

# Delivering on Our Promise: DNA Results for *All of Us* Participants and What It Means for Healthcare Providers

**All  
of Us**  
RESEARCH PROGRAM



February 15, 2023

Joshua Denny, MD, MS  
Chief Executive Officer

*All of Us* Research Program

**NIH** National Institutes of Health

## Factors of Risk in the Development of Coronary Heart Disease—Six-Year Follow-up Experience

### The Framingham Study

WILLIAM B. KANNEL, M.D., THOMAS R. DAWBER, M.D., F.A.C.P.,  
ABRAHAM KAGAN, M.D., F.A.C.F., NICHOLAS REVOTSKIE, M.D.,  
AND JOSEPH STORES, III, M.D.  
*Framingham, Massachusetts*



# Framingham Heart Study

INCREASINGLY RELIABLE ESTIMATES of the prevalence and incidence of coronary heart disease (CHD) emphasize the importance of this disease as a contemporary health hazard. Cardiovascular disease is

Since it has been established that coronary atherosclerosis is present for many years prior to the development of symptomatic CHD, it seems evident that efforts at prevention must begin many years before the

now the leading cause of death in the United States. The prevalence of CHD in the United States has increased steadily over the past decade, and this increase is expected to continue. The increase in CHD is a result of a combination of factors, including changes in diet, lifestyle, and genetics. The increase in CHD is a result of a combination of factors, including changes in diet, lifestyle, and genetics.

Received for publication from the Framingham Heart Study, National Heart Institute, U.S. Department of Health, Education, and Welfare, Bethesda, Md. Presented at the American Heart Association National Conference, Boston, Mass., October 1961. Requests for reprints to Dr. William B. Kannel, Heart Disease Branch, National Heart Institute, Bethesda, Md.

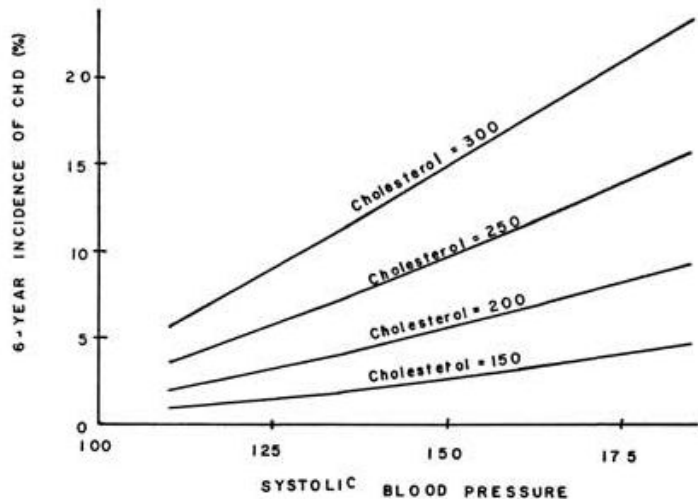


FIGURE 2. Six-year incidence of coronary heart disease according to level of systolic blood pressure at specified serum cholesterol levels (men 45 to 62 years). For explanation, see legends for Figure 1.

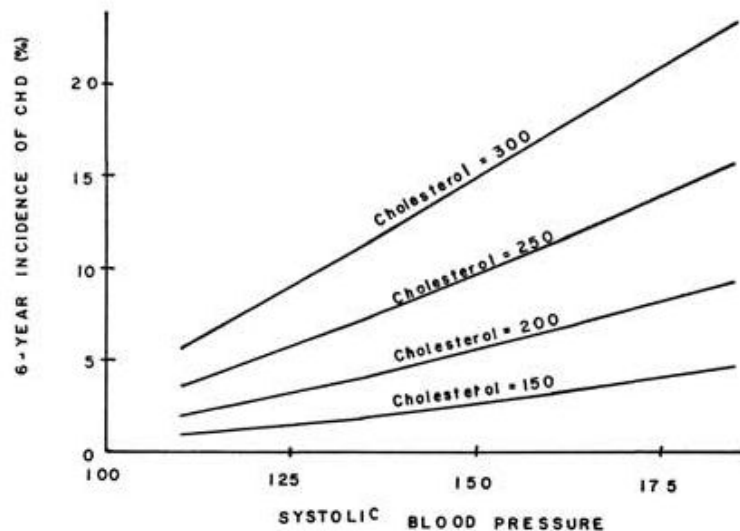
Enrolled 5,209 men and women in 1948

Some Framingham early discoveries:

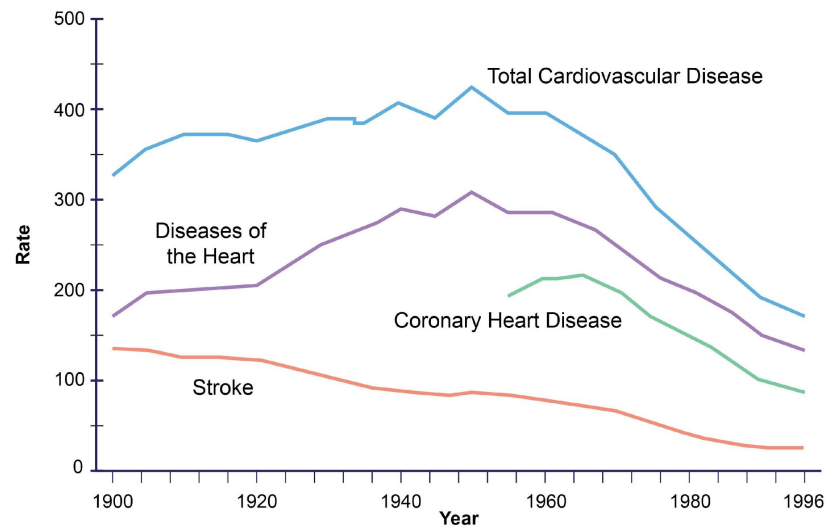
- 1960 – Cigarettes increase heart disease
- 1961 – cholesterol, blood pressure increase heart disease
- 1967 – exercise decreases risk of heart disease; obesity increases it
- 1970 – high blood pressure and atrial fibrillation cause stroke

# Large Cohort Studies Have Transformed Disease Treatment

Framingham and other cohorts have taught us much about heart disease...

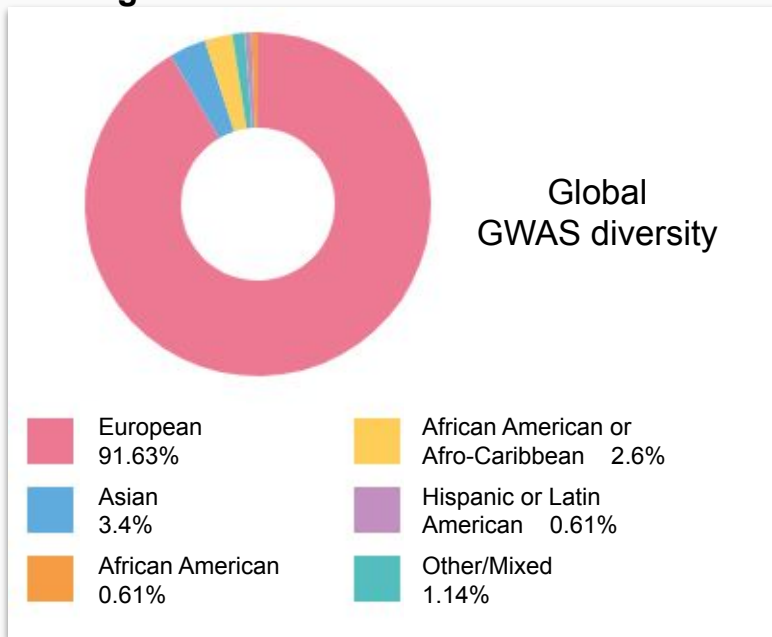


...and cardiovascular deaths have decreased

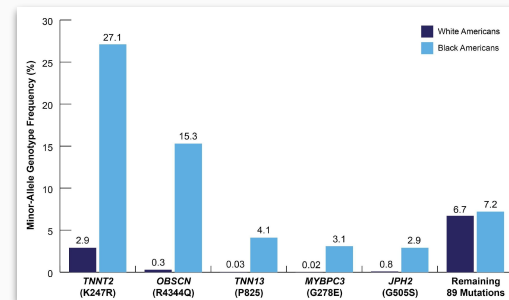


# Precision Medicine is Expanding, but Genomic Studies Are Not Diverse

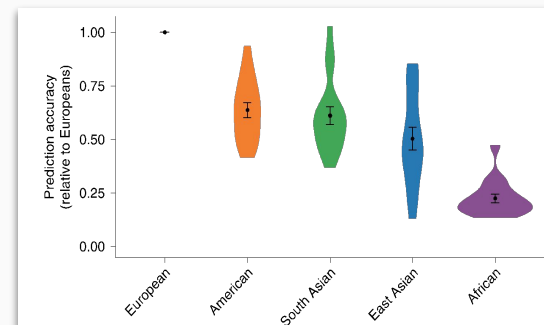
There is a lack of diversity in genome-wide association studies.



This affects interpretation of genetic variants...



... polygenic risk scores for diseases

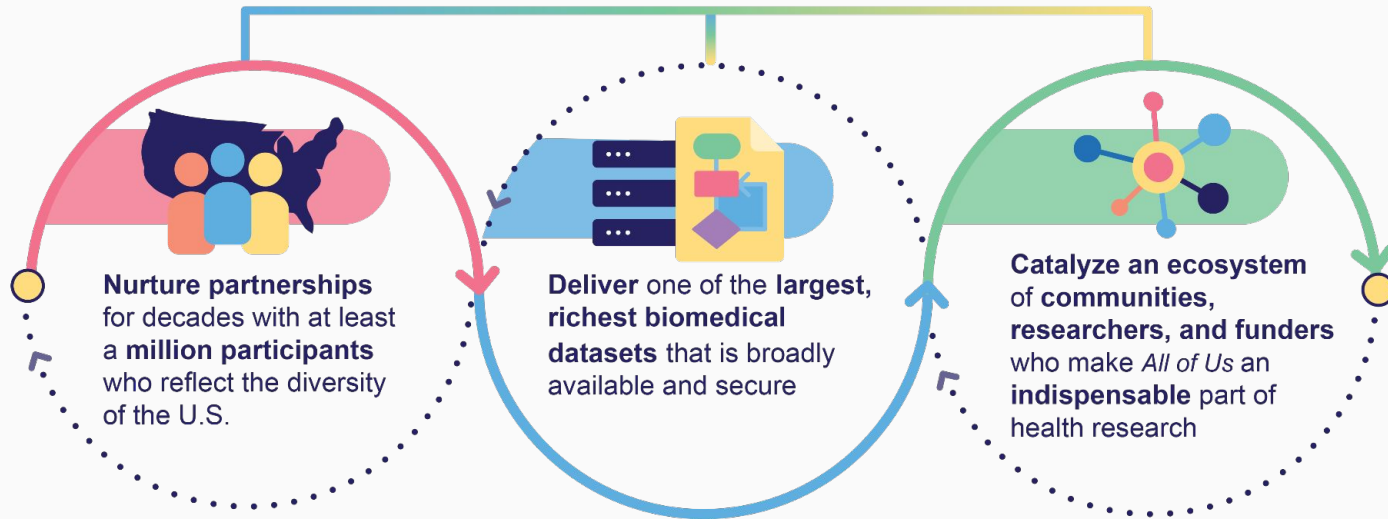


... and many other impacts



# The *All of Us* Research Program 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

## All of Us Research Program Core Values

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 will be accessed **broadly** for research purposes.

**Security and privacy** will be of highest importance.

The program will be a catalyst for **positive change** in research.

# All of Us Consortium Members (as of August 2022)

## The Participant Center



## Communications & Engagement

WONDROS



## HPO Network (Health Care Provider Organizations)

### RMCs All of Us California



### Illinois Precision Medicine Consortium



### All of Us New England



### Trans America Consortium



### New York City Consortium



### All of Us Southern Network



### All of Us Southeast Enrollment Center



## HPO Lite



### All of Us Wisconsin



### All of Us Pennsylvania



### University of Arizona and Banner Health



### FQHCs (Federally Qualified Health Centers)



### VA Medical Centers



## Participant Technology Systems Center (PTSC)



## Biobank



## Data & Research Center (DRC)



## Genomics Partners



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



# All of Us Community and Provider Partner Network (as of August 2022)



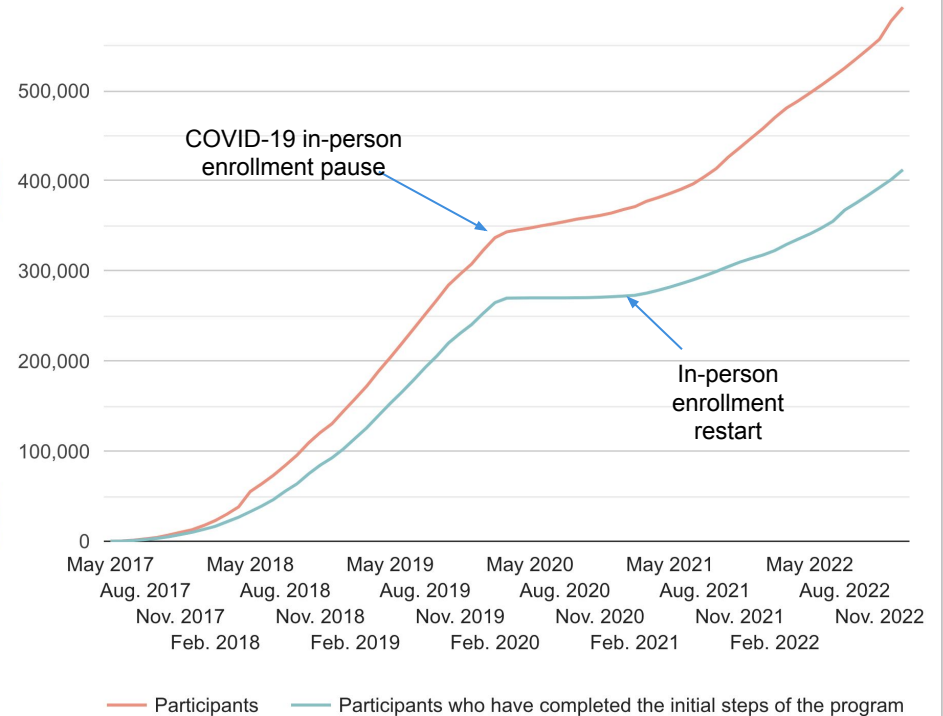
# Enrolled 596K+ Participants With Continued Growth

**596,000+**  
Participants

**349,000+**  
Electronic Health  
Records

**414,000+**  
Participants who have  
completed initial steps of the  
program

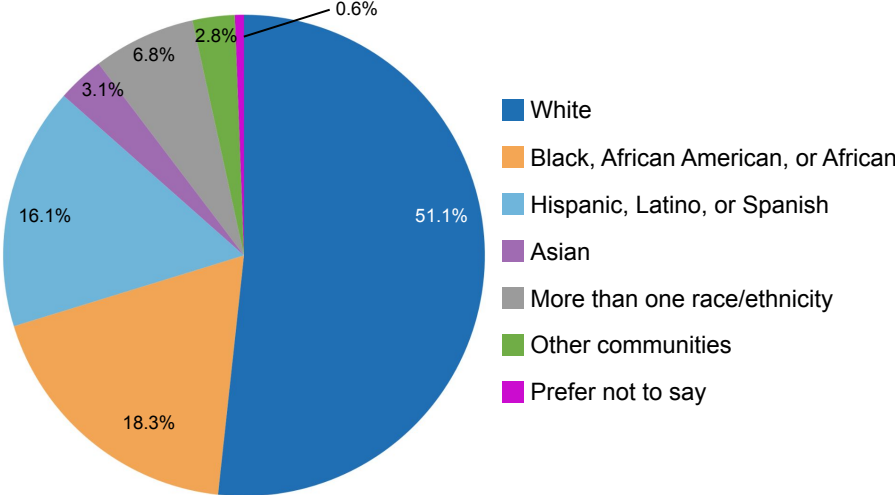
**430,000+**  
Biosamples



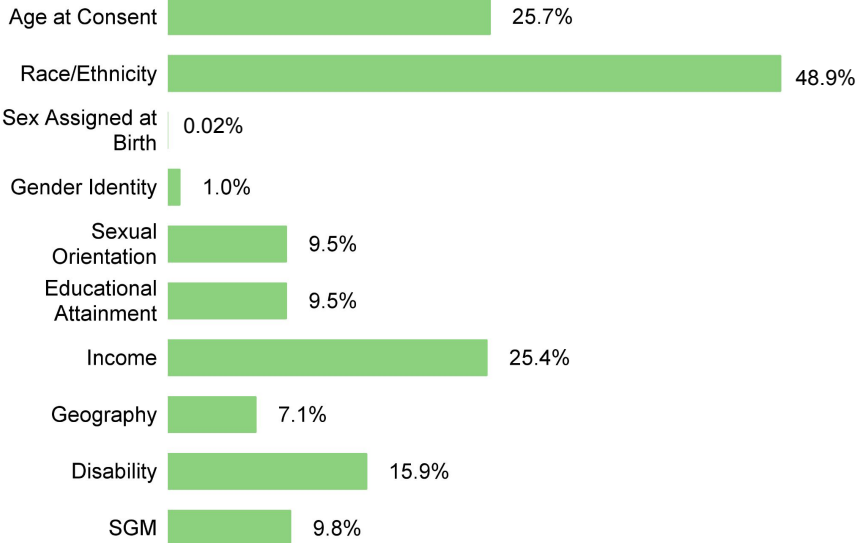
Numbers current as of February 10, 2023

# Participant Diversity

## Race & Ethnicity of Participants



## UBR Category



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

**Numbers current as of February 10, 2023**

# Data Collected from *All of Us* Participants



Consent and Electronic Health Records



Participant Surveys



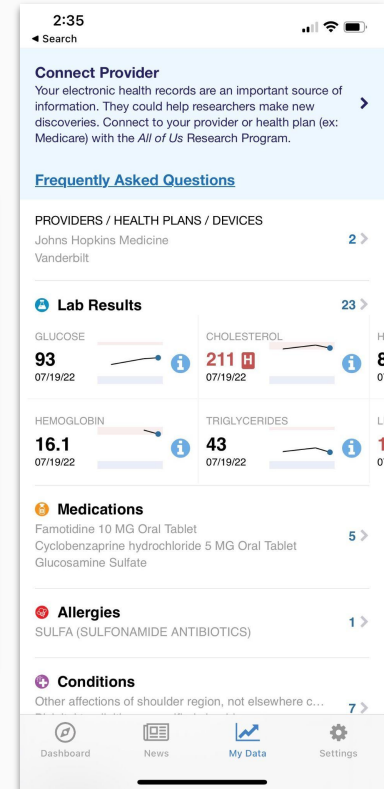
Physical Measurements



Biosamples



Mobile/Wearable Tech

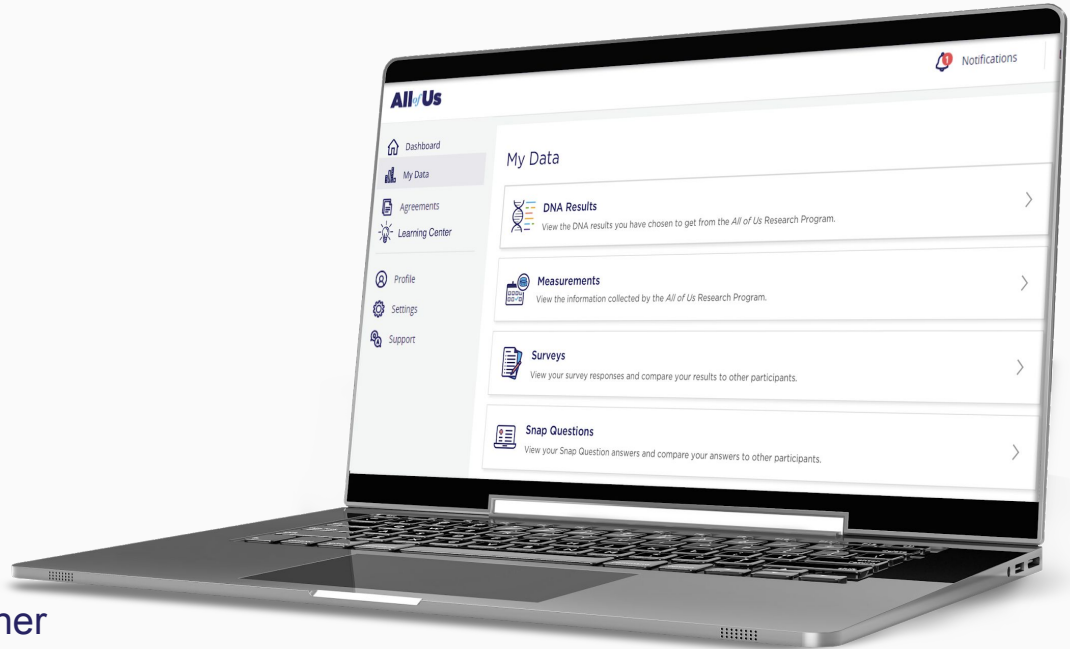


# Returning Value for Participants

**Engagement is key:** we leverage engagement studios, surveys, and involvement of participants throughout all levels of *All of Us* leadership.

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 Genetics Return Strategy

## Engagement

Genetic ancestry and traits results

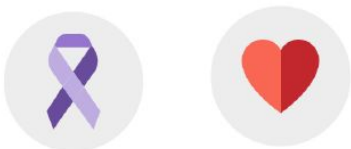


7 regions (21 subregions) and 4 traits

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

- *CYP2C19*
- *DPYD*
- *G6PD*
- *SLCO1B1*
- *NUDT15*
- *TPMT*
- *UGT1A1*

# Genetic Ancestry and Traits (as of February 10, 2023)

## DNA Results

You'll see all of your DNA results here when they're ready. See [options for your DNA results](#).

### Genetic ancestry and trait results

5 results



#### Genetic ancestry

Genetic ancestry can be very interesting, but you may also learn information you didn't expect. [Learn more](#)

[View Results](#)



#### Bitter taste perception

Learn what your genes can tell



#### Cilantro preference

Your genes play a role in whet



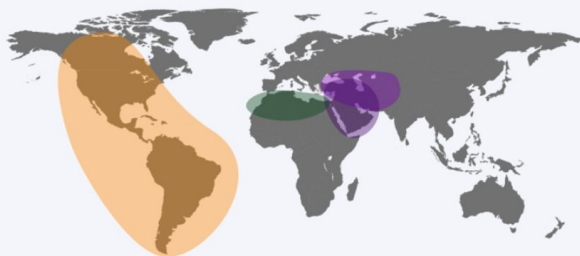
#### Earwax type

Flaky or sticky? Earwax type is



#### Lactose intolerance

Your genes have a say in how v



- **Over 182,000 participants sent notifications so far** (email, push, and SMS based on participant preference) to choose if they want to receive results

<b>The Americas</b>	50% ▾
The Americas	100%
Such as North, Central, and South America	
<b>The Middle East and North Africa</b>	50% ▾
Northern Africa	10%
Such as Morocco, Algeria, and Egypt	
The Middle East	40%
Such as the Arabian Peninsula and Egypt	
Western Asia and the Caucasus	50%
Such as Turkey, Iran, Syria, Iraq, and the Caucasus	
<a href="#">See Other Ancestry Groups Tested</a>	

- **72% complete genetic ancestry and traits informing loop choice** (130k)
- **99%** of those that view any result **view any of the 4 trait results** (129k)
- **98%** of those that view any result **viewed their genetic ancestry results** (128k)

# Genomic Health-Related Return of Results Now Available

## Hereditary Disease Risk (starting with ACMG59)

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JANE DOE  
DOB: January 1, 2000  
ID: 2

Specimen: Whole Blood  
Barcode: 4021 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

## Medicine and Your DNA (Pharmacogenomics)

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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 #202005662  
Laboratory Director: Heidi L. Rehm, PhD, FACSHP

1 / 13

- Participants can choose results they want
- Interpretation begins at Clinical Validation Laboratories
- All results supported by Genetic Counselors
- **Started returning results on December 13**
  - **16,991 participants** have been notified their report is ready to request
  - **6,705 participants** have seen their results
  - Scaling each week to notify up to **155,000 eligible participants**



# A Little Closer to Home: My Results



GENETICS AND MEDICINE

## Your genetic results

### Your Results:

Gene

***CYP2C19***

The *CYP2C19* gene is a "metabolizer" gene. These genes play a role in how quickly or slowly medicines are used, or metabolized, by the body.

Version

**\*1/\*8**

What it means

#### Intermediate Metabolizer

An intermediate or likely intermediate metabolizer. You may take medicines at a slower rate than expected, and it may take a longer amount of time than expected for medicines to be removed from your body.



GENETICS AND MEDICINE

## DNA and medicine

### This table points out some medicines that may be affected by your genetic results.

If you are taking one of these medicines, talk with your doctor or pharmacist about whether ordering a clinical pharmacogenetic test is right for you.

#### These medicines MAY BE impacted by your genetics.

In some cases, pharmacogenetic information may help doctors and pharmacists choose medicines and doses.

Gene

***SLCO1B1***

The *SLCO1B1* gene helps move some medicines out of the body when they are done working. People with changes in this gene may have a harder time removing these medicines from their body. This means those medicines may build up in the body and cause muscle pain.

Version

**\*15/\*15**

What it means

#### Poor Function

A "poor function" version of the gene. This means some medicines may build up in the body and cause muscle pain.

Gene

***CYP2C19***

- brivaracetam (Briviact®)
- clobazam (Onfi®)
- clopidogrel (Plavix®)

Gene

***SLCO1B1***

- simvastatin (Zocor®)

# Genomic Health-Related Return of Results Assets

*All of Us* has a variety of resources for participants and clinicians in English and Spanish about genomic health-related return of results

- Talking Points: Digital Health-Related Genetic Return of Result
- Fact Sheets
  - Clinical DNA Testing
  - DNA Results and Insurance
  - DNA Results and Your Family
  - Health-Related DNA Results from *All of Us* Research Program
  - Hereditary Disease Risk
  - Information for Clinicians - Patient Health-Related DNA Results



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### Information for Clinicians Health-Related DNA Results From the *All of Us* Research Program

***All of Us* participants who provide a blood or saliva sample can decide to get personalized DNA results for free.**

*All of Us* offers the following health-related results:

- Medicine and Your DNA report (pharmacogenetics).
- Hereditary Disease Risk report

**IMPORTANT:** *All of Us* is a research program. **The DNA results we provide are not authorized by the FDA for use in clinical decision-making.** An FDA-authorized, clinical DNA test is needed to confirm our results before making changes to an individual's health care.

*All of Us* offers a free clinical DNA testing option through our partner, Color Health, to participants whose Hereditary Disease Risk report indicates an increased risk of disease. Participants may decide to get their clinical DNA test through another provider. *All of Us* will not pay for clinical tests through another provider.

*All of Us* will not offer a clinical DNA test to participants based on their Medicine and Your DNA results.

### About *All of Us* Medicine and Your DNA Results

For this report, *All of Us* analyzes seven genes known to affect how the body processes medicine:

- *CYP2C19*
- *DPYD*
- *G6PD*
- *NUDT15*
- *SLCO1B1*
- *TPMT*
- *UGT1A1*

For each gene, the report will explain what kind of variant the participant has and what that means. The report also will include a table of medications that may be affected by their genetic results.

### What is *All of Us*?

The *All of Us* Research Program is an ambitious effort to accelerate research and improve health by gathering health data from one million or more people living in the United States.

We are creating the largest and most diverse health research database of its kind, including communities who have been historically underrepresented in biomedical research.

People from all walks of life can enroll and complete online surveys, provide samples, and connect their EHRs. By looking for patterns in this information, researchers may learn more about what affects people's health, leading to advances in precision medicine.



(844) 842-2855



TTY dial 711

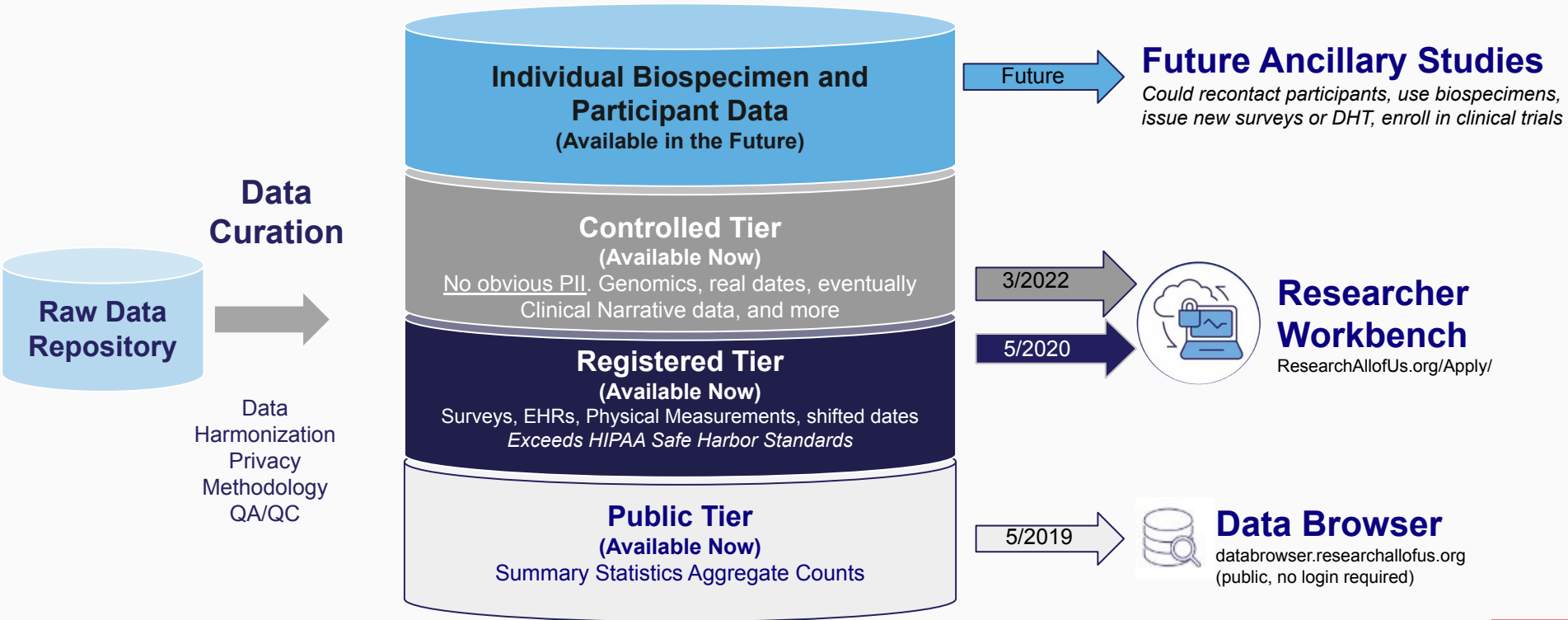


help@joinallofus.org



JoinAllOfUs.org

# Researcher Data Access



# All of Us Research Hub: Public Data Browser

## Summary statistics of:

- EHR Data (Conditions, Drug Exposures, Lab & Measurements, Procedures)
- Genomic Variants
- Survey Questions (including COVID-19 surveys)
- Physical Measurements
- **Open Access (no login required)**

[DataBrowser.ResearchAllofUs.org](https://DataBrowser.ResearchAllofUs.org)



**Search Across Data Types**

Search: Cancer

Data includes 316,760 participants and is current as of 10/1/2020.

**EHR Domains:**

- Conditions**  
189 matching medical concepts  
192,000 participants in this domain  
[View Results](#)
- Labs & Measurements**  
57 matching medical concepts  
182,000 participants in this domain  
[View Results](#)
- Procedures**  
33 matching medical concepts  
182,000 participants in this domain  
[View Results](#)

**Top 10 by Descending Participant Counts**

Top Concepts	Participant Count
Malignant neoplastic disease	35k
Malignant neoplasm of skin	10k
Malignant tumor of breast	7k
Malignant neoplasm of female breast	7k
Carcinoma in situ	7k
Basal cell carcinoma of skin	5k
Secondary malignant neoplastic disease	5k
Malignant tumor of prostate	5k
Malignant neoplasm of respiratory system	3k
Malignant tumor of intestine	2.5k

# Using Variant Search on the Data Browser

## Genomic Variants

Variant Search

Participant Demographics

Use the Variant Search to explore allele frequencies for a gene or genomic region. Drill down into specific variants to view select annotations and genetic ancestry associations. Variants are called against the GRCh38/hg38 genome reference and stored with associated metadata via a [Variant Annotation Table](#).

CFTR

Examples by query type:  
**Gene:** BRCA2  
**Variant:** 13-32355250-T-C  
**RS Number:** rs169547  
**Genomic Region:** chr13:32355000-32375000

244 pathogenic/likely pathogenic  
CFTR variants

Filter

ClinVar Significance **pathogenic** **likely pathogenic**

244 variants found

Variant ID ↓	Gene	Consequence	Protein Change	ClinVar Significance	Allele Count	Allele Number	Allele Frequency
7-117479930-G-A	CFTR	upstream_gene_variant	-	likely pathogenic, uncertain significance	21	197152	0.000107
7-117480096-T-C	CFTR	start_lost	ENSP0000000308 4.6:p.?	likely pathogenic, pathogenic	1	197124	0.000005
7-117480108-C-T	CFTR	missense_variant	ENSP0000000308 4.6:p.(Pro5Leu)	likely pathogenic, pathogenic, uncertain significance	8	197168	0.000041
7-117480138-T-C	CFTR	missense_variant	ENSP0000000308 4.6:p.(Leu15Pro)	likely pathogenic, pathogenic	1	197166	0.000005
7-117504314-C-T	CFTR	stop_gained	ENSP0000000308 4.6:p.(Gln39Ter)	pathogenic	3	197174	0.000015
7-117504336-C-T	CFTR	missense_variant	ENSP0000000308 4.6:p.(Ala46Val)	likely pathogenic, uncertain significance	21	197176	0.000107
7-117509031-C-T	CFTR	intron_variant, splice_region_variant	-	likely pathogenic, pathogenic	6	197176	0.00003
7-117509035-G-A	CFTR	missense_variant, splice_region_variant	ENSP0000000308 4.6:p.(Glu56Lys)	drug response, pathogenic	2	197180	0.00001

# All of Us Researcher Workbench: Access to Row-Level Data for Analysis

## Researcher Workbench

- Cloud-based central resource
- **Passport access model** - just create, describe your workspace, and get to work! **No separate IRB approval needed.**
- Currently open to US nonprofits and nonprofit/for-profit academic and healthcare organizations
- Working to expand to international and broader for-profit audiences as we speak

**All of Us**  
RESEARCHER WORKBENCH

Welcome to the  
**RESEARCHER WORKBENCH**  
The secure platform to analyze All of Us data

Workspaces +

- Featured Workspace: Dementia  
OWNER  
Last Changed: 02/11/20, 07:32 PM
- All of Us Survey Codebook and Frequency Distributions  
OWNER  
Last Changed: 02/11/20, 07:51 PM
- Featured Workspace: Depression  
OWNER  
Last Changed: 02/11/20, 07:50 PM
- Featured Workspace - Type 2 Diabetes  
OWNER  
Last Changed: 02/11/20, 07:50 PM

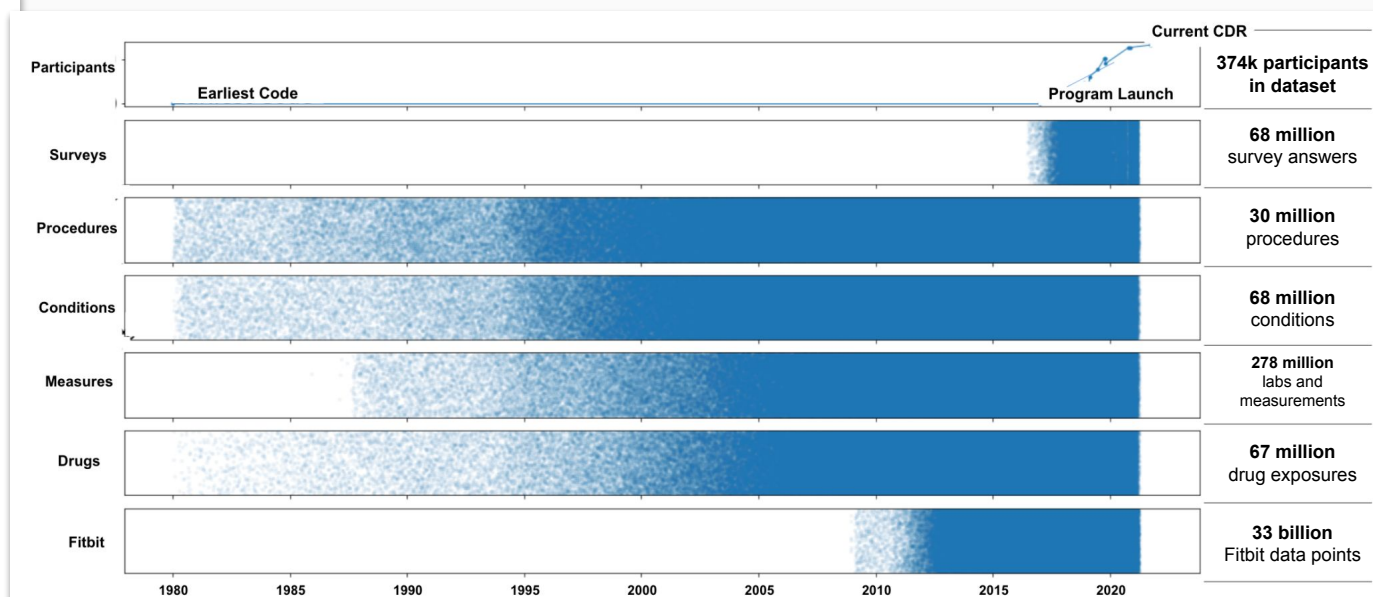
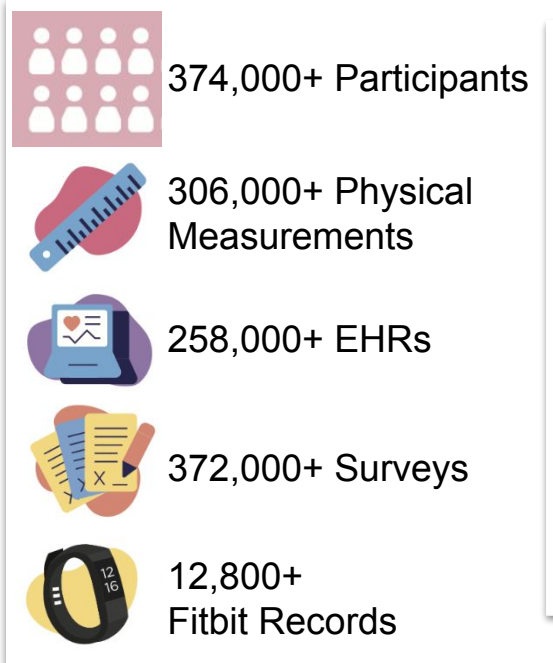
Recently Accessed Items

- Case 1 Notebook  
Notebook  
Last Modified: Mar 06 2020
- Dementia Analysis from Cohort Builder  
Notebook  
Last Modified: Feb 04 2020
- Ischemic Heart Disease Analysis  
Notebook  
Last Modified: Feb 04 2020
- Dementia Analysis  
Notebook  
Last Modified: Feb 04 2020
- Type 2 Diabetes Analysis  
Notebook  
Last Modified: Jan 31 2020
- Ischemic Heart Disease Analysis  
Notebook  
Last Modified: Jan 31 2020

[ResearchAllofUs.org/Data-Tools/Workbench/](https://ResearchAllofUs.org/Data-Tools/Workbench/)

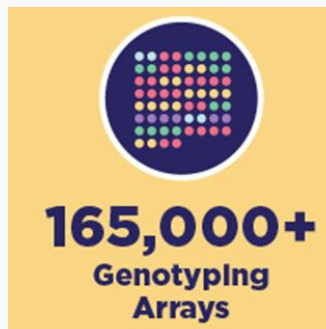
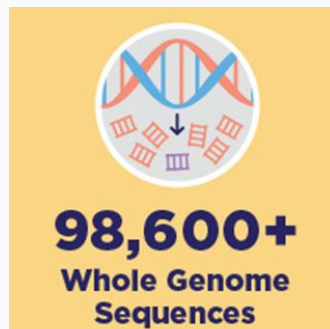


# Data on the Researcher Workbench is Diverse and Longitudinal



# All of Us Genomic Data Available to Researchers

## Researcher Workbench's Controlled Tier Launched March 2022



Cloud-based tools to allow anyone to analyze billions of variants



Includes 100M+ variants with  $\geq 3$  occurrences not seen in gnomAD 3.0



*New release coming soon with >200k genomes!*

[ResearchAllOfUs.org/Data-Tools/Workbench/](https://ResearchAllOfUs.org/Data-Tools/Workbench/)

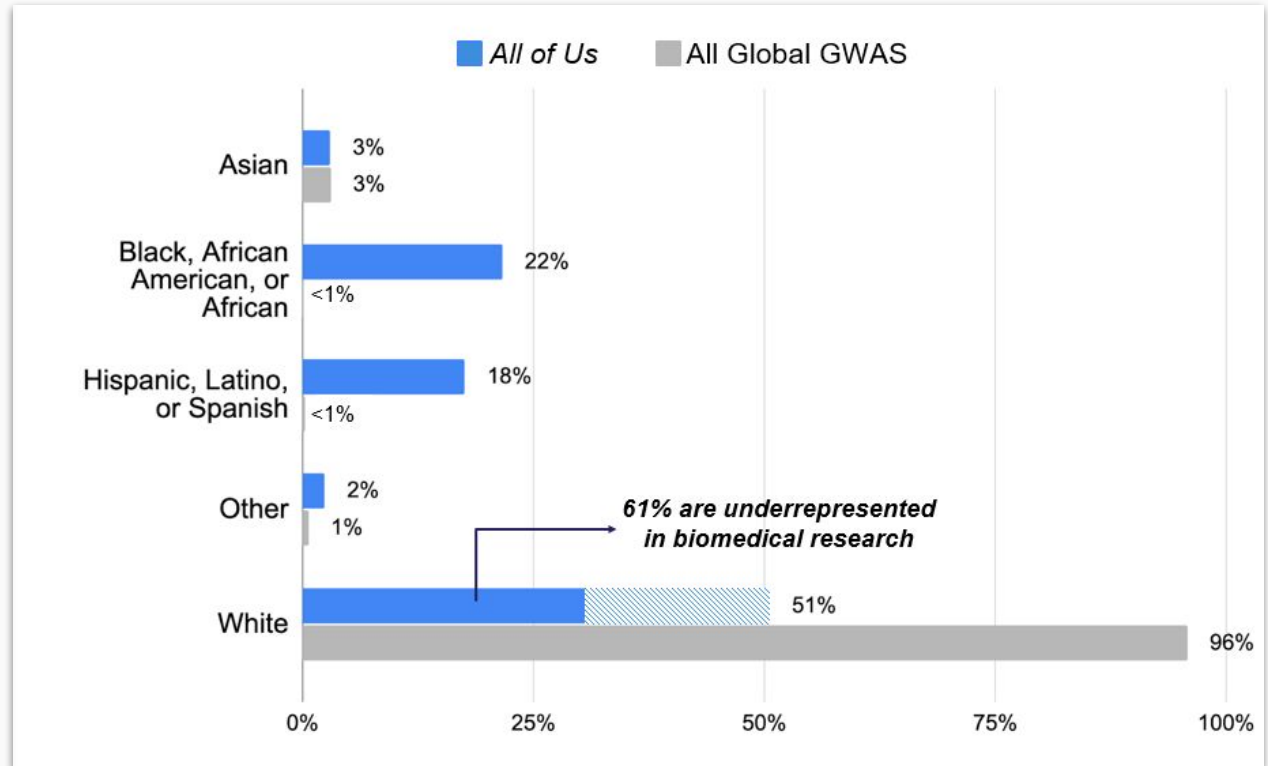


# All of Us Will Enhance Diversity of Genomic Studies

## First genomic data set

~50% diverse by  
race/ethnicity,

80% underrepresented in  
biomedical research



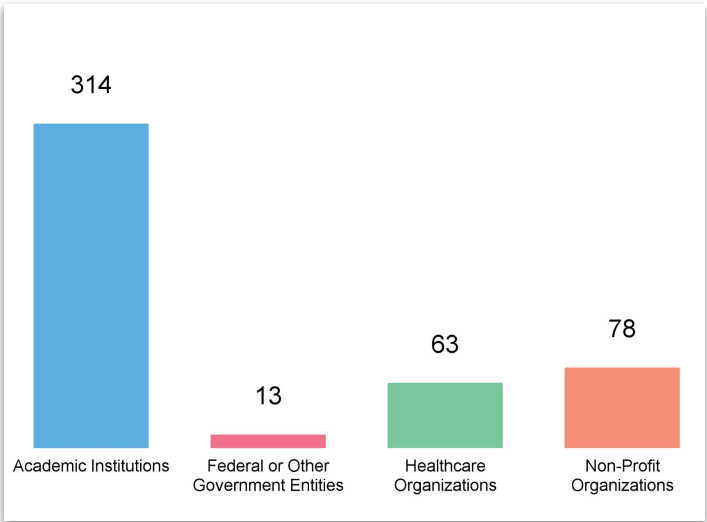
All Global GWAS values from [www.gwasdiversitymonitor.com](http://www.gwasdiversitymonitor.com). Values current as of February 17, 2022

# Researcher Workbench Usage and Diversity (as of February 10, 2023)

## Research on the Researcher Workbench



- 480+ Organizations:
- 32 Historically Black Colleges & Universities
  - 41 Hispanic Serving Institutions



# What Does It Look Like To Do an Analysis in *All of Us*? A Genome Wide Association Study (GWAS) of Type 2 Diabetes



**All of Us**  
RESEARCHER WORKBENCH

Welcome to the  
**RESEARCHER WORKBENCH**  
The secure platform to analyze *All of Us* data

**Workspaces** +

Create your first workspace  
As you create your workspaces, this area will store your most recent workspaces. To see all workspaces created, click on **See all workspaces** to the right.

**Cohorts** +

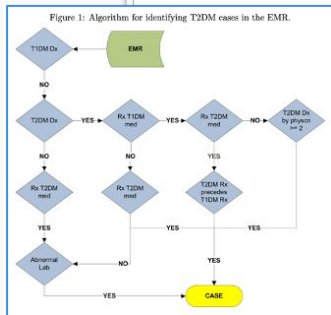
A cohort is a group of participants based on specific criteria.

All of Us Participants → Your Cohort

**Datasets** +

A dataset is a table containing data about a cohort that can be exported for analysis.

Your Cohort + Data About Your Cohort = Your Dataset



- ~23M SNPs
- ~20k participants
- GWAS runtime of ~20 minutes
- Cost \$37

1 GWAS using Hall in Jupyter Notebooks

2 Initializing Hall

3 Load our data

3.1 Environment details

3.2 Variant calls from the WGS

```
In [4]: M = ht - hl.read_matrix_table('gs://fc-secure-4a0212f0-46f4-4a79-99f9-af898086c060/data/cohort_2_350u_cleaned.ht')
```

3.3 Case/control and demographics information

```
In [5]: M = table = (hl.import_table(ht.bucket('ny/2020status.csv'), imports=htw, types={'person_id': hl.tstr}, key_by={'person_id'}))

2021-11-23 21:08:14 Hall: INFO: Reading table to impute column types
2021-11-23 21:08:15 Hall: INFO: Finished type imputation
Loading field 'person_id' as type str (user-supplied type)
Loading field 'gender_concept_id' as type int32 (imputed)
Loading field 'gender' as type str (imputed)
Loading field 'race_concept_id' as type str (imputed)
Loading field 'race' as type str (imputed)
Loading field 'ethnicity_concept_id' as type int32 (imputed)
Loading field 'ethnicity' as type str (imputed)
Loading field 'sex_at_birth_concept_id' as type int32 (imputed)
Loading field 'sex_at_birth' as type str (imputed)
Loading field 'ht20status' as type bool (imputed)
Loading field 'isMale' as type bool (imputed)
```

## All of Us Data Includes Range of Diseases

Conditions	Domain	Participants
Heart Disease	Heart	73,100
Obesity	Endocrine	65,740
Type 1 Diabetes	Endocrine	5,620
Type 2 Diabetes	Endocrine	45,360
Any cancer	Cancer	42,080
Asthma	Pulmonary	40,560
Chronic Obstructive Pulmonary Disorder	Pulmonary	19,740
Epilepsy	Neuro	7,440
Stroke	Neuro	640
Rheumatoid Arthritis	Autoimmune	6,980
Osteoarthritis	Autoimmune	81,980

Conditions	Domain	Participants
Depressive Disorder	Mental Health	67,380
Bipolar Disorder	Mental Health	12,820
Dementia	Mental Health	4,760
Human Immunodeficiency Virus	Infectious Disease	4,640
COVID-19*	Infectious Disease	58,000*
Alcohol Abuse (AUDIT-C)	Abuse	84,000
Opioid Usage	Medication	155,000
Age-Related Macular Degeneration	Eye	4,740
Hearing loss	Hearing	30,400
Falls	Ageing/Nursing	4,860

\*using combination of diagnosis code, lab test, and COVID survey answers

# All of Us Researcher Workbench: Access to Row-Level Data for Analysis



## LEARN MORE ABOUT THE DATA AVAILABLE

Explore the data available through the [Data Browser](#), which provides interactive views of aggregate-level participant data. Learn about individual-level [data access tiers](#) and the [Researcher Workbench tools](#).



## CHECK FOR YOUR INSTITUTION'S AGREEMENT

Before you can register, your institution must have a [Data Use and Registration Agreement](#) in place with *All of Us* to ensure data security.



## CREATE A RESEARCHER WORKBENCH ACCOUNT

Complete your researcher profile, sign the Terms of Service, and agree to the Privacy Policy.



## VERIFY YOUR IDENTITY USING LOGIN.GOV

Verify your identity using Login.gov. You may need to provide an SSN and a state-issued ID. Your institution may also require you to use an eRA Commons account. If so, contact your institution directly. [Read more about Login.gov](#).



## COMPLETE ALL OF US RESEARCH TRAINING

The mandatory training provides education on conducting responsible and ethical research with data from *All of Us* participants. Please allow at least one hour to complete.

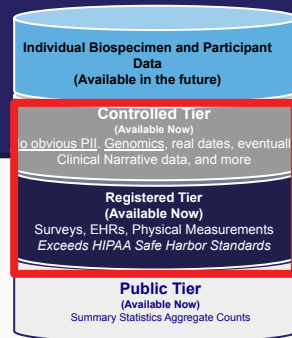


## SIGN THE DATA USER CODE OF CONDUCT

The Data User Code of Conduct is an agreement that outlines the program's expectations for researchers.



[ResearchAll of Us.org/Data-Tools/Workbench/](https://ResearchAll of Us.org/Data-Tools/Workbench/)



# What Kind of Research Can *All of Us* Support?

## Example studies in *All of Us*

- Associations between diseases, medications, behaviors, SDOH, genomics
- Health disparities
- Historically underrepresented populations
- Genomics and PGx
- Drug target discovery
- Early disease detection
- Geospatial linkages (future)
- ***Insert your topic here***

## Modalities of research *All of Us* supports

- AI/ML
- Risk stratification
- Predictive analytics
- Phenotype algorithms & cohort development
- Novel method development
- Basic EHR investigations
- Validation of other studies

## *All of Us* is not

- A representative US sample
- A study with uniform follow-up of all variables
- A resource for real-time outbreak surveillance

# Recent Scientific Publications Utilizing *All of Us*

JOURNAL ARTICLE ACCEPTED MANUSCRIPT

## Migraine among adults with atopic dermatitis: A cross-sectional study in the *All of Us* research program <sup>FREE</sup>

Ryan Fan, Audrey C Leasure, William Damsky, Jeffrey M Cohen ✉

*Clinical and Experimental Dermatology*, llac004, <https://doi.org/10.1093/ced/llac004>

Published: 20 October 2022 Article history ▼



Journal of the American Academy of Dermatology

Available online 13 October 2022

In Press, Journal Pre-proof ?



Racial and Ethnic Differences in Barriers to Care Among US Adults with Chronic Inflammatory Skin Diseases: A Cross-Sectional Study of the *All of Us* Research Program

[nature](#) > [nature medicine](#) > [articles](#) > [article](#)

Article | [Open Access](#) | [Published: 10 October 2022](#)

## Association of step counts over time with the risk of chronic disease in the *All of Us* Research Program

[Hiral Master](#), [Jeffrey Annis](#), [Shi Huang](#), [Joshua A. Beckman](#), [Francis Ratsimbazafy](#), [Kayla Marginean](#),

Published: [Robert Carroll](#), [Karthik Natarajan](#), [Frank E. Harrell](#), [Dan M. Roden](#), [Paul Harris](#) & [Evan L. Brittain](#) ✉  
*Ophthalmol Sci.* 2022 March ; 2(1): . doi:10.1016/j.xops.2021.100099.

Novel Association between Opioid Use and Increased Risk of Retinal Vein Occlusion Using the National Institutes of Health *All of Us* Research Program

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE



## An Overview of Cancer in the First 315,000 *All of Us* Participants

Briseis Aschebrook-Kilfoy ✉, Paul Zakin, Andrew Craver, Sameep Shah, Muhammad G. Kibriya, Elizabeth Stepniak, Andrea Ramirez, Cheryl Clark, Elizabeth Cohn, Lucila Ohno-Machado, Mine Cicek, Eric Boerwinkle, Sheri D. Schully, [...].  
On behalf of the *All of Us*

Published: September 1, 2022



Journal of Pain and Symptom Management

Available online 9 September 2022

In Press, Corrected Proof ?



Original Article

Predictors of Unrelieved Symptoms in *All of Us* Research Program Participants With Chronic Conditions

Caitlin Dreisbach PhD, RN <sup>1,2</sup>, Susan Grayson BSN, RN <sup>3</sup>, Katelyn Leggio MSN, RN <sup>4</sup>, Alex Conway MS <sup>3</sup>, Theresa Kolecik PhD, RN <sup>3</sup> ✉

# All of Us Top 5 Publications of 2022 by Altmetric

Metrics as of December 22, 2022

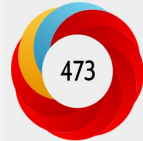
In 2022, 100+ articles using *All of Us* data were published in peer-reviewed publications.

All five of these articles score in the top 5% of all research publications scored by Altmetric.



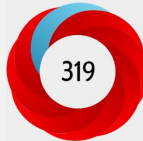
## Association of step counts over time with the risk of chronic disease in the *All of Us* Research Program.

Master, H., Annis, J., Huang, S. et al. (2022) *Nature Medicine*



## Association of longitudinal activity measures and diabetes risk: an analysis from the NIH *All of Us* Research Program.

Perry, A (2022) *The Journal of Clinical Endocrinology & Metabolism*



## Revisiting the Latino Epidemiologic Paradox: an analysis of data from the *All of Us* Research Program.

Montanez-Valverde R, et al. (2022) *Journal of General Internal Medicine*



## Association of everyday discrimination with depressive symptoms and suicidal ideation during the COVID-19 pandemic in the *All of Us* Research Program.

Lee Younga H, et al. (2022) *JAMA Psychiatry*



## Wearable fitness tracker use in federally qualified health center patients: strategies to improve the health of all of us using digital health devices.

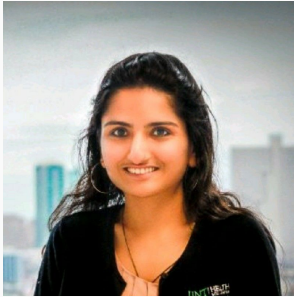
Holko Michelle, et al. (2022) *NPJ Digital Medicine* (1) 53

AltMetric is an indicator of the volume and type of attention a research publication has received. The donut score reports identify how much and what type of attention a publication received.

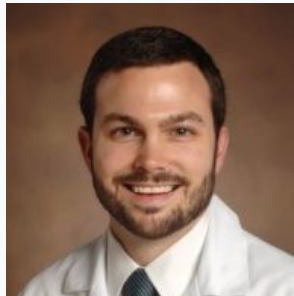




# All of Us Discoveries: Physical Activity and Human Disease

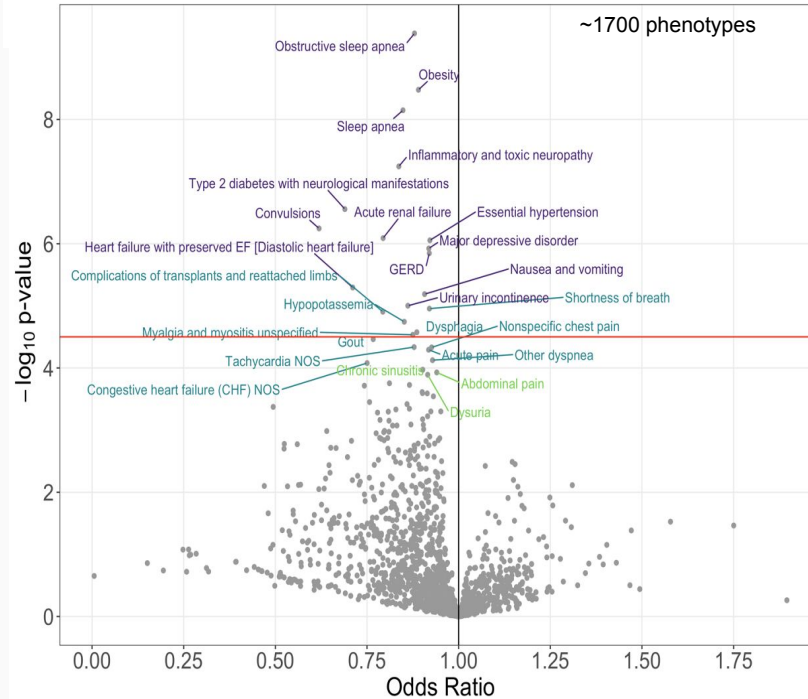


**Hiral Master, PT, PhD, MPH, CPH**  
Senior Scientist at  
Vanderbilt University Medical Center

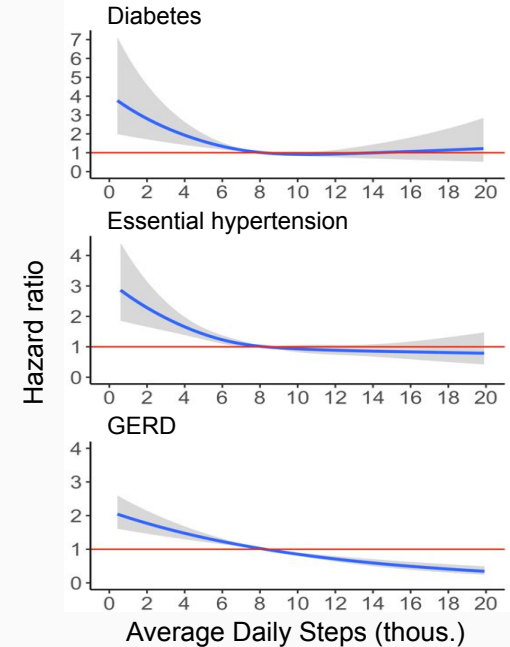


**Evan Brittain, MD, MSc**  
Associate Professor of Medicine, Division of  
Cardiovascular Medicine at  
Vanderbilt Translational and Clinical  
Cardiovascular Research Center

## Incident Diagnoses after 6 months



- Analysis uses average of daily steps *prior to diagnosis*.
- Effect size per 1000 steps, adjusted for age, sex, race



Adjusted for age, sex, race, CAD, cancer, BMI, systolic blood pressure, education level, smoking, alcohol use, and *monthly daily steps (time varying)*

# Sharing Discoveries: Comparing the Prevalence of Cardiovascular Disease across Diverse Populations



**Olveen Carrasquillo, MD, MPH**

Chief, Division of General Medicine at University of Miami

Principal Investigator for the *All of Us* Research Program at University of Miami



**Raúl Montañez-Valverde, MD**

Resident, Internal Medicine at Jackson Memorial Hospital at University of Miami

## Revisiting the Latino Epidemiologic Paradox: an Analysis of Data from the All of Us Research Program

[Raul Montanez-Valverde MD](#), [Jacob McCauley PhD](#), [Rosario Isasi JD MPH](#), [Stephan Zuchner MD, PhD](#) & [Olveen Carrasquillo MD MPH](#) [✉](#) on behalf of the SouthEast Enrollment Center Investigators and the All of Us Research Program Demonstration Projects Subcommittee

[Journal of General Internal Medicine](#) (2022) | [Cite this article](#)

**Scientific Question Being Studied:** Is there evidence of the Latino Epidemiological Paradox in cardiovascular outcomes for *All of Us* participants?

**Findings:** In contradiction to the paradox, Latinx participants in the *All of Us* dataset actually **have a higher, not lower, prevalence of CVD** than white participants and, in some cases, even black participants.

# Mental Health Projects & *All of Us*

## New Mental Health & Wellbeing Module

### Goals:

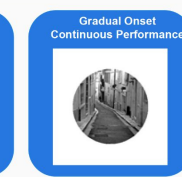
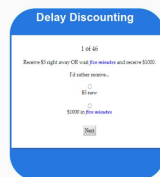
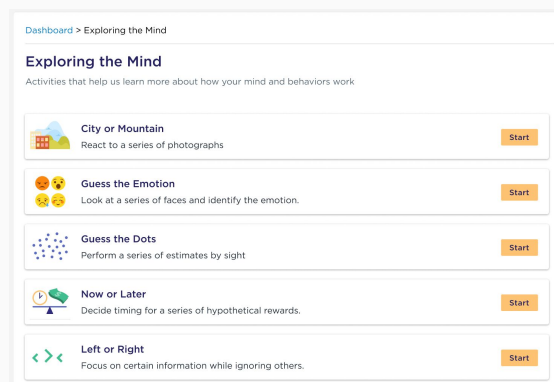
- Encourage and enable research projects relevant to mental health through self-reported data
- Engage participants on topic of mental health in meaningful and innovative ways

**Survey Content** spans over 17 mental health-related domains, combining over 10 validated instruments:

- Domain: Depression, Anxiety, Trauma, Personality, General Well-being, Phobias
- Instrument: PHQ-9, GAD-7, UK Biobank, ACE Questionnaire

Planning **Return of Information** including relevant resources

## Exploring the Mind Ancillary Study *Pilot started December 2022*



# Research Funding Opportunities with *All of Us* in Partnership with 27 Other NIH Institutes and Centers



RFA-PM-23-001:  
R21 Enhancing the Use of the *All of Us* Research Program's Data



RFA-PM-23-002:  
R03 Small Grants to Enhance the Use of the *All of Us* Research Program's Data



OTA-23-002:  
*All of Us* Research Participant and Partner Services Center (PPSC)

## *All of Us* Notices or ROAs Available

**NOT-PM-23-002: Notice of Future Research Opportunity Announcement for  
*All of Us* Center for Linkage and Acquisition of Data (CLAD)**

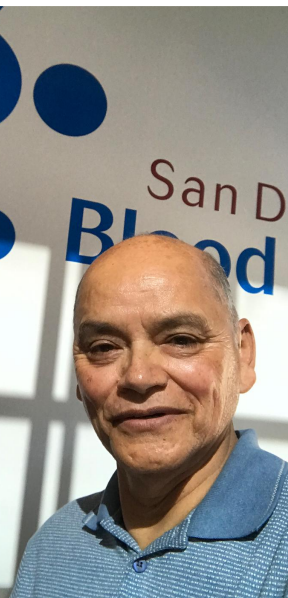
**NOT-ES-23-003: Notice of Intent to Publish a Funding Opportunity  
Announcement for Reporting Back Environmental Health and Non-Genomic  
Research Results**



[AllofUs.NIH.gov](https://www.allofus.nih.gov)

[JoinAllofUs.org](https://www.joinallofus.org)

[ResearchAllofUs.org](https://www.researchallofus.org)



**Thank you!**

@AllofUsResearch  
@AllofUsCEO  
#JoinAllofUs



**Thank you to our 596,000+ participants!**