

# All of Us Research Program: Key Updates Including New Data Release



National Institutes  
of Health

September 12, 2024

Josh Denny, M.D., M.S.  
Chief Executive Officer

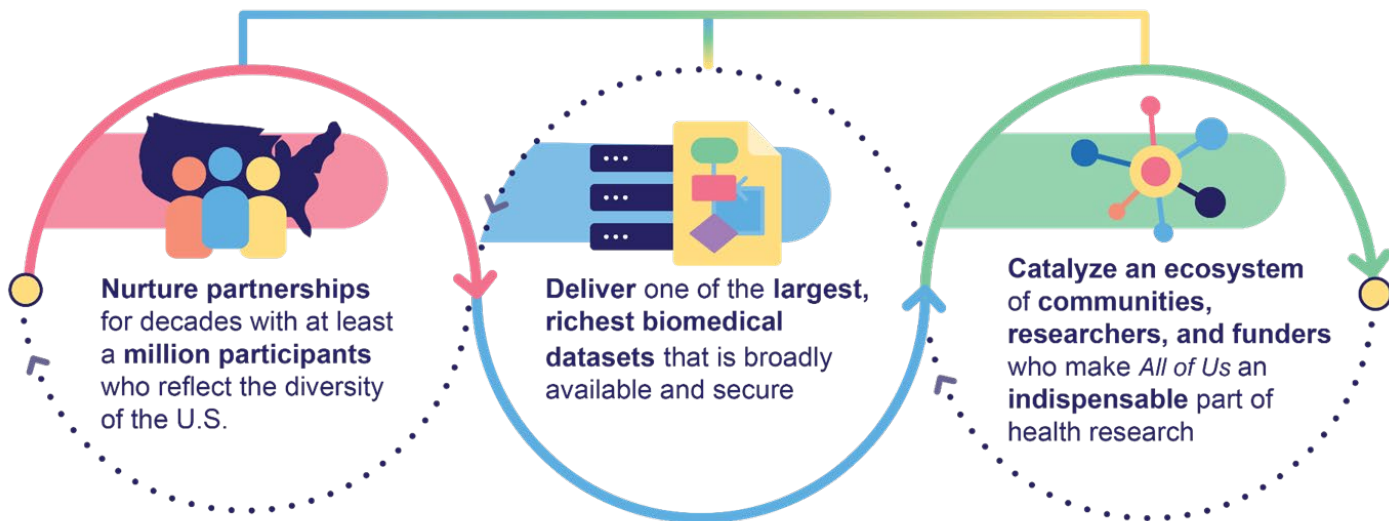


@AllofUsCEO



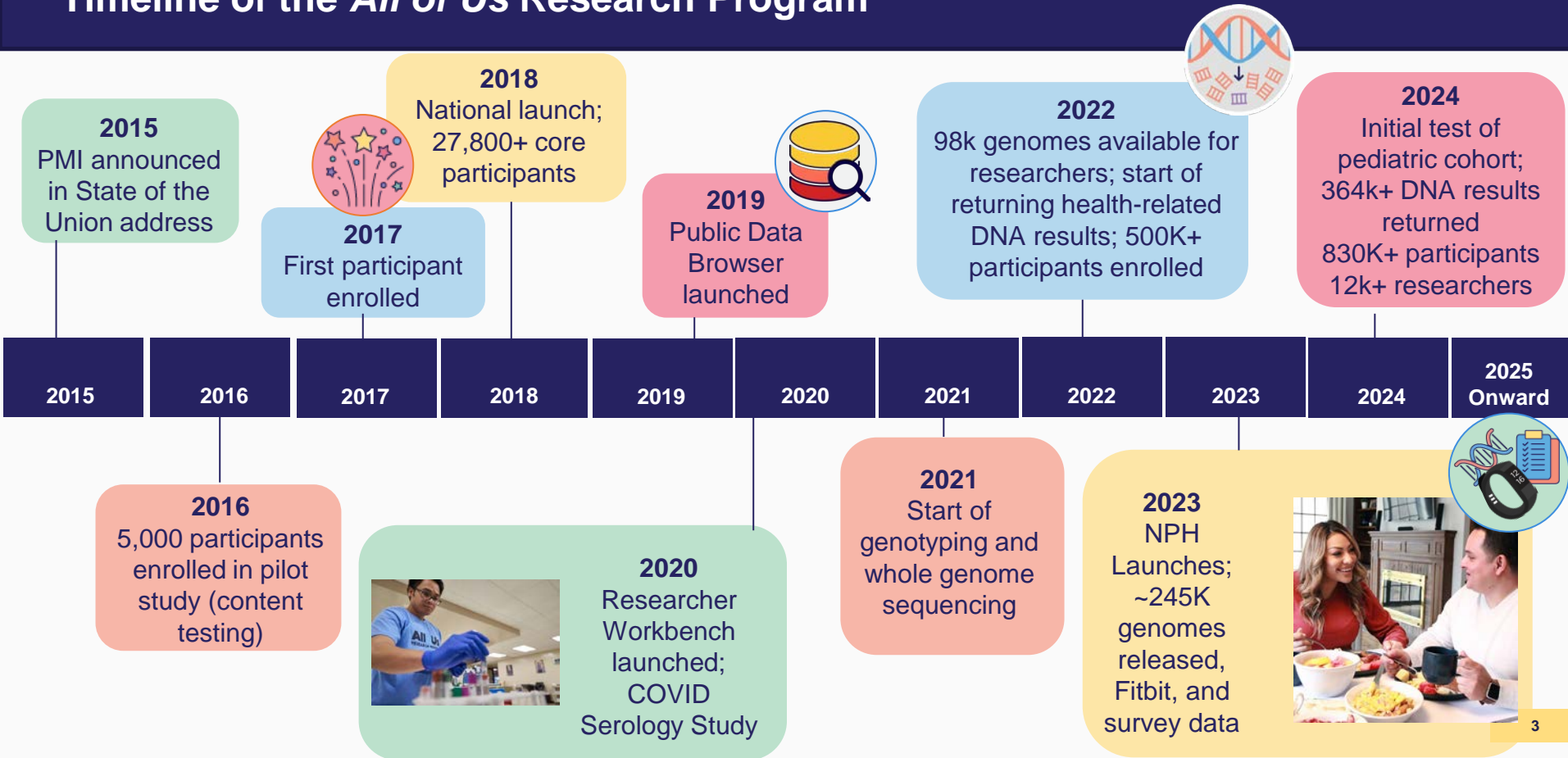
# The *All of Us* Research Program Mission

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

# Timeline of the *All of Us* Research Program



# Status of *All of Us* Participants

## Participant Enrollment

**832,000+**

Participants

**452,000+**

Electronic Health  
Records

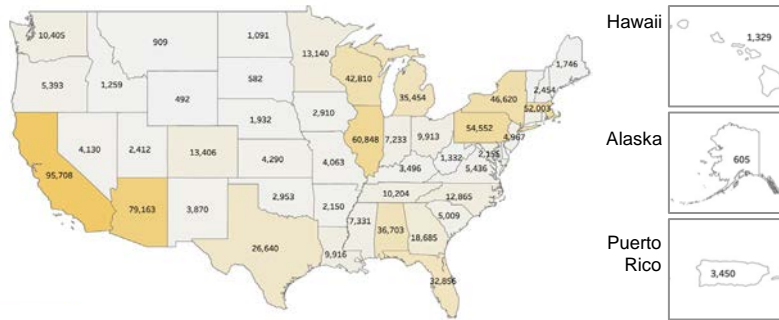
**566,000+**

Participants who have  
completed initial steps of the  
program

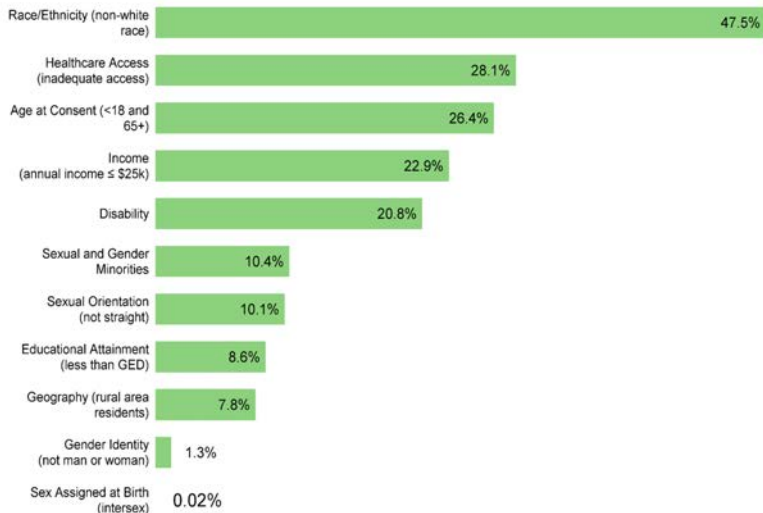
**586,000+**

Biosamples

## Map of Participants



## UBR Category



# Data Collected and Return of Value to *All of Us* Participants



Consent and Electronic Health Records



Participant Surveys



Physical Measurements



Biosamples

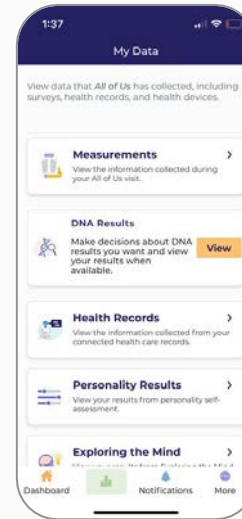


Mobile/Wearable Tech

## Return of Value for 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





# Delivering Clinically Impactful Individual Health Results

## Hereditary Disease Risk



124k *All of Us* Participants have viewed this report, which looks for genetic variants in 59 genes associated with serious health conditions, including:

- Breast cancer
- Ovarian cancer
- Uterine cancer
- Colorectal cancer
- Prostate cancer
- Melanoma
- Brain cancer
- Pancreatic cancer
- Stomach cancer
- Familial hypercholesterolemia
- Cardiomyopathies
- Arrhythmias
- Arteriopathies
- Neurofibromatosis type 2

~3% (>3,300 to date) of participants who receive their hereditary disease risk report will have a **potentially life-changing genetic variant.**

## Medicine and Your DNA



143.2k *All of Us* Participants have viewed this report, which analyzes seven genes that can affect how bodies process medicine and impacts which medication or what dosage you take. This report includes 50+ different medicines that may be impacted by your genetics, including:

- Citalopram (Celexa®)
- Clopidogrel (Plavix®)
- Escitalopram (Lexapro®)
- Sertraline (Zoloft®)
- Lidocaine
- Glimepiride (Amaryl®)
- Sulfamethoxazole/trimethoprim (Bactrim®)
- Simvastatin (Zocor®)
- Amitriptyline (Elavil®)

~90% (>106,000) of participants who received this report have a **result that could impact how their body processes a medication within this report.**

Retrospective research using *All of Us* data suggests that ~20% of participants will be exposed to a drug with an actionable pharmacogenetic result.

# Data Tiered Access Levels Enable Discovery



Available to  
Anyone

## PUBLIC TIER

Public resources include:

- **Data Snapshots:** Aggregated, public-facing overviews of participant characteristics and data types
- **Data Browser:** Interactive preview into the *All of Us* dataset through public-facing aggregate data
  - Currently includes participant-provided survey responses, physical measurements, data from EHRs and wearables, and genomic data
- **Survey Explorer:** Details the questions included in each of the surveys
- **Research Projects Directory:** Descriptions of each research project within the Researcher Workbench



Available to  
Registered  
Researchers

## RESEARCHER WORKBENCH

### REGISTERED TIER

**Registered researchers** can access in-depth data and a variety of research tools to conduct a wide range of studies.



Surveys



Electronic  
Health  
Records



Physical  
Measurements



Wearables

### CONTROLLED TIER

**Registered researchers** with amended institutional agreements can access all of the data in the Registered Tier plus additional and expanded data types, including genomic data, real dates of health events, ICD codes, granular demographic data, and more.



Genomics



Health and  
Lifestyle surveys

*Data have been processed to protect participant privacy*

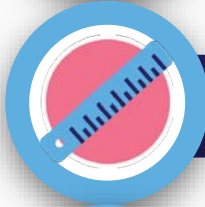
# Data Currently in the *All of Us* Researcher Workbench



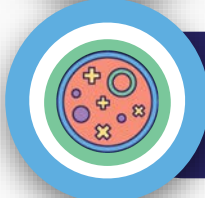
Participant Surveys  
1,958,520+ Surveys Completed



Electronic Health Records  
287,000+ EHRs



Physical Measurements  
337,500+ Physical Measures



Biospecimens  
14,000,000+ Aliquots (DNA,  
RNA, serum, plasma, cfDNA,  
RNA, urine)



Mobile/Wearable Tech  
15,600+ Fitbit Records



Assays  
1,500,000+ Structural Variants



Omics  
312,900+ Genotyping Arrays  
245,350+ Whole Genome Sequences  
1,000+ Long-Read Sequences

The *All of Us* Researcher Workbench contains the one of the **largest sets of whole genome sequences widely available for research.**

The whole genome sequence dataset includes variation at more than **1 billion** locations, which is nearly **one-third** of the entire human genome





# All of Us Research Program's Commitment to Researcher Diversity

(as of August 26, 2024)



12,475+  
Registered  
Researchers



865+  
Organizations  
44 HBCUs and  
73 HSIs



610+  
Publications  
using *All of Us*  
data



135+  
International  
Institutions



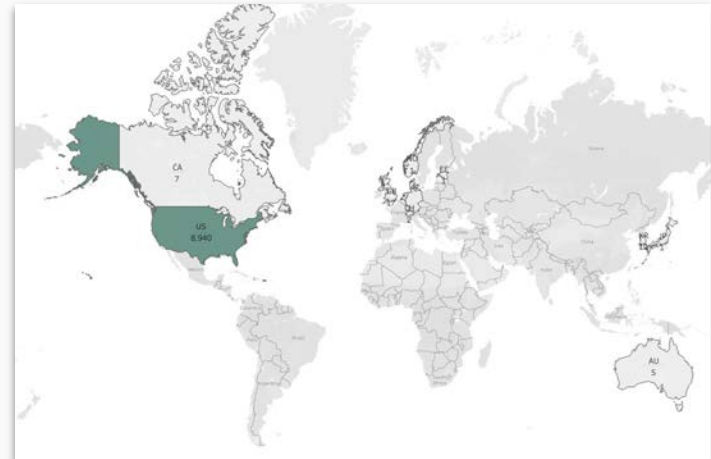
12,390+  
Workspaces Created



Baylor's UBR Faculty Summit

Over 78% of our researchers are underrepresented in the biomedical workforce, including more than 34% who are underrepresented by race and ethnicity (non-White and non-Asian researchers).

*All of Us* is open to national and international researchers at academic, not-for-profit, commercial, and health care institutions.



# The Exponential Growth of *All of Us*-Enabled Discoveries

## Article **nature** Genomic data in the All of Us Research Program

JAMA Network | **Open.**

Original Investigation | Equity, Diversity, and Inclusion

Prevalence of 12 Common Health Conditions in Sexual and Gender Minority Participants in the All of Us Research Program

Nguyen D, et al. *J Hum Genet.* 2023 Aug;68(8):565-570. doi: 10.1038/s10038-023-01147-z. Epub 2023 Apr 18.

**Abstract**  
Common and rare variants associated with cardiometabolic traits across 98,622 whole-genome sequences in the All of Us research program

**AJHG**

Xin Wang

All of Us Research Program

Lucila Ohno

Seung Hoan

Affiliations

PMID: 370726

**Abstract**

All of Us is a

in diverse hun

genomic data

diseases (atria

traits (height

**nature medicine**

Article

<https://doi.org/10.1038/s41591-023-02012-w>

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

Received: 28 Mar

Accepted: 15 Apr

Published online: 1

Check for up

**nature medicine**

Article

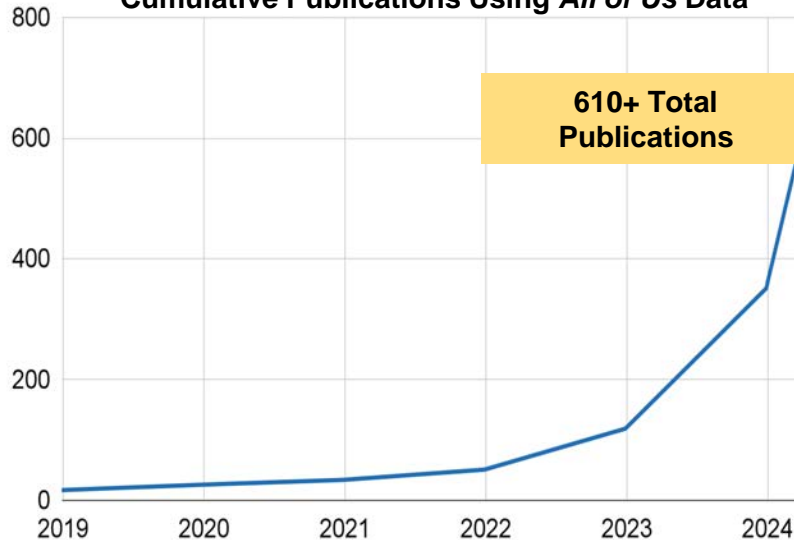
<https://doi.org/10.1038/s41591-024-02796-z>

**Selection, optimization and validation of ten chronic disease polygenic risk scores for clinical implementation in diverse US populations**

Research Highlights



Cumulative Publications Using *All of Us* Data



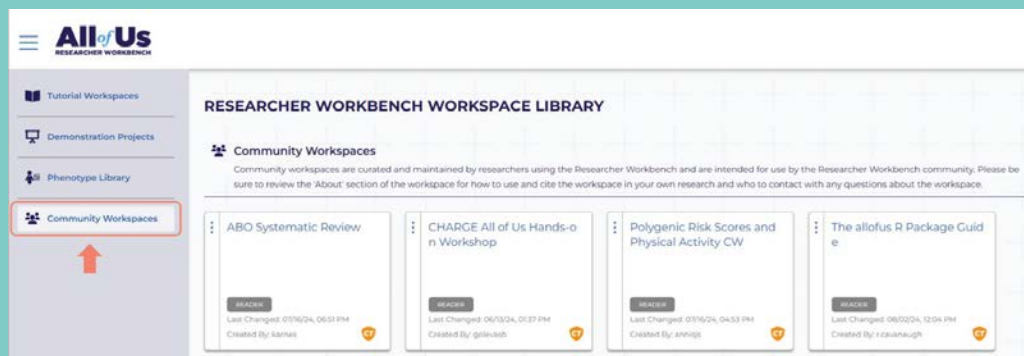
610+ Total Publications

# Researcher Workbench Supports Powerful Analyses and Collaboration

New tools added this year



## Community workspaces for sharing analyses



Visit <https://allof-us.org/3YMklbC> or scan the QR code to learn more

# "All by All" Analyses Uncovering ~500 Billion Gene-Phenotype Associations Results in Workbench; Public Website Coming in November

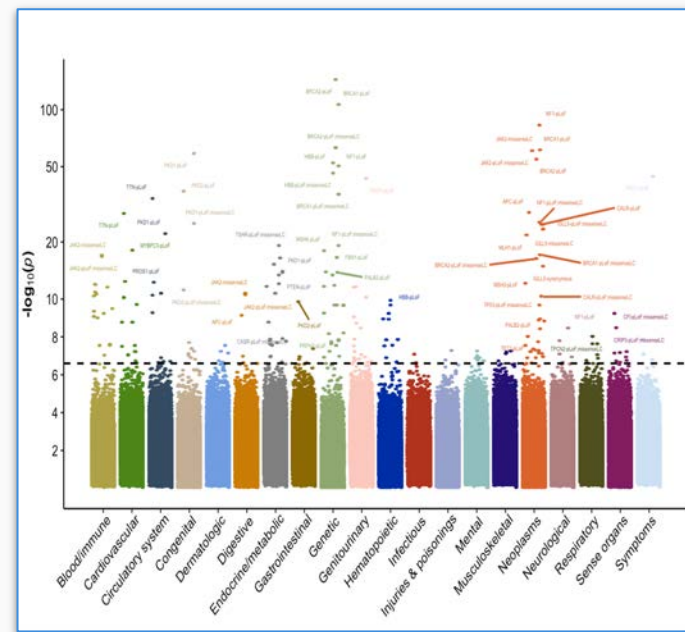
## Phenotypes with number of participants > 200 per group

All by All: Common and rare variant association testing in 250,000 whole genomes across diverse ancestry groups

Genetic ancestry group	Num. individuals	Num. variants
AFR	56,913	383,702,267
AMR	45,035	334,390,971
EAS	5,706	122,729,124
EUR	133,581	628,935,579
MID	942	41,842,694
SAS	3,217	83,584,317
Total	245,394	1,116,593,592

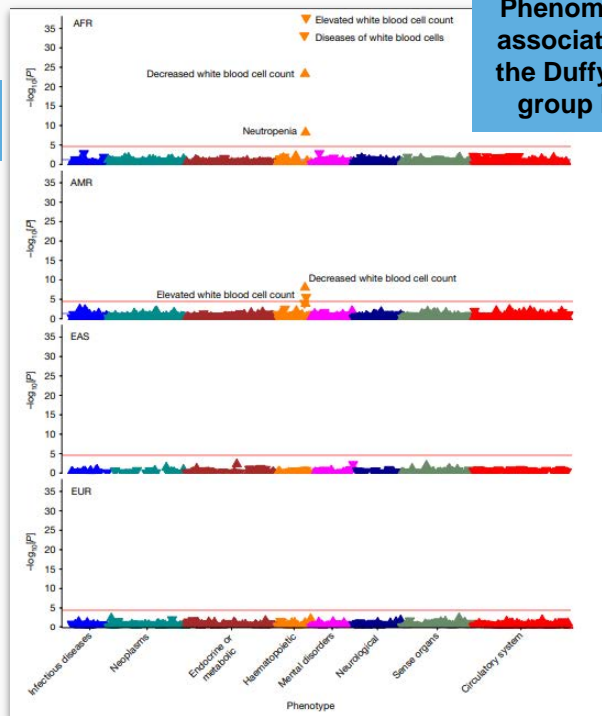
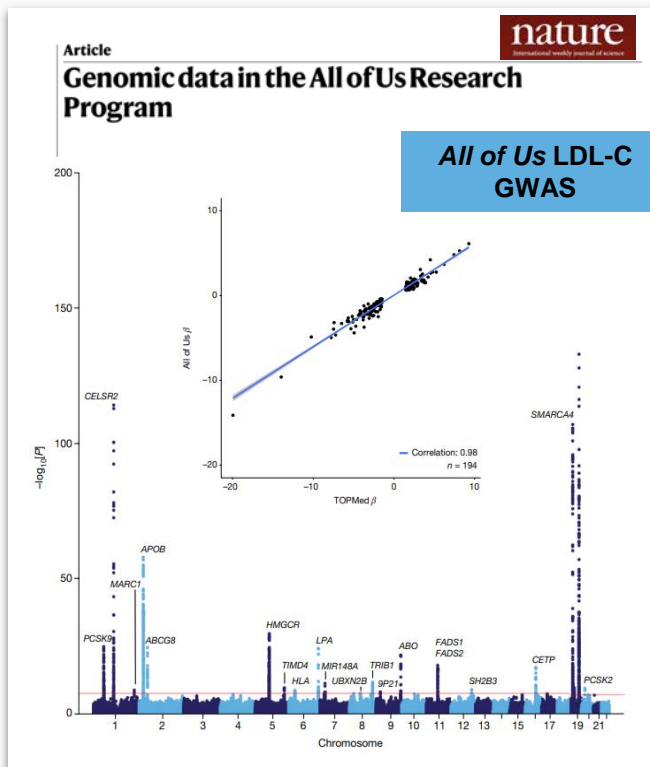
Category	AFR	AMR	EAS	EUR	MID	SAS
Lab measurements	12	12	12	12	12	12
Random phenotypes	30	30	30	30	30	30
mcc2 phecode	573	477	45	1000	1	20
mcc2 phecodeX	869	776	80	1361	0	42
r drug	758	715	357	857	42	288
pfhh survey	20	17	0	78	0	0
physical measurements	10	10	10	10	10	10
Total: 8,688	2,272	2,037	534	3,348	95	402

Lab values including: Cholesterol, Triglycerides  
Glucose, Hemoglobin



Associations across > 5K phecodes

# Using a Diverse Dataset to Discover Novel Genomic Variants



**>1 billion** genetic variants  
**>275 million** previously unreported genetic variants

**Tested for replications of 3,724 genetic variants associated with 117 diseases:**

AFR	AMR	EAS	EUR	SAS
18/25 replicated	13/13 replicated	7/15 replicated	1,064/1,421 replicated	1/1 replicated
72%	100%	46.6%	74.9%	100%

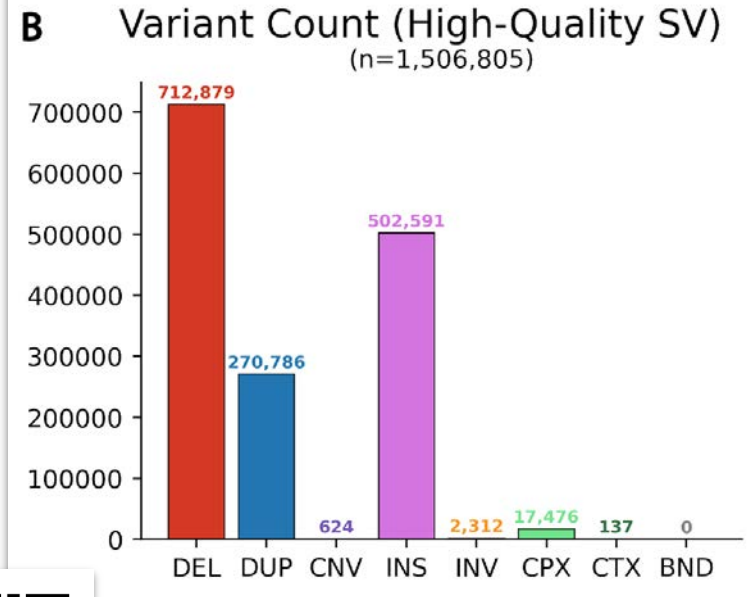
# Pioneering Genomic Research: Over 1.5 Million Structural Variants Ready for Discovery

*All of Us* greatly expanded the structural variant (SV) data available in the Researcher Workbench's Controlled Tier this summer.

Now, there are **more than 1.5 million SVs from nearly 98,000 participants with linked phenotype information**. This makes *All of Us* one of the largest and most widely available catalogs of SV data.

This release represents a huge step toward our goal of expanding the breadth and depth of genomic data:

<https://allof-us.org/SVData>.





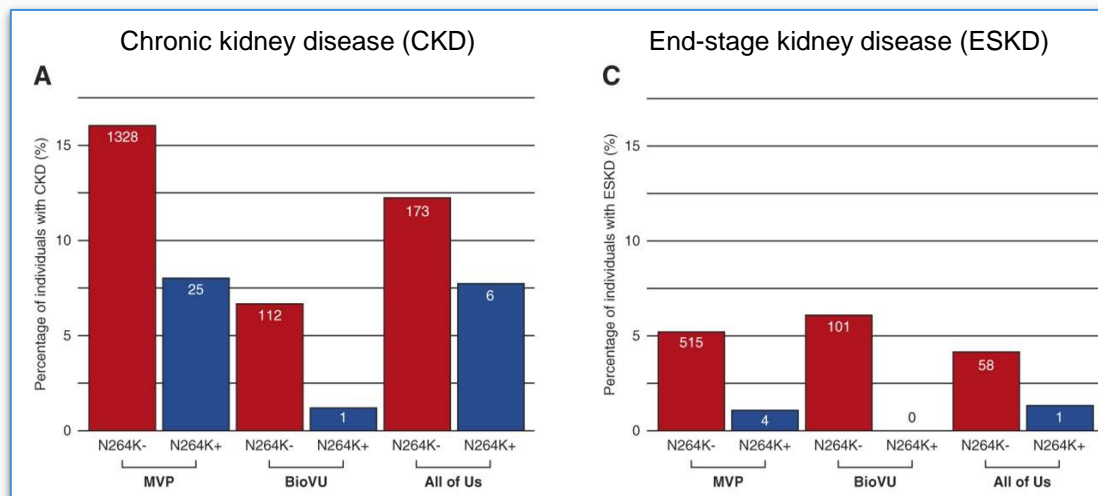
# Using Large, Diverse Datasets to Understand Disease Risk of *APOL1* Variants

Variants in the *APOL1* gene are associated with end stage kidney disease (ESKD) in people of African ancestry

70% of excess ESKD risk in African Americans is thought to be related to *APOL1*

## Significance:

- *All of Us* data from v5 with 98k WGS (v7 has 245k WGS — almost 2.5x increase!)
- Potential drug target for treating *APOL1* ESKD



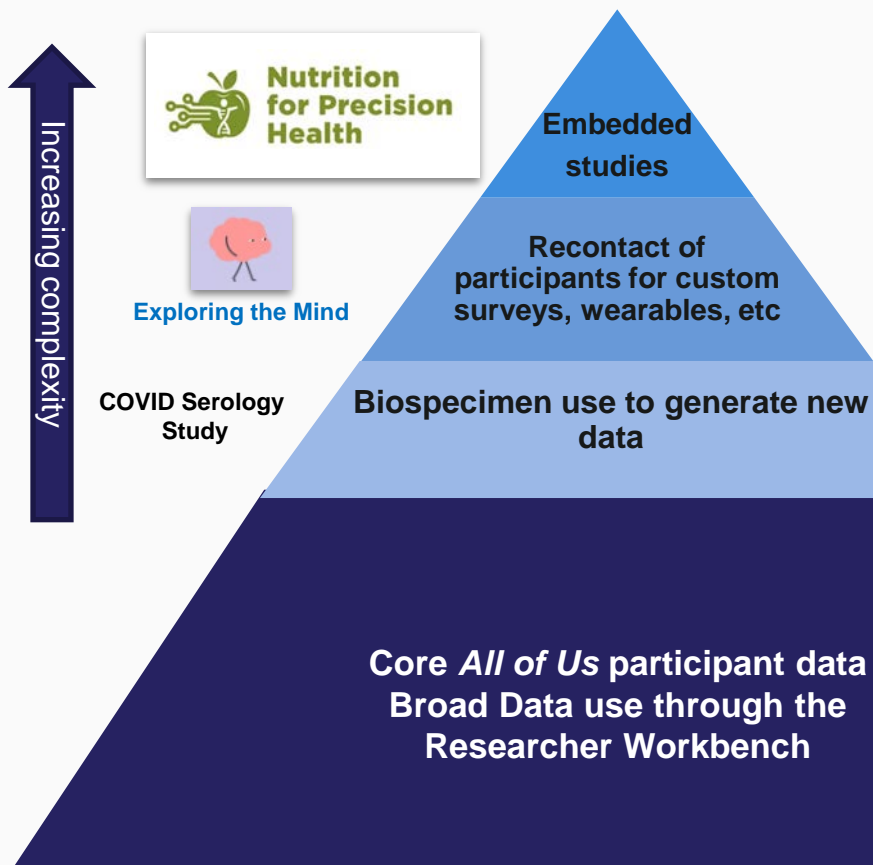
***APOL1* p.N264K is associated with a lower risk of CKD and ESKD**



Read the [Research Highlight](#)

Hung et al. (2023). *Journal of the American Society of Nephrology* : JASN

# All of Us Ancillary Studies



## Ancillary studies:

1. **Address important scientific questions** and deliver insights into health and disease.
2. **Expand the All of Us dataset** by adding new data and/or engaging unique participant communities.
3. **Enable research across boundaries** with novel analyses of lifestyle, environmental, and biologic data.

**23 NIH Institutes, Centers and Offices are involved in 9 completed, ongoing, and proposed ancillary studies.**

# Largest Precision Nutrition Research Effort of its Kind

## Nutrition for Precision Health



### Module 1: The Usual Diet Study

Examine baseline diet and physiological responses to meal challenges



### Module 2: The Provided Diet Study

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



### Module 3: The Live-in Diet Study

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

Researching how nutrition can be tailored to each person's **genes**, **culture**, and **environment** to **improve health**

Involving at least **8,000 All of Us** participants

A screenshot of a video player from GMA. The video shows a woman sitting in a chair while a man in a blue hoodie measures her blood pressure. The video player has a play button icon in the center. The GMA logo is in the top left corner, and navigation links for Video, Shop, Culture, Family, Wellness, Food, Living, and Style are in the top right. A search icon and 'Newsletter' link are also present. Below the video, there is a title 'WELLNESS — May 3, 2024' and a main headline 'Becky Worley on what it's like to join a research study'. Below the headline is a short paragraph: 'ABC News' Becky Worley took part in a study being performed by the National Institutes of Health that could be a game-changer for health research.' Social media sharing icons for Facebook, X, and Email are at the bottom right of the video player.







[Watch the Video](#)

# All of Us x NIMH: Cognitive Leaps with 10x More Data from 50K Minds in 6 Months

## Exploring the Mind

Help us learn more about behavior and how the brain works.

### Available tasks

	<b>City or Mountain</b> React to photographs. (6-10 minutes)	<a href="#">Start</a>
	<b>Guess the Emotion</b> Look at a series of faces. (2-5 minutes)	<a href="#">Start</a>
	<b>Now or Later</b> Choose between example rewards. (5-7 minutes)	<a href="#">Start</a>
	<b>Left or Right</b> Focus on the middle arrow. (5-7 minutes)	<a href="#">Start</a>

**All of Us** collected 10x more task completions in ~6 months than the Many Brains project collected in >10 years.



Over 73,000 participants have completed tasks and their responses overlap with other biomedical data types in *All of Us*:

- 94% have provided physical measurements
- 93% donated biospecimens
- 89% completed both mental health and well-being surveys
- 60% have EHR data

# Exposome Ancillary Study on Environmental Health Launched in July

National Institute of Environmental Health Sciences (NIEHS) and *All of Us* launched a new ancillary study to assess **environmental exposures** and their interactions with genomic and behavioral health factors. Initial investigation is for participants with Type 2 diabetes (incident since joining *All of Us*). These data will become available to all approved *All of Us* researchers.

This study will perform **untargeted metabolomics on >5,600 diverse participant samples** to measure environmental exposures.

Samples selected for multi-omics overlap, including ~80% UBR and ~66% UBR R/E

Data on **environmental, pharmaceutical, dietary, and endogenous metabolites** will be added to existing *All of Us* data in 2026.

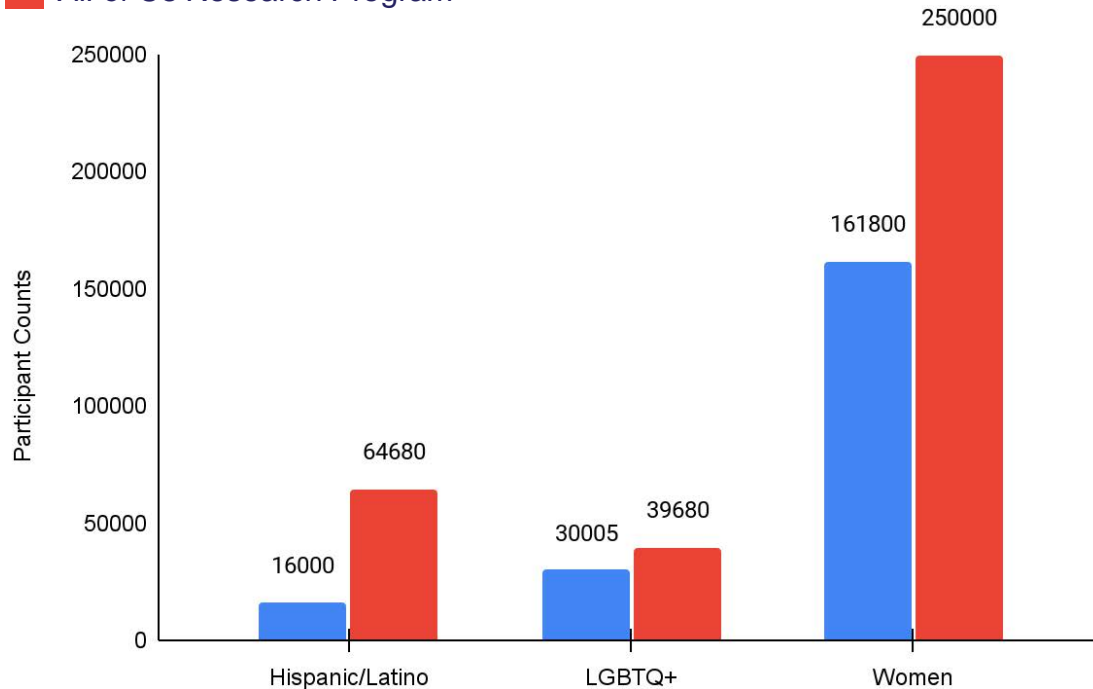


New research on environment, gene, and behavior interactions will **drive discovery across health conditions.**

By leveraging *All of Us* as a platform for this research, NIEHS was able to begin data collection <1 year after submitting their initial proposal and reduced the cost of this study by 75%.

# Inclusion in *All of Us* Compared to Other Community-Specific Cohorts

Other Demographic-Specific Cohort Study  
*All of Us* Research Program

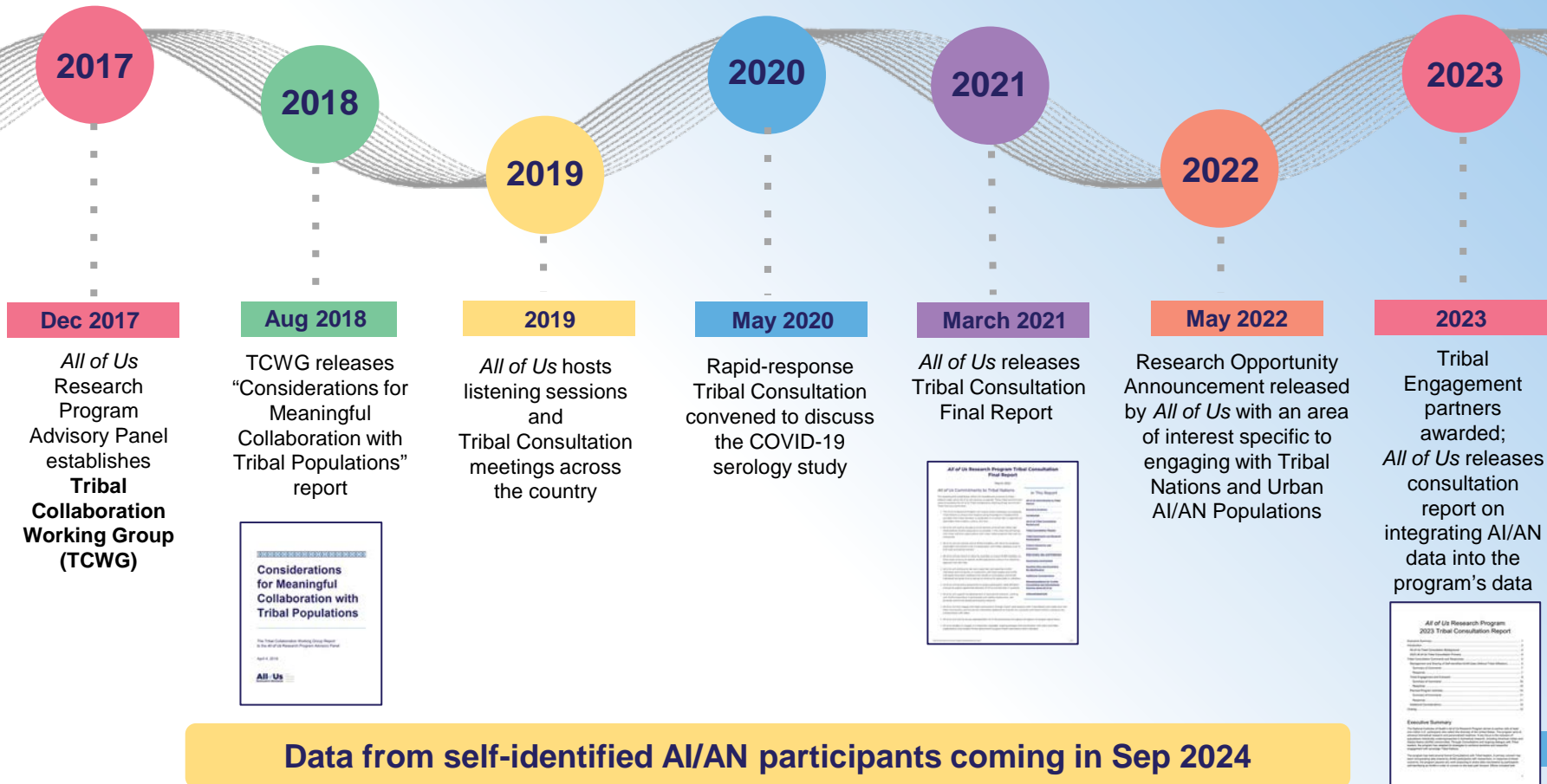


*All of Us* has unprecedented representation compared to other major studies including:

- Hispanic Community Health Study/Study of Latinos
- PRIDENet
- Women's Health Initiative
- RURAL Cohort Study



# Brief Milestones of *All of Us* Consultation & Tribal Engagement



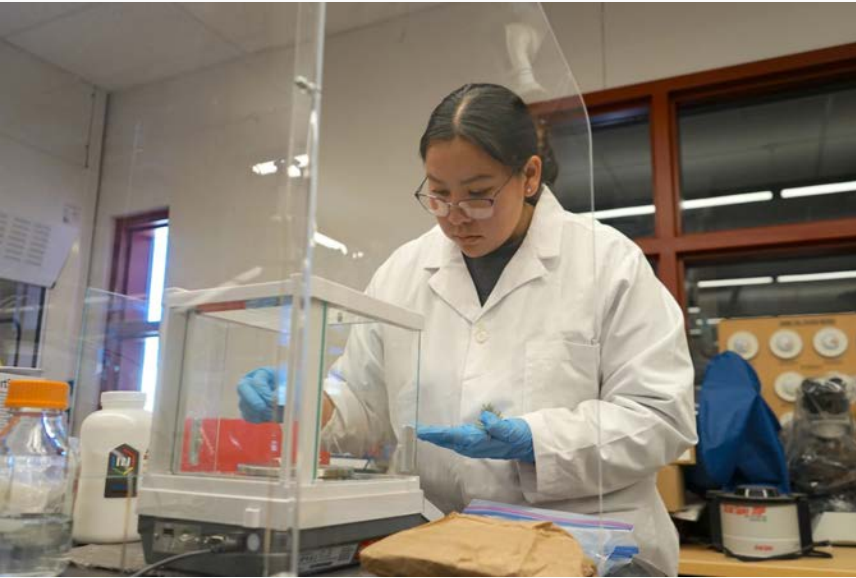
# Intentional and Thoughtful Outreach Driven by Foundational Commitments



Visit <https://allof-us.org/TribalEngagement> or scan the QR code to learn more

- We will **respect Tribal sovereignty** by engaging Tribal Nations to ensure that research using the program's biospecimens and data from Tribal members is done in a way that is respectful and transparent.
- **We will not recruit on Tribal lands or share information about participants' Tribal affiliation** without first getting approval from the Tribe.
- We will **support the development of educational materials** for researchers and participants, work with AI/AN researchers in partnership with AI/AN communities, and promote community-based participatory research.
- We will work to **ensure representation of AI/AN populations** throughout all aspects of program governance.

# Indigenous-led Demonstration Projects for In-Depth First Look at AI/AN Data



*All of Us* awarded the American Indian Science and Engineering Society (AISES) to create and promote the “We Are All Scientists” campaign, focused on Indigenous workforce diversity.

## Phenotypic/Survey Project

**Purpose:** To analyze and compare non-genomic data in comparison to the NHLBI Strong Heart Study

## Genotypic Project

**Purpose:** To compare data to reference populations and associations with elevated disease risk and prevalence factors

**Goal:** To publish these findings, along with a marker paper describing the program’s Tribal engagement and outreach efforts to date

# Communications About AI/AN Data Update

To date, data from self-identified AI/AN participants has not been included in the data available to registered researchers or in the Public Data Browser.

Through the years, we have conducted an extensive series of Tribal consultations and engagement activities to work towards the inclusion of data from self-identified AI/AN participants in the *All of Us* Researcher Workbench.

When this time comes, communications about this data update will be shared through a comprehensive notification plan including:

- Advance notifications to NIH and HHS Tribal advisory groups and collaborators
- Message to AI/AN participants
- Updates to *All of Us* websites
- Information for investigators, including *All of Us*' new policy "Respectful Research Involving American Indian and Alaska Native Populations" and a research guide coming soon



# Coming in September: Incredible New Data on the Researcher Workbench

Total participants will increase from 413k to 633k (+53%)



**429,000+**

With genotyping  
arrays

(+37%)



**400,000+**

With whole genome  
sequences (WGS)

(+63%)



**2,700+**

Long-Read Sequences

(+170%)



**633,000+**

With survey  
responses

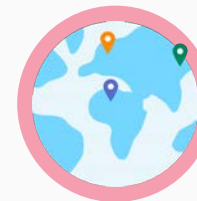
(+53%)



**59,000+**

With Fitbit  
records

(+278%) 6.3 TB!



**633,000+**

Racial and Ethnic  
Subcategories

(+53%)



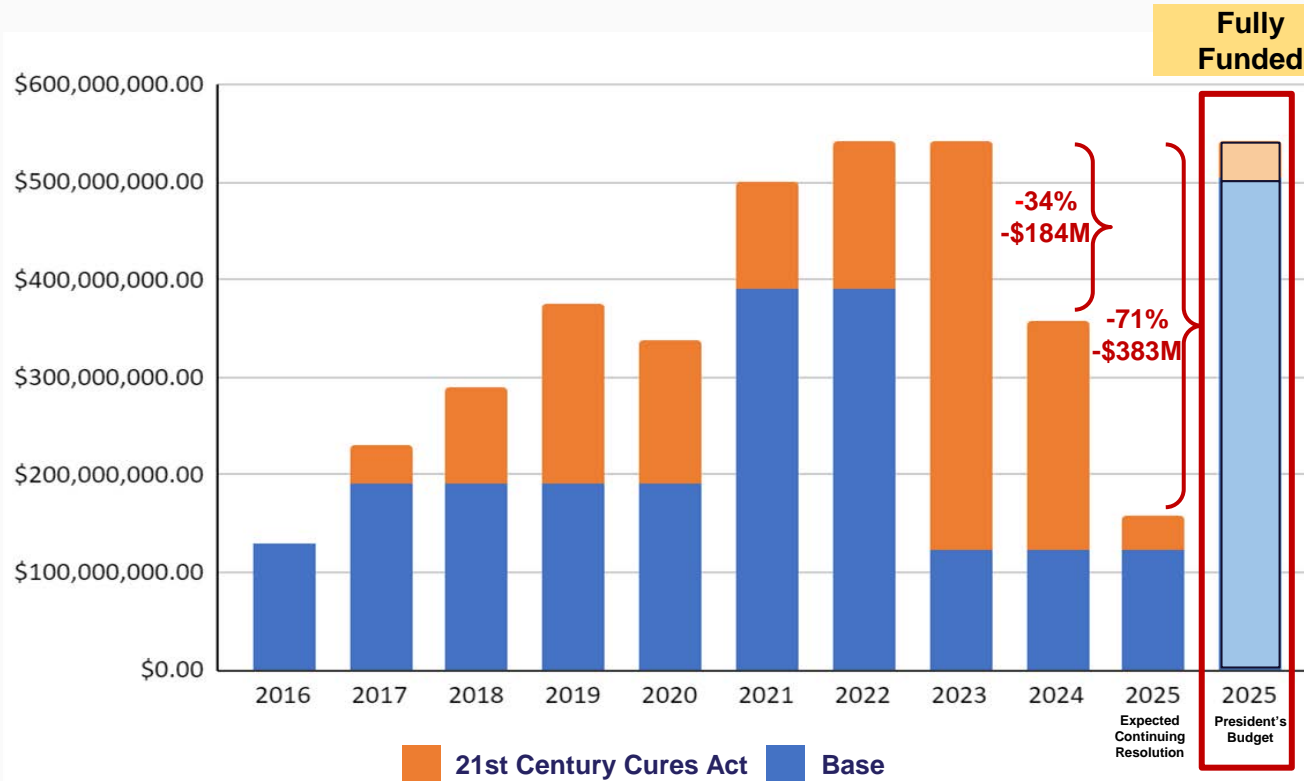
**Self-Identified AI/AN  
Participant Data**

# Budget Background and FY25 Budget Requirements

**FY25 President's Budget Request: \$541M**

Senate FY25 Labor-HHS bill **restored funding** for the program to the FY23 enacted level of \$541M.

If the base allocation stays flat, when the Cures Act funding drops, **the program's budget will be cut an additional 56%.**



\*During the Aug. 1st FY25 L-HHS markup, Subcommittee Chair Tammy Baldwin (D-WI) and Ranking Member Shelley Moore Capito (R-WV) strongly supported advancing precision medicine by restoring full funding to *All of Us*.



# Pediatrics: Limited Launch Now; Ready to Expand when Funding Permits

## Now Enrolling Ages 0-4 at Five Clinical Sites



“Data from children and parents will allow researchers to elucidate the biological, social, and environmental influences that impact our health over time.”



[Read the Press Release](#)





[All of Us.NIH.gov](https://www.AllofUs.NIH.gov)

[JoinAll of Us.org](https://www.JoinAll of Us.org)

[ResearchAll of Us.org](https://www.ResearchAll of Us.org)



**Thank you!**

@All of UsResearch  
@All of UsCEO  
#JoinAll of Us



**Thank you to our 832,000+ participants!**