

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, D.C. 20549

**FORM 8-K**

**CURRENT REPORT**

Pursuant to Section 13 15(d) of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): January 18, 2022

**23andMe Holding Co.**

(Exact name of registrant as specified in its charter)

Delaware  
(State or other jurisdiction  
of incorporation)

001-39587  
(Commission  
File Number)

87-1240344  
(IRS Employer  
Identification No.)

223 N. Mathilda Avenue  
Sunnyvale, California 94086  
(Address of principal executive offices, including zip code)

Registrant's telephone number, including area code: (650) 938-6300

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Class A Common Stock, \$0.0001 par value per share	ME	The Nasdaq Global Select Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

**Item 7.01. Regulation FD Disclosure.**

On January 18, 2022, 23andMe Holding Co. (the “Company”) hosted a virtual R&D Day for investors. A copy of the presentation is included as Exhibit 99.1 to this Current Report on Form 8-K and incorporated herein by reference.

In addition, on January 18, 2022, the Company issued a press release announcing that GlaxoSmithKline plc (“GSK”) elected to exercise its option to extend the exclusive target discovery period of the ongoing collaboration with the Company for an additional year to July 2023 and that the Company elected to take a royalty option on its joint immuno-oncology antibody collaboration program with GSK targeting CD96. A copy of the press release is included as Exhibit 99.2 to this Current Report on Form 8-K and incorporated herein by reference.

The information in this report furnished pursuant to Item 7.01, including Exhibit 99.1 attached hereto, shall not be deemed “filed” for the purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), or otherwise subject to the liabilities of that section. It shall not be deemed to be incorporated by reference into any of the Company’s filings under the Exchange Act or the Securities Act of 1933, as amended, whether made before or after the date hereof and regardless of any general incorporation language in such filings, except to the extent expressly set forth by specific reference in such a filing.

**Item 9.01. Financial Statements and Exhibits.**

(d) Exhibits.

<u>Exhibit No.</u>	<u>Description of Exhibit</u>
99.1	<a href="#">23andMe Holding Co. R&amp;D Day Presentation, dated January 18, 2022</a>
99.2	<a href="#">23andMe Holding Co. Press Release, dated January 18, 2022</a>
104	Cover Page Interactive Data File - the cover page interactive data file does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document

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**SIGNATURES**

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

**23ANDME HOLDING CO.**

By: /s/ Kathy Hibbs  
Name: Kathy Hibbs  
Title: Chief Legal and Regulatory Officer

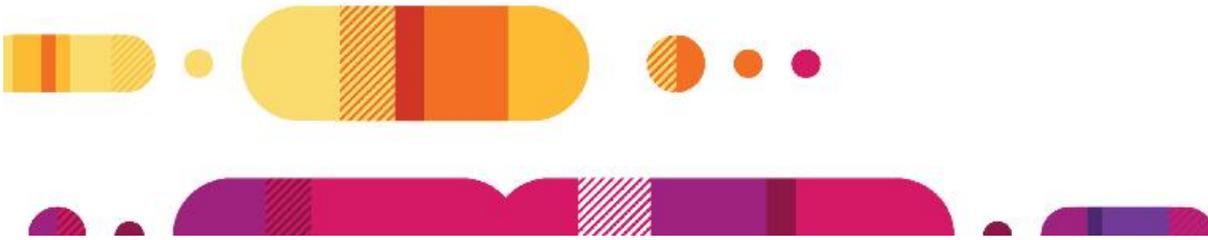
Dated: January 18, 2022

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# 23andMe R&D Day

January 18, 2022



# Disclaimer

## Forward-Looking Statements

This presentation contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, including statements regarding the future performance of 23andMe's businesses in consumer genetics and therapeutics and the growth and potential of its proprietary research platform. All statements, other than statements of historical fact, included or incorporated in this presentation, including statements regarding 23andMe's strategy, financial position, funding for continued operations, cash reserves, projected costs, plans, and objectives of management, are forward-looking statements. The words "believes," "anticipates," "estimates," "plans," "expects," "intends," "may," "could," "should," "potential," "likely," "projects," "continue," "will," "schedule," and "would" or, in each case, their negative or other variations or comparable terminology, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. These forward-looking statements are predictions based on 23andMe's current expectations and projections about future events and various assumptions. 23andMe cannot guarantee that it will actually achieve the plans, intentions, or expectations disclosed in its forward-looking statements and you should not place undue reliance on 23andMe's forward-looking statements. These forward-looking statements involve a number of risks, uncertainties (many of which are beyond the control of 23andMe), or other assumptions that may cause actual results or performance to be materially different from those expressed or implied by these forward-looking statements. The forward-looking statements contained herein are also 8-K filed with the Securities and Exchange Commission ("SEC") on June 21, 2021 and in 23andMe's Current Report on Form 10-Q filed with the SEC on November 10, 2021, as well as other filings made by 23andMe with the SEC from time to time. Investors are cautioned not to place undue reliance on any such forward-looking statements, which speak only as of the date they are made. Except as required by law, 23andMe does not undertake any obligation to update or revise any forward-looking statements whether as a result of new information, future events, or otherwise.

## Intellectual Property

All rights to the trademarks, copyrights, logos and other intellectual property listed herein belong to their respective owners. 23andMe's use thereof does not imply an affiliation with, or endorsement by the owners of such trademarks, copyrights, logos and other intellectual property. Solely for convenience, trademarks and trade names referred to in this Presentation may appear with the ® or ™ symbols, but such references are not intended to indicate, in any way, that such names and logos are trademarks or registered trademarks of 23andMe.

## Industry and Market Data

This Presentation relies on and refers to certain information and statistics based on 23andMe's management's estimates, and/or obtained from third party sources which it believes to be reliable. 23andMe has not independently verified the accuracy or completeness of any such third party information.

# Agenda

**Introduction** – Anne Wojcicki, CEO and Co-Founder

## **23andMe Therapeutics**

Therapeutics program overview – **Kenneth Hillan, Head of Therapeutics**

Target discovery vision – **Joe Arron, Chief Scientific Officer, Therapeutics**

Genetics-based target discovery – **Adam Auton, VP of Human Genetics**

CD200R1 immuno-oncology program – **Jennifer Low, Head of Therapeutics Development and Adrian Jubb, Sr. Clin. Dev. Fellow, Therapeutics**

CD96 immuno-oncology program – **Jennifer Low, Head of Therapeutics Development**

Using genetics to inform clinical development – **Jennifer Low, Head of Therapeutics Development**

Therapeutics program concluding remarks – **Kenneth Hillan, Head of Therapeutics**

## **23andMe Consumer**

Genetics-based primary care – **Paul Johnson, VP, General Manager, Consumer**

The power of polygenic risk scores (PRS) for personalized health – **Geoff Benton, Director, Product R&D**

Delivering a genetic-based primary care service – **Davis Liu, Chief Clinical Officer**

**Concluding Remarks** – Anne Wojcicki, CEO and Co-Founder

**Q&A**

# Introduction

Anne Wojcicki  
CEO and Co-Founder

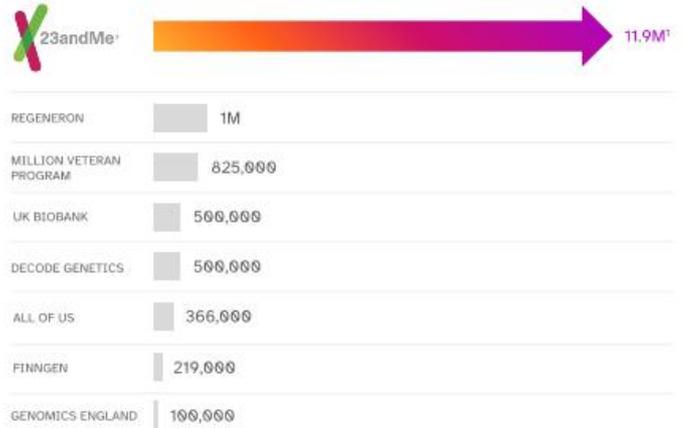
## Today's News on 23andMe and GSK Collaboration

- **GSK has elected to extend the exclusive target discovery period of the collaboration for a fifth year**
  - We will continue to discover and validate novel drug targets using 23andMe's proprietary genetic and health survey database
  - 23andMe will receive a one-time payment of \$50 million
  
- **23andMe elects for royalty option on collaboration program targeting CD96**
  - 23andMe will be eligible to earn tiered worldwide royalties up to the low double digits
  - The worldwide royalty option curtails 23andMe's future investment in this program and provides 23andMe with a potentially high value revenue stream if the program is successful

# FY2022 Highlights

- Advanced a **wholly owned immuno-oncology program into Phase 1** study
- Acquired **Lemonaid Health** to expand into Primary Care and Pharmacy
- Received **FDA clearance** for HOXB13 **hereditary prostate cancer**
- Released **14** new genetic **health predisposition reports**
- Reported on **key genetic research findings** on COVID-19, reproductive lifespan in women, depression, Parkinson's disease, and more
- Added a new ancestry analysis, including additional insights into some customers' **indigenous genetic ancestry** from **North America** and **ancestral connections to 25 African ethnolinguistic groups**

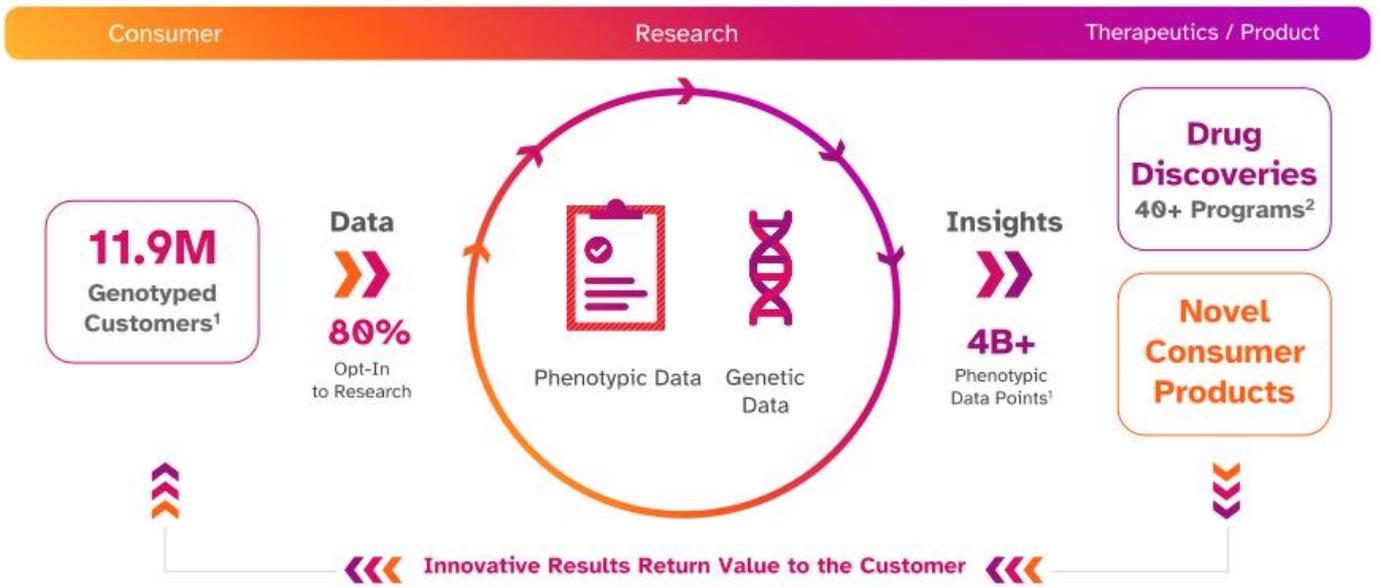
# Our Mission is to Help People **Access, Understand,** and **Benefit** from the **Human Genome**



Size and scale of 23andMe enables rapid, novel discoveries

# Consumer Powered Healthcare Flywheel

We run hundreds of billions of association tests per year that further our unique understanding of human biology



1. As of September 30, 2021. 2. As of March 31, 2021. Programs include collaborated, 100% owned and royalty interest targets.

## What's Coming:

- **Next Generation Reports:** Polygenic Risk Score reports that incorporate lifestyle factors to improve risk estimates
- **Genetics-based Primary Care:** Delivering personalized, prevention-oriented, genetics-based healthcare at scale by integrating Lemonaid Health's digital health platform with 23andMe's personal genetic services
- **Advancing Therapeutics Pipeline:** Advancing a pipeline of multiple clinical and research stage investigational programs addressing targets validated by human genetics

# Therapeutics Program Overview

Kenneth Hillan, M.B., Ch.B.  
Head of Therapeutics

## Limited Use of Genetic Data and Lack of Patient Engagement Constrain Productivity

## Drug Development is Inefficient



1. IND = Investigational New Drug Application. [fdareview.org](https://www.fda.gov/oc/ohrt/ohrt-review-process), "The Drug Development and Approval Process" (2020).  
2. Probability of success for a drug to be approved is estimated to be <12%.  
3. PhRMA, "Biopharmaceutical Research & Development: The Process Behind New Medicines" (2015).

**Pharmaceutical Industry**



**23andMe**



NATURE GENETICS PUBLICATION

**The support of human genetic evidence for approved drug indications**

*Nelson et. al 2015*

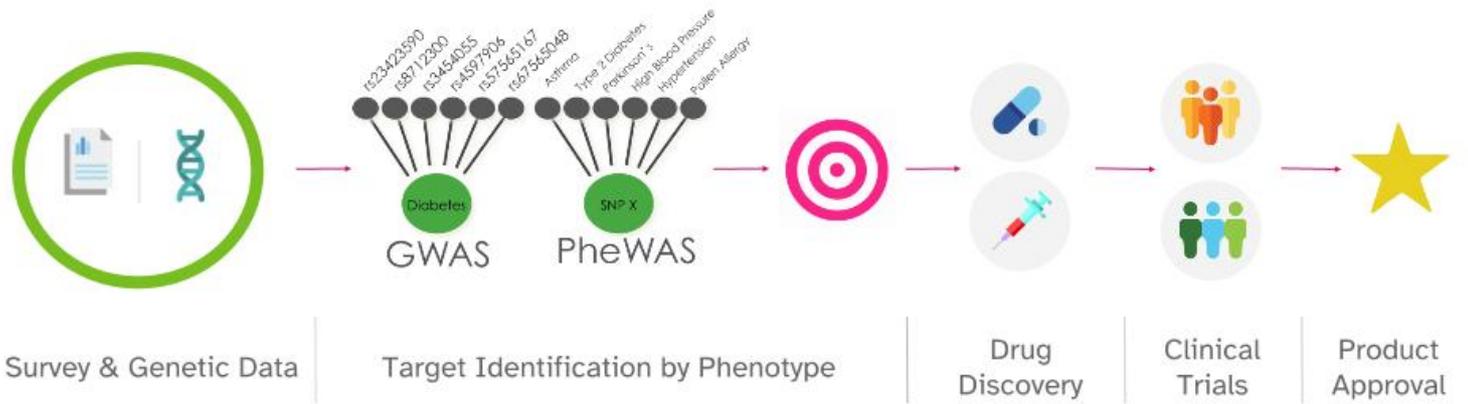
<sup>1</sup>IND = Investigational New Drug Application, fdareview.org, "The Drug Development and Approval Process" (2020).

<sup>2</sup> Probability of success for a drug to be approved is estimated to be <12%, PhRMA, "Biopharmaceutical Research & Development: The Process Behind New Medicines" (2015).

<sup>3</sup> Nature Genetics Publication, "The support of human genetic evidence for approved drug indications" (2015).

Potential to More Efficiently Develop Novel Therapeutics by **"Power, Need, and Speed"**

# DNA-based Target Discovery Playbook: How it works



# Our Scale Enables Real-Time Genetics Health Research<sup>1</sup>



**1,876,573**  
High cholesterol

**358,275**  
Type 2 Diabetes

**37,853**  
Type 1 Diabetes



**1,785,456**  
Depression

**2,355,068**  
APOE e4 carriers  
(Alzheimer's risk)

**85,604**  
Epilepsy



**1,113,057**  
Asthma

**667,019**  
Eczema

**250,764**  
Psoriasis



**634,734**  
Irritable Bowel

**107,126**  
UC / Crohn's

**64,800**  
Barrett's Esophagus



**534,696**  
Arrhythmia

**159,135**  
Coronary Artery

**42,836**  
Pulmonary Embolism



**9,047**  
Systemic Sclerosis

**7,334**  
Sarcoidosis

**4,528**  
Idiopathic Pulmonary  
Fibrosis

<sup>1</sup>As of August 2, 2021. <sup>2</sup>As of September 2021. <sup>3</sup>23andMe COVID-19 manuscript live on MedRxiv September 7, 2020.

**1,287,060**<sup>2</sup>  
COVID-19 study participants

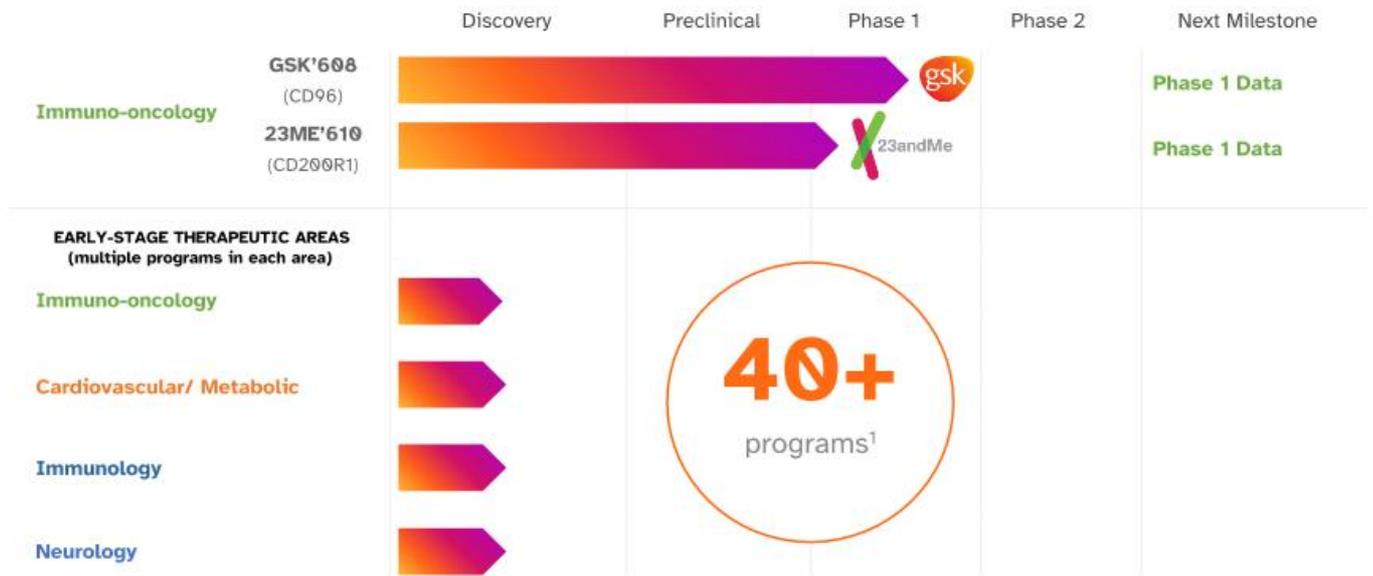
**750K**  
Consumers participated  
in the COVID-19 study  
in the **first 90 days**

## COVID-19 Research (2020)

- **March 16** Kicked Off Study
- **April 6** Launched Study
- **June 8** Preliminary Findings
- **Sept. 7** Posted Findings<sup>3</sup>

Re-contactable Customers  
Participate in Health Research

# We Have Generated a Research and Development Pipeline Covering Multiple Therapeutic Areas



<sup>1</sup>40+ programs in the combined therapeutic areas. Programs include collaborated, 100% owned and royalty interest targets. Note: As of March 31, 2021

# Target Discovery Vison

Joe Arron, M.D., Ph.D.

Chief Scientific Officer, Therapeutics

# My Background

- MD/PhD **Cornell** and **Rockefeller**
- Postdoc **Stanford**
  
- **Genentech** 2006-2021
  - VP and Senior Fellow, Immunology Research
    - Led target discovery for inflammatory, fibrotic, & ophthalmic diseases across >20 laboratories
  - Developed forward & reverse translational strategies across multiple disease areas
  - Contributed to >25 clinical programs from discovery through postmarketing
  - Authored >75 peer-reviewed publications

# Human Genetics has the Potential to Double the Probability of Success in Drug Development

## Reasons for failure



### **Wrong target**

- Hypothesized target not a critical node in disease pathogenesis
- Safety issues associated with target



### **Wrong drug**

- Insufficient affinity/avidity; off-target effects
- Poor PK/tissue penetration/inadequate dosing



### **Wrong outcomes**

- Clinical outcome measure not related to biology of target
- Clinical outcome measure not relevant in trial population

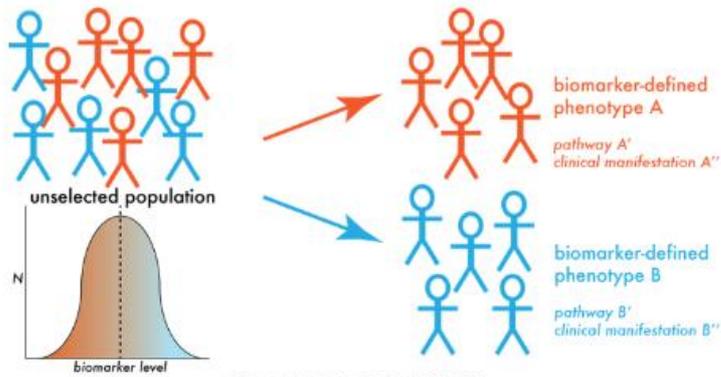
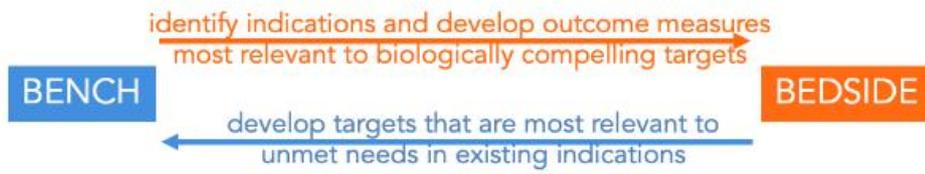


### **Wrong patients**

- Patients not properly stratified according to molecular, pathophysiological, or clinical heterogeneity
- Trials underpowered to detect an effect in the right subset

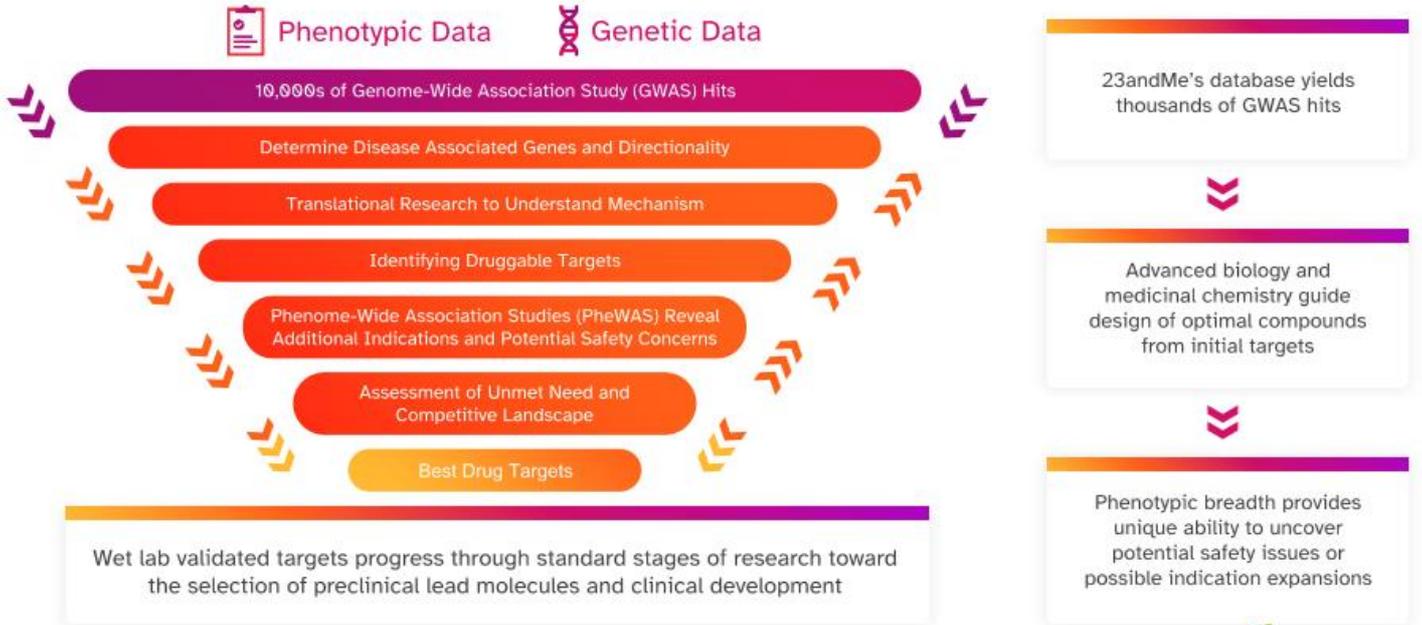
*Our rich database and translational focus has the potential to mitigate these and increase probability of success*

# Focusing on Translational Research to Link Targets and Outcomes



Townsend & Aron. Nat Rev Drug Discov 15:517 (2016)

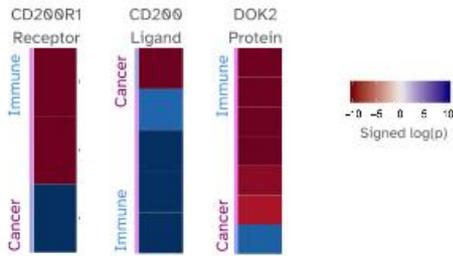
# Systematic, Scalable Research Platform Yields Novel Drug Targets



# Leveraging our database: I/O signature implicates CD200R1 pathway

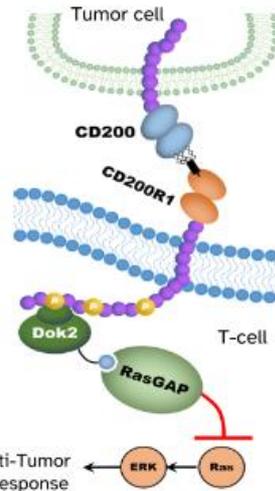
CD200R1 pathway identified as a critical immune checkpoint with our I/O genetic signature

I/O genetic signature shows opposing effects on autoimmune and cancer phenotypes



Implicates **3 components** of the CD200R1 signaling pathway

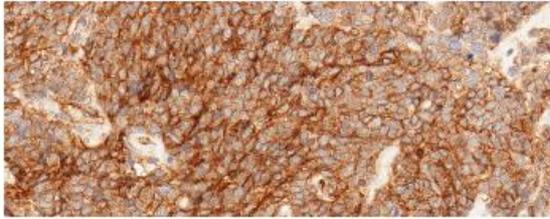
## CD200:CD200R1 Signaling



*We are applying similar approaches to many diseases that are well-represented in our database*

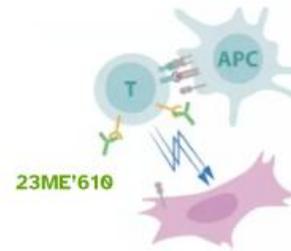
# 23ME'610 is an antibody against CD200R1 that can block CD200-mediated immune suppression

**CD200 is strongly expressed in a subset of human tumors**



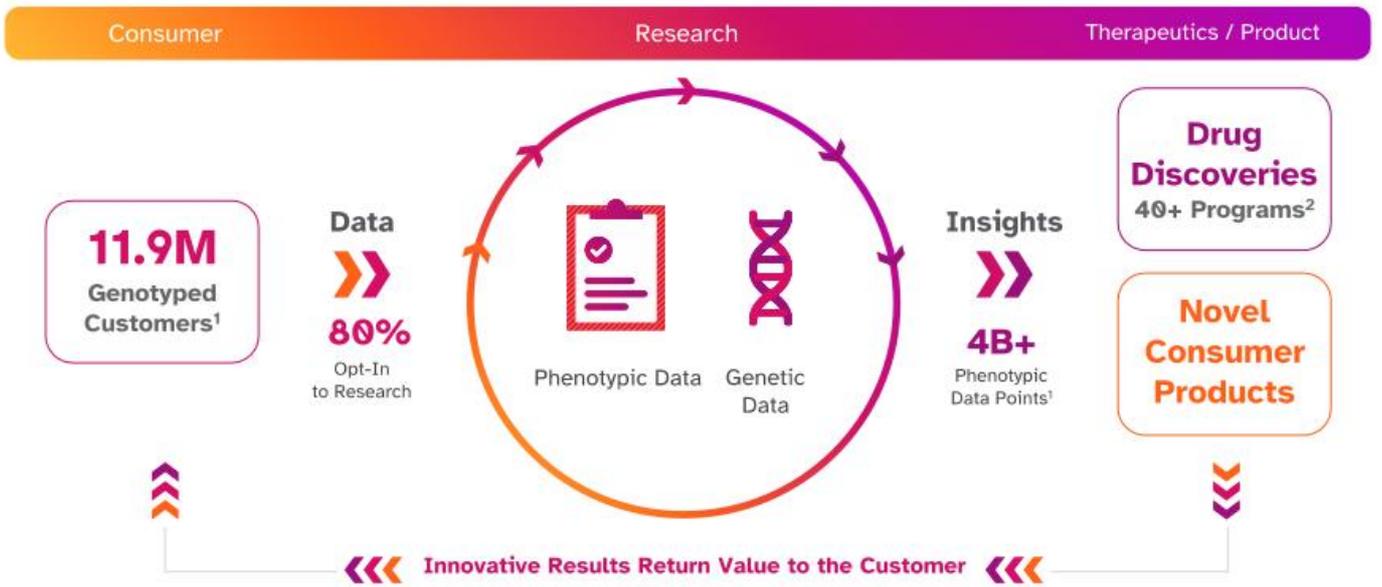
CD200 immunohistochemistry (brown) shows expression on tumor cells

**Inhibiting CD200R1 signaling enhances anti-tumor immune responses**



# Consumer Powered Healthcare Flywheel

We run hundreds of billions of association tests per year that further our unique understanding of human biology



1. As of September 30, 2021. 2. As of March 31, 2021. Programs include collaborated, 100% owned and royalty interest targets.

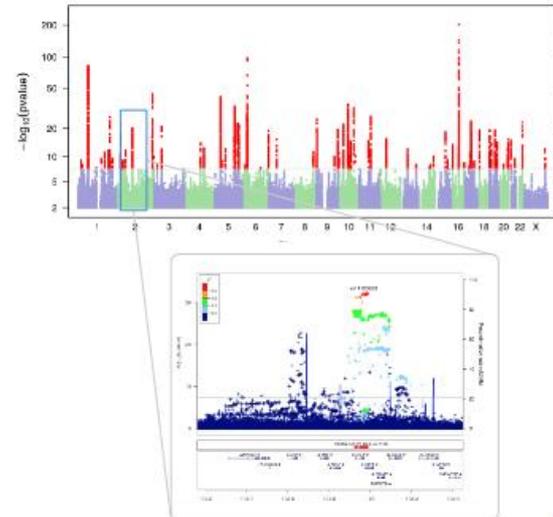
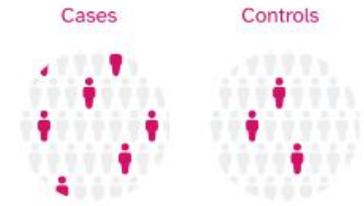
# Genetics-based Target Discovery

Adam Auton, Ph.D.  
Vice President, Human Genetics

# Genome-Wide Association Studies (GWAS)

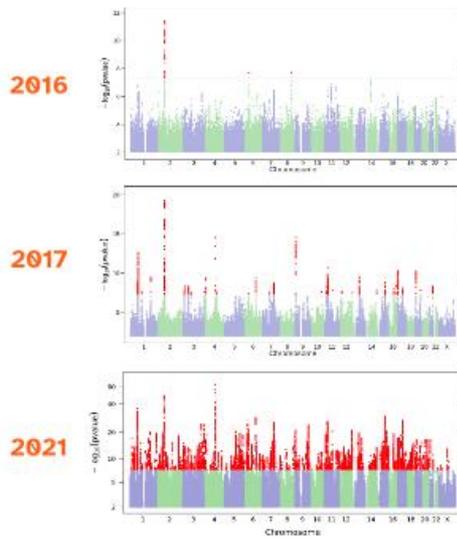
- » GWAS is a statistical analysis of Single Nucleotide Polymorphisms (SNPs), looking To identify differences in frequency between disease cases and controls.
- » SNPs linked with disease will be found at different frequencies in cases versus controls.
- » Association is represented by the level of statistical significance (p-value) of the SNP frequency difference.
- » SNPs can be tested across the genome and mapped to specific regions.

Single Nucleotide Polymorphism (SNP)  
GGCCAGCTGGACGAGG  
GGCCAGCTGGATGAGG

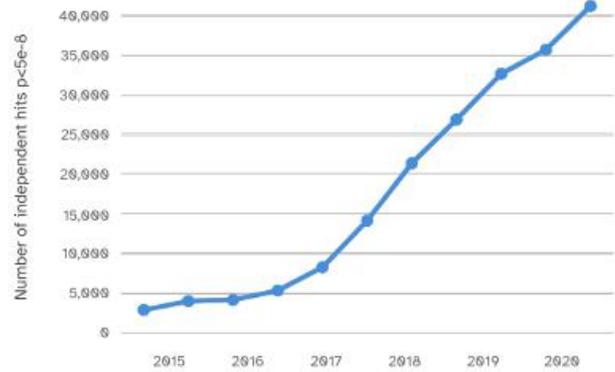


# Size and Scale Accelerate Target Discovery

Example: Number of Osteoarthritis GWAS<sup>1</sup> hits dramatically increase as database grows



New programs are identified through GWAS<sup>1</sup> hits, which increase as size of database grows



<sup>1</sup> GWAS: Genome-Wide Association Study.

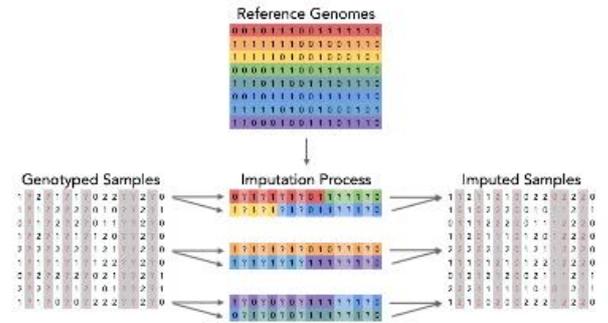
# The Vast Majority of GWAS Discoveries Can be Made Without Large-scale Sequencing

» Nearby genetic variants are correlated with each other. Knowing the variants one position allows the nearby variants to be inferred.

- E.g. Fill in the blanks:

**The q\*\*k brown f\*x jumps ov\*r the \*\*zy dog.**

- The same principle applies in genetics. The process of filling in the gaps is known as 'genotype imputation'.



# The Vast Majority of GWAS Discoveries Can be Made Without Large-scale Sequencing

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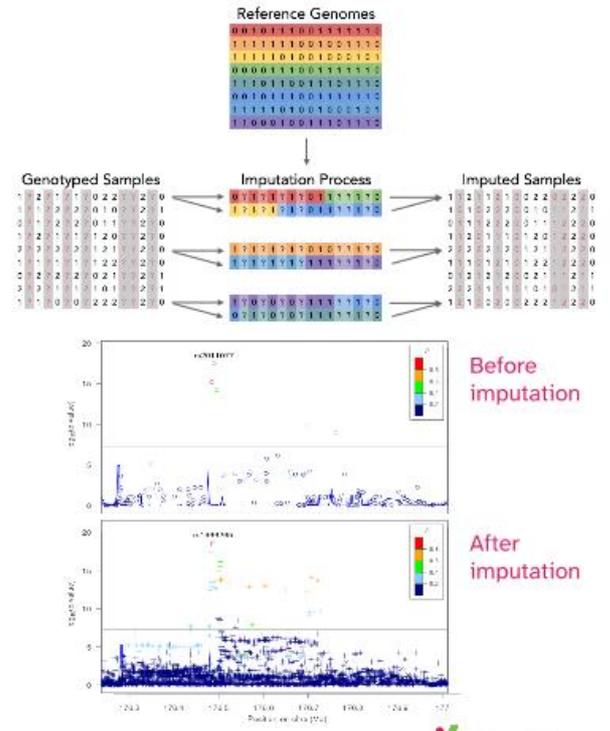
- E.g. Fill in the blanks:  
**The q\*\*\*k brown f\*x jumps ov\*r the \*\*zy dog.**
- The same principle applies in genetics. The process of filling in the gaps is known as 'genotype imputation'.

» We type ~650,000 SNPs using our genotyping array, which allows accurate imputation for >35m SNPs in the genome.

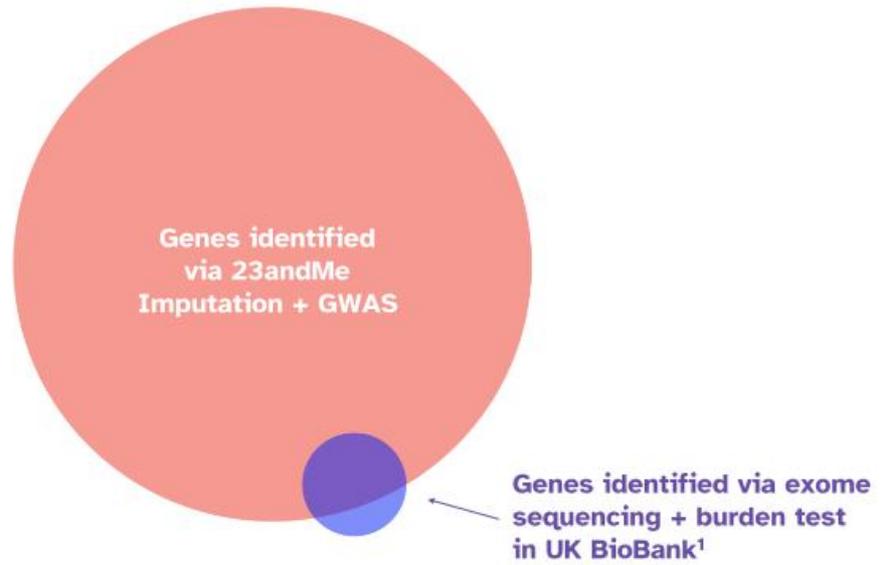
» Genotype imputation is much more cost effective than large-scale sequencing.

- Whole-genome sequencing ~\$1000 / sample.
- Exome sequencing ~\$400 / sample.
- Imputation < \$0.01 / sample

» We do deploy sequencing in situations where there is a clear benefit over and above imputation (e.g. rare disease).

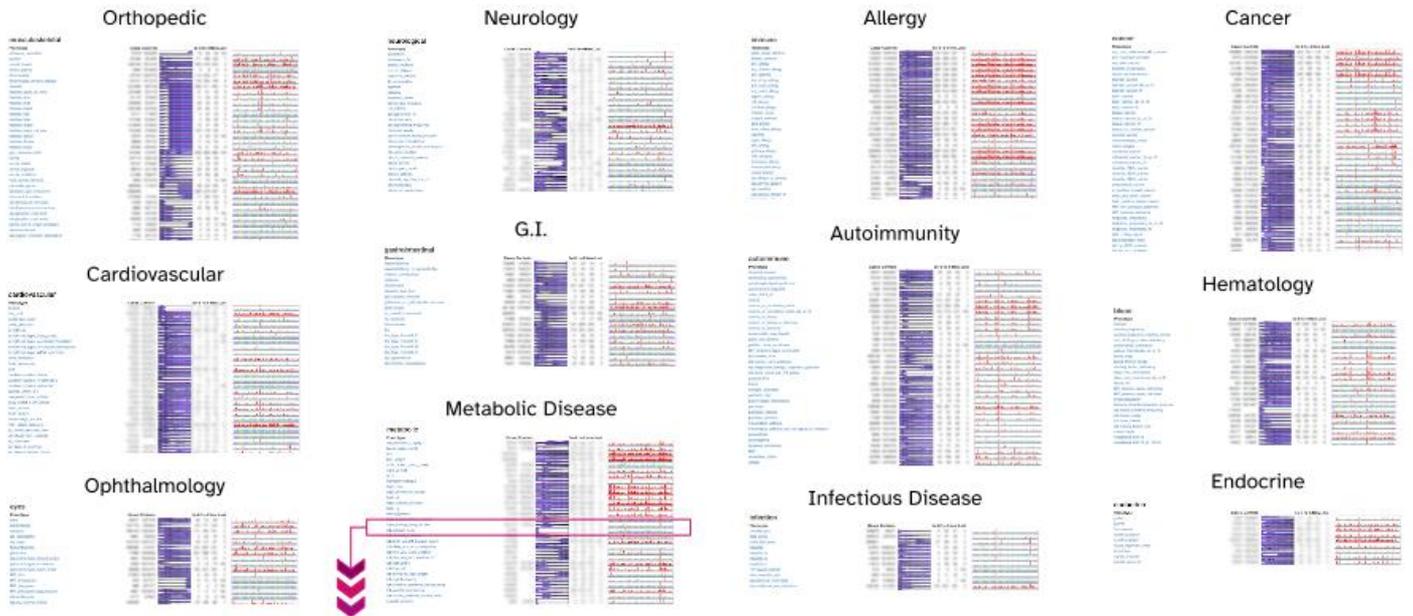


# Imputation and GWAS Enables Discovery of Vast Majority of Genes Identified via Exome Sequencing



1. List of genes identified via UKBB exome sequencing: Backman et al., Nature 2021, Exome sequencing and analysis of 454,787 UK Biobank participants

# Hundreds of Distinct Clinical Phenotypes Across Major and Rare Diseases



## Phenotype

NAFLD (Non-Alcoholic Fatty Liver Disease)

## Cases Controls

48048 2517644



## Hits New Lost

104 44 2

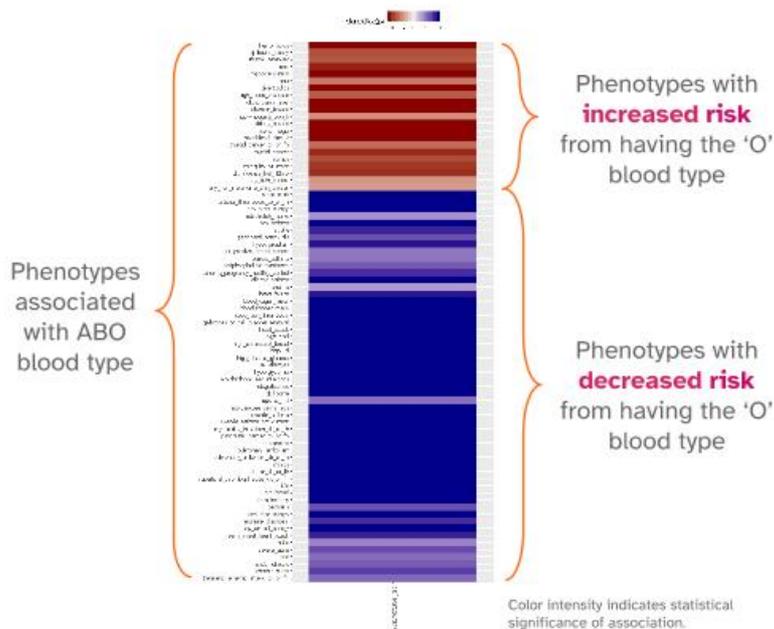


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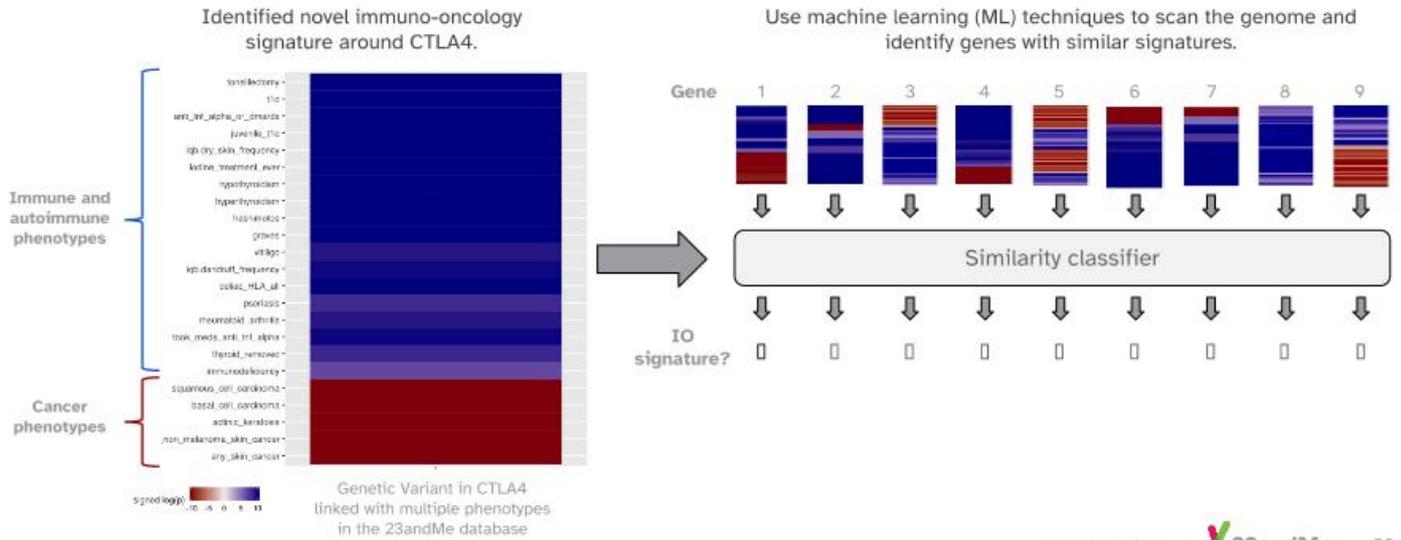
# Breadth of Phenotyping Provides Deeper Genetic Understanding Across Multiple Diseases

- **PheWAS** = Phenotype Wide Association Study
- Every SNP in the genome can be interrogated at >1,000 medically related phenotypes
- Besides the role of a gene in a disease of interest, we can use genetics to learn **potential indication expansions or possible unwanted effects**



# Using PheWAS to Identify Immuno-oncology Targets

We have defined an **'immuno-oncology signature'**; genetic evidence that a particular gene both activates the immune system and simultaneously reduces cancer risk.



# **23ME-00610 (P006): A Novel Immuno-oncology Antibody Targeting CD200R1**

Jennifer Low, M.D., PhD  
Head of Therapeutics Development, and  
Adrian Jubb, M.B., Ch.B., Ph.D.  
Senior Clinical Development Fellow

# 23andMe Immune-Oncology (I/O) Signature Highlights

## Genetically-Driven Targets

Large I/O market with over \$41B expected in 2021 sales<sup>1</sup>

2021 projected sales of leading checkpoint inhibitors

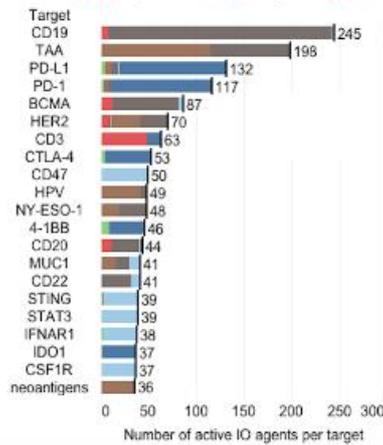
**KEYTRUDA** \$17.0B

**OPDIVO** \$7.9B

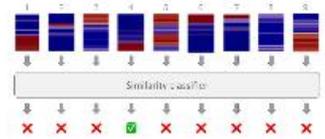
**YERVOY** \$1.8B

Global Immuno-Oncology Drug Development Pipeline  
Published by Senix, Upadhyay & Anzai, Ya on Sep 18, 2020  
 Sources: CD, CD, Analysis, Clinicaltrials.gov, CD, Wiki, and GlobalData

4,720 agents and 504 targets in 2020.

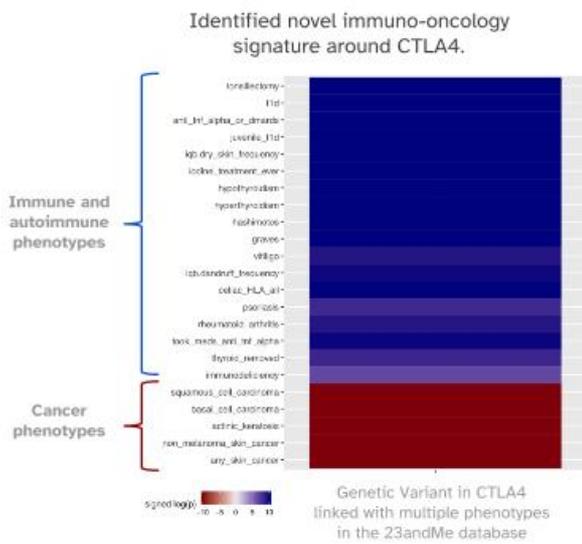


23andMe's I/O signature identifies targets that are genetically-driven



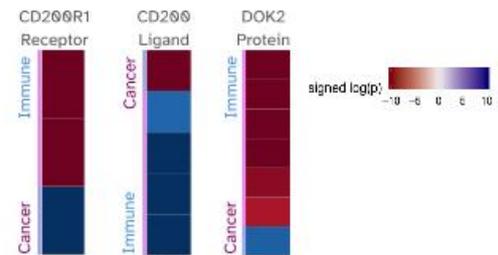
<sup>1</sup> Source: Evaluate Pharma historical and forecast estimates.

# CD200R1 was Identified as a Promising Anti-Cancer Drug Target with 23andMe's Proprietary Immuno-oncology (I/O) Genetic Signature



CD200R1 pathway identified as a critical immune checkpoint with our I/O genetic signature

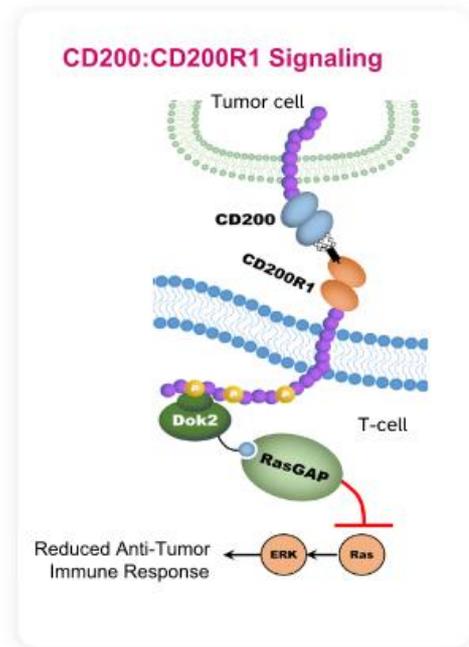
I/O genetic signature shows opposing effects on autoimmune and cancer phenotypes



We discovered that 3 *components* of the signaling pathway for CD200R1 have a similar genetic signature to other I/O drugs

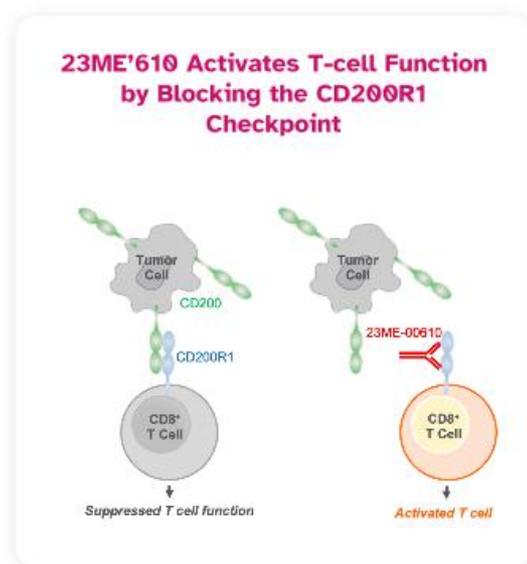
# CD200R1 is an Immune Checkpoint

- CD200R1 is an inhibitory receptor expressed on T-cells and myeloid cells
- CD200 is the only known ligand for CD200R1 in humans and is highly expressed in certain cancers
- Binding of CD200 to C200R1 decreases the ability of T-cells to recognize and kill cancer cells
- Several viruses, including HHV8 have co-opted CD200 analogues to suppress and evade the host immune response



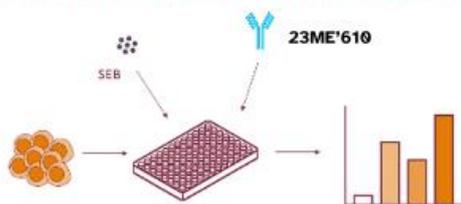
# 23ME-00610 (23ME'610) Binds with High Affinity to CD200R1 and Inhibits Immunosuppressive Signaling

- 23ME '610 is a fully humanized, effectorless, IgG1 antibody against human CD200R1
- 23ME '610 binds CD200R1 with high affinity ( $K_D < 0.1$  nM)
- 23ME '610 blocks CD200 ligand binding to CD200R1, resulting in inhibition of immunosuppressive signaling
- The restoration of T-cell activity by 23ME '610 was demonstrated using in vitro models of the tumor microenvironment
- No adverse effects of blocking CD200R1 have been observed in nonclinical toxicology studies



# 23ME'610 Shows Broader Enhancement of Proinflammatory Cytokine Secretion than Anti-PD1

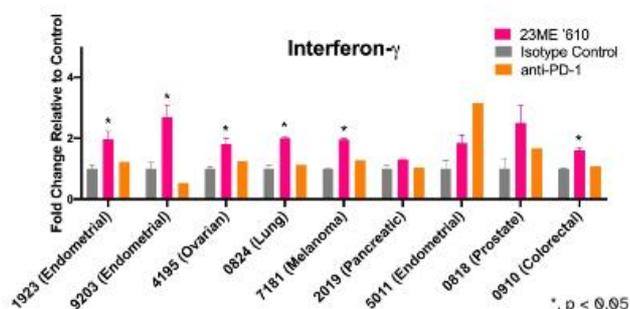
## Mixed immune cell assay that stimulates T cells with MHCII binding bacterial super antigen



### Cancer patient-derived PBMCs

PBMCs: Peripheral Blood Mononuclear Cell (T cells, B Cells, NK Cells, Monocytes)  
 SEB: Staphylococcal Enterotoxin B (bacterial super antigen)

## 23ME'610 Increases Interferon-gamma Secretion from SEB-Stimulated Cancer Patient PBMCs



- Interferon-gamma is a pro-inflammatory cytokine that is secreted by activated T cells
- 23ME '610 increases interferon-gamma secretion from SEB-stimulated cancer patient PBMCs compared to the isotype control antibody and anti-PD-1 in the majority of tumor samples tested

# Phase 1 Study of 23ME'610 in Patients with Locally Advanced or Metastatic Solid Malignancies



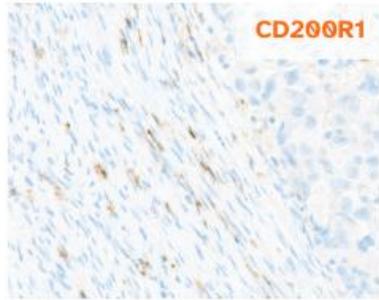
Abbreviations: AEs: Adverse Events; DLT: Dose limiting toxicity; DoR: duration of response; IV: intravenous; ORR: Objective Response Rate; OS: Overall Survival; PFS: Progression Free Survival; Q3W: every three weeks; RECIST: Response Evaluation Criteria in Solid Tumors; RP2D: Recommended Phase 2 Dose

Copyright © 2022 23andMe, Inc.

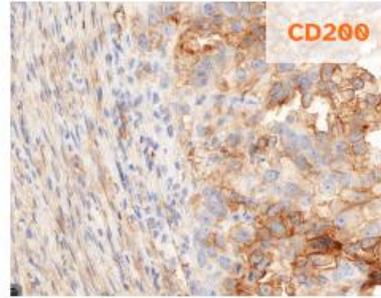


## CD200R1 Ligand (CD200) is Highly Expressed in a Subset of Human Tumors

### CD200R1 and CD200 Protein are Co-expressed in Ovarian Cancer



CD200R1 immunohistochemistry (brown) shows expression on immune cells within and around the tumor



CD200 immunohistochemistry (brown) shows expression on tumor and stromal cells

## Why Target the Receptor (CD200R1) Instead of the Ligand?

- **CD200R1** expression is mainly expressed on immune cells
  - **CD200** (ligand) is broadly expressed on many cell types
- An anti-**CD200** monoclonal antibody, samalizumab (**ALXN 6000**) did not saturate cell surface **CD200**<sup>1</sup>
  - evaluated in patients with **CD200**-expressing B-cell malignancies in a Phase 1 trial<sup>1</sup>
- **23ME'610** is expected to **saturate CD200R1** and fully **block binding** to **CD200**

	<b>CD200R1</b>	<b>CD200</b>
Target distribution	Immune cells	Expressed on a wide range of cells (B cells, endothelial cells, neuronal cells, etc)
	<b>23ME'610</b>	samalizumab
Antibody affinity ( $K_D$ )	< 0.1 nM	~10 nM

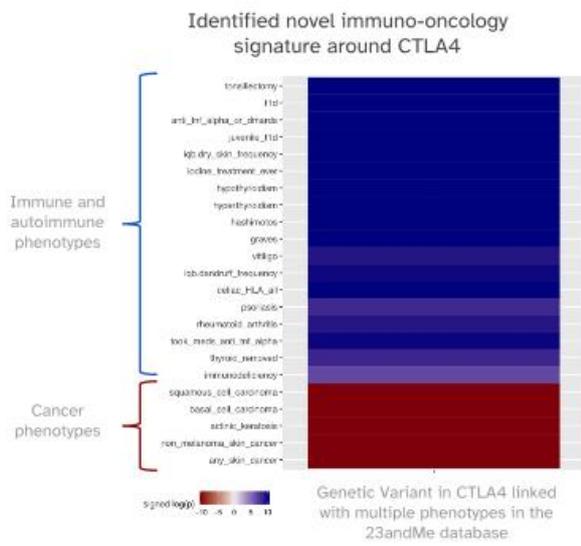
# 23ME '610 Targeting CD200R1: A Genetically-Validated Approach to Anti-Cancer Therapy

- 23andMe's I/O signature highlights potential targets with genetic evidence of importance
- CD200R1 is an immune checkpoint with a clearly defined I/O signature in three components of the pathway
- CD200R1 ligand is highly expressed in a subset of human cancers
- 23ME '610 is a potent monoclonal antibody against CD200R1 that has the potential to restore T-cell killing of cancer cells
- The Phase 1 study of 23ME '610 in patients with advanced solid malignancies has been initiated and the first patient was dosed in January 2022

# CD96 Program: First Clinical-stage Immuno-oncology Antibody Targeting CD96

Jennifer Low, M.D., Ph.D.  
Head of Therapeutics Development

# CD96 was Identified as a Promising Anti-Cancer Drug Target with 23andMe's Proprietary Immune-Oncology (I/O) Genetic Signature



CD96/CD226 pathway identified as a checkpoint with our I/O genetic signature

I/O genetic signature shows opposing effects on autoimmune and cancer phenotypes

CD226 pathway (includes CD96)

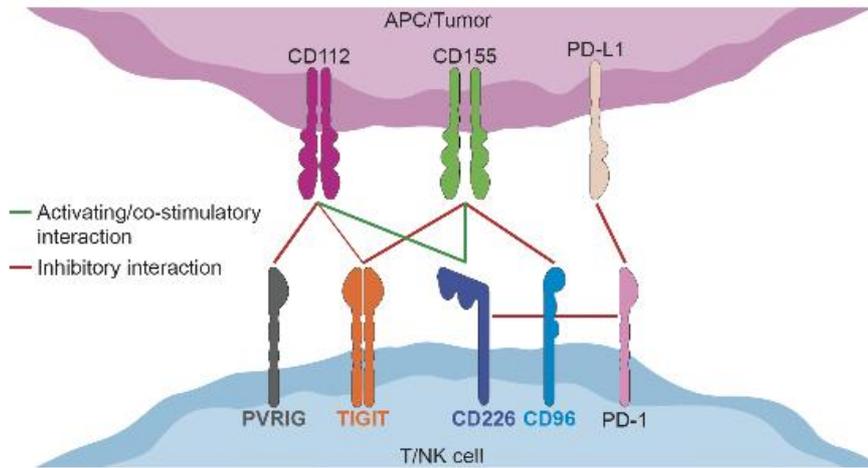
signed log(p): -10 -6 0 6 10

Multiple Autoimmune Phenotypes

Multiple Cancer Phenotypes

# PD-1 is a Negative Regulator of the CD226 Axis

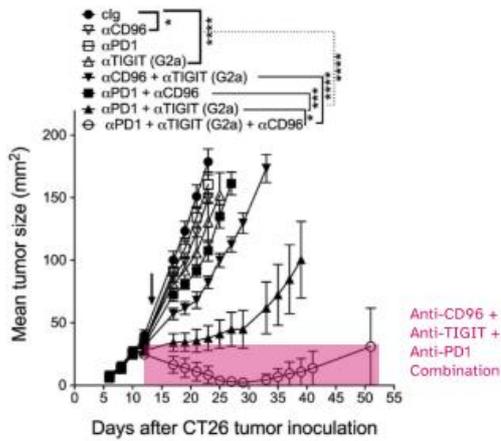
*Inhibition of CD96 and TIGIT may enhance PD-1 activity*



- CD226 activates NK/T-cells
- PD1 directly regulates CD226 activity
- TIGIT and CD96 indirectly suppress CD226
- Combining inhibitors (anti-PD-1, anti-CD96, anti-TIGIT) may have more activity than anti-PD-1 alone

# Preclinical Data Supports Combining CD96 with PD-1 and TIGIT Inhibitors

## CD96, TIGIT and PD-1 Combination Suggests Synergy



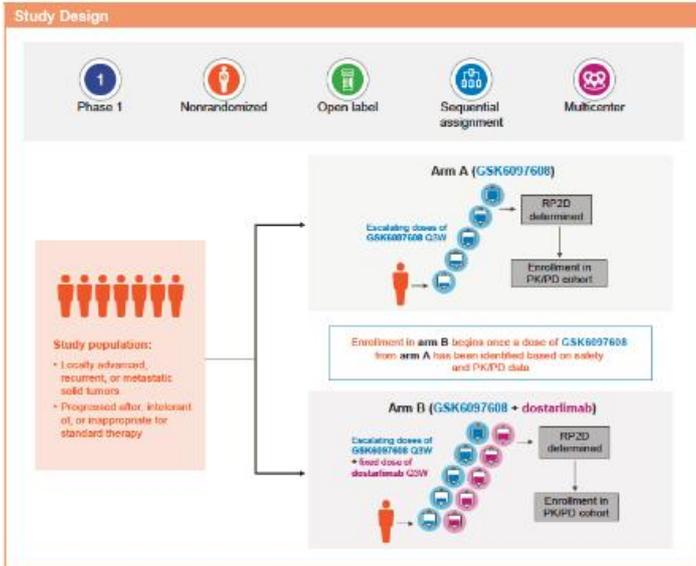
Cancer Immunol Res. 2019;7(4):559

## CD226 pathway components owned by GSK

Component	Molecule	Partner
PD-1	Dostarlimab	Acquired from Tesaro
CD96	GSK'608	23andMe
PVRIG	SRF813	In-license from Surface Oncology
TIGIT	GSK4428859 (EOS448)	iTeos

# GSK6097608: Phase 1 Study Design

<https://www.clinicaltrials.gov/ct2/show/NCT04446351>



**Study Endpoints**

<b>Primary</b>	<ul style="list-style-type: none"> <li>• Dose limiting toxicities</li> <li>• Adverse events</li> </ul>	<ul style="list-style-type: none"> <li>• Serious adverse events</li> </ul>
<b>Secondary</b>	<ul style="list-style-type: none"> <li>• ORR per RECIST 1.1</li> <li>• ADAs against GSK6097608 and dostarlimab</li> <li>• PK parameters of GSK6097608 and dostarlimab</li> </ul>	<ul style="list-style-type: none"> <li>• Clinically important changes in laboratory parameters, electrocardiograms, and vital signs</li> <li>• Dose reductions or delay</li> <li>• Withdrawal due to AEs</li> </ul>
<b>Current Status</b>		
The study is currently open and recruiting. 		

Commenced in 2020; data expected 2022

ADA, anti-drug antibodies; AEs, adverse events; ORR, objective response rate; PK, pharmacokinetics; PK/PD, pharmacokinetics/pharmacodynamics; Q3W, every 3 weeks; RP2D, recommended Phase 2 dose

# CD96 is Part of the Genetically-validated CD226 Axis and is Progressing in Clinical Development

- The 23andMe immuno-oncology signature has highlighted the importance of the CD226 pathway which includes CD96 and TIGIT
- Combining components of the CD226 pathway may be more efficacious than inhibiting single components, but will require complex clinical trials
  - GSK has the relevant agents to target the CD226 axis
- The Phase 1 clinical trial with GSK'608 (anti-CD96) and dostarlimab is ongoing (conducted by GSK)
  - Data is expected in 2022

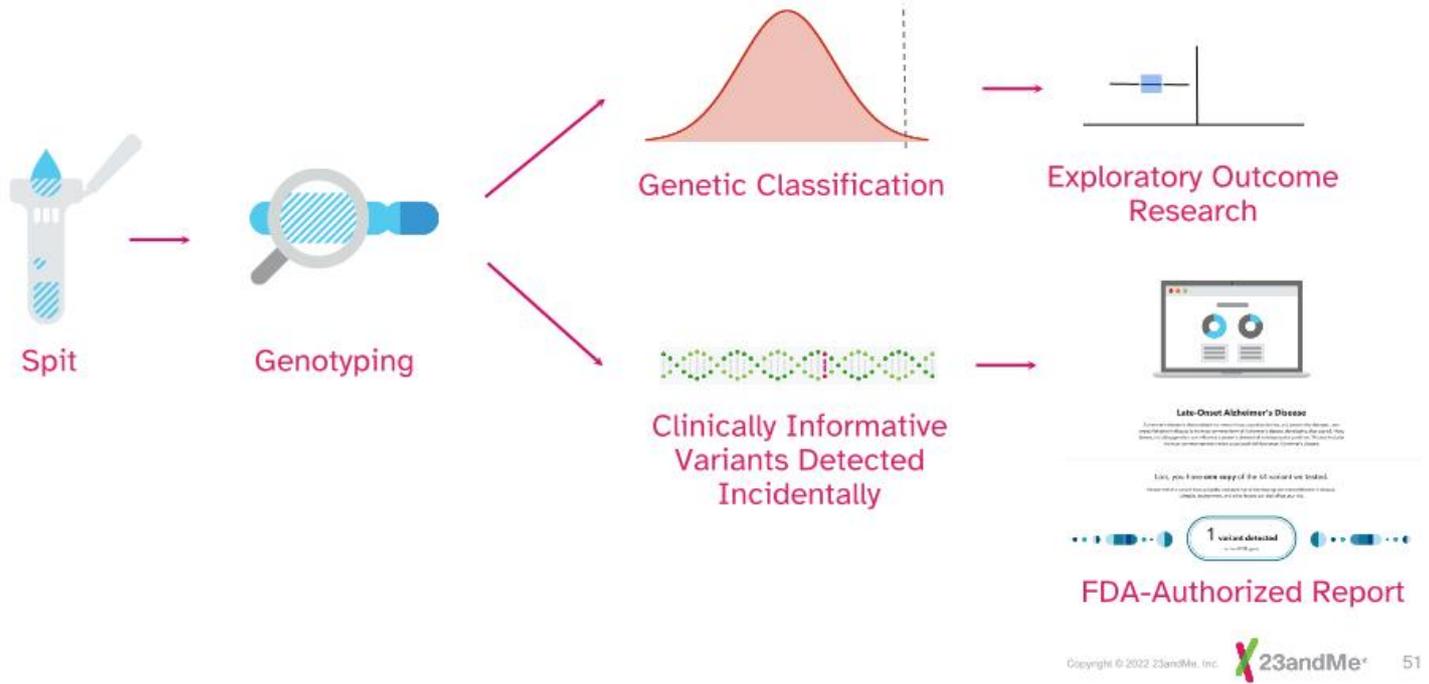
# Using Genetics to Inform Clinical Development

Jennifer Low, M.D., Ph.D.  
Head of Therapeutics Development

What if we could  
use **genetics** to  
predict **immune  
function** and  
**immune response**  
to I/O agents?

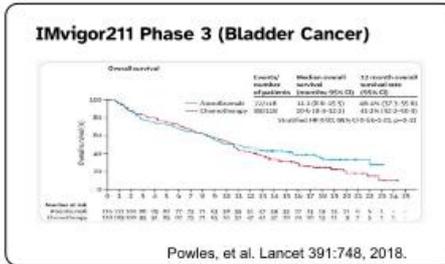
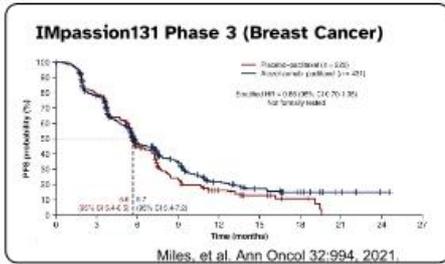
# Genetics-Based Drug Development

Taking a different approach across our development pipeline



# Polygenic Scores for Hypothyroidism, Psoriasis Predicted Clinical Efficacy to Immune Checkpoint Blockade

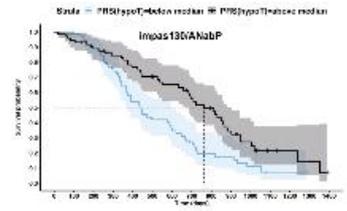
## Negative Phase 3 Studies



## Genetic variation associated with thyroid autoimmunity shapes the systemic immune response to PD-1 checkpoint blockade

Zia Khan<sup>1</sup>, Christian Hammer<sup>1</sup>, Jonathan Carroll<sup>1</sup>, Flavia Di Nucci<sup>1</sup>, Sergio Ley Acosta<sup>1</sup>, Vidya Maiya<sup>1</sup>, Tushar Bhargava<sup>1</sup>, Julie Haskapiller<sup>1</sup>, Ira Melman<sup>1</sup>, Matthew L. Albert<sup>1,2</sup>, Mark I. McCarthy<sup>1</sup> & G. Scott Chandler<sup>1,2</sup>

NATURE COMMUNICATIONS | 2021 | 12:3055 | <https://doi.org/10.1038/s41467-021-23851-4> | www.nature.com/naturecommunications

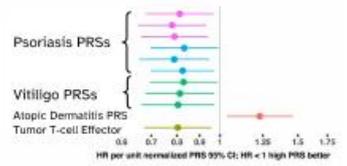


## Polygenic risk for skin autoimmunity impacts immune checkpoint blockade in bladder cancer

Zia Khan<sup>1</sup>, Flavia Di Nucci<sup>1</sup>, Antonia Kwan<sup>1</sup>, Christian Hammer<sup>1</sup>, Sanjiv Mariathasan<sup>1</sup>, Vincent Rouilly<sup>1</sup>, Jonathan Carroll<sup>1</sup>, Magnus Fonten<sup>1</sup>, Sergio Ley Acosta<sup>1</sup>, Elie Guadino<sup>1</sup>, Haiyan Chen-Harris<sup>1</sup>, Tushar Bhargava<sup>1</sup>, Ira Melman<sup>1</sup>, Jonathan Rosenberg<sup>1</sup>, Thomas Powles<sup>1</sup>, Julie Haskapiller<sup>1</sup>, G. Scott Chandler<sup>1</sup>, and Matthew L. Albert<sup>1,2</sup>

PLoS June 2, 2020 | 11(7) | e0238844 | <https://doi.org/10.1371/journal.pone.0238844>

## Hazard Ratios for Atezolizumab Overall Survival



## Polygenic Scores May Predict Safety and Efficacy

- 23andMe is incorporating clinical genotyping into our clinical trials
- Use of polygenic scores could enable more efficient clinical development and improve the probability of success
- Developing drugs in genetically-defined patient populations may differentiate products based on better outcomes and improved benefit-risk profiles

Providing the right drugs to the right patients

# Executive Summary - Therapeutics

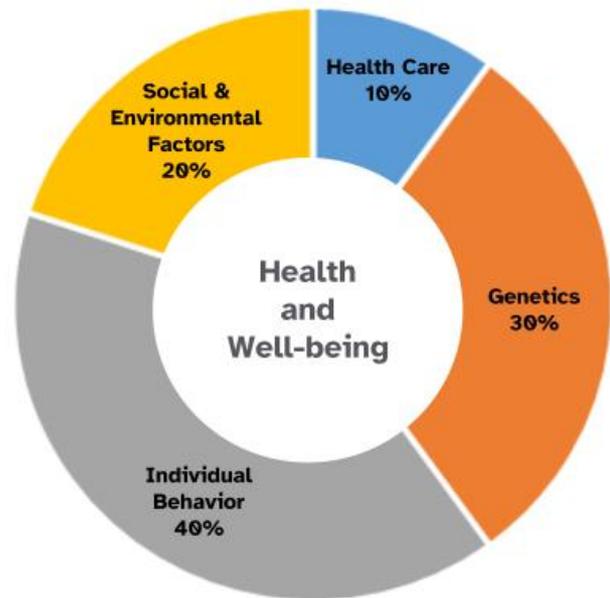
- 23andMe has generated a research and development pipeline covering multiple therapeutic areas in indications of high unmet medical need
- To date, more than 40 programs have been generated from the database as part of our collaboration with GSK
- GSK has extended their exclusive target discovery period of their collaboration with 23andMe for an additional fifth year
- 23andMe advanced a novel immuno-oncology antibody targeting CD200R1, 23ME-00610, into the clinic
- 23andMe has taken a royalty option on immuno-oncology antibody collaboration program targeting CD96 into later stages of development
- Managing our therapeutic portfolio investments based on scientific data to optimize investment, mitigate risk and maximize potential future returns

# Genetics-Based Primary Care

Paul Johnson

Vice President, General Manager, Consumer

# Impact of Different Factors on Risk of Premature Death



Source: Schroeder, SA. (2007). We Can Do Better - Improving the Health of the American People. NEJM. 357:1221-8.

# Opportunity to Deliver **Genetics-Based Primary Healthcare** at Scale



+



Genetics-Based  
Primary Care

Telehealth

Diagnostics  
Testing

Wellness  
Reports

Pharmacy / E-  
Prescribing

Medical  
Records

# What is **Genetics-based Healthcare**?

## Health Predispositions

Targeted prevention,  
monitoring, and management

## Carrier Status

Understanding your  
potential risks

## Wellness

Targeted to help you  
feel your best

## Pharmacogenetics

Therapeutics that  
work for you

# Personalized Healthcare at Scale

Healthcare based on a patient's wellness, choices, and genetics

Acquiring Lemonaid Health positions us to

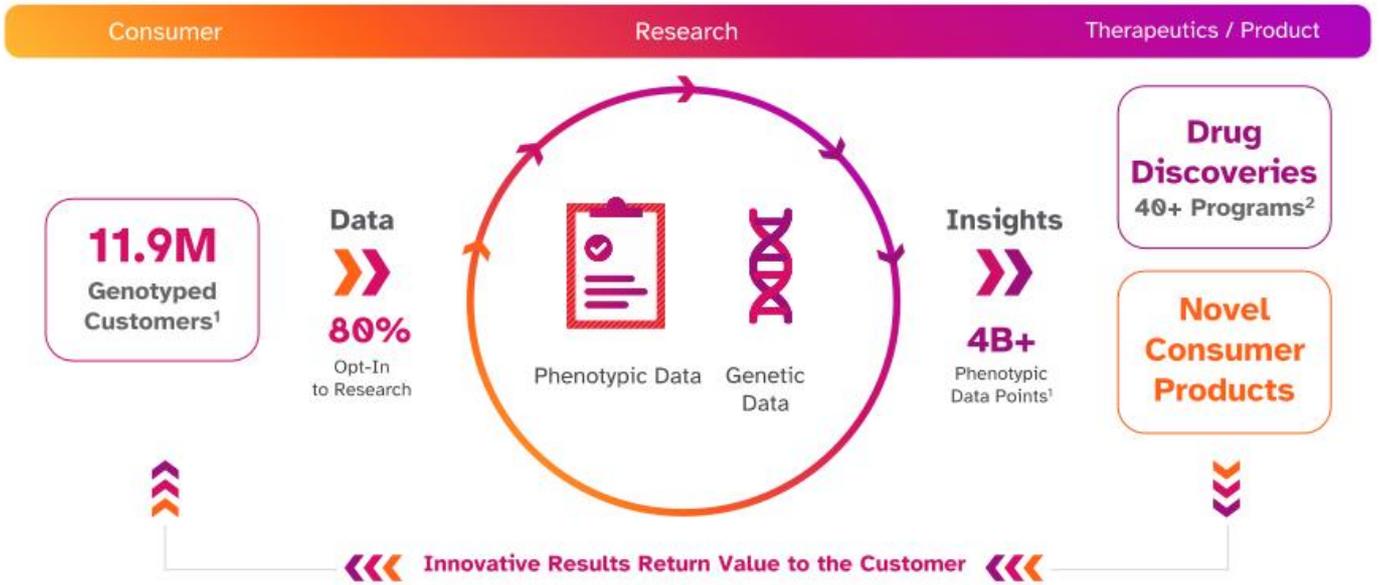
- Provide personalized healthcare at scale
- Become a trusted holistic wellness and healthcare brand
- Create a fully integrated offering across 23andMe with accessible, affordable healthcare, driving strategic differentiation

# The Power of Polygenic Risk Scores (PRS) for Personalized Healthcare

Geoff Benton, Ph.D.  
Director, Product R&D

# Consumer Powered Healthcare Flywheel

We run hundreds of billions of association tests per year that further our unique understanding of human biology



1. As of September 30, 2021. 2. As of March 31, 2021. Programs include collaborated, 100% owned and royalty interest targets.

# Our Health Service

The First and Only Multi-Disease DTC Genetic Service That Includes FDA-Authorized Reports and Provides Personalized Genetic Insights and Tools



## Health Predispositions

**30+**

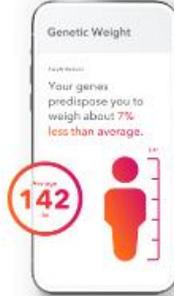
Including:  
 Type 2 Diabetes (Powered by 23andMe Research)  
 Coronary Artery Disease **23andMe+**  
 Uterine Fibroids  
 Migraine **23andMe+**  
 MUTYH-Associated Polyposis  
 BRCA1/BRCA2 (selected variants)  
 HOXB13 (prostate cancer)



## Wellness<sup>1</sup>

**10**

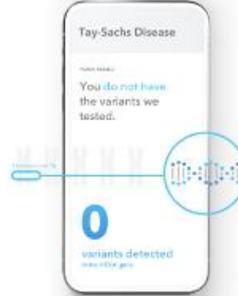
Including:  
 Muscle Composition  
 Genetic Weight  
 Alcohol Flush Reaction  
 Saturated Fat and Weight  
 Sleep Movement  
 Dog & Cat Allergies **23andMe+**



## Carrier Status

**40+**

Including:  
 Cystic Fibrosis  
 Sickle Cell Anemia  
 Familial Hyperinsulinism (ABCC8-Related)  
 Tay-Sachs Disease  
 Glycogen Storage Disease (Type 1a)

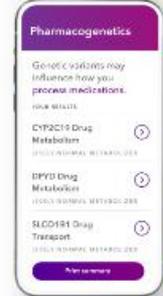


## Pharmacogenetics

**3**

23andMe+

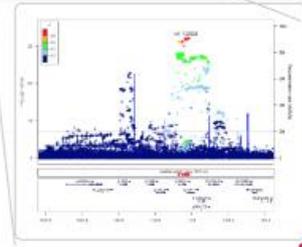
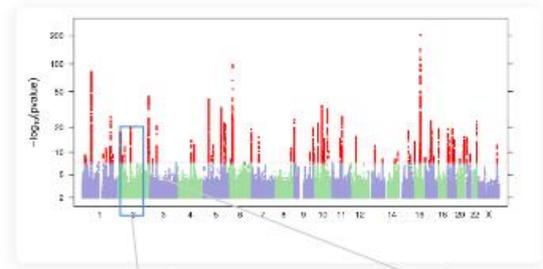
Including:  
 SLCO1B1 Drug Transport  
 CYP2C19 Drug Metabolism  
 • e.g., citalopram and clopidogrel  
 DPYD Drug Metabolism



<sup>1</sup> Wellness information does not require FDA Authorization.

# Genome-Wide Association Studies (GWAS)

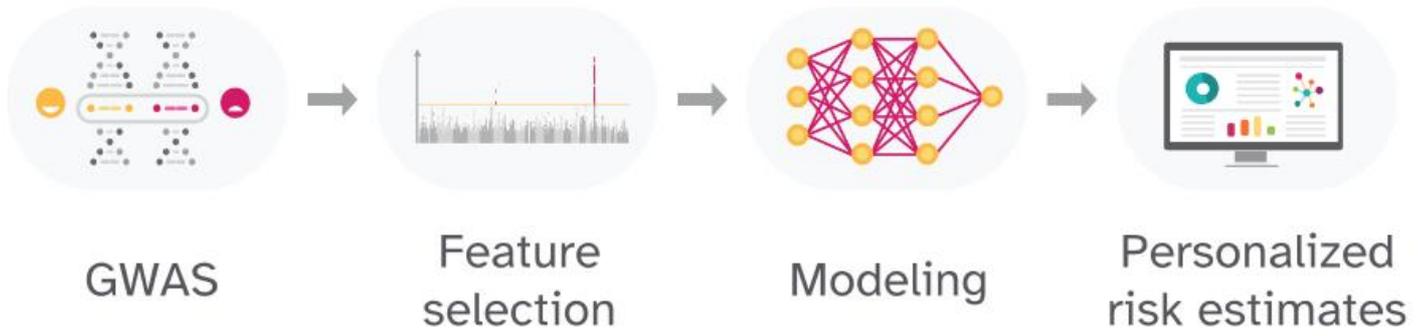
- » GWAS is a statistical analysis of Single Nucleotide Polymorphisms (SNPs), looking to identify differences in frequency between disease cases and controls.
- » SNPs linked with disease will be found at different frequencies in cases versus controls.
- » Association is represented by the level of statistical significance (p-value) of the SNP frequency difference.
- » SNPs can be tested across the genome and mapped to specific regions.



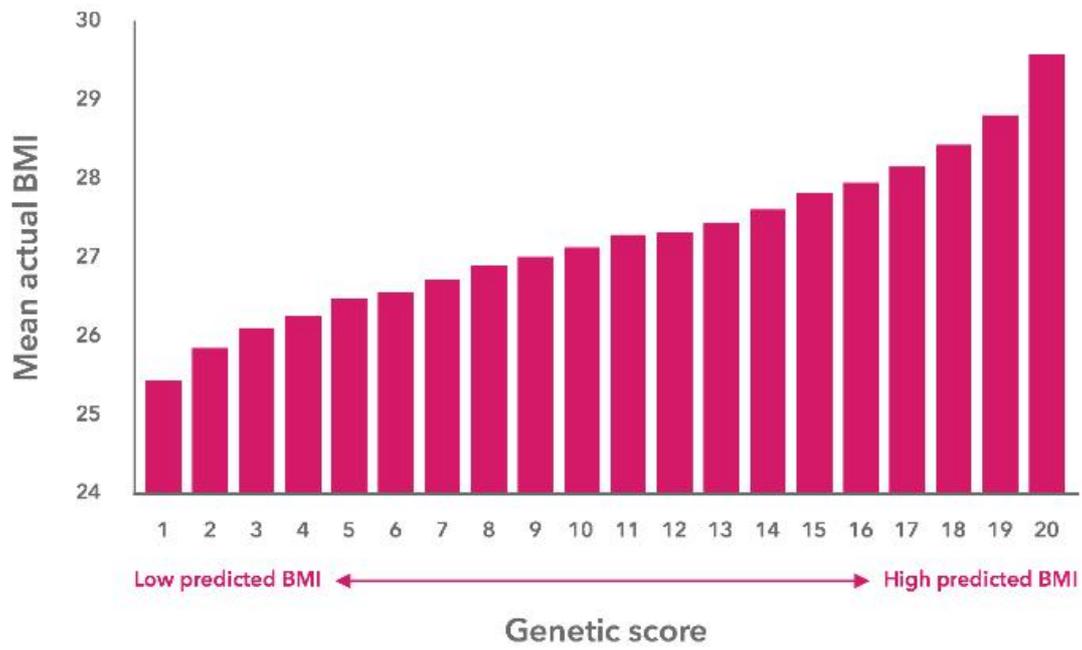
Copyright © 2022 23andMe, Inc.



# Prediction with Polygenic Scores (PGS)



# Using Polygenic Risk Scores to Meaningfully Stratifying Actual Results



# Personalized Risk Report

## Genetic Weight

Your genes influence not just your weight, but also the impact of different healthy habits.

[Overview](#) [Scientific Details](#)

John, your genes predispose you to weigh about 8% more than average.

This predisposition doesn't mean you will definitely weigh more than average. Keep in mind that your lifestyle and environment have a big impact on your weight.

### How did we calculate your result?

We determined your result by looking at [DNA variants](#) associated with weight based on our research. Some variants have a stronger effect on weight than others, which our analysis took into account. Because of this, your proportion of higher to lower weight variants may not exactly align with your overall predisposition. Keep in mind

### What is average?



For a 41-year-old man who is 5'8"

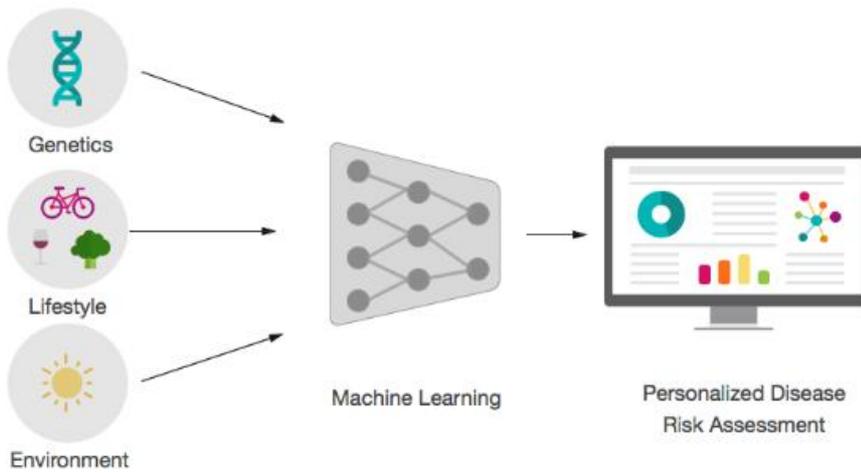
## FY'21 Releases

- Coronary Artery Disease, Atrial Fibrillation, High Blood Pressure, LDL Cholesterol
- Migraine
- Uterine Fibroids
- Obstructive Sleep Apnea
- Restless Legs Syndrome
- Gout
- Non-Alcoholic Fatty Liver Disease
- Kidney Stones
- Polycystic Ovary Syndrome
- Triglycerides

## FY'22 Releases

- Cat Allergy, Dog Allergy
- Eczema (Atopic Dermatitis)
- Low HDL Cholesterol
- Gallstones
- Gestational Diabetes
- Severe Acne
- Nearsightedness
- Coming soon
- Coming soon
- Coming soon

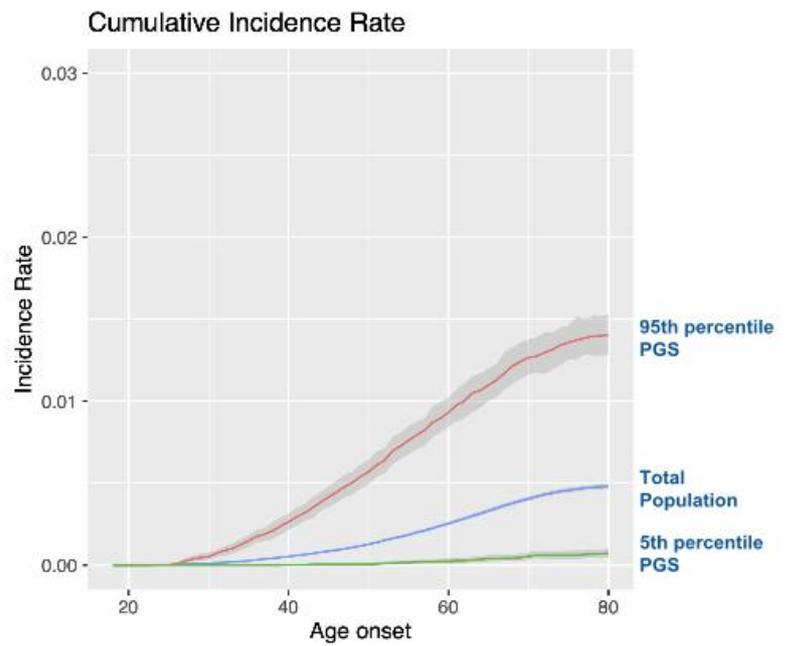
# It's Not Just About Genetics, It's About **Prediction**



- Insight into potential **trajectories**
- Potential impact of different **interventions**
- **Risk over time** as behaviors, biometrics, and health change

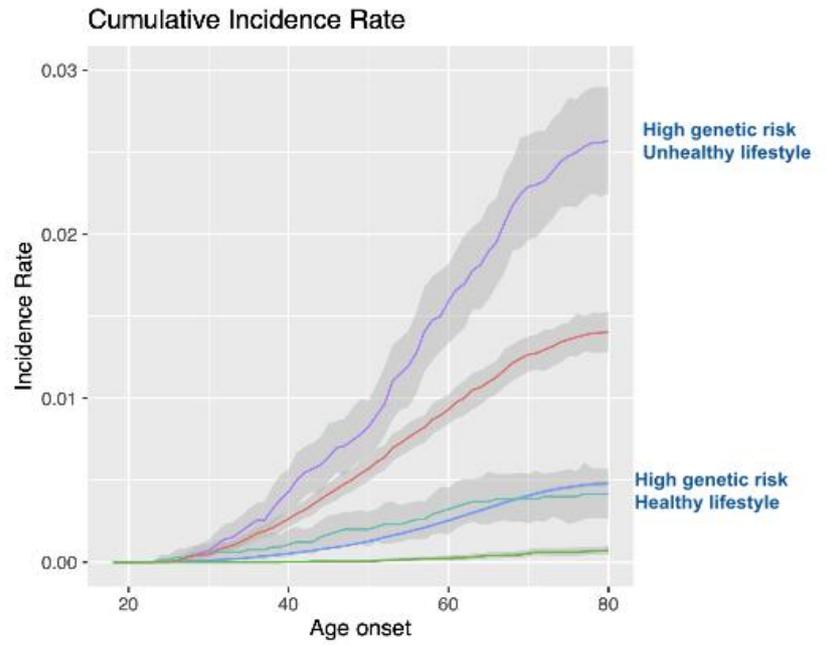
# Using PGS to Predict Real-world Outcomes

- » Can use PGS to predict incident cases of Type 2 Diabetes (T2D)
- » The 95th percentile of genetic risk has nearly 3x increase in risk for developing T2D



## Bending the Curve with Lifestyle

- » Combine PGS with lifestyle factors to improve prediction of incident cases of Type 2 Diabetes (T2D)
- » Lifestyle factors allow for greater precision of risk estimates and better personalization of results for customers



# Opportunity for Personalized Healthcare at Scale

## Practice of Medicine Today

**Reactive** – no customization until symptomatic



## 23andMe+

**Proactive** – truly individualized from the very beginning



# Delivering a Genetics-based Primary Care Service

Davis Liu, M.D.  
Chief Clinical Officer

# Lemonaid Health is Fully Integrated with a Broad Service Offering



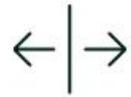
## Online doctor visits

Cutting out the doctor waiting room – with fully integrated w-2 core clinical team



## Mail order pharmacy

Cutting out the retail pharmacy – owned and controlled mail order pharmacy



## Broad range of services

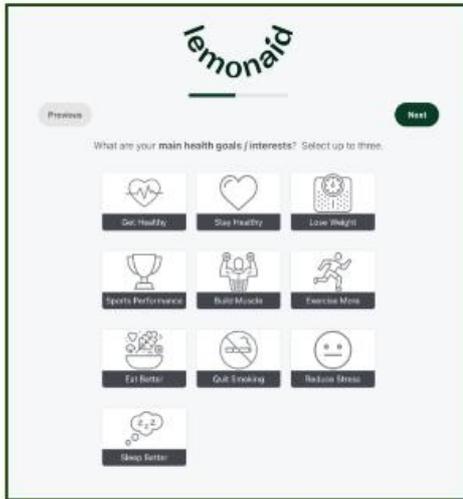
Building the online healthcare brand with the biggest impact



All connected using an algorithm-driven proprietary technology platform

# The Future: Primary Care Complete

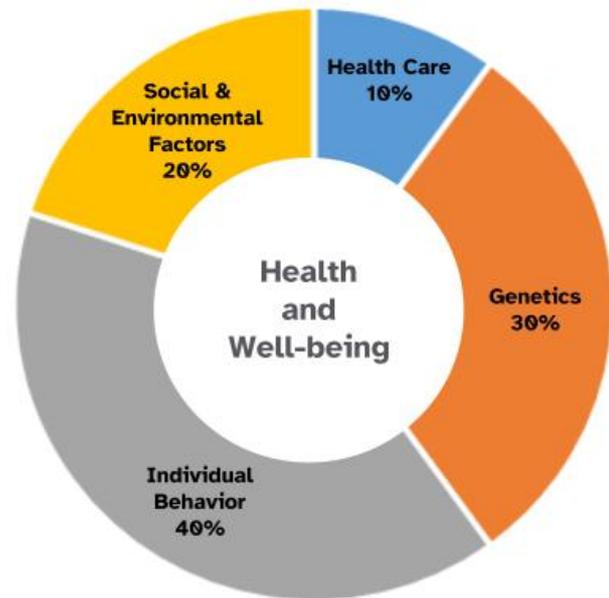
Will be matched with a doctor who is attuned to genetics, wellness goals, interests, and medical conditions.



Lemonaid Health clinician

# The Future: Primary Care Complete

- Initial video visit focused on **overall health and well being** - not just the 10%
  - Genetics
  - Individual Behavior
  - Wellness
  - Health Care
- **Long-term relationship**
- Leading to **long, healthy, productive lives**



Just the beginning!

# Concluding Remarks

Anne Wojcicki  
CEO and Co-Founder

# Future of 23andMe

- Continuing to be **world leader** in direct-to-consumer **personal genetic health services**, growing annually
- Pioneering a **genetics-based primary care service** that empowers individuals to be proactive with their health
- Developing a pipeline of **over 40 clinical and research stage programs** addressing targets validated by human genetics
- **Leveraging strong balance sheet** to support investment in therapeutics portfolio and strategic initiatives in DTC personal health services

# Q&A

**23andMe Announces Extension of GSK Collaboration and Update on Joint Immuno-oncology Program**

*GSK extends exclusive target discovery period of collaboration for a fifth year to discover and validate novel drug targets using 23andMe's proprietary genetic and health survey database*

*23andMe elects for royalty option as GSK advances immuno-oncology antibody collaboration program targeting CD96 into development*

*Company will discuss at its R&D Day event today at 8:00 a.m. Pacific Time*

SUNNYVALE, CA - January 18, 2022 - 23andMe Holding Co. (Nasdaq: ME) ("23andMe"), a leading consumer genetics and therapeutics company, today provided an update on its collaboration with GlaxoSmithKline plc ("GSK"). GSK has elected to exercise its option to extend the exclusive target discovery period of the ongoing collaboration with 23andMe for an additional year to July 2023. 23andMe will receive a one-time payment of \$50 million to extend the period. In addition, 23andMe has elected to take a royalty option on its joint immuno-oncology antibody collaboration program with GSK targeting CD96 (GSK6097608, a.k.a. GSK'608), currently in Phase 1 studies. GSK will be solely responsible for GSK'608's subsequent development in later-stage clinical trials, including full development costs moving forward.

"The collaboration with GSK has been very productive. In less than four years, under this collaboration, we have identified over 40 therapeutic programs and have advanced an immuno- oncology antibody targeting CD96 into clinical development," said Kenneth Hillan, Head of Therapeutics at 23andMe. "GSK's decision to extend the exclusive target discovery period of our collaboration for an additional year demonstrates the enthusiasm for our collaboration and the value our database provides for identifying targets and advancing new medicines based on human genetics."

"Our collaboration with 23andMe continues to exceed expectations, with more than 40 genetically validated drug discovery programs in the GSK portfolio that were initiated under the collaboration," said John Lepore, SVP and Head of Research at GSK. "Evidence shows that genetically validated drug targets have at least double the probability of success in becoming medicines; today more than 70% of our targets in research have genetic validation. Working with 23andMe for an additional year will continue to strengthen the quality and breadth of our pipeline and reinforce GSK's long-term focus on human genetics, the immune system and advanced technologies to discover and develop transformational new medicines for patients."

"The CD96 program is a prime example of the potential value we bring to drug discovery and development. Through our genetic validation and based on the Phase 1a data, we are hopeful that targeting CD96 will have the potential to provide cancer patients with a new medicine in the fight against cancer," states Hillan. "We believe GSK is in the best position to move this program forward because of its leading portfolio of antibodies targeting the CD96 axis, and their ability to conduct the complex clinical studies of combination therapies that the development plan will require. This decision also allows 23andMe to strategically invest capital and resources into advancing our diverse portfolio of therapeutic programs."

23andMe's Therapeutics team was established in 2015 with the goal to improve the way drug discovery is currently conducted by starting with human genetic information. With approximately 12 million genotyped customers, of which approximately 80 percent consent to research, 23andMe has the world's largest set of genotypic information paired with billions of phenotypic data points contributed by engaged research participants.

**About the GSK and 23andMe Collaboration**

In July 2018, GSK and 23andMe entered into a collaboration which included an initial four-year exclusive target discovery period, with GSK having the option to extend that period for a fifth year. In order to jointly discover novel targets for drug development, 23andMe performs proprietary statistical analysis in-house using de-identified data from 23andMe's consenting research participants. Together 23andMe and GSK review the summary results that can be used to progress new medicines into development. GSK and 23andMe collaborate, using their combined resources, to identify new targets and prioritize them based on the strength of the biological hypothesis, possibility to find a medicine, and clinical opportunity and progress programs to generate lead compounds, perform preclinical research and progress into clinical development.

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For joint projects, program costs and profits in relevant territories (US, UK and EU) are split (50% / 50%), with each company having certain rights to opt-out of further funding or reduce its funding share for any joint collaboration program at certain defined development milestones. The company that opts out of the cost/profit split is eligible to receive a worldwide royalty, or in the case of reduced funding, an adjusted percentage of profits or royalty outside the relevant territories, if the program is successfully commercialized.

Additionally, GSK made a \$300M equity investment in 23andMe, Inc. in 2018.

#### **About the CD96 Program**

The CD96 program is an immuno-oncology therapeutic mAb targeting CD96 called GSK'608. CD96 sequesters a shared ligand, CD155, away from the costimulatory receptor, CD226, effectively attenuating T and NK cell antitumor immune responses. By blocking CD96, GSK'608 may allow activation of CD226 and enhance anti-tumor immunity through T and NK cells.

GSK'608 is now being dosed in combination with GSK's PD-1 blocking drug, dostarlimab, in a Phase 1 clinical trial. Additional studies will potentially also involve combinations with other anticancer treatments, such as anti-TIGIT and anti-PVRIG drugs.

Prior to taking the worldwide royalty election, the CD96 program was advanced under a 50/50 cost share and a profit share arrangement between 23andMe and GSK in the shared territories of US, UK and EU with a tiered royalty for other territories. With the worldwide royalty option, 23andMe will be eligible to earn tiered worldwide royalties up to the low double digits if GSK'608 is successfully brought to market. This option allows 23andMe to retain economic upside if GSK'608 is successfully brought to market but will no longer be contributing to the development costs as the program advances into later, larger and more complex clinical studies. This allows 23andMe to invest further in its advancing pipeline of therapeutic programs, largely identified under the GSK collaboration. In addition, if GSK'608 is successful in achieving market authorization, 23andMe will not be required to contribute to marketing and commercialization costs.

#### **R&D Day Event Information**

To discuss the GSK collaboration updates and other developments from its Therapeutics and Consumer groups in more detail, the company is hosting a virtual R&D Day event today from 8:00 a.m. to 11:30 am Pacific Time. The webcast event can be accessed at <https://investors.23andme.com/news-events/events-presentations>. A webcast replay will be available at the same address for a limited time within 24 hours after the event.

#### **About 23andMe**

23andMe, headquartered in Sunnyvale, CA, is a leading consumer genetics and therapeutics company. Founded in 2006, the company's mission is to help people access, understand, and benefit from the human genome. 23andMe has pioneered direct access to genetic information as the only company with multiple FDA authorizations for genetic health risk reports. The company has created the world's largest crowdsourced platform for genetic research, with 80 percent of its customers electing to participate. The 23andMe research platform has generated more than 180 publications on the genetic underpinnings of a wide range of diseases, conditions, and traits. The platform also powers the 23andMe Therapeutics group, currently pursuing drug discovery programs rooted in human genetics across a spectrum of disease areas, including oncology, respiratory, and cardiovascular diseases, in addition to other therapeutic areas. More information is available at [www.23andMe.com](http://www.23andMe.com).

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## Forward-Looking Statements

This press release contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, including, without limitation, statements regarding opportunities related to and the benefits of 23andMe's collaboration with GSK, the discovery and the potential of genetically validated targets, and the development and commercialization of therapeutic programs. All statements, other than statements of historical fact, included or incorporated in this press release. The words "believes," "anticipates," "estimates," "plans," "expects," "intends," "may," "could," "should," "potential," "likely," "projects," "predicts," "continue," "will," "schedule," and "would" or, in each case, their negative or other variations or comparable terminology, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. These forward-looking statements are predictions based on 23andMe's current expectations and projections about future events and various assumptions. 23andMe cannot guarantee that it will actually achieve the plans, intentions, or expectations disclosed in its forward-looking statements and you should not place undue reliance on 23andMe's forward-looking statements. These forward-looking statements involve a number of risks, uncertainties (many of which are beyond the control of 23andMe), or other assumptions that may cause actual results or performance to differ materially from those expressed or implied by these forward-looking statements, including, without limitation: (i) whether 23andMe's cash resources will be sufficient to fund the further development of therapeutic programs pursuant to the collaboration agreement with GSK or otherwise; (ii) whether results obtained in preclinical studies and clinical trials will be indicative of the results that will be generated in future clinical trials; (iii) whether any of the therapeutic programs will advance into or through the clinical trial process when anticipated or at all or warrant submission for regulatory approval; (iv) whether any such therapeutic programs will receive approval from the U.S. Food and Drug Administration or equivalent foreign regulatory agencies; (v) whether, if any such therapeutic programs receive approval, they will be successfully distributed and marketed; (vi) whether the collaboration with GSK will continue to be productive or will ultimately be successful in developing new medicines; (vii) collaborators' ability to successfully complete clinical development of, obtain regulatory approval for, and commercialize any therapeutic programs; and (viii) the impact of public health crises, including the coronavirus (COVID-19) pandemic. The forward-looking statements contained herein are also subject to other risks and uncertainties that are described in 23andMe's Quarterly Report on Form 10-Q for the quarter ended September 30, 2021 filed with the Securities and Exchange Commission ("SEC") on November 10, 2021 and in the reports subsequently filed by 23andMe with the SEC. The statements made herein are made as of the date of this press release and, except as may be required by law, 23andMe undertakes no obligation to update them, whether as a result of new information, developments, or otherwise.

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