All of Us Research Program

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Chief Operating Officer
All of Us Research Program

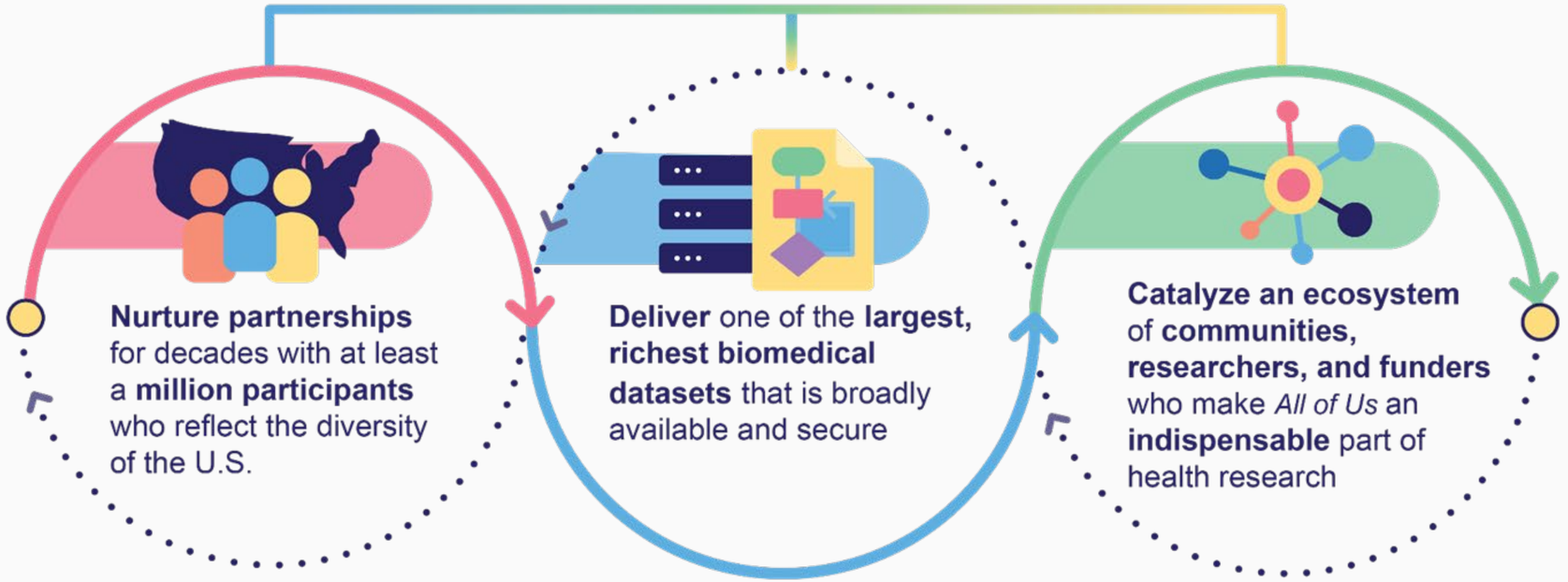
Workshop on Considerations for Returning Individual Genomic Results from Population-Based Surveys
December 8, 2022

National Institutes of Health

All of Us Research Program Mission

Our Mission

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



Made possible by a team that maintains a culture built around the program's core values

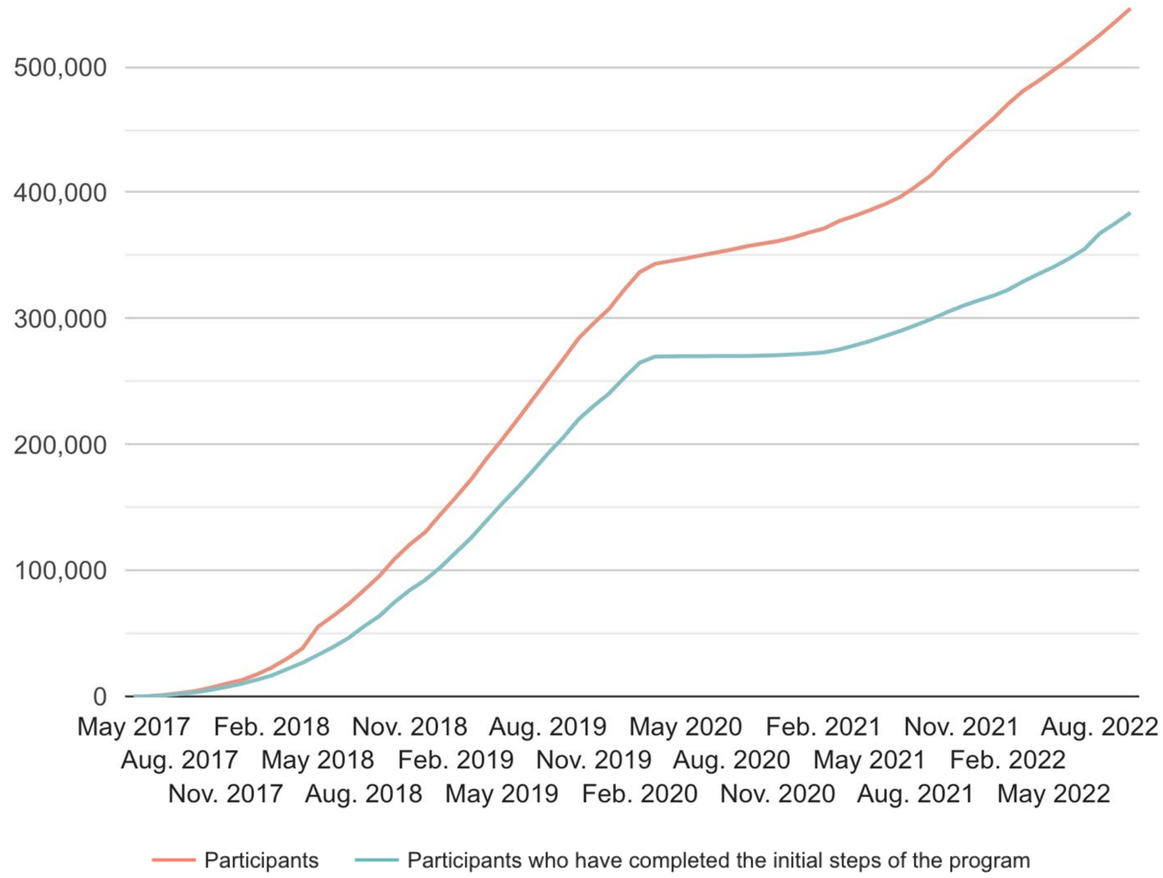
Enrollment Update (as of November 29, 2022)

556,000+
Participants

338,000+
Electronic Health Records

391,000+
Participants who have completed initial steps of the program

409,000+
Biosamples



Diversity

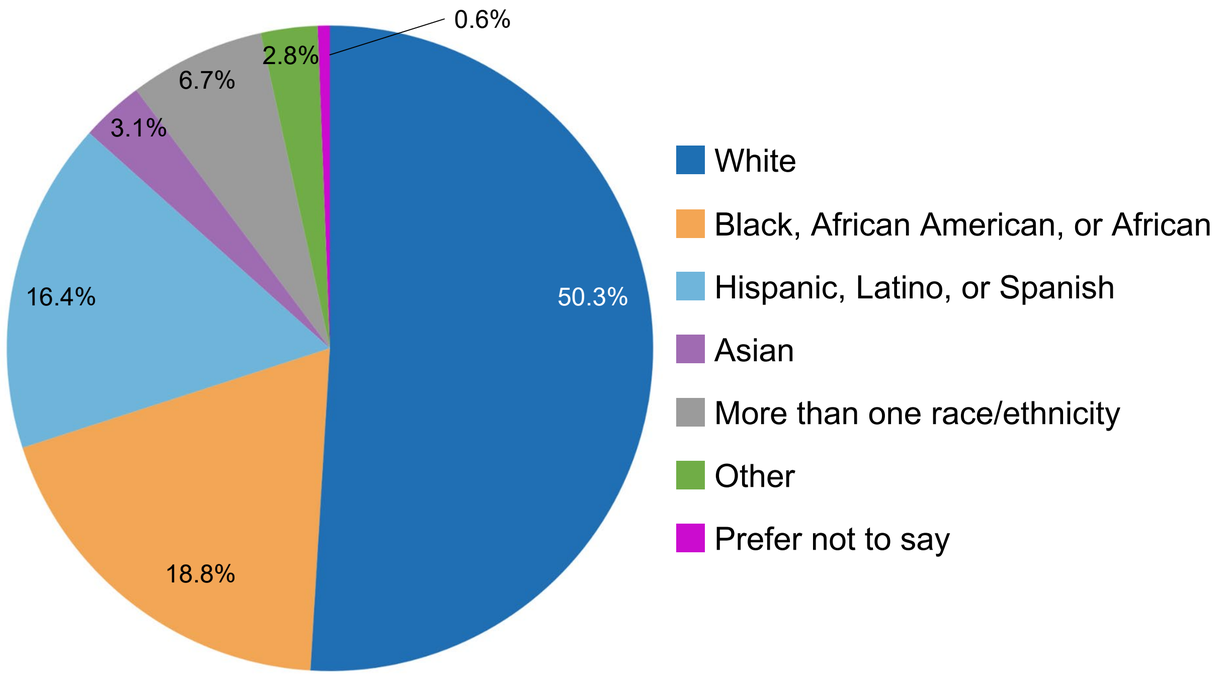
Includes racial and ethnic minorities as well as sexual and gender minorities, people with low income or limited education, and other groups.

50%+ Racial and Ethnic Minorities

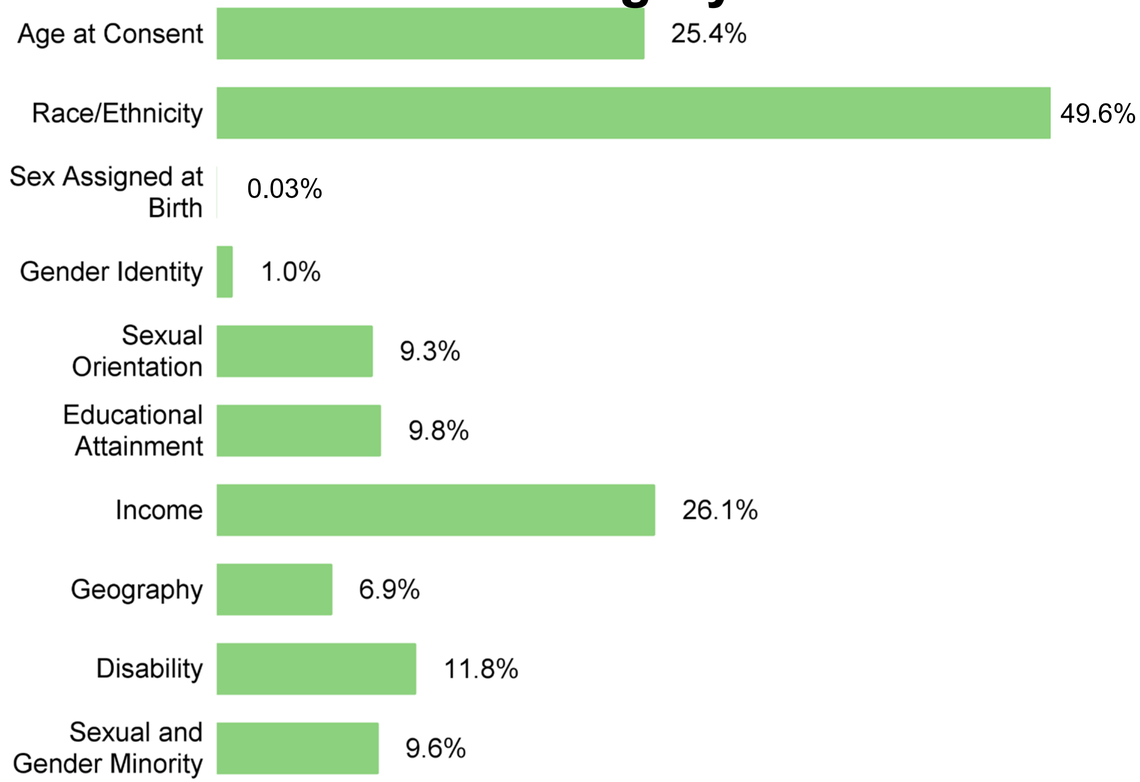
80%+ Underrepresented in Biomedical Research

Participant Diversity (as of November 29, 2022)

Race & Ethnicity of Participants



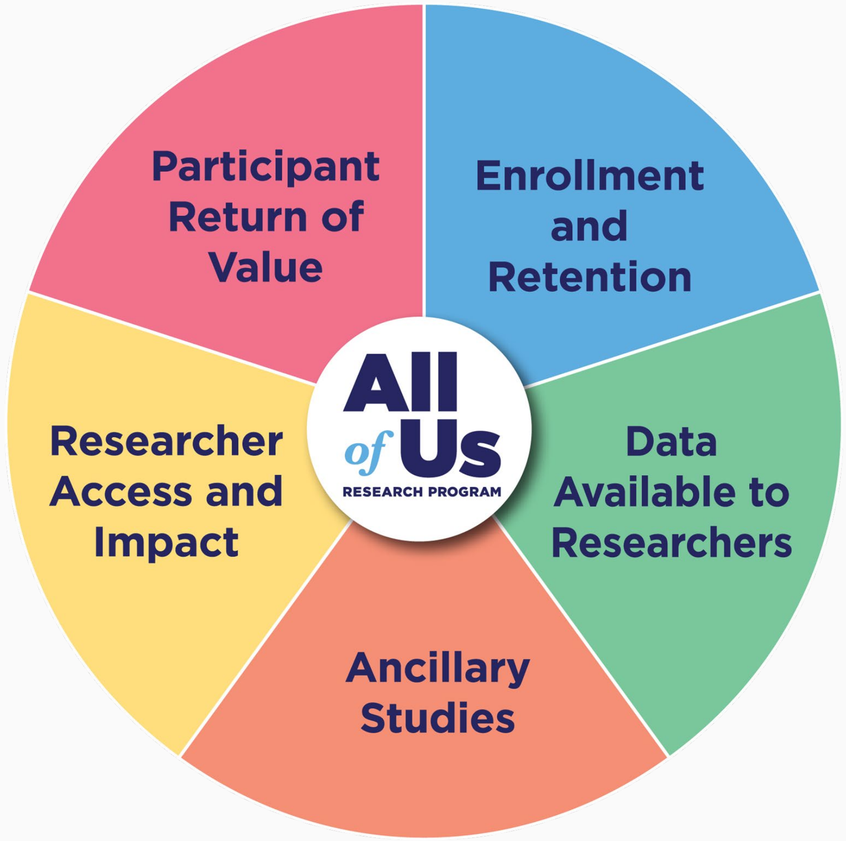
UBR Category



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

Core Values and Goals

- Participation is **open** to all.
- Participants reflect the rich **diversity** of the U.S.
- Participants are **partners**.
- Trust will be earned through **transparency**.
- Participants have **access** to their information
- Data is accessed **broadly** for research purposes.
- **Security and privacy** are of highest importance.
- The program may be a catalyst for **positive change** in research



A Vision Spanning Three Decades

"*All of Us* is among the most ambitious research efforts that our nation has undertaken."

Former NIH Director,
Francis Collins, M.D., Ph.D.

A Principle from the Beginning: Returning Information to Participants

"So tonight, I'm launching a new Precision Medicine Initiative to bring us closer to curing diseases like cancer and diabetes, and to give all of us access to the personalized information we need to keep ourselves and our families healthier."

- President Barack Obama
State of the Union Address, Jan. 20, 2015

The Precision Medicine Initiative Cohort Program – Building a Research Foundation for 21st Century Medicine

"[All of Us] should ensure the responsible return of personal results and information to individual participants and sharing of aggregate findings from its investigations with participants so [they] may have opportunity to benefit from the science."

- PMI Working Group Report
Sept. 17, 2015

What Do Participants Want?

Community Engagement Studios in 2016

77 Studios in 17 cities with 654 community members

- 16 different demographic subgroups, 4 topics
- 46% racial and ethnic minorities
- 9% sexual and gender minorities

All of Us Participant Partners

Ivye L. Allen
Mississippi

Michelle Anderson
Massachusetts

Lottie Barnes
North Carolina

Keisha Bellamy
California

Randee Bloom
Michigan

Craig Braquet
Louisiana

Larry Briendel
Massachusetts

Joyce Brown
Illinois

Jeff Buchanan
Tennessee

Daisy Burgos
Connecticut

Hugo Campos
California

Carolyn Cronin
Massachusetts

Sixto Escobar
Massachusetts

Dejen Eshete
Arizona

Miguel Flores, Jr.
Arizona

Edina Harsay
Kansas

Nazia Hussain
Texas

Anna Johnston
Alabama

Roger Levine
California

Juana Mata
California

Aida Milian
New York

Michael Miller
Alabama

Valarie Paige
Mississippi

Marilyn Roman
Florida

Karla Rush
Arkansas

Lynz Sickler
Pennsylvania

David Storm
Kansas

Vannesa Uzoh
Texas

Tiana Vargas
California

Alonzo Walker
Wisconsin

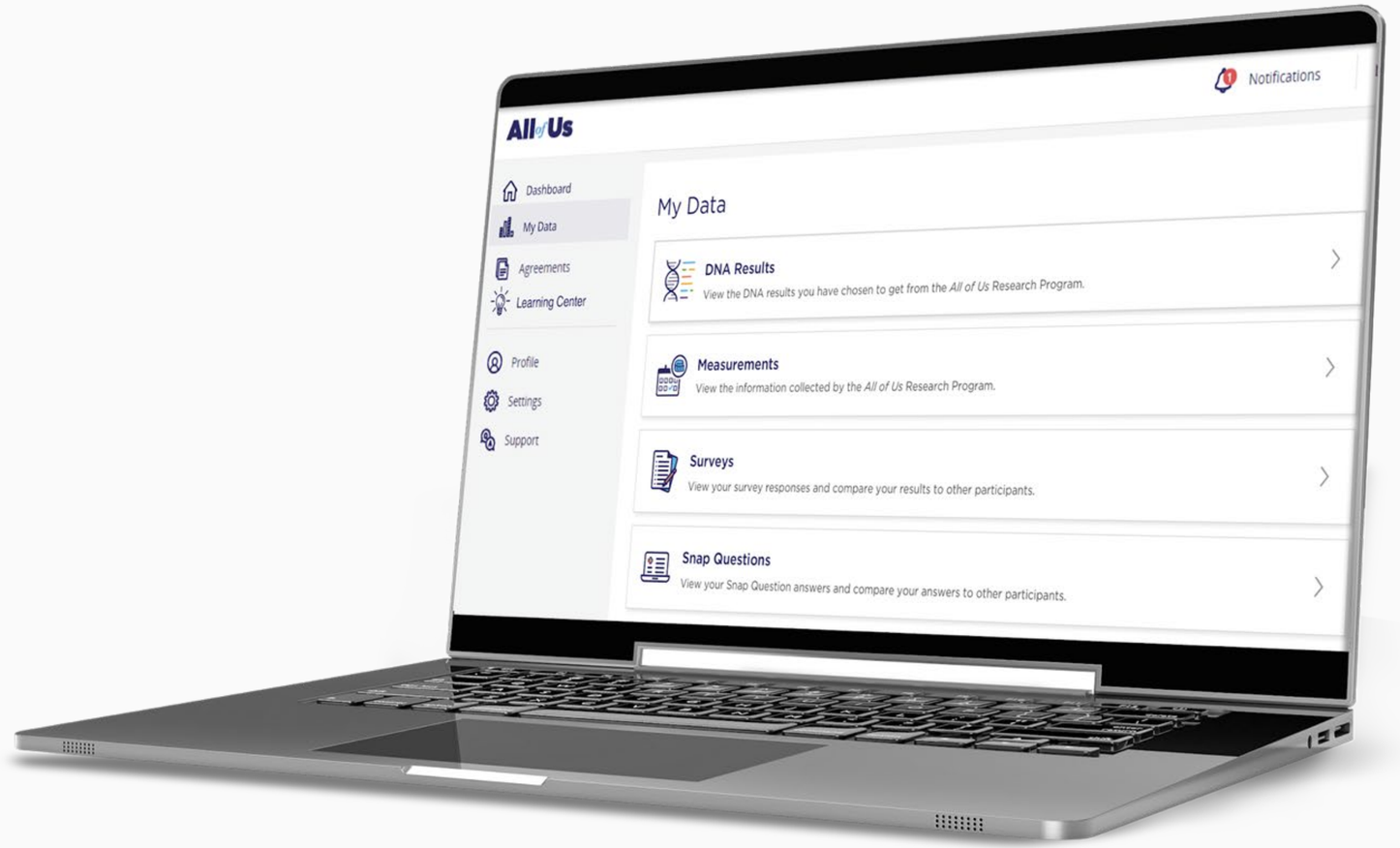
Joyce Bell Winkler
South Carolina

Otis Winstead
Wisconsin

Return of Information to Participants

Participants may receive:

- ***Genetic information***
- Survey data (comparative)
- EHR and claims data
- Ongoing study updates
- Aggregate results
- Scientific findings
- Opportunities to be contacted for other research opportunities



All of Us Consortium Members *(beyond community partners, as of August 2022)*

The Participant Center

Scripps Research Translational Institute · BlueCross BlueShield · SENSIS · SageBionetworks · waves · Walgreens · MAYO CLINIC · Dedalus · Medscape · Bloodworks Northwest · CVS Health · Blood Assurance · Gulf Coast Regional Blood Center *Commit for Life.* · careevolution HEALTHCARE TECHNOLOGY · MONTAGE MARKETING · WebMD · active minds · patientslikeme · South Texas Blood & Tissue A SUBSIDIARY OF BIOBRIDGE GLOBAL · CASCADE REGIONAL BLOOD SERVICES YOUR COMMUNITY BLOOD CENTER · ACHA American College Health Association advocacy • education • research · SYNC FOR SCIENCE · Quest Diagnostics · San Diego Blood Bank · NATIONAL BLOOD COLLABORATIVE BLOOD SOLUTIONS | TRUSTED SOURCE · fitbit · Mary's Center

Communications & Engagement

WONDROS · PYXISPARTNERS PATHWAYS TO PROGRESS · RTI INTERNATIONAL · THE UNIVERSITY OF UTAH

HPO Network

(Health Care Provider Organizations)

HPO Lite

UTHealth The University of Texas Health Science Center at Tyler · VCU Health · Washington University in St. Louis

RMCs

All of Us California

UC San Diego Health · UCI Health · UC DAVIS HEALTH · UCSF University of California San Francisco · ECRMC · Cedars Sinai · Keck School of Medicine of USC

Illinois Precision Medicine Consortium

Northwestern Medicine · THE UNIVERSITY OF CHICAGO · NorthShore University HealthSystem · RUSH · THE UNIVERSITY OF ILLINOIS COLLEGE OF MEDICINE PEORIA CHICAGO ROCKFORD URBANA · UI Health UIC · COOK COUNTY HEALTH

All of Us New England

Brigham and Women's Hospital Founding Member, Mass General Brigham · Massachusetts General Hospital Founding Member, Mass General Brigham · Mass General Brigham · BOSTON MEDICAL CENTER

Trans America Consortium

Henry Ford Health System · Spectrum Health · Essentia Health · BaylorScott&White HEALTH · RELIANT MEDICAL GROUP Part of OptumCare® · HealthPartners Institute

New York City Consortium

COLUMBIA · Weill Cornell Medicine · NYC HEALTH+ HOSPITALS | Harlem · NewYork-Presbyterian

All of Us Southern Network

UAB MEDICINE · USA HEALTH · UAB HEERSINK SCHOOL OF MEDICINE The University of Alabama at Birmingham SELMA • MONTGOMERY • HUNTSVILLE · University Medical Center · Mitchell Cancer Institute Community Health Sciences Rural Health Research THE UNIVERSITY OF ALABAMA · Cooper Green Mercy HEALTH SERVICES AUTHORITY AFFILIATE OF UAB HEALTH SYSTEM · TUSKEGEE UNIVERSITY · The University of Mississippi MEDICAL CENTER · LSU Health NEW ORLEANS · Tulane University

All of Us Southeast Enrollment Center

UHealth UNIVERSITY OF MIAMI HEALTH SYSTEM | UNIVERSITY OF MIAMI MILLER SCHOOL of MEDICINE · EMORY UNIVERSITY · MOREHOUSE SCHOOL OF MEDICINE · UF UNIVERSITY of FLORIDA · THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

All of Us Wisconsin

Marshfield Clinic Health System · WISCONSIN UNIVERSITY OF WISCONSIN-MADISON · Froedtert & Medical College of Wisconsin · GUNDERSEN HEALTH SYSTEM

All of Us Pennsylvania

University of Pittsburgh

University of Arizona and Banner Health

THE UNIVERSITY OF ARIZONA · Banner Health · MARIPOSA Your COMMUNITY HEALTH CENTER

FQHCs (Federally Qualified Health Centers)

Cherokee HEALTH SYSTEMS · JACKSON-HINDS COMPREHENSIVE HEALTH CENTER · SAN YSIDRO HEALTH · WAIANAE COAST COMPREHENSIVE HEALTH CENTER · Community Health Center, Inc. · Cooperative Health · Sun River Health

VA Medical Centers

VA · U.S. Department of Veterans Affairs · Veterans Health Administration

Participant Technology Systems Center (PTSC)

vibrent

Biobank

MAYO CLINIC

Data & Research Center (DRC)

VANDERBILT UNIVERSITY MEDICAL CENTER · BROAD INSTITUTE · verily · COLUMBIA · SCHOOL OF PUBLIC HEALTH UNIVERSITY OF MICHIGAN · Northwestern Medicine · UTHealth The University of Texas Health Science Center at Houston

Genomics Partners

Baylor College of Medicine DEPARTMENT OF MOLECULAR & HUMAN GENETICS · JOHNS HOPKINS MEDICINE · UTHealth The University of Texas Health Science Center at Houston · HudsonAlpha INSTITUTE FOR BIOTECHNOLOGY · BROAD INSTITUTE · color · Mass General Brigham · UNIVERSITY of WASHINGTON

Note: These are not approved lockups and should not be repurposed on assets.

Current *All of Us* Genetics Return Strategy

Engagement

Genetic ancestry and traits results

7 regions (21 subregions)

- Sub-Saharan Africa
- Europe
- Oceania
- Southern Asia
- Eastern and Northern Asia
- The Middle East and North Africa
- The Americas

4 traits

- Ear wax
- Bitter taste perception
- Cilantro preference
- Lactose intolerance

Health information

Hereditary Disease Risk Report

59 genes (SNVs + indels)

- Breast cancer
- Ovarian cancer
- Uterine cancer
- Colorectal cancer
- Prostate cancer
- Melanoma
- Brain cancer
- Pancreatic cancer
- Stomach cancer
- Familial Hypercholesterolemia
- Cardiomyopathies
- Arrhythmias
- Arteriopathies

Medicine and your DNA Report

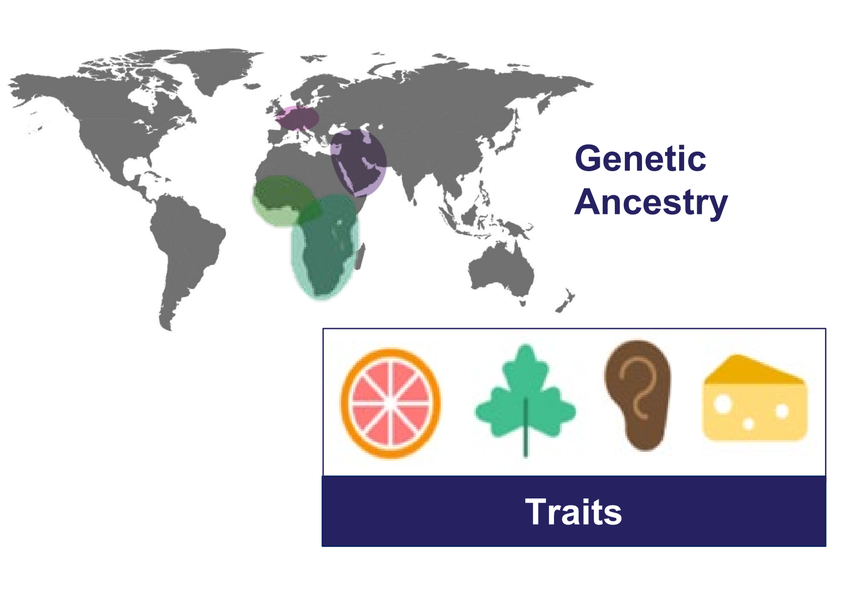
7 genes (Common Drugs)

- Drug metabolism
- Production of molecules (e.g., NADPH)
- Drug response
- Membrane-bound anion transporters

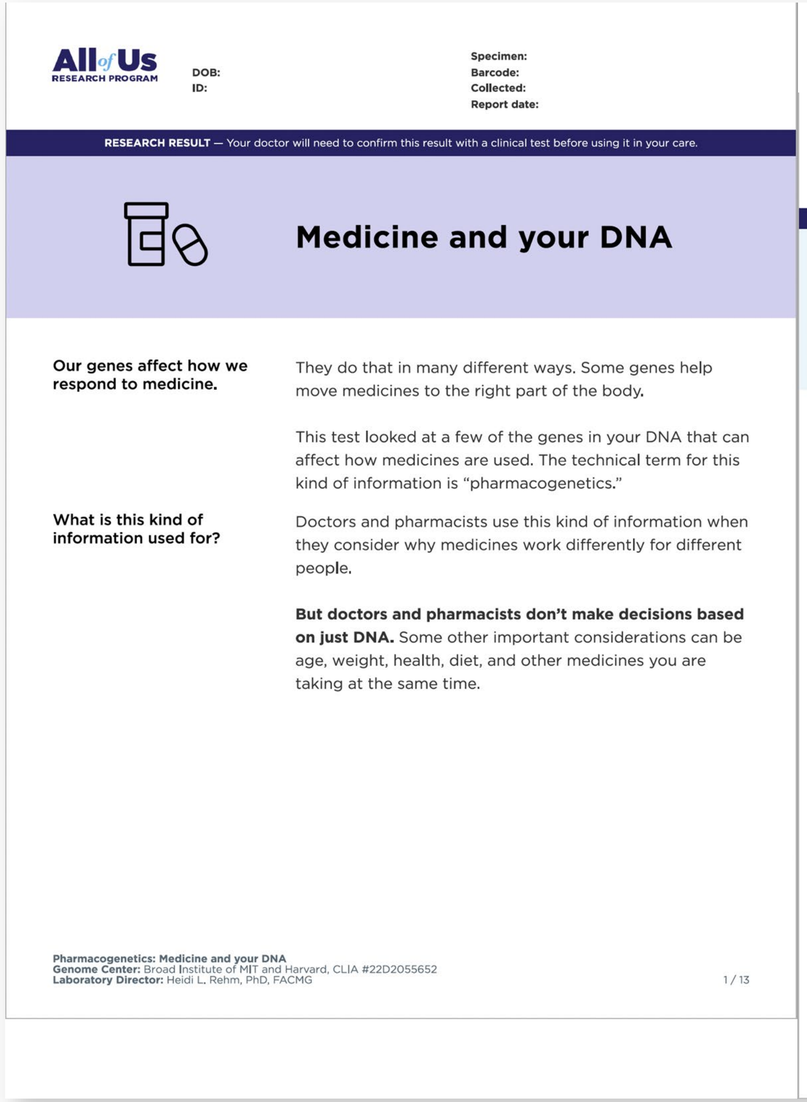
Genetic Ancestry and Traits (as of November 2022)

- **Over 180,000 participants sent notifications so far** (email, push, and SMS based on participant preference) to choose if they want to receive results

- **71% complete** genetic ancestry and traits **informing loop choice** (128k)
    - **88%** of those that view any result **view any of the 4 trait results** (bitter taste perception, cilantro preference, earwax type, and lactose intolerance) (113k)
    - **97%** of those that view any result **viewed their genetic ancestry results** (125k)



Genomic Health-Related Return of Results in Pilot Testing



All of Us RESEARCH PROGRAM

DOB:
ID:

Specimen:
Barcode:
Collected:
Report date:

RESEARCH RESULT — Your doctor will need to confirm this result with a clinical test before using it in your care.

Medicine and your DNA

Our genes affect how we respond to medicine.

They do that in many different ways. Some genes help move medicines to the right part of the body.

This test looked at a few of the genes in your DNA that can affect how medicines are used. The technical term for this kind of information is "pharmacogenetics."

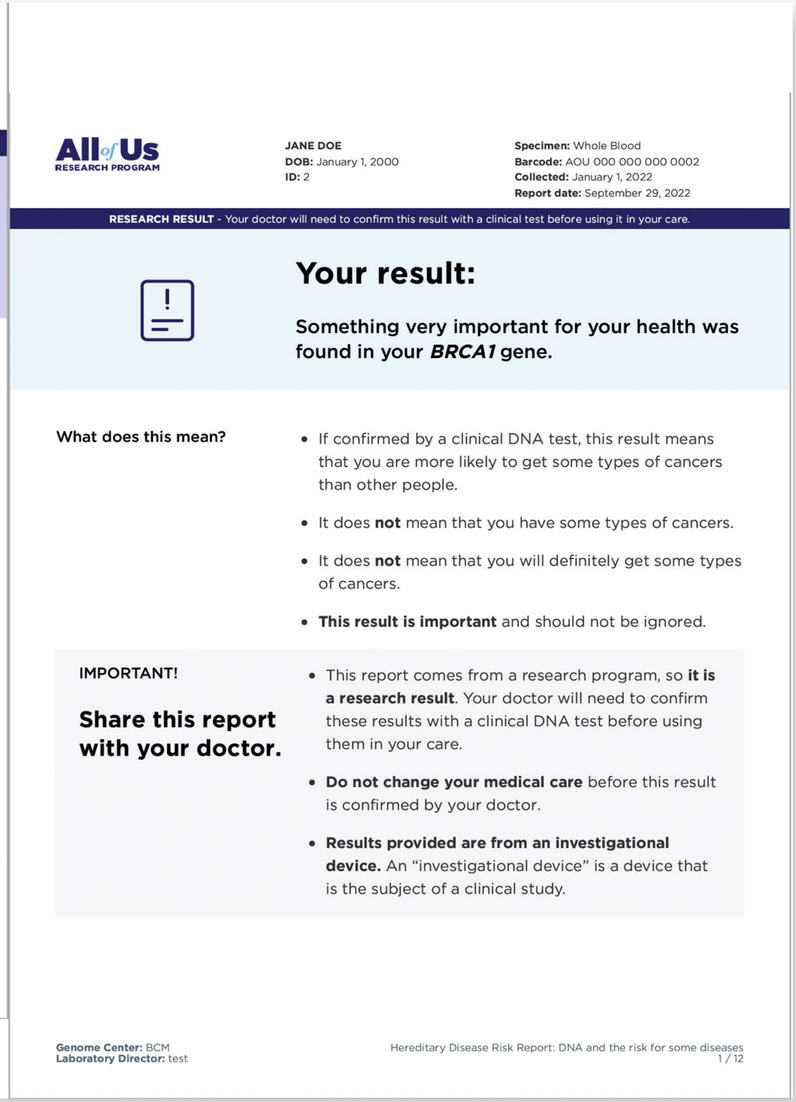
What is this kind of information used for?

Doctors and pharmacists use this kind of information when they consider why medicines work differently for different people.

But doctors and pharmacists don't make decisions based on just DNA. Some other important considerations can be age, weight, health, diet, and other medicines you are taking at the same time.

Pharmacogenetics: Medicine and your DNA
Genome Center: Broad Institute of MIT and Harvard, CLIA #22D2055652
Laboratory Director: Heidi L. Rehm, PhD, FACMG

1 / 13



All of Us RESEARCH PROGRAM

JANE DOE
DOB: January 1, 2000
ID: 2

Specimen: Whole Blood
Barcode: AOU 000 000 000 0002
Collected: January 1, 2022
Report date: September 29, 2022

RESEARCH RESULT - Your doctor will need to confirm this result with a clinical test before using it in your care.

Your result:

Something very important for your health was found in your *BRCA1* gene.

What does this mean?

- If confirmed by a clinical DNA test, this result means that you are more likely to get some types of cancers than other people.
- It does **not** mean that you have some types of cancers.
- It does **not** mean that you will definitely get some types of cancers.
- **This result is important** and should not be ignored.

IMPORTANT!

Share this report with your doctor.

- This report comes from a research program, so **it is a research result**. Your doctor will need to confirm these results with a clinical DNA test before using them in your care.
- **Do not change your medical care** before this result is confirmed by your doctor.
- **Results provided are from an investigational device.** An "investigational device" is a device that is the subject of a clinical study.

Genome Center: BCM
Laboratory Director: test

Hereditary Disease Risk Report: DNA and the risk for some diseases
1 / 12

- **Hereditary disease risk** (starting with ACMG59) and **medicine and your DNA** (pharmacogenomics)
- Participants can choose results they want
- Interpretation begins at Clinical Validation Laboratories
- All results supported by Genetic Counselors
- Participants can obtain clinical results available for ACMG59 at no cost

Things We've Learned Along the Way

- **Participants want this information.**
  - Research participants (both prospective and consented participants) want individual level information back about themselves.
  - Among types of information people want back, genetic information has consistently ranked at the top of the list
- **It takes commitment of time and resources**, especially to:
  - Design and build/identify the infrastructure needed with strong security and privacy standards
  - Comply with all regulatory requirements
  - Establish the workflows and core processes
- **Ensure support is in place for participants**
  - *All of Us* established a network of expert organizations to run the analyses, build the technology and communication pathways, provide materials and live support through genetic counselors for return of actionable health related results
  - Offering clinical confirmation for any HDR + result
  - Recontact of participants is critical
- **There's still a lot to learn.** We're at the very beginning of returning health-related genetic results. We offer continued discussion along the way.

Thank You!

All of Us RESEARCH PROGRAM

NIH National Institutes of Health

ResearchAllofUs.org

AllofUs.nih.gov

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#JoinAllofUs