computer scientists, engineers, and biologists to work together effectively to advance AI research related to health should be considered and/or created. A new trans-NIH need we ask that NIH consider is renewed funding for computing related to biomedical research and healthcare, in focus areas such as multi-modal computing for biomedical intelligence systems, computing for predictive intelligence in medicine, blockchain computing for transparent and traceable management of health records, and quantum computing with both short and long-term goals including advancing MRI and cancer therapy. We encourage NIH to partner with other federal agencies to jointly fund research in these areas, and/or potentially form a trans-NIH initiative similar to the NIH Roadmap Initiative, National Centers for Biomedical Computing, to support new computing centers across the country as well as related program announcements for single investigators and small teams to coordinate with the newly-funded centers. We also urge NIH to prioritize funding for construction/modernization of physical infrastructure for biomedical research space as a trans-NIH need, either through creation of an initiative similar to the 2009 American Recovery and Reinvestment Act (ARRA)-funded construction of biomedical research facilities or through continued/expanded support through the C06 mechanism.

Comments: Cross-cutting themes:

The Association of American Universities appreciates the opportunity to submit comments on NIH's FY 2012-25 Strategic Framework and values our continued engagement with NIH. Founded in 1900, the AAU is composed of America's leading research universities. AAU's 65 research universities transform lives through education, research, and innovation. The cross-cutting themes articulated in the NIH framework represent areas of critical importance for the federal role in U.S. biomedical research enterprise. The themes indeed underpin optimization of NIH's processes and stewardship, which have never been more necessary than during the COVID-19 crisis. AAU's comments will focus on the cross-cutting theme of: Optimizing Data Science, and Objective 2: Developing, Maintaining and Renewing Scientific Research Capacity. Optimizing Data Science AAU agrees it is beneficial to make data from federally funded research available to the public to accelerate scientific discovery and ensure research integrity through robust replication and re-analysis. At the same time, it is imperative we achieve the appropriate balance between public access and privacy to support and enable scientific inquiry. Appropriate data sharing and access requires significant consultation, collaboration, and investment by federal agencies, universities, scholars, and the research community more broadly. Policies should not

only support access to data but enable reuse through adherence to FAIR data principles. AAU is actively working with our member campuses to develop appropriate campus policies, practices, and guidance to enable public access to research data. As NIH moves to implement data sharing requirements and policies, AAU requests that several issues be considered: clarity on the definition of scientific data, guidance on the amount and type of data needed for replication and re-analysis, and requirements for data management and sharing plans. Appropriately defining 'scientific data' is particularly important. Universities and researchers should easily be able to interpret and comply with NIH's definition of scientific data because it requires extensive time and technical data expertise to assess the endless amounts of data that may be generated over the life of a grant. The amount and type of data necessary to validate and replicate research findings is, in many cases, subjective and varies widely across disciplines. Without appropriate guard rails in place, this definition may result in the sharing of large swaths of data that are unnecessary, costly, and burdensome to manage and share. Additionally, maintaining quality and ensuring FAIR principles will be difficult, if not impossible, if researchers are required to share any and all data used in research findings throughout the project. To ensure the data researchers share is useable by the research community and broader public, we suggest the definition of scientific data only include data underlying scholarly publications. AAU supports NIH's intention to request additional information be included with the Data Management Plan when needed. We interpret this to mean NIH will make it clear to the grantee if other information is expected, particularly for compliance with new agency policies. This approach supports a collaborative relationship between the program officer and the grantee which is essential throughout the life of the grant. An expectation that NIH will

Comments: Priorities/benefits/drawbacks:

Objective 2: Developing, Maintaining and Renewing Scientific Research Capacity NIH's continued role in increasing, enhancing and supporting diversity through the further development of the scientific workforce and more inclusive research opportunities are key components in the U.S. biomedical enterprise. Biomedical research has excelled in the U.S due, in large part to the strong partnership between federal sponsors and universities. The NIH should continue to work with AAU and other stakeholders to attend to the emerging areas of threat to the ecosystem of the biomedical workforce. The concerns here are many; constrained opportunities for young investigators to pursue independent research, the structure and duration of graduate training and post-doctoral fellowships, the challenges of supporting high-risk, high-reward research; the need for pathways to non-academic careers. These are urgent challenges, ones that will demand focused attention in the years ahead. Should these impediments discourage the best and the smartest from careers in science, the U.S. will have lost its dominant position in world science. Ensuring workforce diversity, attracting and retaining women and underrepresented minorities to biomedical research, must continue to be a high priority for leaders in all sectors. However, as long as the research career trajectory involves a long period of uncertain and low-paying employment followed by a long period of intense competition with uncertain outcomes, it will be difficult to attract talented individuals who have an array of other opportunities. NIH's efforts to support "re-entry" programs for early career investigators who may have to step away from research due to family needs and need assistance to resume their careers are laudable. This is yet another example of the importance of NIH's leadership role in cultivating the biomedical workforce. Federal

investment in doctoral education fills a critical gap that neither states nor industry can fill. Universities and the NIH should grow and support programs – such as the Broadening Experience in Scientific Training (BEST) – which enhance training opportunities for graduate students and postdoctoral scholars to prepare them for careers in the biomedical research workforce that might take them outside of conventional academic research. NIH has spent considerable energy incentivizing methods to increase multidisciplinary collaboration that align with current scientific opportunities and spawn innovative thinking. NIH should look to enhance and expand such multidisciplinary collaboration in ways that expand and broaden students’ training opportunities when considering new workforce and training mechanisms. The sustainability of the nation’s research effort ultimately depends on our ability to recruit the best students at our colleges and universities to careers in science and provide them with the means to pursue their interests. We applaud NIH’s pilot efforts to try to address this issue, such as the New Innovator Award, Early Independence Award, and Pathway to Independence Award. And we commend the NIH to continue to experiment with grant programs to support high-risk, high-reward research and create independent research opportunities earlier in the careers of the next generation of investigators. AAU supports efforts to enhance creativity and research quality by funding scientist or research programs instead of proposals for specific

Comments: Future/emerging opportunities/needs:

How can universities and NIH work together to provide incentives for the creation and design of these graduate programs? Would shifting away from the doctorate as the only standard in research degrees allow for a more permanent technician or research scientist position that would relieve the competitive pressure of our bottom-heavy workforce? These are complex questions whose answers could result in a radical shift in everyday life in the laboratory. Proposed policy changes are going to need to be carefully evaluated for their impact on the innovative efficacy of our scientific enterprise as well as their financial impact on the agency and the extramural research community. We look forward to exploring these opportunities with NIH in the coming days.

Comments: Cross-cutting themes:

Eating disorders affect people of all genders, ages, races, religions, ethnicities, socioeconomic levels, sexual orientations, body shapes, and weights, and new studies have shown that treating an eating disorder has the highest cost out of any psychiatric illness. Eating disorders affected 30 million Americans during their lifetime and have the second highest mortality rate out of any behavioral health condition, second only to opioid use. In turn, it is of the utmost concern to our community of individuals and families experiencing eating disorders that the National Institutes of Health (NIH) and its Institutes and Centers (ICOs) invest in behavioral health research across all ICOs to increase eating disorders research, incorporate the recommendations below, and work towards increasing collaborative behavioral health research including eating disorders.

A. Promoting Collaborative Science

Recommendation 1: Incorporate Co-Morbid Behavioral Health Research Within Biomedical Research, Ensure Peer-Reviewers and Relevant ICOs Understand Behavioral Health Co-Morbid Occurrence with Biomedical Health, and Broaden Outcome Measurements for Co-Morbid Research

We applaud the work of NIH to increase collaborative science and have noted the immediate difference in this

2021-2025 NIH-wide Strategic Plan as it incorporates both biomedical and behavioral sciences into the overall strategic plan, whereas the 2016-2020 plan was limited to primarily biomedical research activities.

As research advances and we learn more about the behavioral-biomedical co-morbid connection, we can no longer responsibly separate behavioral health from physical health in our efforts to understand the foundational science, prevention of diseases and health promotion, and development of treatments, interventions, and cures for diseases and disorders. As the National Institute of Mental Health (NIMH) notes this correlation for chronic conditions like cancer and diabetes, "It may have come as no surprise that people with a medical illness or condition are more likely to suffer from depression. The reverse is also true: the risk of developing some physical illnesses is higher in people with depression." This is also true of other behavioral health conditions and co-morbid medical conditions. For example, some medical conditions that can emerge as a direct result of an eating disorder include: cardiac disability, starvation, hepatitis, refeeding syndrome, cognitive dysfunction, kidney failure, esophageal cancer, osteoporosis, fractures (hip, back, etc.), hypoglycemia, seizures, amenorrhea, infertility, high and low blood pressure, Type II diabetes mellitus, edema (swelling), high cholesterol levels, gallbladder disease, decalcification of teeth, severe dehydration, chronically inflamed and sore throat, and inflammation and possible rupture of the esophagus.

While we recognize NIH's first steps towards incorporating behavioral health within the NIH Strategic Plan, we urge NIH to take this effort a step further and ensure that ICOs and Peer-Reviewers understand the co-morbid connection between behavioral health and biomedical health in their review of applications, and urge increased funding for research that addresses the co-morbid occurrence within foundational science, prevention, and treatment.

Over the years, NIH and its ICOs have begun funding research that addresses some of these co-morbid behavioral and biomedical research conditions. For example, since 2015 over 16 ICOs have incorporated eating disorders research within co-morbid condition research on diseases such as diabetes and kidney failure. However, researchers have indicated that when a behavioral health research proposal is submitted outside of ICOs directly relating to behavioral health, outcomes must often be conformed to address the co-morbid biomedical condition instead of both the co-morbid behavioral and biomedical condition. While we are starting to see a gradual improvement within some ICOs, we urge NIH to encourage broader outcome measurements to allow researchers to follow the science within these studies in order to have the highest impact and return on investment from NIH funding for all co-morbid fields.

Recommendation 2: Share Behavioral Health Findings and Collaborate Further with Health Research Agencies/Programs within the U.S. Department of Health and Human Services (HHS) and Outside of HHS During the March 9, 2020 webinar, we were pleased to hear a positive discussion on NIH's work to collaborate with other federal agencies, centers, and institutes outside of NIH. Particularly around the area of obesity and eating disorders/disordered eating prevention and treatment, we find a gap in knowledge and NIH-funded research amongst other federal actors such as the Center for Disease Control and Prevention. We recommend that the NIH increase its collaborative science to share its research findings in areas of co-morbid conditions.

Additionally, while we are pleased to hear the desire to collaborate with other research arms of HHS, we also encourage NIH to conduct collaborative science education with other departments' research arms such as the U.S. Department of Defense's Congressionally Directed Medical Research Programs Peer Reviewed Medical Research Program (PRMRP) and the U.S. Department of Agriculture's Agricultural Research Service (ARS). The PRMRP conducts a wealth of research on behavioral health, including eating disorders, that can be utilized to help with translational research for the NIH civilian population.

Additionally, NIH's in-depth research on nutrition, obesity, and disordered eating/eating disorders can help to further USDA's ARS' nutrition research and Food and Nutrition

Services' (FNS) program development in the nutrition education and obesity prevention space.

B. Increasing, Enhancing & Supporting Diversity and Improving Women's Health and Minority Health, and Reducing Health Disparities

Recommendation: Increase in Intersectionality of Behavioral Health Research as it Relates to Minority Health and Reducing Health Disparities

Regarding intersectionality within behavioral health, there is a critical need for further inclusivity of minority populations and the reduction of health disparities. Particularly with eating disorders that have long held the stigma of affecting only young, Caucasian women, a part of breaking that stigma, promoting public health changes, and treating those in need is to break the bounds of current research limits. The lack of inclusion and diversity among those researched within the behavioral health, and particularly eating disorders, field leads to data that is not representative of the full range of persons affected. We urge NIH to enhance research on the intersectionality and social determinants of minority health for behavioral health conditions, and how these interplay with health promotion and treatment. Some areas to consider are racism as it relates to weight stigma, as well as clinical presentation, risk factors, and testing of existing models within marginalized populations such as low income communities, food insecurity, culturally sensitive treatments for diverse populations, and diversity in studies including diverse samples based on race, ethnicity, gender, body weight, and medication exposure.

As it relates to the research workforce, we are hopeful that NIH's focus on prioritizing inclusion and diversity among researchers, including the retention of researchers from underrepresented groups, will ensure that the dearth of research regarding eating disorders in underrepresented and marginalized populations will be addressed.

C. Addressing Public Health Challenges Across the Lifespan

Recommendation: Need for Longitudinal Behavioral Health Studies

We support NIH's directive to target public health challenges across the lifespan. We find a significant missing component in behavioral health research, particularly for eating disorders, is a lack of longitudinal studies across the lifespan of a research participant to help clarify course, outcomes, and predictor variables, amongst other items. For example, while we are beginning to see more research on eating disorders amongst individuals fifty years and older, there is still a gap in understanding how prevention and treatment may differ from the typical adolescent and young adult research populations.

Comments: Priorities/benefits/drawbacks:

Objective 1: Foundational Science

Recommendation: Enhance Behavioral Health Research on Genetics and Influence of the Genes on Co-Morbid Conditions

The field of eating disorders has benefited greatly from researchers involved in genetics research and we commend the NIH's support of these investigations through NIMH. This is especially true for findings related to anorexia nervosa. The EDC strongly encourages NIH to support efforts by researchers seeking resources to conduct genetics research on all other eating disorders referenced in the DSM-5 (or any revision thereto), other behavioral health conditions, and look towards the influence of the genes on co-morbid conditions as discussed above.

Objective 1: Preventing Disease and Promoting Health and Objective 3: Developing Treatments, Interventions, and Cures

Recommendation: Increasing Implementation and Dissemination of Behavioral Health Research to Medical

Community at All Levels and Public Health Professionals

During the March 9, 2020 webinar, we were pleased to see NIH include implementation and dissemination research as part of both "Objective 2: Preventing Disease and Promoting Health" and "Objective 3: Developing Treatments, Interventions and Cures". Particularly in the behavioral health research of eating disorders, the biggest area of need is for further implementation and dissemination of research to the medical community, especially as it relates to developing evidence-based curricula and disseminating it to health professionals in medical education, training, and practice. For example, despite research funded by NIH on early identification of eating disorders, only 20% of medical residency programs offer elective rotations on eating disorders.

Additionally, in looking towards the implementation and dissemination of behavioral health information, we recommend NIH collaborate with other federal agencies that may be positive dissemination conduits to preventing disease, promoting health, and intervention. For example, behavioral health research about prevention in schools could be better disseminated to the U.S. Department of Education and nutrition education and disordered eating prevention and intervention to the USDA's FNS activities within schools and communities.

Objective 1: Developing Treatments, Interventions and Cures

Recommendation: Increasing Research on Managing Co-Morbid Conditions

Regarding biomedical conditions that are co-morbid with behavioral health conditions like eating disorders, we also recommend a renewed focus on research targeted to managing these co-morbid medical conditions within treatment, intervention, and cures. While we have a wealth of research on co-morbid behavioral health and biomedical diseases and conditions, there is a gap in research for treatment providers and public health experts on how treatment may need to be altered to address these conditions. For example, with treatment of eating disorders, more research is needed on how to manage conditions like osteopenia and osteoporosis. It is also essential that research focus on the impact weight cycling, chronic dieting, and weight stigma have on the mental and physical health of those with and without eating disorders diagnoses. Additionally, for co-morbid behavioral health conditions, we would recommend NIH include a focus on increasing transdiagnostic treatments and treatment decision making. For example, with co-morbid eating disorders, transdiagnostic treatment for substance use, trauma, and anxiety disorders should be considered.

Comments: Future/emerging opportunities/needs:

A Few Bold Predictions for America's Future Recommendations:

We applaud NIH's past efforts to make "a few bold predictions" surrounding the science being researched and developed through NIH. We pose a new challenge for NIH's prediction, particularly as NIH refocuses its strategy to include behavioral health: (1) Increase the federal government's return on investment by disseminating and implementing past NIH research for behavioral health government and nationwide, and (2) targeting research that addresses both co-morbid behavioral health and biomedical research.

Comments: Cross-cutting themes:

ACR supports these cross cutting themes as presented in the NIH strategic plan framework and agrees with the emphasis on embracing diversity and addressing disparities. The ACR Patient and Family Centered Care Commission was formed to bring increased attention to the needs of all members of our society and to recognize the unique needs of the various segments of the population. Our Commission on Women and Diversity is now 7 years old and actively works on increasing diversity and inclusion in the radiology specialties to better reflect the patient population. The work of ACR's Research Commission has also underscored the challenges associated with engaging those members of society who represent minorities, diversity, and the need for targeted outreach efforts to truly appreciate the benefits of personalized medicine. Additional incentives are required to promote increased diversity in research initiatives and to provide researchers with the resources necessary to properly engage these populations. The ACR formed the Data Science Institute in 2018 to respond to the rapidly accelerating role of advanced imaging informatics and artificial intelligence in both research and clinical practice. Through the combined efforts of ACR's Center for Research and Innovation and the Data Science Institute, the ACR has endeavored to respond to the needs for data repositories which include curated data and images and which facilitate longitudinal studies of populations. There remain significant challenges associated with the creation of such databases stemming from anonymization methods and institutional firewalls, along with variability in data structure and nomenclature due to the lack of any standards at the patient medical record level. Current efforts to create databases have resulted in fragmented and redundant approaches rather than a coordinated approach that will yield maximum value. Support for the advancement of tools such as validated artificial intelligence methods and federated models will help address these concerns, but addressing these critical systemic issues are necessary steps to truly optimize the power of data science tools and methods. Previously, the ACR filed comments with the White House OSTP and the HHS ONC suggesting that there is an urgent need for trusted third party validation and real world performance monitoring of artificial intelligence/machine learning (AI/ML)-enabled tools to help mitigate or manage risk for these developing technologies. Challenges associated with the basic premise of image exchange also needs to be addressed. Federal agencies can enable the radiology community's work in this area in several ways, such as through the development of a national image-sharing strategy covering provider-to-provider exchange and enabling patient access to medical images via open APIs, incorporation of medical images into the U.S. Core Data for Interoperability, requiring image exchange facilitation of health information networks participating

in the Trusted Exchange Framework and Common Agreement. We recommended that federal agencies require that AI algorithms deployed in a clinical setting be validated and continually monitored. We believe that NIH could play a role in these areas by supporting third party AI validation organizations, image exchange, and related standards development efforts in the radiology community.

Comments: Priorities/benefits/drawbacks:

Objective 1: The ACR has an extensive history of developing clinical practice guidelines for the diagnostic radiology and radiation oncology community and the ACR also provides the community with numerous evidence-driven platforms for quality improvement initiatives which promote healthy communities through detection, monitoring, and where warranted, intervention. Changes in clinical practice standards are driven by research initiatives undertaken by the ACR and other researchers, and such research has been predicated upon the traditional clinical trials structure. Future advancements may be accelerated through the inclusion of novel approaches that include the use of data registries and virtual clinical trials. These research models alleviate the burdens encountered by clinical researchers and accruing institutions and represent opportunities for more rapid collection of clinical data at lower cost, with some compromise in the quality of the data. The ACR has experience with the development and operation of clinical data registries and was one of the first adopters of the CMS Coverage with Evidence Development program, leading to the development of the National Oncologic PET Registry (NOPR) and more recently the Imaging Dementia – Evidence for Amyloid Scanning (IDEAS) study. Both of these registry projects have led to definitive results to change patterns of clinical care, while also creating a tremendous wealth of data that can be used for secondary analysis projects for years to come when paired with systems such as ACR’s Data Archive and Retrieval Toolkit (DART) or other data lakes. The ACR would also advocate for the significance of new biomarker discovery and development as a fundamental element in the strategic framework. ACR’s collaboration with other medical disciplines (such as the IDEAS study or the Detection of Early lung Cancer Among Military Personnel (DECAMP) study has led to the formation of consortia which are dedicated to the exploration of blood and tissue based biomarkers. Such biomarkers promise to radically transform ACR’s ability to predict those at higher risk of disease and also provide invaluable information to optimize therapy for those that have become ill. Objective 2: The ACR fully supports this objective. The Center for Research and Innovation has collaborated with academic researchers, federal sponsors, and industry sponsors to conduct over 500 clinical trials over the past 51 years and has generated significant scientific results which have translated into changes in clinical practice in both diagnostic imaging and radiation oncology. Adequate funding to support the costs associated with conducting clinical research, which complies with regulatory requirements and ensures the integrity of the data and the research outcomes is critical to sustaining the organizations conducting the research. The value of the time and dedicated effort associated with physicians conducting federally funded research has been shown to be a small percentage of the actual cost of their time. In addition, the burdens associated with leading a multicenter trial performed under NIH funding has often led investigators to not pursue additional such research projects, depriving the research community of the leadership and expertise of these leading minds.

Comments: Future/emerging opportunities/needs:

(Continued from previous question) Objective 3: ACR agrees with the NIH strategic plan framework Objective 3. The need for integrity in research and ACR's approaches to managing and analyzing data is critical to ensuring we have a system, which will generate credible results. The ACR represents nearly 40,000 diagnostic radiologists, interventional radiologists, nuclear medicine physicians, radiation oncologists, and medical physicists. In addition to collaborating with members, the ACR has leveraged numerous partnerships and consortia, which combine the specialized knowledge needed to answer complex medical questions. Future opportunities or emerging trans-NIH needs: • Nationwide registries for generating real world evidence at a fraction of the cost of randomized controlled trials; • Inclusion of AI models in the research framework which enable new efficiencies and new analytic models and ; • Promoting research environments, which recognize emerging integrated diagnostic centers of excellence.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Objective 1: It is essential to its mission that the NIH keeps funding RO1 mechanisms. The modular budget cap also needs to be increased significantly since this has not been adjusted for many years. As with cross-cutting themes, promoting diversity and younger faculty participation in team science is a real problem and this is due to the very difficult ability to get PPG mechanism. There needs to be a smaller PPG mechanism that goes through the same review and parent committee which is intended to promote schools with less depth in senior and mid-career talent to learn to work together as a team. As it is now the near impossibility of getting a PPG actually disrupts teams that are built for the submission. Once a PPG gets a score that causes the team to become discouraged, all that work that was put into the team is lost, making it a huge drag on talent and team building. NIH should consider making certain benchmark criteria for investigators. One of these could be documenting implicit bias training. The other having data science committee examine certain aspects of their scientific approach to any grant submitted. This might force all medical centers to develop these training tools and support staff allowing this oversight before applications are submitted to the NIH. Objective 2: As the largest biomedical research agency in the world, the National Institutes of Health is uniquely positioned to support academic and research training that will help prepare a diverse and highly trained STEM workforce. Unfortunately, Undergraduate NRSA Institutional Research Training Grant (T34) funding is at its lowest point in eight years, with just over \$2 million funded in FY2019. Significant additional investments must be made in this and other programs aimed at preparing more high school and undergraduate students for STEM careers. Objective 3: The NIH should consider asking or requiring journals to sponsor internet sites that allow readers to query authors on reagent usage, collaborations, and strategies. Often methods in journal articles are poorly written and refer back to countless other manuscripts to the point where the reader gives up and the information sought is lost. This could also be NIH sponsored. The other problem is the terrible practice in the commercial space for non-specific antibodies. If journals with NIH support encouraged best practice sites that indicated antibodies that worked while the ones

that didn't, companies might be less likely to waste taxpayer money with worthless antibodies they sell before they have tested them properly.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Collaboration with the Mathematical and Computational Community for Cross Cutting Innovation SIAM encourages NIH to integrate computational science and promote biomedical and computational partnerships throughout its extramural and intramural programs. This kind of interdisciplinary work can lead to novel solutions to the biomedical problems of the future. NIH can develop these collaborations by separately evaluating and funding tool development to enable better collaboration between biomedical domain experts and those who are focused on new modeling, data analysis, and computational tools. These collaborations should be fostered through deliberate approaches such as the National Institute of General Medical Sciences (NIGMS) Collaborative Program Grant for Multidisciplinary Teams (RM1) and support for specialized teams that develop tools to solve specific challenges. Mechanisms like RM1 can also be used to support adaptation of tools from other fields to solve biomedical challenges. There are a number of successful programs that support collaboration between NIH and the mathematics community. These include the interagency Joint NSF Division of Mathematical Sciences (DMS)/NIGMS Initiative to Support Research at the Interface of the Biological and Mathematical Sciences and the Joint NSF/NIH Initiative on Quantitative Approaches to Biomedical Big Data. It is important that NIH look beyond traditional data analytics to develop modeling tools that can utilize data for enhanced understanding of biomedical challenges. For example, new mechanistic models are needed to enable understanding of causal relationships between variables covered by heterogeneous data, such as genomic and clinical data. These tools complement data analysis tools such as machine learning approaches, unlock new insights, and enable innovative treatment paradigms. The National Institute for Biomedical Imaging and Bioengineering (NIBIB) plays a critical role in utilizing applied mathematics and computational science to improve biomedical devices. NIBIB should implement a funding mechanism that supports large-scale, center-based research that converges at the intersection of bioengineering and computational science. This would accelerate the development of modeling and simulation tools for use on ever-more advanced capabilities while also helping to create a bioengineering workforce with computational skills.

Comments: Priorities/benefits/drawbacks:

Objective 1: Advancing Biomedical and Behavioral Sciences Artificial Intelligence (AI) and other emerging technologies have tremendous potential to transform health and biomedical research. However, NIH has historically lagged behind other agencies in supporting interdisciplinary research between applied mathematicians, computational scientists, engineers, and others who could work with biomedical researchers to advance these technologies and their health applications. NIH has begun to identify opportunities to leverage AI based on the recommendations of an Advisory Committee to the Director (ACD) Working Group Report on Artificial Intelligence, and SIAM urges NIH to build on that

progress by including AI and the potential of other computational technologies in the 2021-2025 Strategic Plan. Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity While the NIH has done commendable work to support a diverse and strong future biomedical workforce, SIAM contends that NIH must enhance workforce development in biomedical data sciences. Training is necessary both to foster researchers with specific expertise in biomedical data sciences and to ensure that NIH-supported researchers generally are trained with highly developed quantitative skills and the ability to work in interdisciplinary teams. Programs should also look to explicitly foster joint training between the mathematics, computing, and statistics communities and those engaged in biomedical research. The current R25 training programs in data science are an important component, but NIH should also consider funding shorter-term programs to foster training partnerships between different communities. NIGMS has supported short courses in the past through the R25 mechanism, with many course participants going on to illustrious careers in the quantitative biosciences community. SIAM recommends that NIH re-establish these kinds of opportunities, which could include workshops, travel, or summer programs to enhance awareness and cross-collaboration. Finally, NIH should prioritize programs that foster the development of a more interdisciplinary workforce. Most relevant to such efforts is the K series, which focuses on career development for senior postdoctoral fellows or faculty. Specifically, the K25 program exists to help researchers with quantitative backgrounds gain exposure and apply their skill sets to NIH-relevant problems. Such mechanisms will be critical to solving health-related challenges using computational tools as they become increasingly relevant to biomedical research.

Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science As biology develops as a predictive science, new approaches to information analysis, data, and modeling will be needed to advance our understanding of the natural world and address societal challenges. In the last two decades there has been a surge of predictive modeling and computer-aided design tools used in bioengineering enabled by mathematics and computational science. Using such tools helps address reproducibility issues known to plague biotechnology and mitigates high costs of production and testing using predictive modeling. There is no better way to protect research and ensure continued progress than by prioritizing responsible data stewardship and management. This includes building up technological infrastructure, a data-competent workforce, and strong partnerships with the computational science community to ensure that NIH can remain ahead of the curve on the tools needed for rapid discoveries.

Comments: Future/emerging opportunities/needs:

One specific area that has great potential to foster collaborations between the biomedical and mathematics fields is the development of platform technologies. Platform technologies play a significant role in accelerating methods for the prevention and detection of disease and disability. Data experts play a key role in the development of these fundamental tools that can assist with everything from basic sciences, to applied research, to final stage cures. Another novel area of application is the Computational Psychiatry program at the National Institute of Mental Health (NIMH). The goal of the program is to examine the biomarkers and treatment targets to improve and change the way we diagnose and treat psychiatric disorders. Experts in the fields of mathematics, computer science, and modeling are integral to the future of the Computational Psychiatry program to analyze the way the brain responds to the presence, or lack of, certain proteins and nutrients. In addition, a data-driven

approach can assist in the evaluation and testing of certain drugs, neuromodulations, and cognitive interventions. Personalized medicine for common disorders such as depression can increase the likelihood that sufferers will seek help and be better equipped to stick with their treatment plan.

Comments: Cross-cutting themes:

On behalf of CSWE and SSWR, we appreciate the opportunity to respond to the request for input from the community regarding the future directions of the NIH. As you may know, CSWE is a nonprofit national association representing more than 2,500 individual members and more than 800 master's and baccalaureate programs of professional social work education. SSWR, also a nonprofit organization, is dedicated to the advancement of social work research, representing more than 1800 members internationally and more than 200 universities and institutions. CSWE and SSWR are very supportive of NIH's cross-cutting themes that are articulated in the framework for the 2021-2025 NIH-Wide Strategic Plan. Our members support the ongoing efforts to address the social, economic, and biomedical challenges to promoting the health and well-being of the nation through the themes highlighted in the framework. We encourage NIH to continue to promote collaborative science to ensure mechanisms are in place to incorporate social work research and social workers in critical scientific research. Social work uses social-ecological models and theory to inform epidemiological, health services, translation, intervention, and implementation research, and we strongly encourage NIH to include studies informed by these conceptual models to address these cross-cutting themes. When operationalizing the theme, "Addressing Public Health Challenges Across the Lifespan", we encourage NIH to consider developing funding opportunity announcements that address mental health and substance use problems and health disparities associated with multi-level responses to epidemics and pandemics. As NIH moves to optimize data science and the development of technologies and tools, we urge you to consider how NIH will help leverage research to reduce disparities in the age of disruptive breakthroughs. As technological developments accelerate, and precision medicine, machine learning, and artificial intelligence transform healthcare delivery, there is a substantial chance that those who are the most socially and economically vulnerable will be left out of this revolution. Technology has great potential to make it easier for individuals to age in place and to ease some of the burden on their caregivers, but those most likely to benefit from these capabilities are those who can afford them, understand how to deploy them, and even know to ask for them. This is another space where social workers can play an important role in connecting patients, individuals, families, and communities to resources, but we see great potential for technology to exacerbate existing structural inequities across the spectrum of healthcare facilities and providers. We strongly encourage NIH to commit to reducing, not increasing these disparities as you improve in this space. CSWE and SSWR also commends NIH for its efforts to address public health challenges across the entire lifespan. Specifically, as social workers and social work researchers, we are aware of the critical connection between adverse childhood experiences, many of which do not present with physical trauma or illness, and the resulting chronic health conditions as well as behavioral consequences. We strongly encourage NIH to continue to make investments in this area of research as a critical national need.

Comments: Priorities/benefits/drawbacks:

We support NIH's efforts to advance behavioral and biomedical research at NIH as this resonates with our social work researchers who conduct research generating outcomes that can be translated into programs and interventions for diverse populations across the lifespan. Social workers and social work researchers can help NIH achieve some of the goals laid out in these proposed objectives through the specific social and behavioral lens by which they view engaging individuals in research. This would lead to better outcomes that are more reflective of human behavior. Social work research prioritizes studies that have an action-research component and are translational. At a basic level, these projects do not simply "subject" participants to the researchers' protocols, but rather support processes to encourage community members' input and ownership of the research projects, as well as the researchers' input and ownership of broader community-level efforts with relevance to their scholarly interests and expertise. This process is essential to promote health and develop successful interventions. In addition, social workers in academia and in practice conduct research to develop an evidence base for effective social service programs to address the complex needs of a diverse population. In social work education, students are taught to apply, evaluate, and investigate various models of care for not only culturally, racially and ethnically, and geographically diverse populations but also for diversity across the spectrum of gender and sexual expressions in order to support the best outcome achievable and to prepare them for work in the profession. This grounding in evidence-based practice and practice-based evidence is the foundation for continuous improvement in health policies and services. CSWE and SSWR encourage NIH to include social work research and social workers from the biomedical research workforce. Social work researchers have expertise in, and are likely to be especially astute at, engaging individuals, groups, organizations, and communities as partners in research endeavors. This enables them to forge connections between "basic and translational science" projects and efforts to enhance the capacity of individuals and organizations to address their own needs. Strategies the NIH may use to enhance research conducted by social work researchers include placing emphasis on the integration of basic science and psychosocial dimensions and approaches in program announcements and request for proposals, active recruitment of social work researchers to apply for mentored research scientist awards and training grants (K01s, R15s, R25s), and being proactive in including social workers on review panels. Greater integration of social workers and social work researchers into these scientific studies may help connect more people looking to participate in clinical trials or contribute to precision medicine efforts such as All of Us (allofus.nih.gov). Because social work researchers approach research within an ecological, person-in-environment framework (a social determinant of health lens) with the intention of developing knowledge to improve policy and practice, they would be more likely to pursue NIH funding if more solicitations sought to fund research that focused on understanding and influencing social determinants of health.

Comments: Future/emerging opportunities/needs:

The conclusions reached by NASEM's 2019 Consensus Study Report entitled "Integrating Social Care into the Delivery of Health Care" to optimally improve the health and well-being of the population can serve as guidance to NIH on future opportunities and emerging trends. In light of the growing understanding that social factors play a major role in people's health and per the NASEM report, NIH is

encouraged to fund research to test innovations in the design of health care and social service delivery models that integrate social care into health care and health care into social services and to fund research to test the effectiveness of these integrated services. Research on integration of social services and health delivery models, including the use of technological innovations for seamless communication and data sharing, among others are at their infancy. Social workers are well-positioned to contribute to this line of research. Finally, we also encourage NIH to invest more on dissemination and implementation science. Meaningful, comprehensive, and long-lasting improvements to the health of the population will occur only when interventions are widely implemented across all sectors of society and not just benefit those who are privileged to have access to health care. Social workers are well-positioned to lead, and contribute to research conducted by transdisciplinary teams to advance dissemination and implementation science across all themes and cross-cutting themes listed in the NIH's Strategic Plan. As NIH considers its role in the development of research moving forward, CSWE and SSWR encourage engaging social workers not only as part of the continuum of care, but also as active members of the social and behavioral science research community who lead and coordinate basic and applied research to scale successful models of social services and support the full diversity of our nation's populations. We thank you for your attention and this opportunity to provide feedback on the FY 2021-2025 NIH-Wide Strategic Plan, and hope you will consider both organizations as resources moving ahead with your planning process.

Comments: Cross-cutting themes:

The AAMC agrees with the inclusion of these five cross-cutting themes, as they affect all areas of biomedical research and should be included in the final strategic plan. The AAMC has on many occasions endorsed initiatives that embody these themes. For example, the AAMC has previously supported the consideration of sex as a biological variable in human and animal studies, and the incorporation of different ages "across the lifespan" in NIH clinical trials. The Association has expressed continued commitment to women's health and minority health, the promotion of data science, especially around data sharing, and a commitment to team science and collaborations with industry and community partners. (The AAMC would also consider clinical trials and other research directly involving human subjects to qualify as collaborative science.) We point out that inclusion of a particular topic, such as reducing health disparities or optimizing data science, as a cross-cutting theme must not lessen the importance of funding focused research in these same specific areas. The AAMC would hope that any research on the pathology of disease or potential health interventions would consider disparities in the burden of disease, or in access or treatment, as part of its design. At the same time, we strongly support the work of the National Institute on Minority Health and Health Disparities (NIMHD) on its focused research in those areas. The AAMC also recognizes that the role of directing a research portfolio on a topic that is also "cross-cutting" to all NIH institutes is a special challenge, often shared by such institutes as NIMHD, Child Health, and Aging. The need for targeted funding and trans-NIH coordination is especially true for data science. While all NIH research contributes to the development of data resources and to processing and analyzing data, the NIH should also expand programs that focus on the data science itself, including artificial intelligence, machine learning, and statistical techniques. We also

acknowledge that the several cross-cutting themes proposed in the framework interact with each other: for example, efforts harnessing growing data resources in health care have the potential to exacerbate health disparities and bias—the health system data will not include groups that lack access to care. Future NIH-sponsored research and the final strategic plan should acknowledge these interactions as well. Although the AAMC does not seek to increase the number of cross-cutting themes identified in the NIH framework as the five clearly high priorities, we note several critical NIH initiatives which are not clearly addressed by this list but should be recognized and supported separately. This includes work in genomics and neuroscience that has demonstrated the importance of concomitant research on ethical, legal and social issues (ELSI), and there may be reason to consider such issues across NIH more broadly (for example, CRISPR). Similarly, evaluation research is important and needed for many programs and projects, and for the strategic plan itself.

Comments: Priorities/benefits/drawbacks:

1: The importance driving foundational science cannot be over-emphasized. In a publicly funded agency, the tension between support for fundamental science and research that is more clearly disease- or health-directed is a persistent challenge. The framework appropriately reflects this balance. The AAMC also considers fundamental or foundational science to include social sciences as well as basic and behavioral research. Despite the advances in basic research, the growth of basic science departments within AAMC member institutions has been relatively much smaller than for other departments. Basic science departments are also often merged or reorganized, in part to reflect changing science and needs and in part to seek greater efficiency. The next NIH-wide strategic plan must continue to reflect an unflagging support for basic science among the NIH's priorities, as a signal to the community and to young scientists that there is a future for this research. Research promoting health and health interventions also engenders implementation science, health effectiveness research, and population health, for which the NIH also partners with other federal agencies. Studies of the Social Determinants of Health are increasingly recognized as essential for proper assessment of health needs and for successful implementation of interventions and health strategies.

2: The AAMC has long supported NIH's broad efforts on strengthening the biomedical research workforce. We support promoting versatility and excellence in research careers, understanding that trainees may successfully contribute to science and health from later employment in different sectors and positions. To assist in training biomedical scientists from a diversity of backgrounds and for a diversity of careers, the AAMC is committed to developing mentors (and mentoring teams) that can better train for such careers. The AAMC also encourages professional development programs that help trainees and early-stage investigations navigate career paths. The AAMC is interested in the concept of "cohort hiring" to promote more diversity in the academic research workforce, although the cohorts would need to be spread across multiple departments or even institutions, as many medical centers have only very limited numbers of tenure-track positions open in a given year. A central concern is the training and career development of physician scientists. The population of physician researchers has been held stable largely by the aging of the current investigator pool, and the community must provide more concerted efforts for helping attract new physicians to train as scientists and establish research careers. NIH maintains separate programs for support of shared instrumentation and facilities construction or renovation. As the NIH develops its strategic plan, we hope that award programs will allow for better integration of research

resources with facilities. We also strongly encourage support for shared regional cores, e.g. NIGMS' Cryo-EM-program. 3: AAMC commends the NIH for placing objective 3 on equal footing with the other objectives. As the complexity of biomedical research and its importance for society grows, the research community will need to make more concerted efforts to ensure accountability and good stewardship of these resources. We emphasize the importance of leveraging partnerships in this objective.

Comments: Future/emerging opportunities/needs:

In conclusion, the AAMC notes several elements that should be included in a forthcoming strategic plan:

- Big Data, including from health systems with millions of covered lives, and parallel data generated through personal applications and other data sources. The use of such data sources requires steps to ensure that studies based on “real world evidence” are rigorous and account for and correct for potential biases, such as those arising from inequities in health care.
- Artificial intelligence and machine learning: the recent working group of the NIH Director’s Advisory Committee correctly noted that NIH may need different types of grant mechanisms to engage scientists who are expert in these fields.
- Research on the Social Determinants of Health, necessary to more fully understand the burden of disease and the potential for health interventions.
- The development of tools and platform technologies, similar to the BRAIN initiative. Tech transfer and commercialization (noted in Objective 2).
- The integration of instrumentation with specialized facilities, and networks (also noted in Objective 2).
- The development and articulation of more useful and appropriate animal models. The AAMC would be pleased to provide any additional information or clarification on these comments.

Comments: Cross-cutting themes:

Reducing Health Disparities: The American Institute for Cancer Research is the leading U.S. authority on the link between diet, physical activity, body composition and cancer prevention. As such, we recognize that socioeconomic status and other socioecological factors play into the choices that people make every day. According to the American Cancer Society, incidence rates for cancer are generally higher among those who are economically disadvantaged, in part because having pre-existing conditions that contribute to cancer (such as being overweight and obese) are also more prevalent in these populations. These same communities generally have less access to healthy foods and safe recreational spaces, as well as increased access to unhealthful foods such as “fast foods” which are generally high in calories and low in nutrients. In designing interventions to reduce rates of preventable disease, we urge the NIH to consider interventions that are more specific to each community’s needs, rather than using a one-size-fits-all approach.

Promoting Collaborative Science: As a scientific research organization, we encourage NIH to work across sectors for collaboration. We ask that NIH take into consideration external research while creating and implementing the strategic plan. One of the pillars of AICR’s research, along with our sister organization, World Cancer Research Fund, is the Continuous Update Project, which analyzes global research on how diet, nutrition and physical activity affect cancer risk and survival by conducting systematic literature reviews and meta-analyses. This work is always available to NIH as a resource. Additionally, we ask that NIH share data and research with key stakeholders and partners, such as other scientific organizations and patient-advocacy groups. This will alert stakeholders and partners to new and emerging research and will help guide further research as well. Addressing

Public Health Challenges Across the Lifespan: Public health interventions should be unique to each life stage. NIH should leverage existing federal guidelines, such as the Dietary Guidelines for Americans and the Physical Activity Guidelines for Americans, to address the burden of chronic disease and public health challenges across the lifespan, particularly in cancer patients. Utilizing these existing guidelines and recommendations will allow for consistent messaging on how to reduce and prevent chronic disease and improve public health across the lifespan.

Comments: Priorities/benefits/drawbacks:

Response (specific to Objective 1): Research from the NIH provides a foundation for many of our nation's guidelines and recommendations in the private and public sector for health. The science and research produced from NIH is vital to programs and policies aimed at improving health for both general and specific populations. We encourage rigorous, scientific processes for all research that can be used to provide recommendations on the prevention, treatment and the cure of diseases. The WHO estimates that nearly 40 percent of cancers can be prevented through measures such as being physically active, eating a healthy diet and maintaining a healthy weight. These factors are, after avoiding tobacco, the most important ways to reduce cancer risk. Therefore, the first priority of all our national health initiatives should be to prevent disease. The strategic plan should include ways that NIH will support the prevention of disease, particularly chronic diseases such as cancer and the promotion of health through focusing on lifestyle factors and behavior change. Any programs that are introduced should be evidence-based and we encourage the NIH to prioritize grants and other resources that focus on prevention in order to accelerate the availability of this evidence. Although medication is needed to treat or cure many diseases, we ask that you consider how behavior change can improve disease status, including encouraging physical activity, proper nutrition and maintaining a healthy weight.

Comments: Future/emerging opportunities/needs:

Although much of the work that NIH does is related to treatment of diseases or conditions, we hope that NIH will continue to elevate research that focuses on prevention and reduction of illness and chronic disease through behavior change and lifestyle modifications. The World Health Organization (WHO) estimates that by eliminating major risk factors related to chronic disease, at least 80% of all heart disease, stroke and type 2 diabetes could be prevented and over 40% of cancer could be prevented. Prevention research, especially within the fields of cancer and, more broadly, chronic disease, can help combat growing medical and productivity costs. While we continue to recognize the importance placed on curing disease, we also implore the NIH to accelerate research on the impact of lifestyle factors on cancer prevention and survivorship in order to identify best practice strategies for implementing what we know works to change behavior. AICR looks forward to working with NIH in the future and are open to any and all opportunities for collaboration. Additionally, we are happy to provide any resources necessary to assist NIH in the development of the 2021-2025 strategic plan.

Comments: Cross-cutting themes:

-Improving Women's Health and Minority Health, and Reducing Health Disparities. This theme does not address the importance of beginning the improvement of health during the prenatal period if we are to

avoid a never-ending loop of health disparities, nor does it recognize transgenerational effects. Although it is clear that improving women's health can also improve the health of the developing embryo, fetus and child, that connection is not clear or set as a priority as currently worded. Suggested Rerwording - "Improving Women's Health and Minority Health as a Path to Reducing Health Disparities Across Multiple Generations" is proposed. Nor do the 5 themes sufficiently address the importance of improving health across all stages of life. Theme 5 (Addressing Public Health Challenges Across the Lifespan) does touch on the entire lifespan, but not with enough focus on the importance of prenatal and childhood health being the foundation of future generations yet to be conceived. The NIH Environmental influences on Child Health Outcomes (ECHO) program has been designed to investigate child health as it relates to the physiologic responses of environmental influences. ECHO studies focus on five key pediatric outcomes that have a high public health impact: pre/peri/postnatal outcomes, obesity, airway disease, positive health and neurodevelopment. The outcomes studied in ECHO are directly related to improving the overall health of all women prior to and during pregnancy. We encourage the NIH-wide Strategic Plan to emphasize the need for increased funding to continue and expand research in the area of pre- and post-conception women's' health and the environmental exposures that impact infant and child health.

Comments: Priorities/benefits/drawbacks:

Objective 1: Advancing biomedical and behavioral sciences • Driving foundational science • Preventing disease and promoting health The 2016-2020 Strategic Plan highlighted a focus on high-risk behaviors such as the use of tobacco. It has become increasingly apparent that legalized use of cannabis, and the plethora of cannabinoid products flooding the marketplace might also place users at risk. BDRP recommends that the 2021-2025 Strategic Plan address this area of concern, particularly in regard to susceptible populations such as pregnant women and their offspring. • Developing treatments, interventions, and cures ? Objective 2: Developing, maintaining, and renewing scientific research capacity • Cultivating biomedical workforce BDRP prioritizes and invests resources in early career scientists; we encourage the NIH Strategic Plan to specifically address providing enhanced opportunities to support and encourage the next generation of scientists and to promote diversity, equity and inclusion in biomedical research. • Supporting research resources and infrastructure Research funding through Federal grants is critical to scientific research and to keeping early career and at-risk scientists engaged in science as a career. BDRP encourages the maintenance and expansion of NIH grants programs with modifications to peer review to improve success rates for early stage investigators and those productive scientists at risk of losing research funding. Objective 3. Exemplifying and promoting the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science • Fostering a culture of good scientific stewardship • Leveraging partnerships BDRP welcomes the opportunity to collaborate with NIH, in scientific discourse, research opportunities and in the presentation of NIH-funded research at the BDRP annual meeting. Additionally, we offer our services as a resource for experts in multidisciplinary research on normal and abnormal development. • Ensuring accountability and confidence in biomedical and behavioral sciences The decreased confidence in the sciences is a disturbing reality, demonstrated for example by the anti-vax movement. Public confidence in scientific information is dependent on clear, unbiased outreach to the public in understandable language that utilizes multiple media channels as society communication options evolve. (BDRP will

soon be published a position statement in support of vaccinations as a means toward public health and disease prevention.) To what extent can the NIH strategic plan address (and reverse) the trend towards lack of confidence in the sciences? • Optimizing operations It has been suggested that NIH agencies could have facilitated a speedier response to coronavirus testing in the US. Recognizing that NIH has had past success in managing Ebola outbreaks, we would recommend including enhanced response implementation as a priority future focus.

Comments: Future/emerging opportunities/needs:

In the 2016-2020 Strategic Plan, there was an objective to “Excel as a Federal Science Agency by Managing for Results.” To what extent has this been achieved? Additionally, how has NIH fared overall in addressing the objectives highlighted in the “Bold Predictions for America’s Future” that were included in the Strategic Plan? These were laudable goals and should be maintained or restructured as appropriate. Thank you for the opportunity to comment. Society for Birth Defects Research and Prevention www.birthdefectsresearch.org

Comments: Cross-cutting themes:

JDRF agrees with the emphasis on these themes with one addition: collaboration across different diseases. JDRF is actively collaborating with scientists and foundations investigating different related illnesses (i.e. other autoimmune, metabolic, and those with chronic complications). JDRF encourages NIH to emphasize interdisciplinary science as well to further the understanding of these diseases and how they can be treated, cured, and prevented.

Comments: Priorities/benefits/drawbacks:

Objective 1: Advancing Biomedical and Behavioral Sciences JDRF agrees with this objective as it closely aligns with JDRF’s mission to accelerate life-changing breakthroughs to cure, prevent and treat T1D and its complications. More specifically and as an example, research to support the development of integrated psychosocial and behavioral medicine into routine clinical testing can lead to the development of bona fide therapies that can be seamlessly incorporated into clinical practice, such as but not limited to, generation of age- and disease-stage specific PROs. Driving Foundation Science is a priority for JDRF and area of collaboration with NIH. Better understanding T1D heterogeneity (leading to personalized medicine), biomarkers (diagnostic, prognostic, and predictive), and disease etiopathogenesis are areas of opportunity. Preventing Disease and Promoting Health is important to JDRF because Prevention is a form of a cure and an area where JDRF and NIH continue to collaborate, in particular through the TEDDY and TrialNet registries and clinical studies. Likewise, the NIH and NEI supported DRCR Network— also partially supported by the Special Diabetes Program and JDRF— has leapfrogged basic clinical research, epidemiology, drug development and clinical care. Such models could be emulated in kidney and heart diseases resulting from diabetes. Those remain the highest causes of morbidity and mortality in people with diabetes yet are unmet healthcare gaps worldwide. Developing Treatments, Interventions, and Cures is critical in the next five years. Several new therapies and interventions have become available as a result of NIH investing in T1D research. Specifically, the approval of the Tandem Control IQ algorithm, whose pivotal clinical trial was funded by the Special

Diabetes Program, is improving lives and leading to better outcomes. In the next five years, disease-modifying therapies are a possible result of continued collaboration between NIH and JDRF. Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity JDRF supports this objective. Specifically, it is imperative that NIH Support Research Resources and Infrastructure through tissue banks, bio banks, globalization, big data analytics and more and, most importantly, work smarter to avoid redundancies. Two examples are the TEDDY and TrialNet studies, which are funded by JDRF and by NIH, and the resources invested in artificial pancreas technologies, with both JDRF, NIH and other partners playing a vital, complementary role. This is also gap currently not filled by the private sector and they rely on a pre-competitive framework to reduce the barrier of entry toward product development. Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science JDRF is fully committed to this objective and applauds NIH for striving for the highest levels of integrity, accountability, and social responsibility. One potential challenge is balancing this objective while simultaneously optimizing operations. It is paramount that science continue to move forward as quickly as possible while still adhering to this objective. For that reason, NIH must foster collaboration to ensure work is not duplicated and resources are not spent on projects built upon fundamentally flawed science.

Comments: Future/emerging opportunities/needs:

As discussed previously, JDRF sees tremendous opportunity in cross-disciplinary collaboration. Spearheaded by NIH, shared data and science between researchers in different fields has the potential to unlock new discoveries around how type 1 diabetes and many other diseases develop, are treated, and are potentially cure

Comments: Cross-cutting themes:

Dear Dr. Collins: On behalf of the Academic Pediatric Association, American Academy of Pediatrics, American Pediatric Society, Association of Medical School Pediatric Department Chairs, Pediatric Policy Council, and Society for Pediatric Research, organizations dedicated to advancing child health, we write in response to the request for information (RFI) of February 12, 2020, "Inviting Comments and Suggestions on a Framework for the NIH-Wide Strategic Plan for FYs 2021-2025" (Notice Number: NOT-OD-20-064). The work of the National Institutes of Health (NIH) is essential to improving the health of Americans at all stages of life, and we urge you to ensure that the needs of children are adequately accounted for in the NIH's strategic planning work. Children are not simply "little adults" but have unique needs that translate into the need for differentiated prevention strategies, treatment regimens, and drug therapies. For instance, treatments developed for and studied in adults may be ineffective in children, or their use in children may require alternative applications such as novel formulations or weight-based dosing. Even across the pediatric age range, significant differences exist—a neonate, for instance, has dramatically different needs than an adolescent. The study of children also requires specialized pediatric expertise. It is therefore essential that the range of human development be appropriately considered in all of the NIH's activities. Our organizations continue to advocate strongly for the inclusion of children in all human subjects research, which is essential to ensure that children benefit from important scientific advances. To that end, our organizations applaud the NIH for its work

toward implementing the December 2017 Inclusion Across the Lifespan policy. Children have long been needlessly excluded from NIH-sponsored research, and this policy represents an enormous step forward in the study of children in biomedical research. The policy requires all extramural studies funded by the NIH to submit deidentified demographic data for trial participants, including age at enrollment. This new data, which is expected to start becoming available in the coming months, will allow the NIH to robustly monitor the inclusion of children in research. Our organizations continue our work with the NIH to ensure that this policy is implemented such that it meaningfully advances the state of pediatric research. However, the longstanding inequity between children and adults in the conduct of research threatens to continue if the NIH does not integrate age-based considerations across all of its work, making the strategic planning process the ideal opportunity to communicate the importance of age-based considerations across the agency. Advancing the health of all Americans through research requires a commitment to considering the physiological and developmental differences that persist across the lifespan, and the strategic plan is an opportunity to lift up the NIH's commitment to age-based inclusion. Additionally, the study of children requires a workforce equipped to grapple with the distinctions posed by age. The NIH has an opportunity to ensure that its NIH-wide research training programs provide an appropriate and necessary focus on pediatric researchers. If we fail to train the next generation of pediatric scientists, we will lack the research workforce needed to make the advances called for in the NIH-wide strategic plan framework. The strategic plan should ensure that child health research professionals are a top workforce priority across the NIH. For decades, our organizations have been committed to ensuring that children benefit from the federal investment in biomedical research, and strategic planning offers an important opportunity to realize that goal. As the NIH sets its agenda for the years ahead, the developmental change that occurs throughout childhood, and indeed throughout life, ought to be elevated to highlight its importance to the work of the NIH. It is clear that the consideration of children in the NIH's work applies equally across the three main objectives outlined in the RFI, which span the research enterprise itself, workforce development, and scientific stewardship. We therefore urge the NIH to add a cross-cutting theme to its strategic planning document that focuses specifically on pediatric and other age-based considerations. Thank you for this opportunity to comment on the NIH-wide strategic planning framework. If you have any questions, please do not hesitate to reach out to James Baumberger (jbaumberger@aap.org) in the AAP Washington Office.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

1. Increasing, enhancing, and supporting diversity While ASBMB applauds the NIH for focusing on increasing, enhancing, and supporting diversity, specific areas within diversity need to be articulated to further guide NIH's actions to support underrepresented communities in the STEM fields. Sexual harassment in STEM is one specific area that should be clearly emphasized in the NIH's strategic plan.

Experiences of sexual harassment and discrimination prevent women from fully participating in STEM research and often prevent women from staying in STEM fields and attaining leadership positions. As such, the ASBMB would like to see the NIH raising the importance of this issue to have its own subheading within the strategic plan. Additionally, the ASBMB suggests issues around underrepresented minorities in leadership positions have a higher standing. When it comes to hiring for senior-level position, women of color face more barriers than other groups. Multiple strategies have been researched to increase the representation of women of color in senior-level positions, which should be addressed through professional development and career training. The NIH needs to incorporate professional development goals for all employees that discuss racial and gender bias. These professional development workshops should address how to create inclusive environments and should address how to prevent negative biases from influencing hiring decisions. Accountability should be ensured and paired with training in implicit and explicit biases at the administrative, faculty, and staff level. 5. Addressing public health challenges across the lifespan. ASBMB advocates for addressing public health challenges across the lifespan, which includes sustaining long-term investments in researching health issues and specific disease areas. We believe research should not, however, be done in bulk via top-down disease specific research. Rather, we support an approach that provides adequate funding for R01 (and R01 equivalent) investigator-initiated research. Investigator-initiated research is a critical component of the NIH research portfolio, allowing individual researchers to identify tracks of research with potential unexpected outcomes that may be valuable outside of the intended scientific aims. Historically, many major scientific breakthroughs, especially those pertaining to lifespan, have required basic research using model organisms and as such, the NIH must continue funding these efforts. Addressing public health challenges requires cross-cutting agency action, sustained investments, and investing in workforces to address these issues.

Comments: Priorities/benefits/drawbacks:

Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science ASBMB is fully supportive of promoting the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science, especially as it relates to international scientific collaboration. However, the NIH has given conflicting messages to the scientific community about engaging in collaborative scientific research because of recent threats to research integrity in the United States from foreign governments. The NIH's guidance to the scientific community has provided unclear instructions for researchers on how to promote collaborative science that will ensure scientists are safe from being unfairly prosecuted by the NIH or other federal funding agencies. ASBMB urges the NIH to provide clear, concise guidelines to the community about disclosure and conflict of interest reporting requirements and to lead other federal funding agencies in doing so as well. ASBMB also urges the NIH to promote international collaborative science and professionalism through extensive training and working with grant-receiving institutions to implement best practices for reporting requirements. By doing so, the NIH would ensure the highest level of scientific integrity and allow scientists in the U.S. to leverage partnerships with other countries successfully.

Comments: Future/emerging opportunities/needs:

In addition to sustaining long-term investments in disease areas, ASBMB encourages the NIH to undertake sustainability and environmental policies with a goal of running scientific laboratories as green as possible. Climate change and global warming stands as one of the most pressing public health challenges of the twenty first century. Because the NIH is a leader in the scientific community and sets norms for the HHS, the NIH must incorporate environmentally green policy recommendations for their grant recipients and grant receiving institutions.

Comments: Cross-cutting themes:

Increasing, Enhancing, and Supporting Diversity. Morehouse School of Medicine (MSM) has demonstrated its commitment to the advancement of health equity through its mission to improve the health of all individuals and communities, increase diversity in the biomedical research workforce, and address primary healthcare needs for people of color and underserved communities. MSM has a variety of institutional programs and approaches to meet the unique needs of basic, clinical and population scientists, as well as an Office of Career Connections, Learning Communities and skills development activities for our learners who we are preparing to become the future leaders in biomedical research fields. MSM is also engaged in partnerships between institutions that further enhance efforts to reduce isolation, increase community building, and foster career advancement for early-career faculty.

Recommendations: We recommend that the NIH Strategic Plan prioritizes:

- Leveraging existing mentoring models like those implemented at MSM, and national models that engage underrepresented faculty, as a resource for future mentoring initiatives;
- Supporting programs that focus on research education and training for underrepresented undergraduate and graduate students that are developed or modified with input from stakeholders;
- Giving more attention to mentorship initiatives focused on underrepresented junior faculty; and
- Continuing to support diversity fellowships and career development awards, and research capacity building programs such as Research Centers in Minority Institutions (RCMI), RISE and Support for Competitive Research (SCORE).

Improving Women's Health and Minority Health and Reducing Health Disparities To address persistent disparities in maternal health during pregnancy and poor birth outcomes, we propose that the NIH strategic plan focuses on research in the following areas:

Assessing the Impact of Stress. Recommendation: The NIH Strategic Plan should prioritize research to understand the role that stress plays in the increased pregnancy complications in African American women regardless of their socioeconomic status and medical background.

Assessing the Impact of adverse childhood experiences (ACEs). Recommendations: We recommend that the NIH Strategic Plan prioritizes:

- Research that measures the impact of quality early learning program models and other community-based interventions on providing a buffer or resilience to the impact of ACEs.
- Research that focuses on identifying biochemical or genomic models that connect ACEs to poor birth outcomes or to higher incidences of pre-eclampsia, prematurity and SGA.

We also recommend that the NIH Strategic Plan:

- Prioritizes the development of a strategic and integrated network of reproductive health centers;
- Leverages minority institutions and academic health centers to create an integrated Network of Reproductive Centers. Centers should facilitate research participant recruitment, support research in focus areas, and partner with other centers in the network on multidisciplinary research initiatives.

Optimizing Data Science and the Development of Technologies and Tools Recommendations:

The NIH Strategic Plan should prioritize: • Funding physical infrastructure and human capital that supports data science at minority institutions; • Promoting public/private partnerships that engage government agencies and labs, non-government labs and minority-serving institutions in both research and research training activities related to data science; • Supporting research that facilitates the collection and analysis of multi-level data required to address health disparities and health equity.

Comments: Priorities/benefits/drawbacks:

Cultivating the Biomedical Research Workforce Recommendations: The NIH Strategic Plan should prioritize: • Supporting programs that focus on research education and training for underrepresented undergraduate and graduate students such as RISE. These programs should be developed or modified with input from stakeholders, and have realistic timelines for follow-up measures to document impact on diversifying the scientific workforce; • Continuing support for diversity fellowships and career development awards; • Continuing support for research capacity building programs such as Research Centers in Minority Institutions (RCMI) and Support for Competitive Research (SCORE). • Robust training in Data Science that targets underrepresented undergraduates, graduate and medical students; and • Opportunities for improving “Big Data” literacy particularly in vulnerable communities. Developing, Maintaining, and Renewing Scientific Research Capacity. The Instrumentation and Construction Programs within the Division of Construction and Instruments (DCI) are key to developing scientific environments that cultivate cutting edge biomedical research and training of scientists.

Recommendations: We recommend that the NIH Strategic Plan prioritizes: • Support for construction of new research facilities and modernizations of existing research facilities, a critical need to support innovative biomedical research; • Ensuring construction grants and animal facilities improvement grants are awarded to meritorious proposals from Emerging Centers of Excellence; • Continuing support for both large and small instrumentation and instrumentation for animal research. Research Capacity-Building Programs. Minority serving institutions (MSIs) rely on competitive research faculty, who involve their students in their research activities. Without programs like the Research Centers in Minority Institutions (RCMI) it will be difficult -- if not impossible -- for MSIs to develop and maintain competitive research environments and for their researchers to contribute over the long term toward expanding and diversifying the biomedical workforce. HBCU Medical Schools have been adversely impacted by the inability to compete for sufficient resources to support clinical and translational research-i.e. clinical research resources and facilities such as out-patient clinical research centers, staff, clinical labs and participant recruitment staff, resources that were previously made available via the RCMI Infrastructure for Clinical and Translational Research (RCTR) Program. The importance of inclusion of all institutions in the NIH research agenda is heightened in light of our ability to respond to pandemics like COVID 19.

Recommendations: The NIH strategic plan must prioritize the inclusion of programs that will provide the opportunity to compete for clinical and translational research resources and infrastructure in HBCU Medical Schools that are not in IDeA states and therefore ineligible for the IDeA-CTR (NIGMS), and are not large enough to serve as the prime institution for a Clinical and Translational Science Award (NCATS). Given the public health, national security, and employment needs of our nation, the RCMI Program, including the RCTR, and other capacity-building programs like the Endowment Program (NIMHD), RISE and SCORE (NIGMS) must continue to be a high priority.

Comments: Future/emerging opportunities/needs:

Emerging Natural Products Research Center. The area of natural products research remains an under-investigated area that holds an expansive compendium of scientific knowledge. Morehouse School of Medicine is developing a Natural Products Research Center to expand treatment choices and alter the global landscape in the discovery and production of safe, low cost, natural products and pharmaceutical therapies for global populations. In our initial project with an NGO partner, our scientists studied a plant-based treatment for specific viral infections and other infectious diseases. They determined and isolated the active ingredient (in this case a protein) and tested it using models of viral infection. That work has led to other partnerships to look at plant-based treatments for other diseases.

Recommendations: We recommend that the NIH Strategic Plan prioritizes: • Support for more research on natural products including research on cannabinoids and endocannabinoids; and • Expand the number of Natural Products Research Centers, particularly new centers. This will require trans-NIH initiatives and collaboration between NCCIH, NIDA, NIAID, NCATS, NIMHD and ORIP. MSM Genomic Medicine Center: An Emphasis on Resilience. Systemic and specific stresses faced by African Americans (and other members of the African Diaspora) have produced large, well-documented health disparities. However, these acute and chronic adversities have also yielded survivors—persons who show evidence of ideal health despite transgenerational environmental, psychological and physiologic stressors.

Understanding instances of African American resilience (superannuation, long health span low disease rates, low risk profiles, positive outcomes, etc.) despite stressors common to African Americans may unearth a collection of uniquely effective promoters peculiarly relevant to the African American context but with implications for all humans. The unique and unifying focus of the MSM Genomic Medicine Center will be human resilience. Access to a large African American community and patient population combined with an institutional focus on advancing health equity position MSM for leadership in this resilience/strength-based/health promoter-oriented approach to discovery and translation of new knowledge to support improved health for all. Recommendations: Based on this emerging area, we recommend that the NIH Strategic Plan prioritizes: • Continuation of the Genomic Medicine Centers of Excellence funding opportunity specifically for new centers. These centers are necessary to support recruitment of key personnel such as bioinformaticians; genetic epidemiologist, and faculty with expertise in clinical genomics. They would also provide enhanced computational resources to accelerate expansion of the clinical/community data and specimens database and inventory of clinical data and specimens; • Opportunities for faculty exchanges between new Centers like MSM and the leading international genomics medicine centers (e.g. Broad, Geisinger, Stanford, Columbia, UPenn, others) to produce a virtual faculty of wide reach and influence, focused on priority projects. This could be a funded consortium with a single ancillary center or a network of such centers. • Establishing genetic counseling training programs. This will require trans-NIH initiatives and collaboration between NHGRI, NIAID, NCATS, NIMHD, NIDDK, NCI and NHLBI.

Responding on behalf of organization?: Yes

Comments: Cross-cutting themes:

The Society for Maternal-Fetal Medicine (SMFM) supports and exemplifies the NIH's five cross-cutting themes. These themes highlight current areas of research that should be prioritized within the proposed NIH-Wide Strategic Plan Framework for the optimization and advancement of science. Specifically, the SMFM appreciates the NIH's focus on reducing disparities and improving women's health across her lifespan, and minority health. The promotion of collaborative science and addressing public health challenges across the lifespan will be critical to achieve these goals. While other areas of medicine, such as oncology and cardiology, have research and clinical trials largely supported by industry, the vast majority of perinatal research that drives evidence-based guidelines are funded by the NIH, chiefly the NICHD. This was acknowledged during the Task Force Specific to Pregnant Women and Lactating Women (PRGLAC) meetings in 2017 and 2018 by the NIH, that "many of the clinical practice guidelines of the American College of Obstetricians and Gynecologists are rooted in NIH-funded studies." The investment in perinatal research has a strong return, as preventing adverse pregnancy outcomes from preterm birth, preeclampsia and others, has the potential to prevent long term maternal and children diseases such as obesity, cardiovascular disease, diabetes and others. SMFM strongly supports the use of collaborative research infrastructures like the Maternal Fetal Medicine Units (MFMU) Network, housed at the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), to optimize perinatal outcomes, for both mother and child, and improve health equity. The United States currently faces a maternal and infant health crisis; the incidence of severe maternal and infant morbidity and mortality is rising, especially compared to other developed countries. This is in part due to existing racial and ethnic inequalities. Moreover, pregnancy is a critical time, with health events during this critical period of development potentially leading to significant short- and long-term effect on the health of mothers and their children. Fetal conditions contribute to perinatal morbidity and mortality, along with long-term pediatric adverse outcomes. Optimal prenatal diagnosis and treatments are needed to reduce the risk, including averting the risks to the mother. This underscores the need to prioritize research in pregnancy and lactation because of the implications of this crucial time in sculpting populational health. By engaging in clinical trials that include pregnant women, we believe that all five cross-cutting themes can be engaged and achieved.

Comments: Priorities/benefits/drawbacks:

Objective 1: Advancing Biomedical and Behavioral Sciences To advance biomedical and behavioral sciences, further women's health and reduce health disparities, a robust investment in research focused on both pregnant and postpartum women, including therapeutics in pregnancy, should be prioritized. Pregnancy is a window to future health for both mother and baby, thus promoting and strengthening research in this historically underrepresented and vulnerable population will support the advancement of biomedical and behavioral sciences. We urge the NIH to confer with the Task Force Specific to Research in Pregnant Women and Lactating Women (PRGLAC) to ensure appropriate and best practices for inclusion of this population to achieve this objective. Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity Potential challenges related to the cultivation of the biomedical research workforce is the existing support of research resources and infrastructure. We urge the NIH to recognize the obstacles researchers, including physician scientists, face regarding mentorship, funding, support, and career development. One avenue to approach this is to promote team science and facilitate collaborations that would encourage synergistic discovery across disciplines. Additionally, to

broaden and diversify the research workforce, SMFM urges the NIH to focus recruitment activities in less common forums, including engaging physician-scientists, fellowship programs and smaller and/or geographically diverse institutions. Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science The NIH's strong and well-respected culture of good scientific stewardship will facilitate the NIH to achieve its overarching objectives. However, this can be accomplished more efficiently and adeptly by fostering, aligning, and leveraging partnerships between academic institutions, industry and private foundations. Currently, research in pregnant women is largely conducted by the NIH because women, specifically pregnant and lactating women, have traditionally been underrepresented in research either because of exclusion from studies or challenges and barriers with recruitment and retention, trial design and consent. To best leverage partnerships in this population, we suggest that the MFMU serve as an example of a successful multi-trial infrastructure; evidence-based findings from MFMU sponsored trials have been essential to the improvement of obstetrical care for both woman and infant.

Comments: Future/emerging opportunities/needs:

We support and encourage the NIH to include maternal mortality and maternal health is a trans-NIH need. Additional collaboration and coordination is necessary given the rising rates of maternal mortality and the maternal health crisis.

Comments: Cross-cutting themes:

The American Society of Nephrology (ASN) supports the National Institutes of Health's goal of increasing, enhancing, and supporting diversity and encourages the NIH to promote diversity and inclusiveness within NIH and NIH Scientific Review Groups to enhance medical and scientific research and the lives of patients through improved health care, research, and education. As kidney disease disproportionately affects those that are disenfranchised, ASN advocates tirelessly for efforts to reduce health disparities and to develop a medical research and physician workforce that reflects the patient population it serves. ASN is also encouraged by NIH's efforts to optimize data science and the development of technologies and tools and suggests the NIH support further research and development of artificial intelligence and other predictive tools. The Kidney Precision Medicine Project (KPMP), a project spearheaded by the National Institute of Diabetes and Digestive Kidney Diseases, involves interagency, cross-institute and collaboration across multiple external research institutions highlights the opportunity that collaborative science provides through the use of recruitment sites, tissue interrogation sites and central hubs. Making progress on the number of kidney biopsies conducted, KPMP has the ability to fundamentally advance kidney care. ASN recommends listing the Department of Health and Human Services (HHS) as a partner, the Department was not listed in the most recent NIH 5-year strategic plan. NIH's relationship with HHS is both a significant symbol to the medical research community and a tool for its participation in key collaborations, such as KidneyX which is housed in the Immediate Office of the Secretary. KidneyX, is a public-private partnership between ASN and the Department of Health and Human Services aimed at spurring innovation in kidney care through a series of prize competitions.

Comments: Priorities/benefits/drawbacks:

Objective 1: Advancing Biomedical and Behavioral Sciences ASN is pleased to see NIH's priorities of preventing diseases and promoting health and developing treatments, interventions, and cures which align with the Executive Order on Advancing American Kidney Health. ASN encourages NIH to partner with external entities on efforts to promote prevention and education. NIH should engage not just national medical societies and patient organizations for their reach but organizations that represent or advocate for those that are traditionally disenfranchised. By forming relationships with these national organizations, the NIH can reach individuals at a local level. Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity ASN supports NIH's efforts to develop, maintain and renew scientific research capacity by cultivating the biomedical research workforce. ASN encourages NIH to ensure a robust pipeline of the research workforce by developing new and expanding current initiatives that promote careers in biomedical research among undergraduate and high school programs. The Division of Kidney, Urologic, and Hematologic Diseases within the National Institute of Diabetes and Digestive Kidney Diseases hosts an annual Summer Undergraduate Research program to entice undergraduates to continue their medical or graduate careers in areas within the research mission of the Division. This program exposes undergraduates to professional and scientific opportunities, and provides the opportunity to conduct research, network with peers and distinguished faculty, and receive timely career advice. Kidney TREKS (Tutored Research and Education for Kidney Scholars), an initiative established by the American Society of Nephrology (ASN), is designed to foster interest in careers in nephrology and research through a week-long research course retreat and long-term mentorship program. ASN has partnered with Mount Desert Island Biological Laboratory (MDIBL) in Bar Harbor, ME and the University of Chicago in Chicago, IL to host to TREKS programs each year. ASN recommends that NIH consider partnering with external institutions and medical societies to develop similar initiatives. But it is not enough to target undergraduate and graduate students, ASN also recommends that NIH move further upstream and partner with innovative high school programs. Finally, the NIH must provide further support for the current workforce to entice individuals to consider medical research as a viable career path. ASN applauds the commitment that NIH has made to early stage investigators to help start careers in research but believes more can be done. ASN encourages the NIH to expand loan forgiveness programs, promote those by other government agencies, and consider partnering with other agencies to increase the amount of loan forgiveness provided. This effort to further support the workforce will maintain a robust pipeline of future investigators. Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science As reflected by this strategic plan, NIH is taking an appropriately long-term view of our nation's overall research funding portfolio. Supporting this endeavor, ASN recommends that NIH organ-based institutes should be regularly reviewed at a high-level regarding portfolio balance between projects with short term benefit, medium term benefit, and long-term benefit, and balancing higher-risk with more incremental, lower-risk efforts. Furthermore, ASN believes that external stakeholders should participate in this review process. The Center for Scientific Review peer-review process is integral to the long and rich history of successful NIH-funded breakthroughs, and ASN has identified several opportunities to modernize and strengthen it going into the new decade, particularly reassessing and likely raising the stipends paid to reviewers to ensure the highest caliber of expertise as budgets at academic institutions

are increasingly tightening. Recognizing the clear lack of clinical trials in the kidney space when compared to other areas, ASN would encourage institutes across NIH to consider investigator initiated randomized controlled trials (RCT) of more than two centers, or reconsider whether mechanisms of action should carry quite as much weight in every RCT as at present. Lastly, ASN encourages NIH to consider any funding that is identified through the optimization of standard operations to be rededicated to research.

Comments: Future/emerging opportunities/needs:

ASN recognizes the significant value of basic science but encourage NIH to also prioritize innovation. Compared to other disease states, innovation in the treatment for kidney diseases has been relatively stagnant since the advent of dialysis. ASN would encourage NIH to increase opportunities for Small Business Innovation Research (SBIR) awards providing necessary funding to bright innovators that will allow them to advance their solution, enhance scientific understanding, and improve patient quality of life. SBIR grants are an important mechanism to help bridge NIH-funded basic and clinical science into real-world products, and ASN would support a significant increase in SBIR grants across NIH in order to catalyze medical innovation. ASN encourages NIH to consider developing a pathway for design-inspired projects to be funded through an R01 pathway. Furthermore, ASN stands ready to advocate for such a funding increase at the Congressional level. ASN greatly appreciates NIH support for KidneyX, a public-private partnership between ASN and the Department of Health and Human Services aimed at spurring innovation in kidney care through a series of prize competitions. ASN looks forward to continuing to collaborate on KidneyX with NIH and benefiting from the expertise that NIH shares with KidneyX.

Comments: Cross-cutting themes:

The NIH Should Consider “Balancing Health Data Privacy with Data Access and Use” as an Additional Cross-Cutting Theme FPF supports the NIH’s continued commitment to advancing the health of the American people and the global population. We encourage the NIH to consider “balancing health data privacy with data access and use” as a cross-cutting theme. FPF encourages the NIH to include the following components to the proposed cross-cutting theme: Ensuring fidelity to a risk-adjusted consent framework; Developing a clear and privacy-preserving and responsible data use guidance; and Promoting a privacy-centric approach to health data sharing and use across sectors and stakeholders. We believe that by adding this additional cross-cutting theme, a balance might be achieved between the NIH’s drive to advance health and preserving the privacy of individuals who offer their data for the development of new medical procedures, products, pharmaceuticals, and devices. This would include the use and processing of patient data from traditional health records, consumer- and/or patient-reported data, and consumer-generated health data.

Comments: Priorities/benefits/drawbacks:

Foster a Culture of Good Scientific Stewardship Around Consent to Data Use Given that consent is an essential component to the protection of health data privacy, we would like to caution that consent may be an appropriate mechanism for protecting the privacy and data rights of research participants in many cases, but not in all cases, especially given that health data is no longer exclusively generated or

processed by health care providers and insurers. Guidance from the European Data Protection Board (EDPB) reminds that consent may be less appropriate when there is an imbalance of power between data subjects and researchers. FPF encourages the NIH to fund all institutes' development of a nuanced approach to requirements for fidelity to consent that acknowledge the limitations to consent in each disciplinary area and reinvigorates the use of consent documents to outline which research purposes conform to participants' privacy expectations. We are particularly concerned that the NIH's strategic plan encourages each institute to evaluate its approach to individual consent and broad consent with a perspective that merges disciplinary concerns with global privacy concerns. Broad consent requirements give investigators the latitude to request that subjects consider future unknown uses of their data and give consent to those unknown future uses, within the restrictions that they must set out for the period of time the data may be stored, maintained, or used. Under these terms, investigators do not need to re-approach subjects to notify them if clinically relevant research results emerge from secondary use under broad consent.

Comments: Future/emerging opportunities/needs:

Supporting Research Resources and Infrastructure with Ethical Review Models and Tools The NIH is the premier agency from which exceptional health data can be drawn for secondary use. Creating effective tools to facilitate use of data in the NIH repositories, such as adoption of a clear-language approach, with robust verbal and symbolic descriptions of restrictions and use permissions, should be incorporated into all institutes' guidance on secondary data use. FPF has developed infographics that describe data on a spectrum of fully identified to fully anonymized on which we have received excellent user feedback regarding interpretability and explicability. We encourage adoption of our model as one mechanism for description of datasets and terms of their use. Including language that outlines the potential privacy risks for reuse of the data, including results from a well-designed open data risk-benefit assessment, will clarify boundaries to privacy respecting reuse of the data. Secondary uses of health data, including recombination of the NIH funded data with non-research data sources, present issues for all divisions of the NIH, researchers funded by the NIH, and users of data held by the NIH. FPF welcomes the opportunity to work with the NIH to develop policies and procedures necessary to implement an oversight group that can be responsible for reviewing secondary data use requests on behalf of companies using the NIH data repositories and other repositories storing human subjects data. FPF is implementing the objectives of a grant received for the express purpose of designing an ethical review process for data sharing between corporations and research organizations. We have committed to development of an ethical data sharing review board that broadly meets the third objective described in this RFI. The FPF Ethical Data Sharing Review Committee will provide a framework for review that is compatible with the research ethics and research integrity infrastructure that already governs federally funded research projects. This body will serve as an independent body to provide review of data sharing arrangements made between for-profit and not-for-profit, non-profit, academic, and other organizations when those data sharing arrangements are made for the specific purpose of research. Our expertise in corporate data sharing practices, privacy risks for machine learning systems and embedding data protection principles for machine learning puts our organization in an ideal place to serve as a reliable partner for oversight of data use requests.

Comments: Cross-cutting themes:

On behalf of the Disability and Rehabilitation Research Coalition (DRRC), we appreciate the opportunity to comment on the National Institutes of Health's (NIH) Request for Information on the FY 2021-2025 NIH-Wide Strategic Plan Framework. The DRRC is a coalition of more than 20 national research, clinical, and consumer non-profit organizations committed to improving the science of rehabilitation, disability, and independent living. Our members seek to maximize the return on the federal research investment in these areas with the goal of improving the ability of Americans with disabilities to live and function as independently as possible following an injury, illness, disability, or chronic condition. As the National Institutes of Health (NIH) develop the NIH-Wide Strategic Plan, we urge the agency to prioritize disability research across the agency in the goals driving the NIH for FY 2021 – 2025 and beyond. There has been great progress at NIH in the field of disability and rehabilitation research since the enactment of the 21st Century Cures Act, which included provisions to enhance medical rehabilitation research. The disability and rehabilitation research community has recognized a significant increase in the coordination and intensity of rehabilitation research and a high level of enthusiasm towards this area within NIH in recent years. However, more work still needs to be done. Disability cuts across all demographics and almost all areas of research conducted by the NIH and should be recognized as such in the Strategic Plan. Each Institute and Center (IC) has a connection to disability within its scope, and the Plan should ensure that disability and rehabilitation research remains a priority throughout the agency. We encourage the NIH to adopt an understanding of this field that is cross-cutting, multi-disciplinary, and focused on 1) understanding the mechanisms of disability; 2) restoring and improving functional capacity in individuals undergoing rehabilitation; and 3) maintaining and preventing deterioration of functional skills while enhancing quality of life and the ability to participate in activities of daily living for people with disabilities. Reducing illness and disability is a critical pillar of the NIH mission, and the Plan should maintain this focus. The Plan Framework includes a focus on enhancing diversity, an admirable goal which we support. However, individuals with disabilities and/or chronic health conditions are often and inexplicably overlooked in diversity discussions. Similarly, women and racial/ethnic minorities are distinct target populations in the Framework's Cross-Cutting Themes, whereas disability and chronic health conditions are not identified as such. We urge the NIH to identify individuals with disabilities and chronic conditions as representing diversity and explicitly recognize them in the Strategic Plan and (across the ICs) as vulnerable populations who disproportionately experience disparities in both access to care and health outcomes. Including this emphasis with other disparate populations in the Framework and advancing targeted research priorities across the NIH would enhance awareness and innovation by NIH-funded researchers, leading to new discoveries for improving the health and well-being of these often-marginalized populations.

Comments: Priorities/benefits/drawbacks:

We appreciate the Framework's acknowledgement of the importance of cultivating the biomedical research workforce as well as supporting research resources and infrastructure. We encourage the Strategic Plan to include a focus on expanding diversity within the research workforce, including an emphasis on hiring researchers with disabilities. To this end, we urge the NIH to develop and adequately

fund pre- and post-doctoral training programs for researchers with disabilities (analogous to existing programs for racial and ethnic minorities) and encourage grant applicants across the ICs to disclose the disability status of team members. Supporting research (in the disability field and more broadly) by researchers with disabilities will not only improve the representation of this population within the workforce, but also lead to more responsive research and dissemination strategies to ensure that research has the most significant impact on people's lives. Further, we recommend that the Strategic Plan include a focus on improving research infrastructure and the design of research projects across the agency. 21st century research practice increasingly recognizes the importance of breaking down the divisions between researchers and their subjects, in order to create more equitable and meaningful research. We encourage NIH to adopt the community engagement requirements used by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) and the Patient-Centered Outcomes Research Institute (PCORI). Fundamentally, people with a disease, impairment, or functional limitation are the experts on living with specific diseases and disabilities and should be recognized as such when research is conducted on these conditions. The National Center for Medical Rehabilitation Research (NCMRR) led the way at NIH by including six out of eighteen NCMRR Advisory Board members as persons with disabilities. It is now time that many or most studies sponsored by NIH include relevant stakeholders, including those living with conditions that are the subject of such studies, in research development, data collection, analysis and interpretation, and the dissemination and utilization of research findings. We applaud the NIH for highlighting the importance of leveraging partnerships throughout the NIH's work, and encourage the agency to continue engaging with relevant stakeholders (within the federal government and externally) to develop research priorities and studies that will create the broadest impact on peoples' lives. In particular, we would like to commend the leadership of the National Institute on Child Health and Human Development and NCMRR for their openness and accessibility to the research, clinical, and consumer communities. This has engendered a strong collaborative relationship between NCMRR and stakeholders in the field, and we encourage leaders across the NIH to prioritize such collaboration in their ICs. We also recommend leveraging partnerships between the academic and biomedical research industry to the extent possible in a socially responsible manner.

Comments: Future/emerging opportunities/needs:

As the health care system in the United States continues to pursue truly value-based care, we encourage the NIH to include in the Strategic Plan priorities aimed at expanding the translational impact of research conducted by the agency, with increased focus on efficacy studies, comparative effectiveness research, and new and innovative models of treatment. This will allow for optimization of the impact of NIH research and development on Americans' lives. The DRRC encourages NIH to further examine policy changes that increase access to interdisciplinary care and alternative treatments for acute and chronic pain, including physical therapy and cognitive behavioral health. We further encourage the NIH to expand upon existing relationships with other federal agencies and policymakers in Congress and the administration to ensure that current and future research can help develop improved health care policy, including reimbursement policy, and increase access to evidence-based care for individuals with conditions studied by the NIH. We also encourage the NIH to consider that future opportunities may exist with collaboration between clinicians and state health systems in

developing even earlier interventions of persons with disabilities, as has been coordinated in North Carolina with the NCCARE360 network. Scientific evidence should be the major driver for health care policy, and NIH is in a unique position to share data generated by the agency as policymakers develop new solutions to impact the lives of people nationwide. Thank you for the opportunity to comment on the development of the updated NH-Wide Strategic Plan. We look forward to continuing to engage with NIH as this plan takes shape, and we hope that our collective comments will help to guide the publication of the final plan at the end of the year. If you have any questions, please contact Peter Thomas or Bobby Silverstein, coordinators of the DRRC, at 202-466-6550 or by email at Peter.Thomas@PowersLaw.com and Bobby.Silverstein@PowersLaw.com.

Comments: Cross-cutting themes:

The Pulmonary Hypertension Association (PHA) applauds National Institutes of Health (NIH) for developing an FY 2021-2025 strategic plan that includes important, cross-cutting themes that address the needs of rare disease patients and clinician-researchers for whom collaborative science and efforts to reduce public health disparities and improve the health of women and minorities are essential to success. PH is a rare, progressive lung disease characterized by high blood pressure in the lungs that can lead to right heart failure. It is complex and can occur on its own or secondary to another condition, disease or exposure including scleroderma, lupus, sickle cell, HIV and methamphetamine use. PH can impact anyone, however the majority of impacted individuals are female and mortality is highest among African Americans. Average survival from the time of diagnosis has increased from less than three years to more recent estimates of seven to nine years due to the development of multiple FDA-approved, targeted therapies. Ultimately, however, PH remains a fatal, incurable condition that disproportionately impacts women and minorities. The National Heart Lung and Blood Institute (NHLBI) Pulmonary Vascular Phenomics (PVDOMICS) Program is a strong collaboration between NIH and PHA. The overall goal of this large multi-center study is to utilize comprehensive phenotyping include OMICS-based analyses with genomics, proteomic, and metabolomics to supplement the current PH classification and to identify new biomarkers that could help with early diagnosis, at-risk screening, and personalized medicine for interventions and/or prevention for PH. The success of the core PVDOMICS has led to the extension study, L-PVDOMICS, for observation and longitudinal follow-up and repetitive biological measurements. This collaborative extension study will play a key role towards enhanced understanding of the mechanism of action of PH, natural history, disease progression, response to treatment and longitudinal clinical outcomes. L-PVDOMICS has the potential to advance personalized medicine approaches for the treatment of PH by linking newly defined biomarkers from the original study cohort to longitudinal outcome measures. The three objectives outlined in the NIH-Wide Strategic Plan Framework all directly impact the future success of PH research including the PVDOMICS and L-PVDOMICS studies. The PVDOMICS program is an example of advancing biomedical research towards preventing disease and developing interventions (objective 1) and cultivating the biomedical research workforce (objective 2) through leveraging collaborative partnerships (objective 3). PHA strongly supports NIH's continued support of collaborative science and advancement toward a cure for complex rare diseases such as PH.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Increasing, Enhancing, and Supporting Diversity: The American Psychological Association (APA) recommends that NIH expand its efforts to strengthen research programs at minority-serving institutions and to investigate and address disparities in grant success that disadvantage Principal Investigators of minority backgrounds. In addition, the APA recommends studies on decreasing the various forms of explicit and subtle bias and discrimination in the workplace in order to increase retention of scientists from diverse backgrounds at NIH and NIH-supported research institutions.

Improving Women’s Health and Minority Health, and Reducing Health Disparities: The APA recommends that planning and management of NIH research programs take into account recent data on health disparities (such as the CDC’s Health, United States, 2018). The APA also recommends that program descriptions explicitly name disadvantaged and underserved groups in order to increase researchers’ awareness of the various dimensions of health disparities. (These groups include but are not limited to: indigenous peoples, LGBTQIA+ groups, migrants, refugees and asylum seekers, rural workers and rural populations, youth, people of color, people with physical and intellectual disabilities, persons living with HIV/AIDS, persons living with chronic illnesses, persons with mental illness, persons with serious mental illness, and the multiple intersections of such groups.) The APA suggests further that NIH research programs develop specific initiatives (both individual and community-based) to address the most common preventable causes of disease in these groups, such as tobacco use and obesity, as well as support basic research into behavioral and social factors that may contribute to the health of various population groups.

Optimizing Data Science and the Development of Technologies and Tools: The APA recommends that NIH continue to take advantage of opportunities to train scientists in the use of new technologies and advanced study designs like those that have been developed for the Adolescent Brain Cognitive Development Study, All of Us, and BRAIN initiatives. Further, as evidenced by progress on the BRAIN initiative, collaboration with the National Science Foundation has proved extraordinarily fruitful and represents a prime example of how the complementary missions of NSF and NIH can accelerate basic and clinical research toward a common goal on projects involving large data sets. However, with the growth of studies involving “big data,” the APA also recommends that NIH continuously assess the balance and coordination of basic and clinical behavioral and social science research across individual Institutes and Centers.

Promoting Collaborative Science: The APA strongly supports NIH’s encouragement of multidisciplinary research teams, including teams in which psychologists and other behavioral and social scientists have lead roles. Interdisciplinary and interprofessional training initiatives are important components of such efforts.

Addressing Public Health Challenges Across the Lifespan: Along with addressing the well-known leading public health challenges (e.g., depression, infectious diseases, cancer), the APA recommends that NIH take a broad ecological view that includes attention to the health impacts of sociocultural and economic factors and of climate change. Further, the APA

recommends continued support for dissemination and implementation science, in order to ensure the greatest number of people benefit from new discoveries

Comments: Priorities/benefits/drawbacks:

Objective 1: The framework makes few references to research with nonhuman animals despite important findings from NIH-supported research that have led to animal models of learning, cognition, and the relation of these processes to brain structure and function – research that in turn has led to new insights into human behavior. The APA strongly encourages greater focus and support for research with nonhuman animals. This should include support for research on whole-organism behavior within its social and environmental contexts and throughout the course of development. Such work can lead to the design of new behavioral interventions for a variety of human disorders. The APA emphasizes that both research on mechanisms defined at purely behavioral levels and research on mechanisms defined in terms of behavior-brain linkages are valuable and necessary. The APA also urges NIH institutes to devote greater resources to understanding the organization and management of healthcare systems and training. Scientists in fields such as industrial/organizational psychology and human factors research can address such urgent topics as: the educational and occupational pipeline from high school into all facets of the healthcare system; how healthcare teams operate and factors that determine their success; sources of and solutions to fatigue and burnout among healthcare workers; how artificial intelligence can be most effectively incorporated into healthcare systems; and how members of diverse groups, including underrepresented minorities and disabled persons, can be fully integrated into all areas and levels of the healthcare system. Objective 2. The APA recommends that NIH exclude basic behavioral and social science research from its definition of Clinical Trials. The APA appreciates the stated goal of the NIH leadership to increase the transparency of funded research and to ensure the reporting of results of all studies. While the APA supports enhanced transparency and reporting for all forms of research, the APA does not view the incorporation of basic research into a clinical trials framework as an appropriate or useful way to achieve that goal. Other mechanisms, such as the Open Science Framework, can be used to ensure the transparency of basic studies. The proposed definition would add undue regulatory burden on existing investigators and may deter new investigators and excludes potential scientists who do not have the resources/support of a research-oriented institution. Objective 3. The APA recommends that NIH maintain its emphasis on strengthening the rigor and replicability of research, which will improve the quality of research and lead to public confidence in science and evidence-based interventions and policies.

Comments: Future/emerging opportunities/needs:

Building on our recent response to the NIMH draft strategic plan, the APA has longstanding concerns about the distribution of NIH institutes' support for research on mind, brain, and behavior. These concerns relate to the proper balance of research among biological, psychological, social, and cultural levels of analysis; the balance between research aimed at long-term vs. short-term impacts; and the balance among basic, translational, intervention, and services research. Further, the APA is concerned about insufficient coordination among the NIH institutes in funding of health-relevant behavioral and social science research, such that some valuable research topics, especially in basic research, may fall between the cracks and receive little or no support. Greater coordination of NIH efforts with those of

the National Science Foundation and other agencies is also needed to ensure that the behavioral and social science research funded across the federal government has optimal quality, scope, and impact. To address such concerns, the APA encourages NIH to work collaboratively with the research, patient, and professional communities, as it did in the development of OppNet, to establish a new framework for NIH institutes' support and management of behavioral and social science research. The rapid development of scientific opportunities and methodologies, along with recent developments in health and the broader society, make a new effort timely and potentially of high impact. To that end the APA is pleased that the NIH Office of Behavioral and Social Sciences Research (OBSSR) has issued a Request for Information to gather input on cross-cutting approaches that stimulate health-related research on the fundamental processes that influence behavior and social systems. OBSSR is well positioned to manage such a planning process and its implementation, and APA urges that it be given a stronger mandate to lead this effort. The current Covid-19 pandemic has revealed vast regional differences in preparation for, and response to, massive global health crises. Because these crises require large-scale behavior change and pose significant psychological burdens on individuals, insights from the social and behavioral sciences are critical for optimizing pandemic response. APA recommends that NIH invest in research from the behavioral and social sciences relevant to different dimensions of pandemic preparation and response. Such a research portfolio should increase linkages between the Fogarty International Center, the Office of Behavioral and Social Sciences Research and other Institutes/Centers to include research related to navigating threats, social and cultural factors, science communication, moral decision-making, leadership, and stress and coping relevant to pandemics with implications for solving public health issues related to pandemics. APA recommends that NIH initiate an interdisciplinary review of its current portfolio to identify research that can be immediately applied to optimize response to the current Covid-19 pandemic, and also identify important gaps that would help guide future research efforts to prevent and mitigate future pandemics.

Comments: Cross-cutting themes:

Truth Initiative supports the cross-cutting themes articulated in the framework, especially improving women's health and minority health, reducing health disparities, optimizing data science and the development of scalable technologies and tools to promote cessation. Progress in reducing tobacco use has been uneven in the United States. We know that tobacco use disproportionately affects racial and ethnic minorities, who have a long history of being targeted by the tobacco industry and face disproportionate burdens from tobacco-related diseases. Research has shown wide disparities in tobacco use among the largest racial and ethnic groups in the U.S. African Americans smoke at lower or similar rates compared with other racial and ethnic groups, yet are disproportionately affected by tobacco use in several ways. For example, African Americans have higher death rates from tobacco-related causes and are more likely to be exposed to secondhand smoke. The tobacco industry has targeted African Americans and strategically marketed its products to appeal to the community for decades, including placing more advertising in predominantly black neighborhoods and in publications that are popular with black audiences. American Indians and Alaska Natives use tobacco more than any other racial or ethnic group in the U.S. The tobacco industry has a well-documented history of targeting

American Indians and Alaska Natives, which continues today. A recent congressional investigation found that the e-cigarette manufacturer JUUL targeted at least eight American Indian tribes with price discounts and referral program pitches in an effort to promote its products. Nearly one in ten Hispanic adults currently smoke cigarettes -- lower than the national smoking rate of 13.7%. However, studies have shown the prevalence varies significantly between subgroups from specific countries or regions, with Puerto Rican adults having the highest smoking rates and Dominicans having the lowest. Results also indicate Hispanic/Latino adults who were born in the US have higher smoking rates as additional research has found that increased smoking prevalence was observed with increased acculturation. Asian-Americans have the lowest cigarette smoking rates compared with other racial and ethnic groups. However, tobacco use rates vary within Asian-American subgroups. From 2010-2013, Korean-American (20%) and Vietnamese-American (16.3%) adults had the highest smoking rates among Asian-American subgroups, while Chinese (7.6%) and Asian-Indian (7.6%) adults had the lowest smoking rates among Asian-American subgroups. Additionally, smoking rates for women, overall, have not declined as quickly as for men. Since 1965, smoking rates among women have dropped by about 59%, compared with a 66% drop among men. Women who smoke also risk additional consequences, including reproductive issues such as menstruation problems, decreased fertility and premature menopause. The landscape of tobacco use has changed, for youth and young adults in particular. According to the 2019 National Youth Tobacco Survey, 4.1 million (27.5%) high school students report current use of e-cigarettes, 21.4% of whom report use on a daily basis. More research is also needed on health disparities of e-cigarette use. We urge NIH to conduct more tobacco-related research, including e-cigarettes, especially on reducing health disparities and additional cessation interventions that involve new scalable technology and tools that promote cessation.

Comments: Priorities/benefits/drawbacks:

Truth Initiative supports the Objectives articulated in the framework. We urge NIH to conduct more research on interventions to decrease smoking and tobacco and nicotine use among adults. Most smokers — nearly 70% — say they want to quit, and recent data show an increasing number of people quitting successfully. Additionally, 62.4% of adult e-cigarette users in 2016 reported plans to quit e-cigarettes for good and more than 25% reported an attempt to quit e-cigarettes in the past year. In 2016, 59% of adults who ever smoked quit, an increase from 50.8% in 2005. Nevertheless, annual quit success rates remain low — at roughly 7% — underscoring the highly addictive nature of nicotine, the ineffectiveness of the “cold turkey” approach, or not using available treatments, and the multiple attempts it can take to successfully quit. Chances of success increase with each quit attempt. Quit attempts and quit rates decrease with age, possibly because of increased difficulty changing behaviors that have been established over many years, according to data from 2015. Quitting disparities exist among certain populations, including in communities with lower income and education levels, racial and ethnic minority groups, those with mental health conditions and the LGBT community. We encourage NIH to do more research on menthol cigarette users as scientific evidence indicates that adult menthol smokers are less likely than non-menthol smokers to successfully quit smoking despite increased quit intentions and quit attempts. We urge NIH to fund research to better understand e-cigarette harms, behavioral use patterns, and their impact on cessation of other tobacco products such as cigarettes. There has been a dramatic increase in youth e-cigarette use. The most recent data show that 27.5% of

high school students are using these products – a rate of youth tobacco product use not seen in nearly two decades. Young people report severe signs of dependence, including using e-cigarettes when they first wake up, inability to concentrate in the classroom without using an e-cigarette, and even waking in the night to get a nicotine fix. We have known for decades that youth in particular should not be exposed to nicotine because it changes brain chemistry to create a stronger addiction, can lead to memory and concentration problems, and can make youth who use it more susceptible to addiction to other substances. Research suggests that young people who use e-cigarettes are four times more likely to go on to smoke combustible cigarettes. Conversely, as the youth e-cigarette epidemic has continued unabated, we have seen adults, and especially older smokers, simply reject the product. In 2014, 3.7% of adults used the product in the last 30 days. In 2018, the adult usage remained low, at 3.2%, and was largely driven by young adult users (7.6%), who have matured during the youth e-cigarette epidemic. While some adults have switched completely to e-cigarettes from combustible cigarettes, the predominant pattern among adult users continues to be e-cigarette use in conjunction with smoking. This “dual use” provides no reduction in the harms associated with smoking.

Comments: Future/emerging opportunities/needs:

NIH should fund more research on new technologies and tools that promote cessation. Such interventions are especially needed for adolescents, for whom very few options exist to help quit tobacco and/or nicotine use. According to the 2019 National Youth Tobacco Survey, 4.1 million (27.5%) high school students report current use of e-cigarettes. That means the U.S. now has millions of youth who are at risk for nicotine addiction due to the youth e-cigarette epidemic may lack options to help them quit. We also know that using e-cigarettes has been shown to increase the likelihood of smoking cigarettes among young people, raising concerns that e-cigarettes are acting as entry nicotine products that may lead to use of more dangerous combustible tobacco or nicotine products. According to one study, U.S. youth are four times more likely to try cigarettes if they previously used e-cigarettes. The study also estimated that e-cigarettes are likely responsible for nearly 22% of new ever cigarette use (trying a cigarette) and 15.3% of current cigarette use for the same group — totaling nearly 200,000 new cigarette initiators. This underscores the importance of NIH researching cessation interventions for this population. Cessation interventions should go beyond pharmacological approaches only; behavioral health interventions are also necessary. Digital quit smoking programs that address the behavioral and social aspects of cessation have demonstrated strong consumer demand. There is a growing evidence base for their effectiveness in promoting cessation from combusted tobacco among young people that can be leveraged to address e-cigarette use. Most importantly – unlike drug therapies for youth – they can be made available on a widespread basis, today. Cessation efforts for teens must be mobile and social. Young people are digital natives: they have grown up with computers, mobile devices, and social media and use them in virtually all aspects of their lives. Device access and/or ownership is nearly ubiquitous. Research from Truth Initiative shows that a text message-based e-cigarette quit program could aid young people in their desire to stop vaping. This observational data showed more than half of users (60.8%) reported that they had reduced or stopped using e-cigarettes after just two weeks. Truth Initiative is now launching a national clinical study to evaluate the effectiveness of its This is Quitting program in helping young adults ages 18-24 to quit vaping using a rigorous randomized design. Since developing and launching the program in January 2019 in response to the nation’s youth vaping

epidemic, more than 140,000 young people have enrolled, demonstrating the appeal of a text message program and the massive demand for quit vaping support. More clinical research in this area is much needed.

Comments: Cross-cutting themes:

- Consider making “Social Determinants of Health” a cross-cutting theme. - Consider making “Children-at-Risk” a cross-cutting theme. Specifically, call attention to young children six years old and under and how to support their growth, development and well-being. - Consider making “Artificial Intelligence (AI)” a cross-cutting theme. Currently, it appears as though NIH executes AI in siloed and decentralized fashion. NIH will be better able to scale and develop AI faster with a concerted strategy. - Refine the first theme to “Increasing, Enhancing, and Supporting Diversity and Inclusion.” Often there are plans to bring in people of diverse backgrounds, but there are no plans for how to integrate everyone and make them feel comfortable. The lack of inclusion plans can hinder the benefits of diversity. - For the theme “Promoting Collaborative Science,” consider including a deep look at why some populations/entities/institutions do not participate in research and/or do not take up research results/best practices. - With respect to the first two cross-cutting themes (Increasing, Enhancing, and Supporting Diversity; and Improving Women’s Health and Minority Health, and Reducing Health Disparities) there appears to be a lack of expertise and data in these areas. We recommend NIH dedicate significantly more resources to these efforts as making impactful forward progress has been challenging. - Help audiences understand how NIH cross-cutting themes are implemented. For example, which agency or institute has the responsibility to lead its implementation and with what resources.

Comments: Priorities/benefits/drawbacks:

- Given the current COVID-19 pandemic, we recommend that there be more of an emphasis on partnerships and collaboration. NIH is positioned to be a national focal point for relevant activities in this area, to include international collaboration. - With the current COVID-19 pandemic, we are seeing more clearly the disparities in health care access for minorities and individuals in rural areas. We recommend that NIH be an active facilitator and enabler of these communities in having an open dialogue about these inequities, what can be done to address them, and then how can NIH enable those solutions. - With respect to Objective 1, we recommend NIH make a more explicit case and focus more resources on demonstrating how preventive efforts are dollars well spent. For example, spending resources on finding the best ways to prevent obesity as opposed to understanding better its correlation to/causation of cardiovascular disease. - For Objective 3, we recommend that NIH be explicit in stating how it is seeking to reduce costs and administrative burdens. - Elevate topics and activities such as preventing data poisoning and machine learning (ML) model corruption. Both areas focus on making Artificial Intelligence (AI) more transparent. - Create more incentives to drive data sharing, and disincentives for data hoarding.

Comments: Future/emerging opportunities/needs:

Our team of Atlas Research subject matter experts provide comments that can be grouped into three primary categories: Priority Populations, Social Determinants of Health, and Operational/Organizational

Considerations. Priority Populations - Prioritize the evaluation of the side effects of medicines, especially related to people with chronic conditions, to prevent a crisis such as the opioid epidemic. - Prioritize research regarding the ballooning geriatric population, which will have specific new needs requiring extra focus. - Elevate research on the impact of the opioid crisis on young children and their growth, development and well-being. For example, the impact of trauma and poor health practices and how interventions can turn the curve for young children. - Engage rural hospitals in more quality improvement collaboratives, e.g., the Critical Crossroads mental health toolkit. - Prioritize improving healthcare outcomes for women veterans. Notable disparities exist between women of color and white women (breast cancer mortality, maternal mortality and overall women's health). Atlas' evidence-based quality improvement (EBQI) process focused on working with women's health programs to increase access. There may be opportunities to focus on implementing the EBQI methodology for the private sector, and for cross-collaboration opportunities. - There are notable inconsistencies in women's health care provision across U.S. health care systems and geographic regions (e.g., standard of care, comprehensiveness of care, access, equipment utilization, health care promotion). We recommend that NIH assess and expand upon existing health care promotion and outreach efforts that are tailored for culture/age/geographic appropriateness in areas of the U.S. where women are high risk for various health conditions (e.g., cervical cancer mortality, maternal mortality), in addition to reviewing the core privileging requirements and maintenance of any medical professional who sees women. Social Determinants of Health - Consider more prioritized research regarding the impact of Social Determinants of Health on public health challenges across the lifespan, and the shifting of healthcare to home and community-based recovery, rehabilitation, and ongoing care, and its impact on individuals and families. Operational/Organizational Considerations - Conduct an independent evaluation of NIH operations to determine opportunities to align its operations to management best practices. - Prioritize supporting biomedical research at the local level via supporting smaller, non-university affiliated hospitals in participating in research. This will increase research buy-in at these institutions, provide access to populations that are understudied, such as rural populations, and provide greater validity for research outcomes. - Prioritize diversity in the biomedical research workforce, including international synergies/alignment in research. - Spend more resources on ensuring that the taxpaying public learn more about the great work of NIH. This is important for national buy-in to its budget. Offer more focus on teaching and communicating with key stakeholders. - Explore how a targeted and tailored intervention approach, using longer-term, intentional and sequenced intervention (implementation science) models can support stronger and longer term, sustainable results for children. Intervention is often short-term. Explore the systemic elements that need to be impacted to support sustained growth, development and well-being. - With respect to program monitoring and evaluation, create evaluation plans at the beginning of efforts so the enterprise knows what they're working towards and the indicators they will be monitoring. This often is lost when evaluations are conducted.

- In reviewing NIH's 2016-2020 Strategic Plan, there appear to be future opportunities for NIH to leverage strategic planning best practices and terminology. For example, Atlas' subject matter experts in organizational excellence and transformation recommend:

- o Aligning HHS's Strategic Plan and performance measures with the NIH-wide Strategic Plan and performance measures, i.e., show how NIH goals support the achievement of HHS goals.
- o Clearly showing the linkage and alignment of NIH-wide strategic goals with their supporting

objectives and key measures of success.

- o Highlighting the NIH-wide strategic vision in a succinct, inspirational statement or small paragraph that describes the desired NIH end-state (for the end of the 5-year plan, or beyond).
- o Highlighting and describing goals in terms that illustrate the critical outcomes necessary to achieve the strategic vision.
- o Clarifying and highlighting a clear connection/linkage between research outcomes and overall taxpayer health outcomes.
- o Articulating objectives in a way that conveys the ‘how’ of what is needed to achieve a strategic goal.
- o Ensuring objectives are SMART, i.e., specific, measurable, achievable, results-oriented and time-bound.
- o Stating performance measures that define success for each objective.
- o Minimizing narrative in the strategic plan that describes what NIH does, e.g., its current or planned functions (strategic plans describe what organizations intend to achieve, how they will achieve it, and what defines success, not just merely what it does/its functions and capabilities).
- o Showing alignment/linkages to the high-level budgets needed to achieve goals and objectives.
- o Illustrating for the reader which NIH organization would be the ‘lead’ and accountable in an objective’s execution.
- o Illustrating how individual Institute and Center strategic plan goals and objectives and performance measures align to NIH-wide goals and objectives and performance measures, e.g., showing how individual IC goals and objectives execute NIH-wide goals and objectives,
- o Discussing the Executive and Sponsor-level Strategic Plan Governance Committee structure that will be overseeing, resourcing and guiding the execution of the NIH plan, and how that drives accountability across NIH and focuses effort on NIH-wide priorities, and thus shows expert stewardship of taxpayer funds.
- o Possibly creating two ‘strategic plans’ – one that speaks more broadly about the NIH mission, its functions and the value it provides to the US taxpayer and the world; and another plan intended to be actually used to manage the business of NIH, e.g., define what NIH intends to achieve, how it will achieve it, who will be accountable, and how these efforts will be measured, governed and resourced.
- o Clarifying how cross-cutting themes are tangibly applicable to goals and/or objectives. For example, how do they inform/relate to goals/objectives, and are they intended to be operationalized on any level? There is best-practice precedent for the use and notion of ‘strategic themes’ in Kaplan and Norton’s Strategy Mapping body of knowledge, but it is not clear if NIH is using themes in this manner.
- o Clarifying linkages to and an explanation of how the NIH is compliant with the Government and Performance Results Act (GPRA).

Comments: Cross-cutting themes:

The Humane Society of the United States (HSUS) and the Humane Society Legislative Fund (HSLF) appreciate the opportunity to comment on the Request for Information (RFI) on the FY 2021-2025 National Institutes of Health (NIH) - Wide Strategic Plan Framework. We support NIH efforts to improve

research discovery and patient care; however, we believe it is vital that emphasis be placed on reducing the use of, and need for, animal models within its strategic plan. It is one of NIH's stated missions to "foster fundamental creative discoveries, innovative research strategies, and their applications as a basis for ultimately protecting and improving health" and yet much of the NIH-funded research carried out maintains extensive reliance on outdated animal models and is therefore misleading due to the lack of translation to humans or the lack of reproducibility. The historical research paradigm that retains a major element of animal research fails to offer the innovation that is necessary to understand human disease and is failing the public with its general inability to translate into effective treatments and ultimately - cures. We urge the NIH to follow the steps of other agencies, including the Food and Drug Administration (FDA), Department of Defense (DOD), and Environmental Protection Agency (EPA), that have taken recent steps to outline a vision for transitioning away from animal methods. With these agency actions, and other notable efforts across the globe to replace animals in research and testing, it is timely for the NIH to use this next stage of its strategic plan to display its commitment to supporting more human-relevant science. While we are pleased to see that NIH plans to focus on new scientific tools and leverage existing "big data", NIH should clearly prioritize the development, qualification, and application of non-animal, new approach methodologies (NAMs). We note the impressive efforts that are currently underway including the Human Connectome project, the Human Microbiome project, the Precision Medicine Initiative, and other collaborative efforts such as those driven through the National Center for Advancing Translational Sciences (e.g. Tissue Chips for Disease Modeling and Efficacy Testing). Embedding NIH's commitment to applying such innovative and human-based methods throughout the strategic plan is a natural progression, capitalizes on this vision, and places the NIH at the forefront of the drive for more human-relevant science.

Comments: Priorities/benefits/drawbacks:

NIH priorities encompass admirable commitment to fostering innovation and to retaining an effective, competitive workforce. To achieve this, NIH must proactively support the transition from research using animal models of human disease toward more human-relevant methodologies. NIH must create dedicated funding for human relevant NAMs. In the strategic plan, NIH states that "funding has not kept pace with inflation, and the agency has lost approximately 22% of its research purchasing power since 2003." Animal research is expensive. Since funding has not kept pace with inflation, a larger percentage should be invested into more economical, human relevant technologies ensuring each research dollar is more effectively applied to furthering understanding of disease progression and developing effective treatments. We estimate that funding dedicated to non-animal approaches is less than 0.1% of the total budget. An annual shift assigning as little as 1-5% of the overall budget to non-animal approaches could increase funding capacity for human relevant innovations without compromising other research avenues. Additionally, NIH should establish grant review criteria tailored to the development and use of non-animal methods. Currently, NIH Funding Opportunity Announcements specify the review criteria and considerations that are to be used in evaluating those applications. Developing an Additional Review Criterion that specifically considers the development and use of NAMs would be appropriate and timely and would promote consideration of NAMs by grant reviewers. HSUS appreciates that application of non-animal, human relevant approaches requires effective education and training and that a competent workforce is more globally competitive, confident, and able. We strongly believe that the

NIH has the capacity to be a world leader in the development and application of NAMs in biomedical research, and that this requires an educated, empowered workforce. We urge the NIH to take note of ongoing initiatives aiming to address this. For example, the European Commission launched a pilot project developing e-learning modules facilitating NAM development and enabling effective implementation of the 3Rs. Various other efforts are underway to create freely available resources for education and training in the use of NAMs and we encourage the NIH to make use of these and strongly suggest that requirements for training in NAMs are prioritized as part of objective 2. It is vital that all appropriate stakeholders are fully aware of the currently available and emerging non-animal methodologies. We suggest that NIH uses online educational resources to create a NAM training program directed at (but not limited to) grant holders (including intramural), project reviewers, and all Institutional Animal Care and Use Committee members. This could be rolled out to grant reviewers to ensure that anyone who bears responsibility for the review or execution of protocols involving animals is fully aware of potential replacement avenues available, ensuring that the 3Rs are fully respected at every stage, from application, through review and approval, to conduct of the research. Importantly, this could form part of NIH's commitment to enhance the transparency of its decision making - and could help to improve public confidence that animals are used as a last resort.

Comments: Future/emerging opportunities/needs:

Pathway-based Approaches An opportunity gaining traction throughout biomedical research disciplines is the expansion of the pathway-based approaches to biomedical research. The adverse outcome pathway (AOP) concept has revolutionized chemical safety testing and has the capacity to do the same for biomedical research. There is increasing interest in the application of this framework to the understanding of human disease pathophysiology and, within the AOPwiki database, there are many examples of pathways which lead to disease-related adverse outcomes such as inflammation and fibrosis, neurodegeneration, organ impairment, and increased disease susceptibility. NIH could leverage its partnerships with EPA, the Office of Economic Cooperation and Development (OECD), and the European Joint Research Centre to promote the use of pathway-based approaches. NIH could also capitalize on the application of the pathways-based approaches to toxicology which is being driven by the NIEHS' National Toxicology Program, with its vision to make toxicology testing more human relevant and reduce reliance on animal testing. A future opportunity therefore lies in the identification of gaps and priorities for this research and in the development of an integrated outline for training, funding, and dissemination of the AOP that broadens our understanding of diseases, identifies new druggable targets, and overall will advance medical science.

Retrospective Analysis Given the costs and limitations of the continued reliance on animal models for many areas of disease research, we recommend that NIH implement a process for carrying out a retrospective analysis of whether past animal use has positively impacted human health before any new research begins at or is funded by the agency. NIH should evaluate and report whether the objectives of the funded project were achieved, whether any of the information was critical in moving forward into human trials, details regarding the numbers of animals used as well as the overall harms inflicted, levels of pain and distress the animals within the studies were subjected to, and total funds spent. There should be frequent analysis to ascertain whether replacement, refinement, or reduction approaches can be implemented into protocols.

Comments: Cross-cutting themes:

- NIH should continue to promote and support disability and rehabilitation research throughout its Institutes and Centers. We recognize that there has been real progress in this area since passage of the 21st Century Cures Act, and we urge that such rehabilitation efforts include studies of the important public health outcomes of participation and function. Given the success in early detection, diagnosis and medical management of many previously fatal diseases and injuries, people now experience greater survival rates; however, these same people must also now adapt to substantive chronic, disabling conditions that significantly impact personal and public health. NIH's rehabilitation plan must address this public health imperative: recognizing, addressing and managing the implications of chronic conditions and disabilities (such as cancer and autism).
- Interventions in the area of behavioral sciences require new models of care, and new thinking. The new NIH Strategic Plan should outline how research should address aspects of disability and chronic conditions that affect societal participation across the lifespan, including among those with disparities. Learning to effectively manage disabling conditions could drastically reduce health care costs. Rehabilitation is a critical component of a more efficient, effective health care system targeted not just toward disease prevention and management but also participation and function outcomes.
- Team science requires an interprofessional team to address the complex rehabilitation and habilitation issues for chronic illness. This must include researchers trained to investigate lifespan concerns, prevention of secondary conditions, and quality of life. Funding must support these research models that encompass collaboration of rehabilitation professionals and support development of early researchers.

Comments: Priorities/benefits/drawbacks:

(Submitter left answer blank)

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

Response to Cross-Cutting Themes The American Autoimmune Related Diseases Association (AARDA) applauds NIH including women's health as one the major foci in its new 6-Year Plan. The over 80 known autoimmune diseases (AD) and some 40 suspected ADs share a common etiology and overlapping genetics. NIH estimates as many as 24.5 million Americans have an autoimmune disease, 75% of them women. So, AD is a major women's health issue and have a significant impact on healthcare cost, disability programs and family earning power. We believe the estimated prevalence is a sizable underestimate since it is based on epidemiological data developed 50 years ago (in the 1960s) and only included 23 ADs for which there were scientifically sound epidemiology studies. The figure has not been reviewed in two decades, and during this period, increased exponentially. We strongly recommend that NIH undertake epidemiological studies to better determine the criticality of ADs. These data will provide a defensible basis to allocate research funding for the diagnosis and treatment of the interrelated family

of autoimmune diseases and allow for increased accuracy of healthcare cost forecasting. In addition, we recommend research on computational biology of biomarkers to refine diagnosis on an individual basis. Autoimmune diseases are highly heterogeneous, based on multiple genetic, endocrine and environmental factors. With quantitative information it may be possible to start treatment earlier, before injury is irreversible, applying current breakthroughs in cell engineering. Also, access to millions of patients will permit identification of biomarkers that can serve as the basis for prevention in individuals, families, and disease clusters. Autoimmune diseases primarily affect young women in their childbearing years, are chronic illnesses and last a lifetime. Therefore, when considering health over a lifespan it is necessary to consider the effects of such chronic illnesses in all stages of planning regarding medical research, healthcare cost and economic impact in society.

Comments: Priorities/benefits/drawbacks:

Objective one Regarding foundational research AARDA would recommend significant increase in basic research regarding the immune system and the mechanisms involved in the autoimmune response, inflammatory responses and the microbiome. Objective two Supporting Research Resources and Infrastructure by encouraging and supporting crosstalk among all scientific research with an emphasis on big data exchange and the field of immunology. Incentivizing senior researchers to embrace and use the cross-discipline use of data. Increasing support for research into the interrelationship of the immune system and how it responds to epigenetics, environmental triggers and infection.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

We believe the draft plan thoughtfully articulates appropriate cross-cutting themes and objectives that effectively guide the NIH's efforts over the next five years. We have the following comments:

Addressing Health Disparities in Innovative Therapies

The negative impact of disproportionality, based on sex, race, age, etc., in the efficacy of existing therapeutics and interventions has recently become more widely appreciated. The ATS commends the NIH for its initiatives to address health. Additionally, the ATS strongly encourages all components of the Department of Health and Human Services to ensure that emerging and future therapies address the potential for, and actively reduce, disparities in their implementation across demographic groups.

Understanding the Ontogeny of Health and Disease

Congenital origins are evident risk factors for many pulmonary, critical care and sleep disorders. There is a growing appreciation that in utero, neonatal and childhood exposures and growth delays, in the absence of clear congenital risks, may also be common determinants for both acute health and the ontogeny of health throughout the lifespan. Unfortunately, the relationship between these early developmental events, and longer-term disease burden, have not been thoroughly defined. Furthermore, with rare exception, research on the impact of childhood exposures and respiratory, critical care and sleep diseases has been more limited than in their

adult counterparts. The ATS recommends expanded investment in multi-disciplinary studies to understand the burden and mechanisms associated with the acute, chronic and persistent health impacts of developmental and childhood illnesses, with a goal of identifying interventions that will improve health across the lifespan.

Intergenerational Transmission of Health

Environmental exposures, behavior (diet, exercise, mental health), and genetics all play a role in health effects across the lifespan. Researchers and clinicians are increasingly appreciating the effect of maternal environmental exposures, behaviors and genetics on health effects in the next generation. Evidence suggests that climate change, air and water pollution, the human microbiome, obesity, anxiety and depression, drug abuse, and other factors contribute to epigenetic changes that may be transmitted from mother to child. The ATS recommends that the NIH prioritize research funding to focus on basic, clinical and translational study of intergenerational transmission of health and efforts to prevent detrimental health effects in future generations.

Optimizing Data Science and the Development of Technologies and

Tools and Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity

The ATS recommends that the NIH develop research sharing data applications and enable analytics on the cloud across NIH institutes to train the new generation of scientists and clinicians and enable precision medicine initiatives to benefit disease-specific research. The ATS appreciates the opportunity to comment on the NIH Draft Strategic Plan.

Comments: Priorities/benefits/drawbacks:

Emerging Infectious Disease Pandemics

The global pandemic of COVID-19 that emerged in December 2019 is straining the resources of the scientific and medical communities. Increased globalization of travel, commerce and communication have facilitated the frequent emergence and global spread of new infectious diseases over recent years. The ATS recommends that the NIH develop infrastructure to respond effectively to fast-moving diseases by providing accelerated funding mechanisms for short and long-term research projects in areas of clear translational potential including virulence and epidemiology, vaccine and other therapies development, diagnostic tests and training for healthcare workers and researchers.

Scientific Transparency and Rigor

Citizens of the United States and the scientific community must be able to trust the quality of science conducted by NIH researchers. Science needs to be performed and evaluated in an appropriately rigorous peer-reviewed manner and protected from political influence in the selection of grants, interpretation of study findings and the distribution of scientific information. The ATS is concerned that there are several examples of the current Administration delaying or withhold key scientific information out of political considerations. The ATS strongly urges the NIH to continue to protect and preserve the integrity and transparency of the NIH peer-review process.

Address the Rising Burden of Respiratory Diseases – the Fourth Leading Cause of Death in

the U.S.

Chronic lower respiratory diseases are the fourth leading cause of death in the U.S. Major pulmonary diseases such as COPD are still without disease-altering treatments and cures and because they are age-related, their impact and burden on overall health in U.S. will increase in the future. The COPD National Action Plan, released in 2017, provides a roadmap for responding to this disease through increased basic, clinical and translational research and public health efforts. We urge the NIH to provide funding to fully implement the research goal of the COPD National Action Plan. Additionally, the ATS recommends expanding efforts to promote profound understanding of the pathobiology of respiratory diseases, critical illnesses, and sleep disorders. These efforts are essential to the development of diagnostic tools, prevention strategies, and novel therapeutics to address this large and growing public health burden.

Sleep Health and Circadian Rhythm

Alterations in circadian clock and sleeping patterns are well recognized as a cause of metabolic changes, aging, neurological, respiratory and other diseases or vice versa. However, there is a lack of information on how circadian genes are involved in or are regulated by infection, dietary changes or other environmental stimuli and how this may change the outcome of all diseases. The ATS recommends that the NIH expand dedicated efforts on sleep and circadian rhythm and how these processes affect development of disease and overall health.

Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity

Further develop, diversify, and sustain a scientific workforce capable of carrying out the goals and objectives of the NIH Strategic Plan

A sustainable, highly skilled workforce is integral to accomplishing the goals of the NIH Strategic Plan and of improving care for all. This includes prioritizing mechanisms to develop and retain junior investigators as well as sustain established investigators. Inclusion of and equity for clinical and basic scientists, particularly women and underrepresented groups in the workforce is essential to promoting research in respiratory diseases, critical illness, and sleep disorders that is relevant to all. A focus on Team Science will encourage collaboration between basic scientists and clinicians and promote sustainability and synergy of effort.

Comments: Future/emerging opportunities/needs:

The ATS notes with interest and concerns OSTP's consideration of policy that would require immediate public posting of all research publication produced in whole or in part by federal research grants. While this mandate would be placed on the individual grant recipients, the policy change would have an unprecedented impact on peer-reviewed journals. Under an immediate access policy, many journals would be forced to switch from a subscription-based model to an author pays model. The ATS has done an initial estimate of how switching to an author pays model would impact publication costs to the author and is projecting significant increases in author costs, as much as \$6000.00 per manuscript, a \$4000.00 increase over the current typical author costs. In discussions with sister academic organizations, they are projecting similar author cost increases should a policy of immediate access be adopted. This would place significant financial strains on authors.

The increase in author publications costs would have a significant impact on NIH too. Currently, NIH and other federal research agencies allow grant funds to be used to cover publication costs. In 2016, NIH

grant funding was acknowledged in over 115,000 academic manuscripts (https://www.stm-assoc.org/2018_10_04_STM_Report_2018.pdf).

Assuming similar numbers of NIH funded publications an author pays mandate could lead to over \$400 million annual increase in NIH grant funding used to pay for publication costs. Using nearly half a billion annually to pay for publications costs would divert NIH funds from spending on the underlying research. The total costs to the federal government would be much higher as the \$400 million estimate is for NIH only and does not include the wide range of other federal agencies with intramural and extramural research programs that lead to academic manuscripts. As the agency considers its strategic plan, we urge NIH to develop a detailed cost estimate of how implementing an immediate open access policy would effect author publications costs and further, how rising author cost might impact the availability of funds for investigator initiated research at NIH.

Comments: Cross-cutting themes:

The Academy serves the public by transforming health policy through nursing knowledge. Critical to this mission is the necessary evidence that will promote health and wellness now and in the future. As the scientific voice for the Academy, CANS formulates and advances research, scientific training, and career development within the profession. In the effort to promote better health, CANS enhances communication among nurse scientists and the public to develop, disseminate, and utilize nursing research. The Academy and CANS commends NIH for drafting these broad cross-cutting themes. To truly improve health, policies and research must look at ways to expand access to quality care through novel approaches, aimed at eliminating health disparities. To safeguard our future, the wellness and safety of every individual, in any location, during all health stages is foundational. We commend NIH for including the fifth cross-cutting theme “Addressing Public Health Challenges Across the Lifespan.” By optimizing healthy social and physical environments to improve health, you promote health and well-being for all. Moreover, we appreciate the inclusion of “Optimizing Data Science and the Development of Technologies and Tools.” Innovation in the health care industry, as well as emerging practices, must be tested and advanced for heightened impact and improved outcomes. Overall, the cross-cutting themes identified by NIH address the greater impact needed based on current evidence and that which still needs to be explored. To enhance the broader influence of the cross-cutting themes, we offer the following three recommendations.

RECOMMENDATION 1: Create Broader Inclusivity of the Lifespan Related to Health Disparities and Inequity. The second cross-cutting theme is “Improving Women’s Health and Minority Health, and Reducing Health Disparities.” We offer the following considerations. First, we recognize the incredible need to focus on critical issues such as maternal mortality given the alarming statistics nationwide. Yet this does not capture the impact related to children as a vulnerable population. There are many public health challenges that need to be addressed in the country and children’s health is a key component in this work. The impact of chronic and acute health conditions for children is a key area of focus as we look to prevention, treatment, and cure. Additional factors, such as adverse childhood experiences, are demonstrating the need to further study children over the next five years. Therefore, to capture this

more inclusive framing, we recommend revising this cross-cutting theme to read: “Improving the Health of Women, Children, and Minorities.”

RECOMMENDATION 2: Create a new standalone cross-cutting theme focused on improving health equity. We believe great benefit will come from reframing this cross-cutting theme to state “Improving Health Equity” as this works to address the myriad of potential structural and systemic factors impacting health including upstream social determinants of health. Over the past 20 years, an increasingly robust evidence base has documented that the physical, social, and economic circumstances in which people live, work, play, and learn affect their health and well-being.¹ Specifically, when considering the social determinants of health in the strategic plan, the NIH should focus on the social, economic, and environmental factors within this issue to support the attainment of each individual’s full potential for health.

We also suggest the NIH use the phrase “improve health equity” rather than “reduce health disparities” as this is the same terminology the U.S. Department of Health and Human Services is utilizing for the Healthy People 2030 guidelines. Emphasis on health equity within Healthy People 2030 marks a critical shift away from focusing on disease outcomes, which are often attributed to individual behaviors. A health equity approach addresses historical and current structural as well as systematic prejudice and discrimination that result in health disparities. Prejudice and discrimination lead to unfair practices within public and private institutions, broader health systems, and society at large. Drawing distinctions between health equity and related concepts can help to guide action.

For example, policies and practices that promote health equity must reduce or eliminate health inequities and health care disparities that are determinants of people’s health and well-being. Such interventions would not necessarily eliminate all health disparities, but they would reduce health inequalities and provide a foundation for moving closer to health equity. A society with fair and just societal conditions, free of inequities and health care disparities, offers people opportunities to attain the highest level of health and well-being throughout their lifespan.² It would be wise for NIH to adopt the more positively stated theme to Improving Health Equity in the strategic plan.

Comments: Priorities/benefits/drawbacks:

We offer the following comments on each of the three objectives included in the NIH-wide strategic plan for FYs 2021-2025.

Objective 1: Advancing Biomedical and Behavioral Sciences

The Academy and CANS recommend adding the concept of well-being to the second bullet point so that it reads “Preventing Disease and Promoting Optimal Health and Well-Being.” Well-being is central to the Healthy People 2030 program and while objectives are not yet publicly out, all publicly available documents clearly have a focus on health and well-being. As the NIH is considering this strategic plan, we encourage the concept of well-being in the NIH’s definition of health. Well-being is central to the nature of nursing care and we strongly believe it is equally central to research across disciplines. Additionally, we recommend acute and chronic conditions be included in the third bullet point for objective one to read “Developing Treatments, Interventions, and Cures for Acute and Chronic Conditions and Care at the End of Life.”

Objective 2: Developing, Maintaining, and Renewing Scientific Research Capacity

As the NIH finalizes the strategic plan, we recommend the first bullet under objective two be revised to

say “Cultivating a Diverse Biomedical and Behavioral Research Workforce.” We also suggest NIH clarify what is meant by “cultivating” in this first bullet point. The Academy and CANS remain concerned about the slow growth in the research workforce and just as critically, its diversity. A report by the National Academy of Sciences³ recommends that efforts to strengthen U.S. science and engineering must include all individuals especially those from diverse backgrounds, who are the fastest growing groups of the U.S. population but the most underrepresented in science and technology careers. We strongly recommend diversity be reflected in the first bullet point of this objective.

Objective 3: Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science

The Academy and CANS recommend that more specificity be added to the bullet point on “Leveraging Partnerships” It is not clear what types of partnerships are being referred to here. Are these internal (NIH) and external (extramural) partnerships? Additionally, we encourage the NIH to think about the scientific accountability to culture and include language about ethics in the strategic plan. The strategic plan should imbed diversity within this objective. We suggest NIH consider adding some detail to the “Optimizing Operations” bullet point. Is the goal for scientists to work more efficiently and effectively? NIH also should consider addressing the increasing regulatory burdens faced by researchers.

Comments: Future/emerging opportunities/needs:

The Academy and the Council recommend the NIH encourage more collaboration amongst the Institutes. Additionally, our organizations note that there is an overlap in research being funded which suggests there may be a need for better communication . We also strongly recommend greater public engagement in research and in establishing research priorities, and more collaboration between intramural and extramural programs.

Comments: Cross-cutting themes:

New Themes:

1. “Replacing Animal Experimental Systems”

NIH’s continued support for animal experimentation has contributed to its failure to anticipate and mitigate the COVID-19 crisis. America needs a biomedical agency that can articulate the connection between animal consumption and associated health risks – from zoonotic pathogens to the myriad of dietary-related harms (e.g., cardiovascular disease). Moreover, NIH’s continued reliance on animal experimentation delays and distracts from human-relevant innovations.

Some NIH institutes such as NIMH have begun to explicitly recognize the limitations of animal experimental systems to model human disorders. Other agencies like EPA are committing to the replacement of animal research. NIH must formally shift away from animal use toward more ethical, insightful, and applicable methodology. As such, we recommend:

(A) Implement full public transparency on animal use in NIH portfolios (see Future Opportunities).

(B) Set a deadline for eliminating animal-based research and develop a roadmap to explicitly prioritize and achieve this goal (see Future Opportunities).

2. “Integrating Ethics Research, Standards, and Practice”

Although the NIH has indicated that ethics will be integrated broadly across the strategic plan, ethics research and policy remain in the shadow of other themes. The plan must explicitly prioritize and develop ethical guidelines, regulations, and protections to forward scientific discovery, therapeutic development and medical practice. We urge the NIH to:

(A) Establish an NIH-wide Ethical, Legal and Social Implications program (see Future Opportunities).

(B) Increase ethics standards and implement more widespread and rigorous ethics practices.

(C) Increase ethics training standards within training and early stage investigator mechanisms (see Objectives).

Current Themes:

1. “Increasing, Enhancing, and Supporting Diversity”

We strongly support this theme with the recommendation to explore and address reasons for low award rates to non-white investigators (e.g., by prioritizing research topics involving human subjects and investigating health disparities and patient-focused interventions; see Hoppe et al., 2019).

2. “Improving Women’s Health and Minority Health, and Reducing Health Disparities”

We strongly support this theme with several recommendations:

(A) Ensure that research utilizing human subjects or biospecimens demographically represent American patient populations to reduce health disparities (see Martin et al., 2019).

(B) Increase development and use of human-based models, tools, and technologies to investigate the intersection of demography and health.

(C) Expand outreach to underrepresented communities through community-based co-leadership and ensure that engagement prioritizes minimizing risk to participants and is culturally sensitive, language appropriate, reciprocal, mutually agreed upon, and evaluated regularly.

(D) Strictly enforce NIH Inclusion Policy to ensure non-white subject participation in research studies and extend it to research involving any human biospecimen (e.g., post-mortem tissue and cell-based systems).

3. The importance of the above themes is highlighted by the COVID-19 crisis, which lays bare the differences in health outcomes across social groups and the lifespan. COVID-19 and the slew of other health topics differentially affecting American demographic groups must be prioritized at NIH with investments in human-based approaches (e.g. epidemiology, human subjects, biospecimens, tissue chips, and xeno-free cells). The endless chase of animal experiments diverts precious resources away from approaches that directly recapitulate complex human phenomena.

Comments: Priorities/benefits/drawbacks:

II. NIH's priorities across the three Objectives articulated in the framework, including potential benefits, drawbacks or challenges, and other priority areas for consideration. (500 words)

1. "Advancing Biomedical and Behavioral Sciences"

(A) "Driving Foundational Science"

NIH must increase support for human-based experimental systems, technologies, and tools.

Prioritization of strategies utilizing human-derived cell cultures, human tissue studies and repositories, and non-animal technology innovation is a must. NIH must ensure that scientific research officers and study section participants have appropriate expertise in human-based methodologies. From molecules and cells to behavior and environment, animal-based experimental systems cannot capture the complex pathogenesis and pathophysiology of human diseases. Animal experiments fail to model human disorders because they capture neither the genetic and human demographic diversity nor the complex environmental, social, and lifestyle factors associated with disease risk. A major shift is needed now.

(B) "Preventing Disease and Promoting Health"

We strongly support this objective with the recommendation to massively scale up research on preventing disease such as investigations of weaknesses in health care and social safety networks, environmental stressors, and our dependency on animal-based food systems. Much of human disease pathogenesis arises in response to environmental, social, and lifestyle factors that can be modeled with epidemiological approaches and addressed immediately through large-scale policy interventions.

2. "Developing, Maintaining, and Renewing Scientific Research Capacity"

(A) "Cultivating the Biomedical Research Workforce"

In addition to diversity programs and clinician-scientist training programs, NIH must invest in and promote more extensive ethics training. American research has consistently failed to perform the most basic ethical analyses alongside research planning and practice. We believe one reason for this is that biomedical ethics training is severely lacking (see Wolpe, 2006). Current ethics training courses narrowly focus on human subject protections and research misconduct while avoiding more difficult discussions about such topics as animal experimentation and the societal impact of research. We propose a full year of rigorous ethics coursework within doctoral and postdoctoral training programs as well as ethical research design components in studies that promote ethical protections for human and animal subjects.

(B) "Supporting Research Resources and Infrastructure"

The Office of Research Infrastructure Programs must recognize the need for non-animal models of disease and fund human-based model resources.

3. "Exemplifying and Promoting the Highest Level of Scientific Integrity, Public Accountability, and Social Responsibility in the Conduct of Science"

(A) "Leveraging Partnerships" and "Ensuring Accountability and Confidence in Biomedical and Behavioral Sciences"

These goals must be achieved through exceptional public engagement and agency transparency. Strategic plans and research policies must be formed with leadership from more ethicists and

stakeholders with divergent interests and ethical perspectives. Transparency must be strengthened by (1) publishing all strategic planning webinar questions, regardless of whether presenters answered them, (2) publishing all RFI responses in full, not just summaries, and (3) allowing the public an opportunity to provide comprehensive comments without restrictions on word limits on the full draft of the strategic plan, not just this outline.

(B) “Optimizing Operations”

Current cost and risk assessments are applied too sparingly. In order to increase efficiency and effectiveness, NIH must implement comprehensive cost-benefit analyses across all programs, initiatives, and mechanisms.

Comments: Future/emerging opportunities/needs:

III. Future opportunities or emerging trans-NIH needs. (500 words)

1. Transparency in Human Subjects and Vertebrate Animal Research

NIH must commit to reducing animal use, which will reduce costs, increase efficiency, and better guide clinical outcomes, as described in a 2019 report by the Government Accountability Office (GAO; <https://www.gao.gov/assets/710/701635.pdf>). NIH should take steps to implement and expand upon GAO recommendations in transparent, accountable ways:

(A) Track the amount of NIH-wide spending allocated toward human-based and animal-based studies by drawing on information from human subject and vertebrate animal use stated in the Research and Related Other Project Information Form of grant applications.

(B) Make the data publicly accessible in the NIH RePORTER database to allow for independent accountability.

(C) Include a summary of funding allocations and analyses of shifts in funding in the current Strategic Plan and monitor and report changes annually.

2. A Roadmap to Replace Animals in Biomedical Research

NIH must set a deadline to end animal-based research and develop a roadmap that explicitly prioritizes this goal. An NIH-wide roadmap to replace animals in biomedical research would be in line with international ethical principles of the 3Rs, guide researchers to adopt of more human-relevant approaches, and would uphold NIH’s mandate to transform our understanding and treatment of disease and improve human health. A framework could be adapted from the 2018 roadmap released by the Interagency Coordinating Committee on the Validation of Alternative Methods, “A Strategic Roadmap for Establishing New Approaches to Evaluate the Safety of Chemicals and Medical Products in the United States”

(https://ntp.niehs.nih.gov/iccvam/docs/roadmap/iccvam_strategicroadmap_january2018_document_508.pdf). This action would also mirror EPA’s recent directive to reduce mammal research by 30 percent by 2025 and to eliminate all mammal research by 2035.

3. An agency-wide ELSI program

In order to comprehensively address new and persistent ethical, legal, and social implications (ELSI)

related to advances in biomedical research, it is imperative that NIH establish an agency-wide ELSI program. Comprehensive bioethics programs must expand beyond the Clinical Center (Department of Bioethics), human genome research (NHGRI ELSI), and neuroscience (BRAIN Initiative Working Group). These are not the only realms of biomedicine warranting such special efforts - every aspect of health has societal implications and must be studied rigorously and address immediately.

4. Disaster Response and Preparedness

NIH must not resort to or condone responses to emergency situations such as the COVID-19 pandemic that disregard current animal welfare guidelines. The COVID-19 crisis has also made it clear that many animals are being unnecessarily bred and kept – a clear violation of even the most basic ethical standards. Greater scrutiny of grants proposing animal use is therefore warranted. We urge NIH to:

(A) Immediately issue a statement that all funded facilities euthanizing animals or reducing animal welfare standards due to COVID-19 will be considered non-compliant with the Guide for the Care and Use of Laboratory Animal and must be reported promptly.

(B) Develop a plan to reduce the number of animals in US laboratories. Fund a study by the National Academies of Sciences, Engineering, and Medicine to examine how this could be implemented.

Comments: Cross-cutting themes:

(Submitter left answer blank)

Comments: Priorities/benefits/drawbacks:

Compelling case study potential of exosome treatment for lung fections:

- a ... who fell seriously ill after being infeincted with the coronavirus
- made startling recovery after being given stem cell therapy according to a new study by chinese scientists
- the patient had been fighting for her life in the ICU for nearly 2 weeks after contracting Covid-19, the disease caused by the virus
- but according to a paper published by a team of researchers from Kunming Unviersity led by Dr. Hu Min, just four days after being given her first shot of umbilical cord stem cells, the woman was back on her feet and able to walk
- published by stephen chen, south china morning post march 2 2020

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Comments: Cross-cutting themes:

United Spinal, as a member of the Disability Rehabilitation Research Consortium (DRRC), supports the comments the DRRC has made about the Framework. Chief among DRRC's comments applicable to our members and Americans with disabilities in general was the request for "the NIH to identify individuals with disabilities and chronic conditions as representing diversity and explicitly recognize them as

vulnerable populations who disproportionately experience disparities in both access to care and health outcomes. Including this emphasis with other disparate populations in the Framework and advancing targeted research priorities across the NIH would enhance awareness and innovation by NIH-funded researchers, leading to new discoveries for improving the health and wellbeing of these often-marginalized populations.

As United Spinal has expressed previously in various NIH Institutes strategic planning processes, secondary chronic conditions ravage the spinal cord injury (SCI) population as well as those with other neurological conditions and diseases. As such NIH's recognition of disabilities as a health disparate population would achieve a national recognition that has been acutely lacking in our Nation's health delivery system. NIH's Framework should include a federal multi-agency effort to address access to healthcare for individuals with disabilities, some 57 million Americans. NIH must take a leadership role in mobilizing federal agencies in the effort. United Spinal calls upon NIH to conduct the research necessary to bring needed healthcare to all Americans with Disabilities, especially those who find transportation barriers to such essential needed care.

Comments: Priorities/benefits/drawbacks:

Research commissioned by a United Spinal partner in the We Will Ride Coalition, the American Association of People with Disabilities (AAPD), found "that of the 18.5 million Americans with travel limitations (5.7% of the U.S. population), between 11.2 million and 15.4 million can afford ride-sharing options," but are currently underserved. Most significantly, it found, "mitigating transportation related obstacles for individuals with disabilities would enable new employment opportunities for approximately 2 million individuals with disabilities, and save \$19 billion annually in healthcare expenditures from missed medical appointments." The same analysis suggests the U.S. wheelchair-using population is expected to grow 120% by 2022, and the Census Bureau projects that by 2030 an additional 21.5 million Americans over age 55 will need alternatives to driving themselves."

(https://rudermanfoundation.org/white_papers/self-driving-cars-the-impact-on-people-with-disabilities/) Finally, according to Americans with Disabilities:

2010 Household Economic Studies, 30.6 million was the number of people 15 and older who had movement impairment, such as with walking or climbing stairs

(<http://www.census.gov/prod/2012pubs/p70-131.pdf>).

In short, United Spinal believes that creating accessible healthcare options through technological advances in telehealth

and transportation alternatives can provide better health and functional outcomes for Americans, whether it is for

people with disabilities, integrating a growing senior population or serving all manner of access needs of the consumer.

Comments: Future/emerging opportunities/needs:

(Submitter left answer blank)

Appendix III: Coding Schema

1. Was the respondent anonymous?

Yes

No

2a. Was the name of organization shared?

Yes

No

2b. If name of organization was shared, what is the geographical region?

United States and Territories

International

2c. If organization is in the United States and Territories, start typing the state/territory and it will autofill.

Alabama

Alaska

American Samoa

Arizona

Arkansas

California

Colorado

Connecticut

Delaware

District of Columbia

Florida

Georgia

Guam

Hawaii

Idaho

Illinois

Indiana

Iowa

Kansas

Kentucky

Louisiana

Maine

Maryland

Massachusetts

Michigan

Minnesota

Mississippi

Missouri

Montana

Nebraska

Nevada

New Hampshire

New Jersey

New Mexico

New York

North Carolina

North Dakota

Northern Mariana Islands

Ohio

Oklahoma

Oregon

Pennsylvania

Rhode Island

South Carolina

South Dakota

Tennessee

Texas

Utah

U.S. Virgin Islands

Vermont

Virginia

Washington

West Virginia

Wisconsin

Wyoming

2d. If organization is international, which country is it in?

Free text

3. What is the type of organization?

Academic Institution

Scientific Research Organization

Private Sector

Health Professional

Professional Society

Advocacy Group

Patient Community

Government Agency

Member of the Public

Other

4. What is the respondent's role in the organization?

Senior Leadership

Mid-Level Leadership (Faculty, Professor, Director of Depts)

Staff (Administrative)

Staff (Clinical and/or Research)

Trainee (Students, Postdocs)

Member of the Public

Other

Blank

5. Did the respondent submit on behalf of organization?

Yes

No

6. What was the tone of respondent's overall comments on the framework?

5 Very Supportive

4 Supportive

3 Neutral

2 Critical

1 Very Critical

0 Blank

7. Did the respondent comment on the Cross-Cutting Themes?

Yes

No

8. If the respondent commented on the Cross-Cutting Themes, what was the tone of the comments?

5 Very Supportive

4 Supportive

3 Neutral

2 Critical

1 Very Critical

0 Blank

9a. Did the respondent comment on Themes articulated in the framework?

Yes

No

9b. If the respondent commented on the Themes in the framework, which Theme(s) did the respondent comment on? (Select all that apply)

Increasing, Enhancing, and Supporting Diversity

Improving Women's Health and Minority Health, and Reducing Health Disparities

Optimizing Data Science and the Development of Technologies and Tools

Promoting Collaborative Science

Addressing Public Health Challenges Across the Lifespan

9c. If the respondent commented on "Increasing, Enhancing, and Supporting Diversity", please provide 1-2 sentences summarizing comments.

Free text

9d. If the respondent commented on "Improving Women's Health and Minority Health, and Reducing Health Disparities", please provide 1-2 sentences summarizing comments.

Free text

9e. If the respondent commented on "Optimizing Data Science and the Development of Technologies and Tools", please provide 1-2 sentences summarizing comments.

Free text

9f. If the respondent commented on "Promoting Collaborative Science", please provide 1-2 sentences summarizing comments.

Free text

9g. If the respondent commented on "Addressing Public Health Challenges Across the Lifespan", please provide 1-2 sentences summarizing comments.

Free text

10a. Did the respondent comment on additional Themes to consider?

Yes

No

10b. If the respondent commented on additional Themes, please provide 1-2 sentences summarizing comments with relevant keywords or suggested title.

Free text

11. Did the respondent comment on the Priorities Across the Objectives?

Yes

No

12. If the respondent commented on the Objectives, what was the tone of the comments?

5 Very Supportive

4 Supportive

3 Neutral

2 Critical

1 Very Critical

0 Blank

13. If the respondent commented on the Objectives, which Sub-Objective(s) are the comments relevant to? (Select all that apply)

1.0 Biomedical and Behavioral Sciences (please choose this only if cannot be classified into Sub-Obj)

1.1 Foundational Science

1.2 Preventing Disease and Promoting Health

1.3 Treatments, Interventions, and Cures

2.0 Scientific Research Capacity (please choose this only if cannot be classified into Sub-Obj)

2.1 Biomedical Research Workforce

2.2 Research Resources and Infrastructure

3.0 Conduct of Science (please choose this only if cannot be classified into Sub-Obj)

3.1 Scientific Stewardship

3.2 Leveraging Partnerships

3.3 Accountability and Confidence

3.4 Optimizing Operations

14a. If the respondent commented on Objective 1 "Biomedical and Behavioral Sciences" and it cannot be classified into a Sub-Objective, please provide 1-2 sentences summarizing comments.

Free text

14b. If the respondent commented on Objective 1.1 "Foundational Science", please provide 1-2 sentences summarizing comments.

Free text

14c. If the respondent commented on Objective 1.2 "Preventing Disease and Promoting Health", please provide 1-2 sentences summarizing comments.

Free text

14d. If the respondent commented on Objective 1.3 "Treatments, Interventions, and Cures", please provide 1-2 sentences summarizing comments.

Free text

15a. If the respondent commented on Objective 2 "Scientific Research Capacity" and it cannot be classified into a Sub-Objective, please provide 1-2 sentences summarizing comments.

Free text

15b. If the respondent commented on Objective 2.1 "Biomedical Research Workforce", please provide 1-2 sentences summarizing comments.

Free text

15c. If the respondent commented on Objective 2.2 "Research Resources and Infrastructure", please provide 1-2 sentences summarizing comments.

Free text

16a. If the respondent commented on Objective 3 "Conduct of Science" and it cannot be classified into a Sub-Objective, please provide 1-2 sentences summarizing comments.

Free text

16b. If the respondent commented on Objective 3.1 "Scientific Stewardship", please provide 1-2 sentences summarizing comments.

Free text

16c. If the respondent commented on Objective 3.2 "Leveraging Partnerships", please provide 1-2 sentences summarizing comments.

Free text

16d. If the respondent commented on Objective 3.3 "Accountability and Confidence", please provide 1-2 sentences summarizing comments.

Free text

16e. If the respondent commented on Objective 3.4 "Optimizing Operations", please provide 1-2 sentences summarizing comments.

Free text

17a. Did the respondent suggest any new Objectives or content that would not be captured by the current Objectives/Sub-Objectives?

Yes

No

17b. If the respondent suggested additional Objectives or content, please provide 1-2 sentences summarizing comments with relevant keywords or suggested titles.

Free text

18a. Did the respondent comment on Future Opportunities or Emerging Trans-NIH Areas?

Yes

No

18b. If the respondent commented on Future Opportunities or Emerging Areas, please provide 1-2 sentences summarizing comments with relevant keywords.

Free text

19. If there is any information not captured in the prior questions that you think should be captured, please provide 1-2 sentences summarizing it.

Free text

20. Please check the box if you completed coding.

Yes

No

21. Please check the box if this entry needs reviewed.

Yes

No