All of Us RESEARCH PROGRAM

Year in Review and Goals Forward

Advisory Panel Meeting

March 18, 2021

Josh Denny, MD, MS
Chief Executive Officer
All of Us Research Program

@AllofUsCEO

NIH National Institutes of Health

Advisory Panel: Welcome to *All of Us*!!!!!

Aaron Abend, MBA, BA
Executive Director, Autoimmune Registry

Naomi Allen, DPhil, BSc MSc
Chief Scientist, UK Biobank

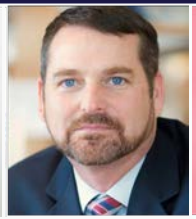
Russ Altman, MD, PhD
Professor of Bioengineering and Genetics, Stanford University

Rob Califf *, MD, MACC
Vice Chancellor for Health Data Science, Duke University, Scientific Advisor, Verily Life Sciences

Wendy Chung, MD, PhD
Professor of Pediatrics, Columbia University

Lovell Jones, PhD
Research Professor, Texas A&M University

James Lu, MD, PhD
Co-founder & Chief Scientific Officer, Helix



Gary Miller, PhD
Professor of Environmental Health Sciences, Columbia University

Elizabeth Ofili, MD, MPH, FACC
Professor of Medicine, Morehouse School of Medicine

Tassy Parker, PhD, RN
Professor of Family and Community Medicine, Mexico Health Services

Erica Ramos*, MS, LCGC
Vice President of Population Genomics, Genome Medical

Marylyn Ritchie*, PhD
Director, Center for Translational Informatics, University of Pennsylvania

Beth Rubinstein
Participant Representative

Prashant Shah*, MS,
Director of Artificial Intelligence (AI) for Health and Life Sciences, Intel Corporation

Scout, PhD, MA
Executive Director National LGBT Cancer Network

Hannah Valentine, MD
Professor of Medicine, Stanford University, Former NIH Chief Scientific Officer for Scientific Workforce Diversity

Roberto Vargas, MD, MPH
Director of Health Policy, Charles R. Drew University of Medicine and Science

Karen Wall, EdD, MA
Participant Representative

Xiaobin Wang MD, MPH, ScD
Director, Center on the Early Life Origins of Disease, Johns Hopkins University

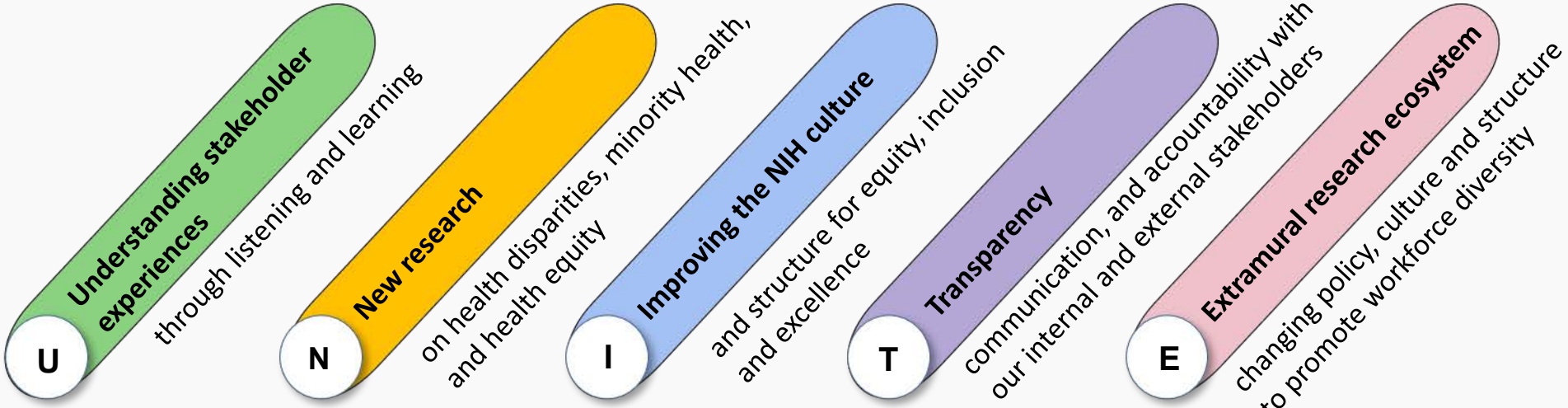
* Continuing from last year

UNITE Program: NIH Stands Against Structural Racism

"To those individuals in the biomedical research enterprise who have endured disadvantages due to structural racism, I am truly sorry. NIH is committed to instituting new ways to support diversity, equity, and inclusion, and identifying and dismantling any policies and practices at our own agency that may harm our workforce and our science."

—Francis S. Collins, M.D., Ph.D., NIH Director

- **NIH RFI:** Inviting Comments and Suggestions to Advance and Strengthen Racial Equity, Diversity, and Inclusion (https://grants.nih.gov/grants/guide/notice-files/NOT-OD-2 1-066.html)
- Soon begin recruiting for *All of Us* leadership position: **Director of Health Equity** (Link)
- UNITE actions coupled with a concrete action plan



https://www.nih.gov/ending-structural-racism

All of Us Research Program Mission and Objectives

Nurture relationships with one million or more participant partners, from all walks of life, for decades

Deliver one of the largest, richest biomedical dataset ever that is easy, safe, and free to access

Our Mission

To accelerate health research and medical breakthroughs, enabling individualized prevention, treatment, and care for all of us

Catalyze the robust ecosystem of researchers and funders hungry to use and support it

Build and maintain a strong *All of Us* Team capable of achieving the program's mission

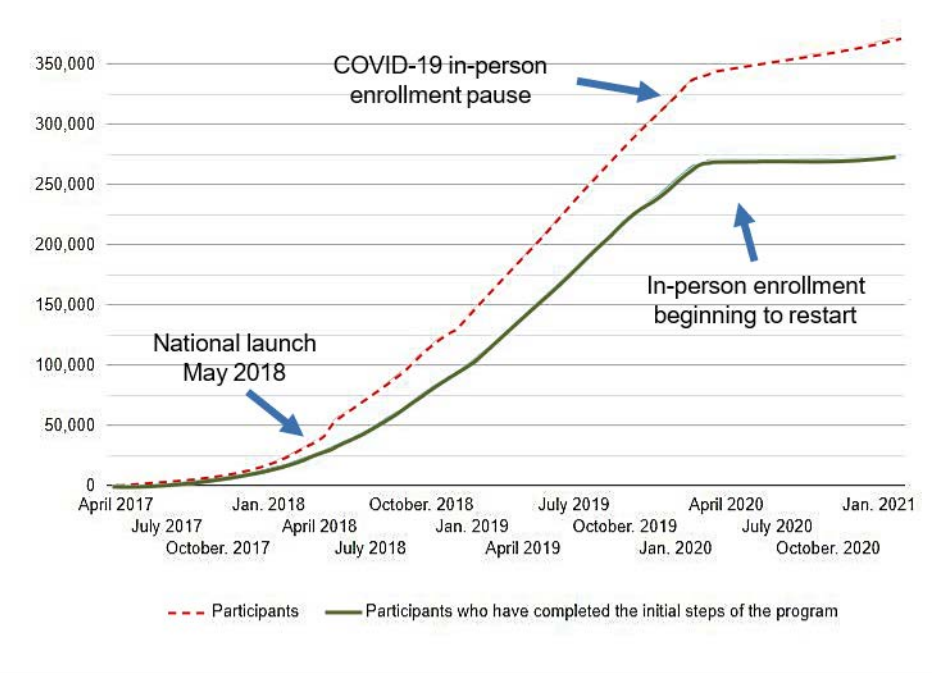
Status of the Program: Enrollment Numbers

374,000+
Participants

238,000+
Electronic Health Records

274,000+
Participants who have completed initial steps of the program

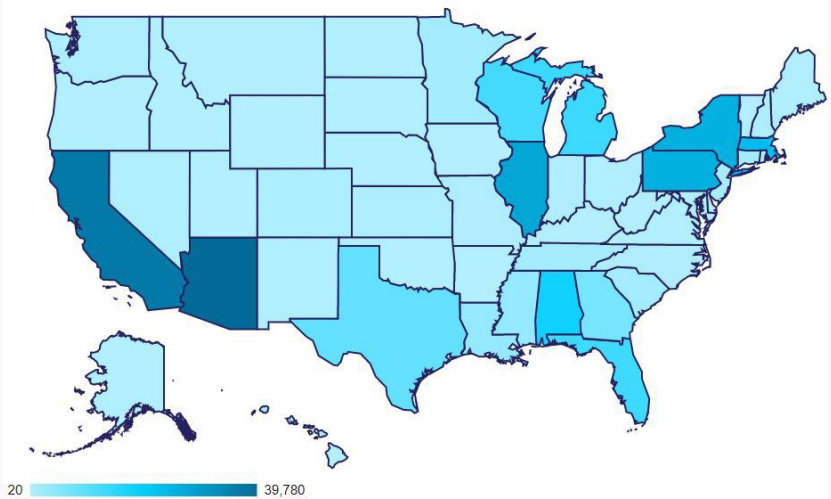
282,000+
Biosamples



https://www.researchallofus.org/data-snapshots/

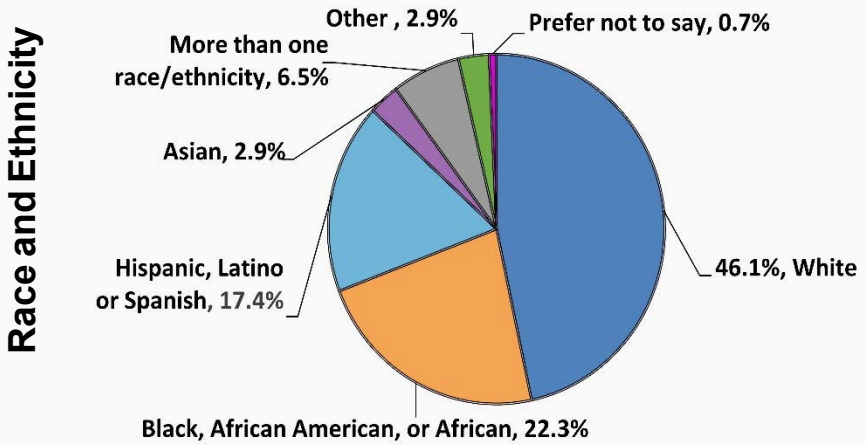
As of March 17, 2021

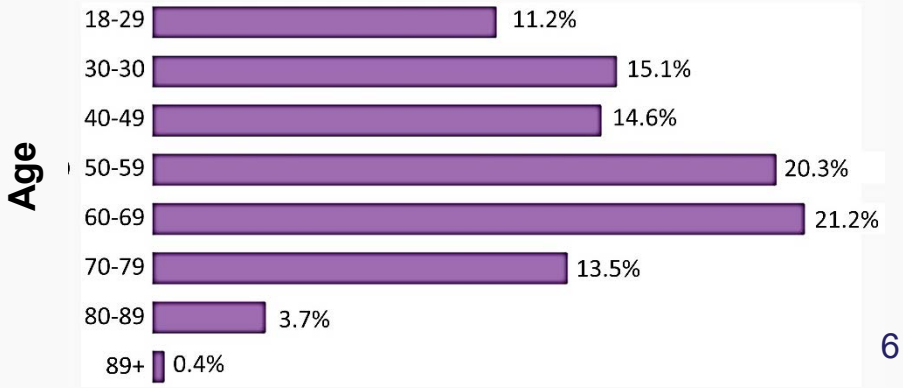
Status of the Program



https://www.researchallofus.org/data-tools/data-snapshots

Over 80% of *All of Us* participants are underrepresented in biomedical research





https://www.researchallofus.org/

2020 Year in Review

Paused Recruitment

Safely paused **>300** sites

COPE Survey Launched and Serology Study Began

As of March 2021, more than **108k** participants have completed at least one survey, **>300k** completions

Implementation of New Sample Collection Approaches

- Saliva collections
- Bring Your Own Kit
- Diversion Pouch
- Quest BioBox

COPE Data on Researcher Workbench

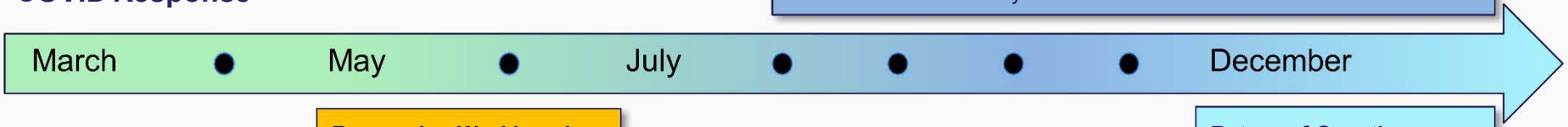
COPE data: **>62k** participants

Reactivation Began and Ongoing

In-person pause was lifted

- Data-driven guidance on site reactivation
- **95 sites** are currently activated

COVID Response



Major Milestones

Researcher Workbench Beta Launch

- Physical measurements
- Survey data
- EHR data

Now: 271 institutional agreements & **624** researchers accessing

Return of Genetic Ancestry and Traits Results

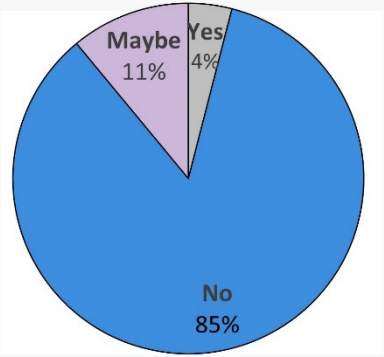
>37k participants sent notifications

Fitbit Data on Researcher Workbench

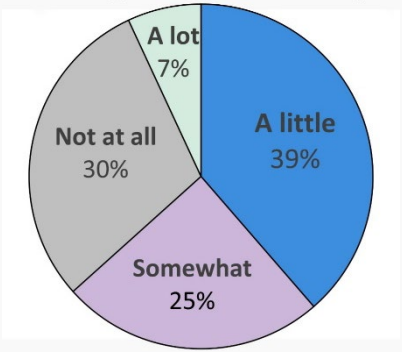
Fitbit data: **>8k** participants

COVID Participant Experience (COPE) Survey Results - from July-Sept survey

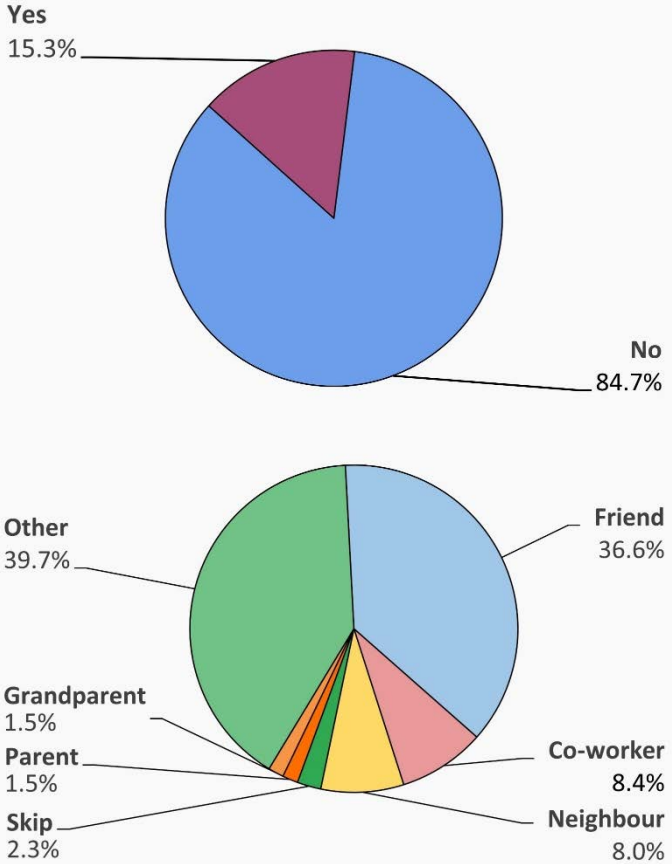
Do you think you have had COVID-19?



In the past month, have recommendations for social distancing caused stress for you?



Do you personally know someone who has died of COVID-19? If yes, who do you know?



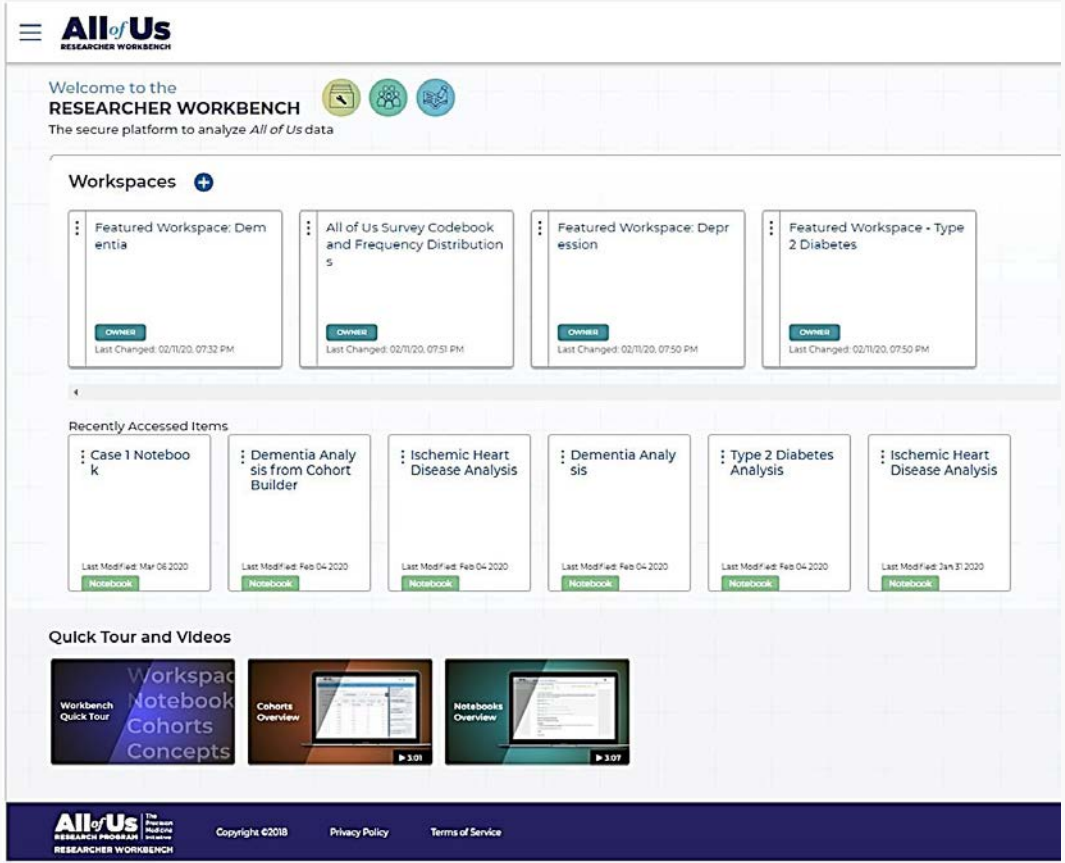
https://databrowser.researchallofus.org/

Key Accomplishments in 2020: Researcher Workbench Beta Launch

- Researcher Workbench Beta Launch on **May 27, 2020**
- Beta currently restricted to U.S. researchers with eRA Commons accounts
- Passport researcher model

<u>As of March 2021</u>:

- **>270** completed Institutional Data Use and Registration Agreements (DUA)
- Median time to complete the DUA is 24 days
- **>421** Workspaces created
- **>624** researchers with access



All of Us Demonstration Projects: Assessing the Validity and Utility of *All of Us* Data

Goal: Fully executed research projects demonstrating the utility and validity of *All of Us* data timed to coincide with launch of data platform launch, *not* novel discovery work.

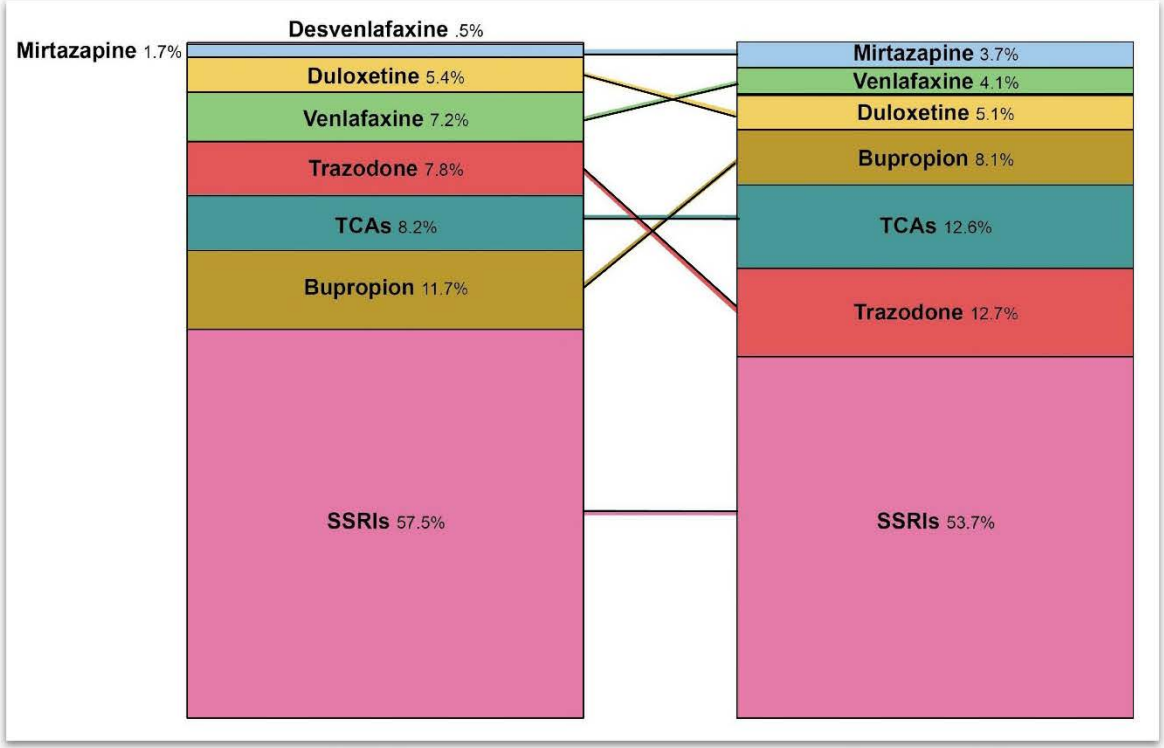
Phase 1
[DRC] Description, Replication, Utility Assessment

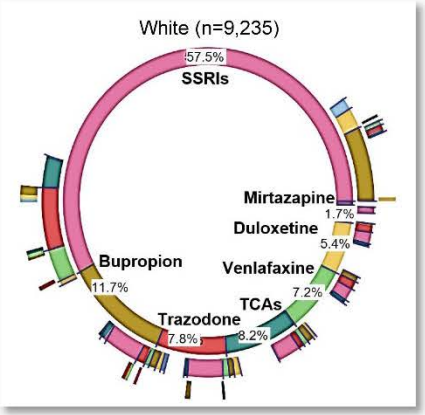
Phase 2
[Consortium] Expanded Description, Replication, Utility Assessment

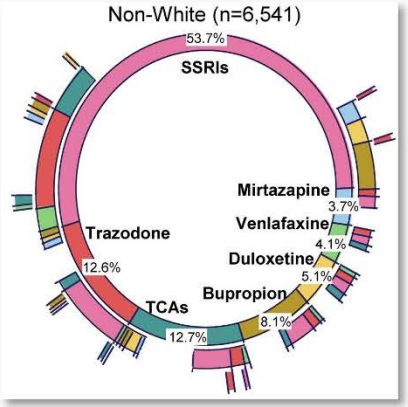
Phase 3
[Consortium] Future Preceding new data types

~30 projects that will all be publicly available as reusable workspaces

Demonstration Project: Antidepressants Taken by Participants with Depression







A Recent Publication Using *All of Us* Data

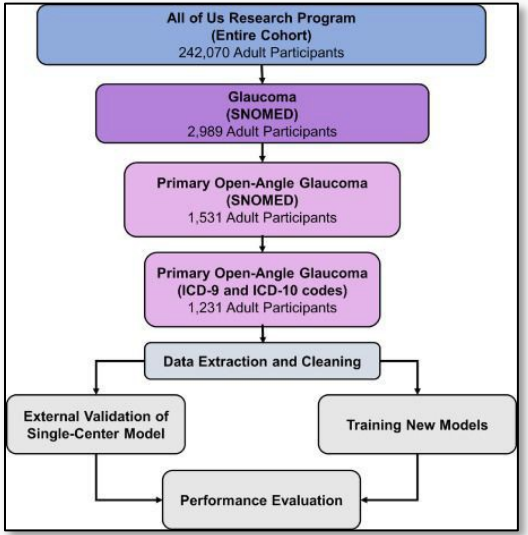
AMERICAN JOURNAL OF OPHTHALMOLOGY

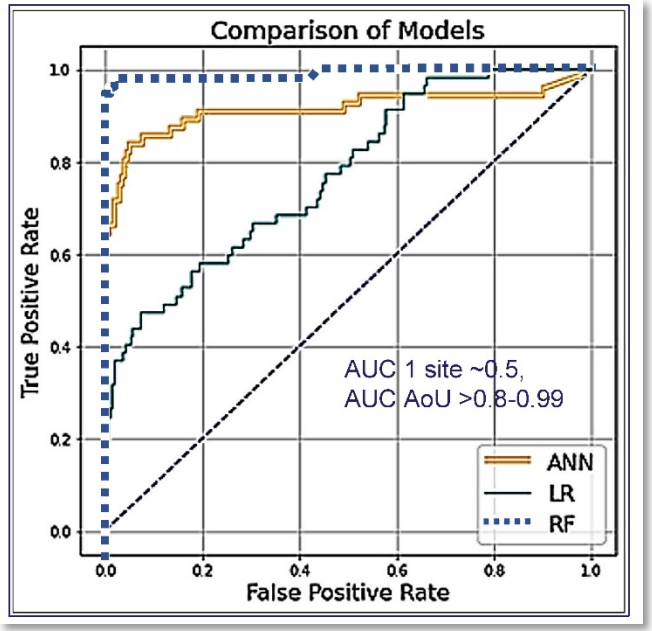
ORIGINAL ARTICLES | ARTICLES IN PRESS

Predictive Analytics for Glaucoma using Data from the All of Us Research Program

Sally L. Baxter • Bharanidharan Radha Saseendrakumar • Paulina Paul • Jihoon Kim • Luca Bonomi • Tsung-Ting Kuo • Roxana Loperena • Francis Ratsimbazafy • Eric Boerwinkle • Mine Cicek • Cheryl R. Clark • Elizabeth Cohn • Kelly Gebo • Kelsey Mayo • Stephen Mockrin • Sheri Schully • Andrea Ramirez • Lucila Ohno-Machado • on behalf of the All of Us Research Program Investigators • Show less

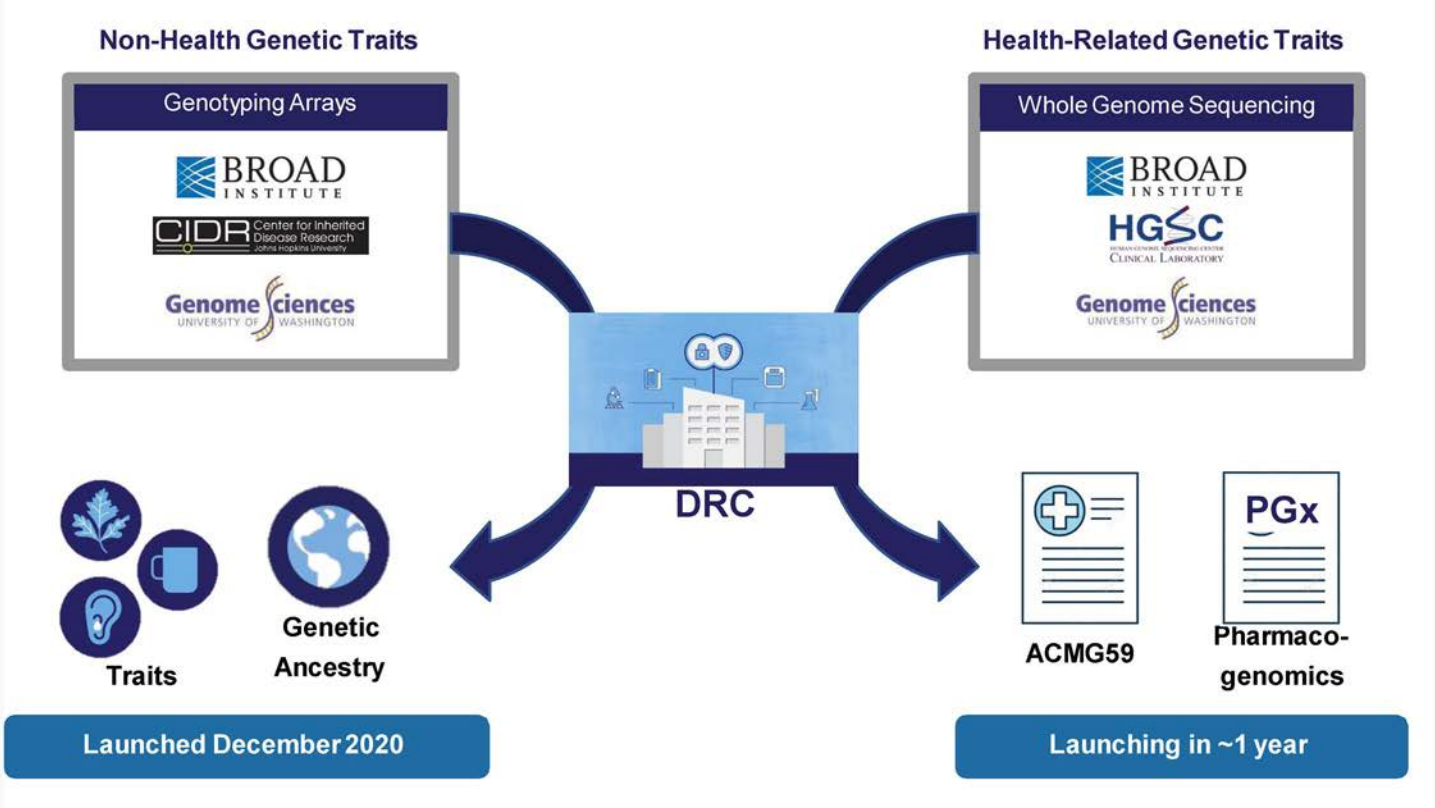
Open Access • Published: January 22, 2021 • DOI: https://doi.org/10.1016/j.ajo.2021.01.008





Conclusion: Models trained with national *All of Us* data achieved **superior performance** compared to using single-center data.

Key Accomplishments in 2020: Genetic Return of Results



Non-health Trait Results

Ancestry

Genetic Ancestry
Genetic ancestry can be very interesting, but you may also learn information you didn't expect. Learn more

Traits

Bitter taste perception
Learn what your genes can tell you about your ability to taste bitter things.

Cilantro preference
Smell and taste work together to influence your cilantro preference.

Earwax type
Flaky or sticky? Earwax type is encoded in your genes.

Lactose intolerance
Your genes code for lactase, which helps you digest milk.

Cilantro preference

Some people like the taste of cilantro and others think it tastes like soap.

What we looked at and why

We looked at a place in your DNA that influences if you have a slightly higher chance of liking or disliking cilantro.[1] The percent of people across the world who dislike cilantro ranges from 3-21%.[2]

- **People who have slightly higher chances of liking cilantro** may find it fragrant and citrusy.
- **People who have slightly higher chances of disliking cilantro** may find it soapy or moldy.

This place in your DNA only predicts a small amount of your chances of liking or disliking cilantro. Environmental and other genetic factors also play a role.

DNA Marker*	Gene	Your result*
rs72921001	*Near OR6A2*	C A

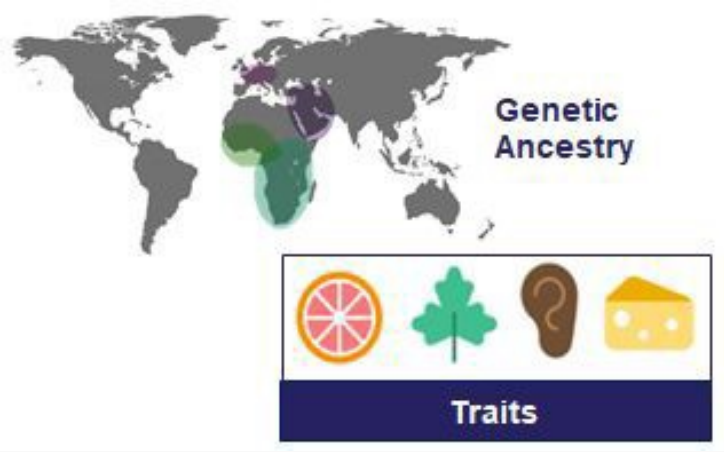
* Each of your parents provides you with a nucleotide at this position, but we don't know which parent gave you which nucleotide.

Scientific details

OR6A2 makes a sensor in the nose that helps us perceive smells. Changes near *OR6A2* may impact whether you find cilantro fragrant and citrusy, or soapy or moldy.[1]

Genetics Engagement Module (GEM): Return of Results

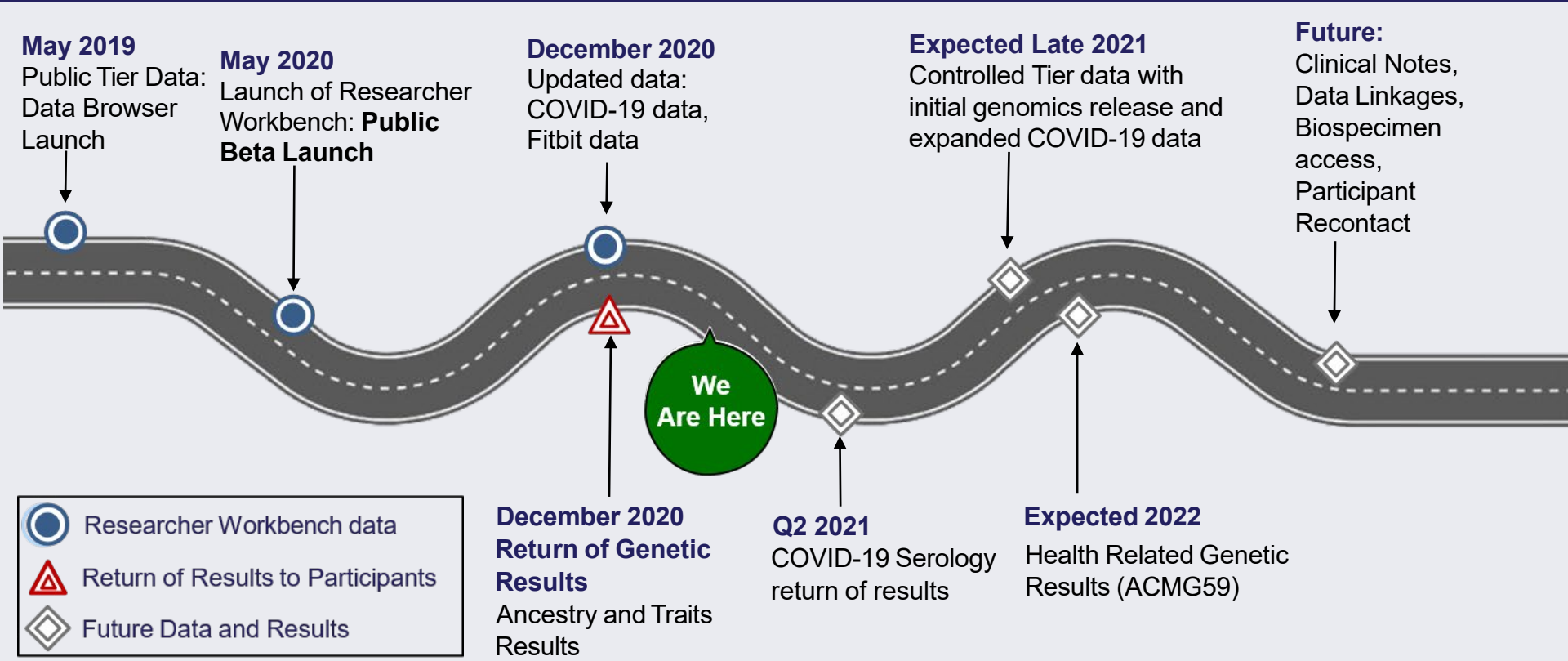
- **37k participants sent notifications** (email, push, and SMS based on participant preference)
- **>70% have** viewed **any GEM results**
  - **87%** viewed **any trait result**
  - **97%** viewed their **genetic ancestry result**



Soft Launch: November 2nd

Public Announcement: December 10th, press release and NIH Director's Blog

All of Us Roadmap



The First ***All of Us*** **Ancillary Study**:

Nutrition for Precision Health

Powered by the *All of Us* Research Program

Goal: To develop algorithms to predict individual responses to foods and dietary patterns based on **microbiome, physiological, metabolic, behavioral, cognitive, and environmental data**, and leverage **existing *All of Us* genomic, EHR, and survey data**.

1

Examine responses to **baseline diet**

10,000 *All of Us* participants

2

Examine responses to 3 short-term intervention diets in free-living **controlled feeding** studies

1,000-2,000 Module 1 participants

3

Examine responses to 3 short-term intervention diets in **domiciled controlled feeding** studies

500-1,000 Module 1 participants

https://commonfund.nih.gov/nutritionforprecisionhealth

All of Us Community and Provider Partner Network *(as of December 2020)*

All of Us Consortium Members *(beyond community partners, as of December 2020)*