



Future of Genomics and Big Data

Dawn Barry
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Luna DNA

Nascent stages of a Genomics Big Bang

Less than 0.01% of the World's pop has been fully sequenced

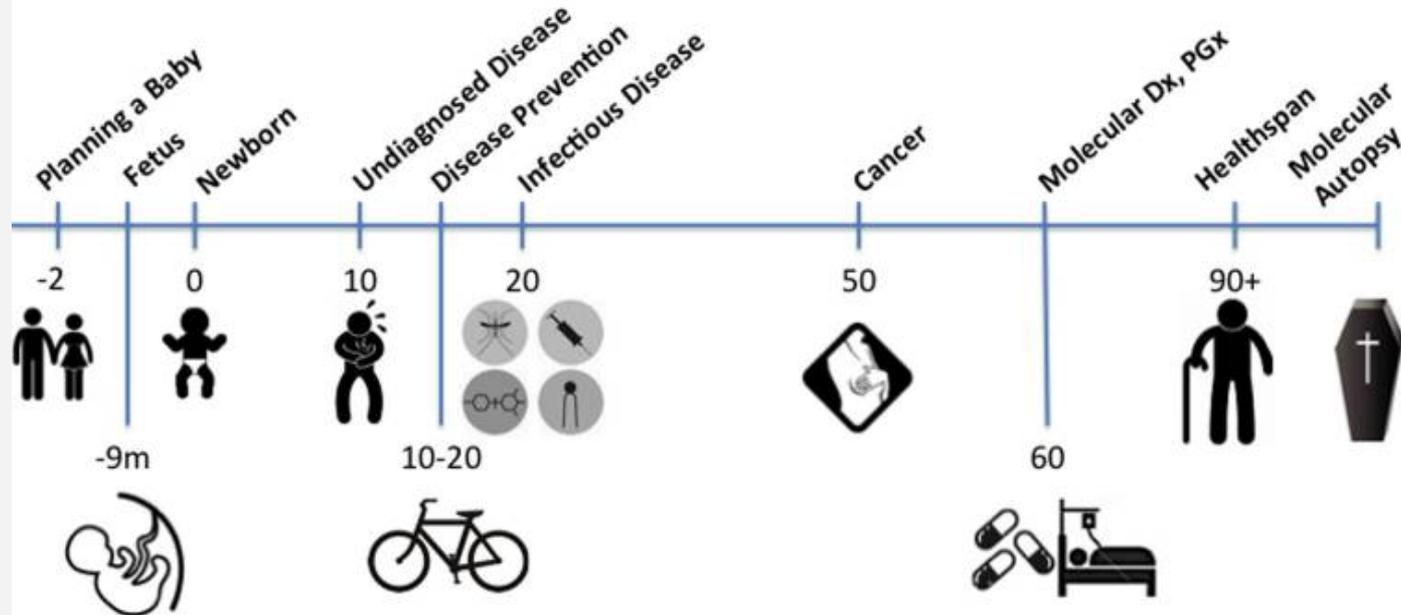


Source: UBS.



Individualized Genomic Medicine

From Pre-Womb to Tomb



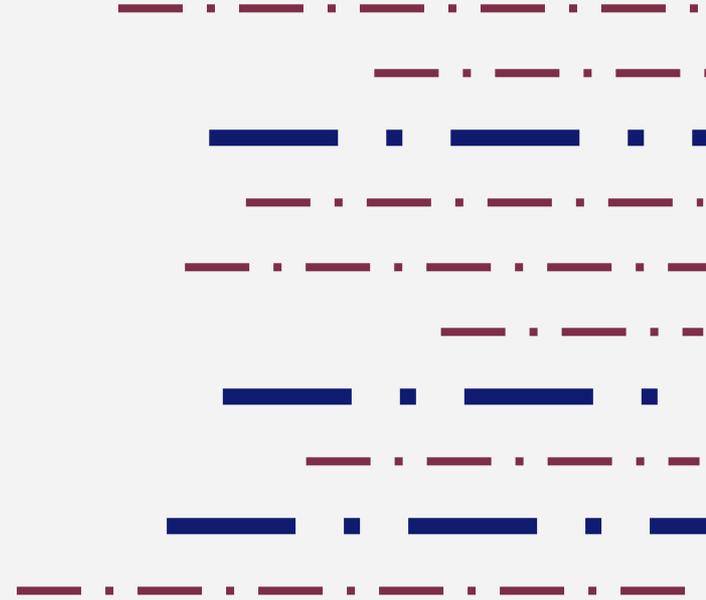
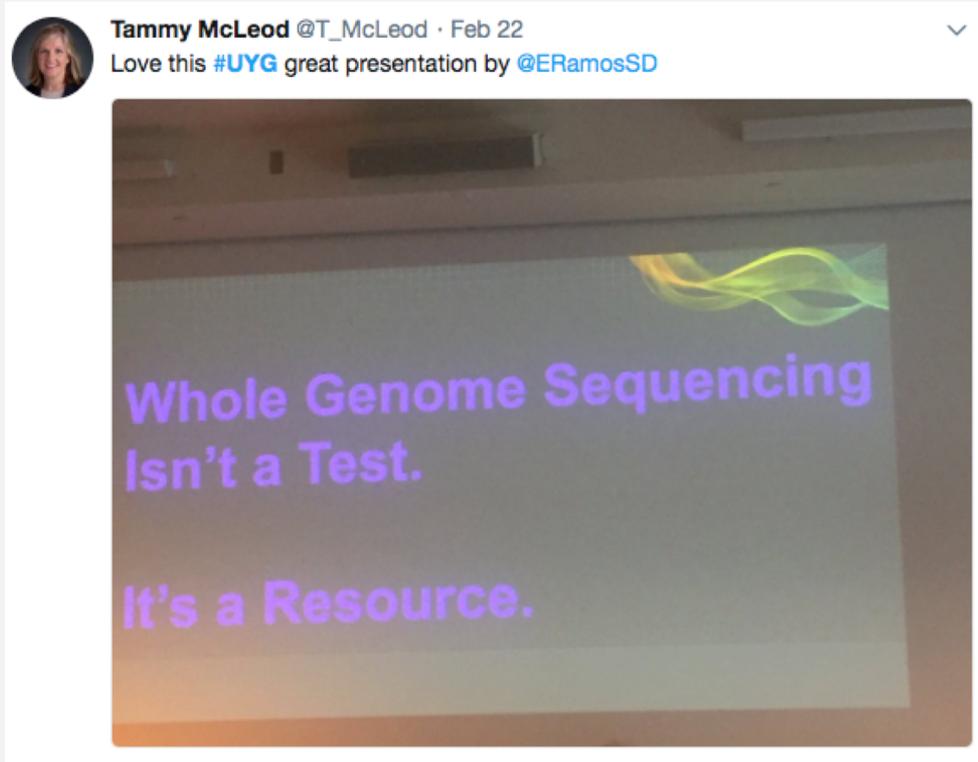
[INDIVIDUALIZED MEDICINE From Pre-Womb to Tomb](#)

Eric J. Topol

Cell. Author manuscript; available in PMC 2015 Mar 27.

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What Does Success Look Like?





A genomic and medical research database
owned by its community

To Unlock the Power of the Genome, We Must Unlock the Potential for Discovery...

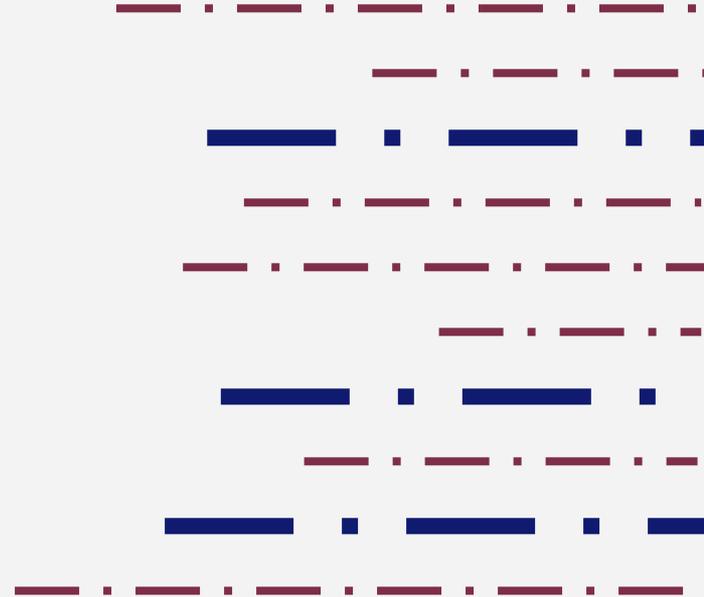
Scope and Scale of Discovery Data

Data Structure Challenges

Silos Hinder Access for Discovery

Data Subjects Should be True Partners in Research

... that's just the data considerations...



Direct-to-Consumer Testing Boom

APR 6, 2017 @ 03:18 PM 15,155

The Little Black Book of Billionaire Secrets

23andMe Rides Again: FDA Clears Genetic Tests To Predict Disease Risk



23andMe now has 2 million customers, Wojcicki says, compared to 800,000 in 2015.



Matthew Herper, FORBES STAFF
I cover science and medicine, and believe this is biology's century.
FULL BIO

Amazon has suddenly become a big marketplace for selling genetic tests

- Amazon has a booming business in sales of health tests.
- 23andMe, Ancestry and other large players in the DNA space are now selling their tests via the marketplace.
- They expect a surge in sales over the holidays.

Christina Farr | @chrissyfarr

Published 8:56 AM ET Tue, 21 Nov 2017 | Updated 10:42 AM ET Tue, 21 Nov 2017



One of the world's most respected review sites just put AncestryDNA at the top of their list.

From The Wirecutter, Aug. 30, 2017 © 2017 The New York Times. All rights reserved. Used under License.

6 million people have learned more about themselves.

Between Black Friday and Cyber Monday, leading personal genomics company AncestryDNA sold about 1.5 million testing kits



Can genome sequencing be part of a normal health screening?

Zayani Bhatt, 06 Nov 2017



0 comment



Could genome sequencing be at the forefront of diagnostic medicine?

GenomeFIRST Return of Results is an experimental programme founded by Geisinger Medical Centre, Pennsylvania, US. Its mission is simple: to provide DNA sequencing as part of standard primary medical care to average American citizens.

Monday, 21 October 2013 10:22 KATE SWEENEY

ILLUMINA AND CAMBRIDGE SPEARHEAD GENOMICS REVOLUTION

U.K. Organizations Partner With Illumina To Sequence 10,000 Whole Genomes

Published on October 21, 2013 at 12:00 PM · [No Comments](#)

100,000 British Genomes

A new initiative led by the UK's National Health Service aims to sequence the genomes of as many as 100,000 patients, a project that will cost £100 million.



Sequencing the genome of an entire population

July 8, 2012 - 05:00

As the first country ever, the Faroe Islands are preparing to sequence the genetic material of its entire population. The FarGen project could become a model for personalised medicine throughout the world.

Wanted: 1 Million People to Study Genes, Habits and Health

HudsonAlpha Establishes Center for Clinical Whole-Genome Sequencing

Apr 24, 2015 | [a GenomeWeb staff reporter](#)

University of Cambridge, Genomics England Ltd., and Illumina Collaborate to Sequence 10,000 Whole Human Genomes for National Health Service Patients

Published: October 21, 2013

Project Will Lay Foundation for Genomic Medicine

Initiative Will Sequence 10,000 Whole Genomes of People with Rare Genetic Diseases

China Province of Jiansu will genome sequence one million people within two years

[brian wang](#) · November 7, 2017

BIOMICEDINE NEWS

Why the U.K. Wants a Genomic National Health Service

The U.K. plans to sequence 100,000 National Health Service patients by 2017—in a bold push to be a genomic medicine leader.

The Million Veteran Program: Building VA's Mega-Database for Genomic Medicine

Veritas Genetics Launches Collaboration with Mayo Clinic to Integrate Whole Genome Sequencing into Clinical Care

Goal is to empower physicians and patients through making whole genome sequencing broadly available

Pinned Tweet



Eric Topol @EricTopol · 8 Oct 2017

Your. Medical. Data.

It's your body

You paid for it

It is worth more than any other type of data

It's being widely sold, stolen and hacked. And you don't know it.

It's full of mistakes, that keep getting copied and pasted, that you can't edit

You are/will be generating more of it, but it's homeless

Your medical privacy is precious

The only way it can be made secure is to be decentralized

It is legally owned by doctors and hospitals

Hospitals won't or can't share your data ("information blocking")

Your doctor (>65%) won't give you a copy of your office notes

You are far more apt to share your data than your doctor

You'd like to share it for medical research, but you can't get it

You have seen many providers in your life; no health system/insurer has all your data

Essentially no one (in the US) has all their medical data from birth throughout their life

Your EHR was designed to maximize billing, not to help your health

You are more engaged and have better outcomes when you have your data

Doctors who have given full access to their patients' data make this their routine

It requires comprehensive, continuous, seamless updating

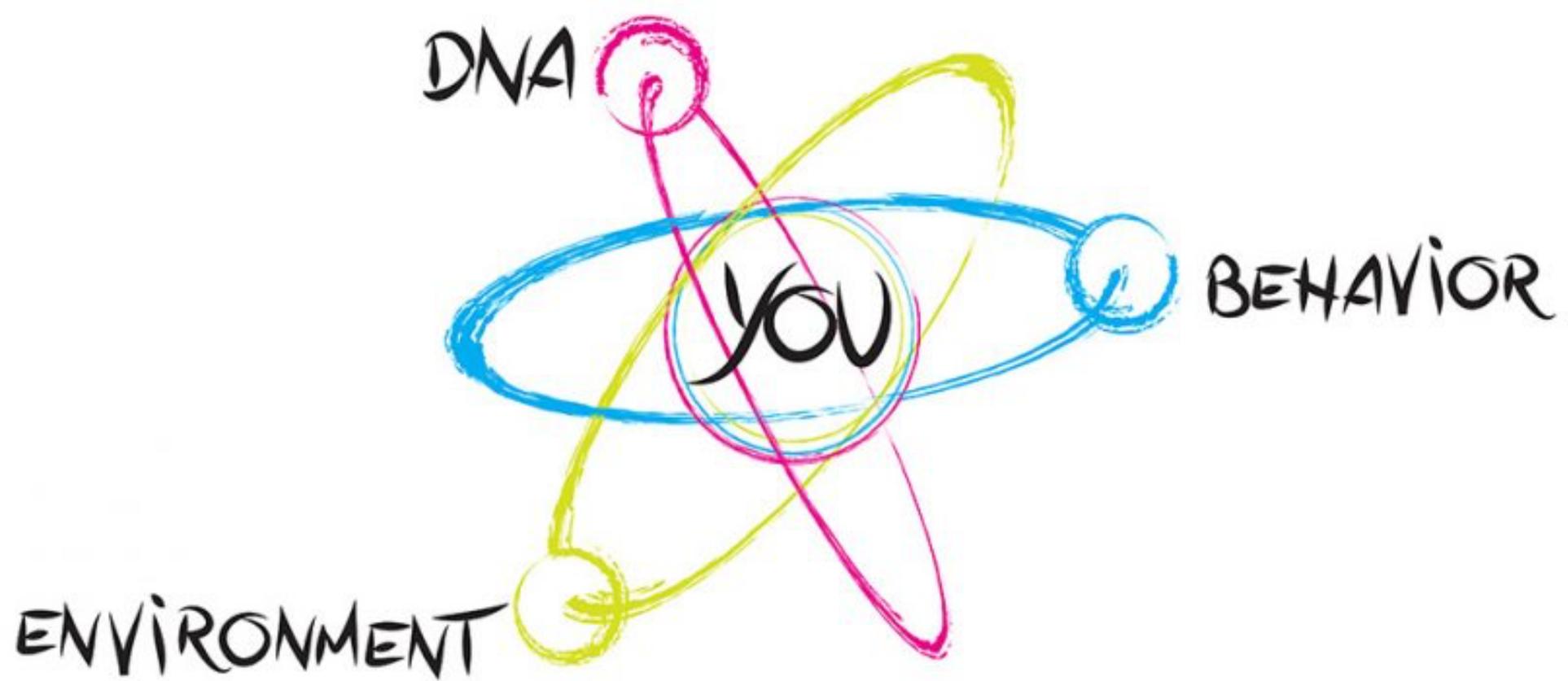
Access or "control" of your data is not adequate

~10% of medical scans are unnecessarily duplicated d/t inaccessibility

You can handle the truth

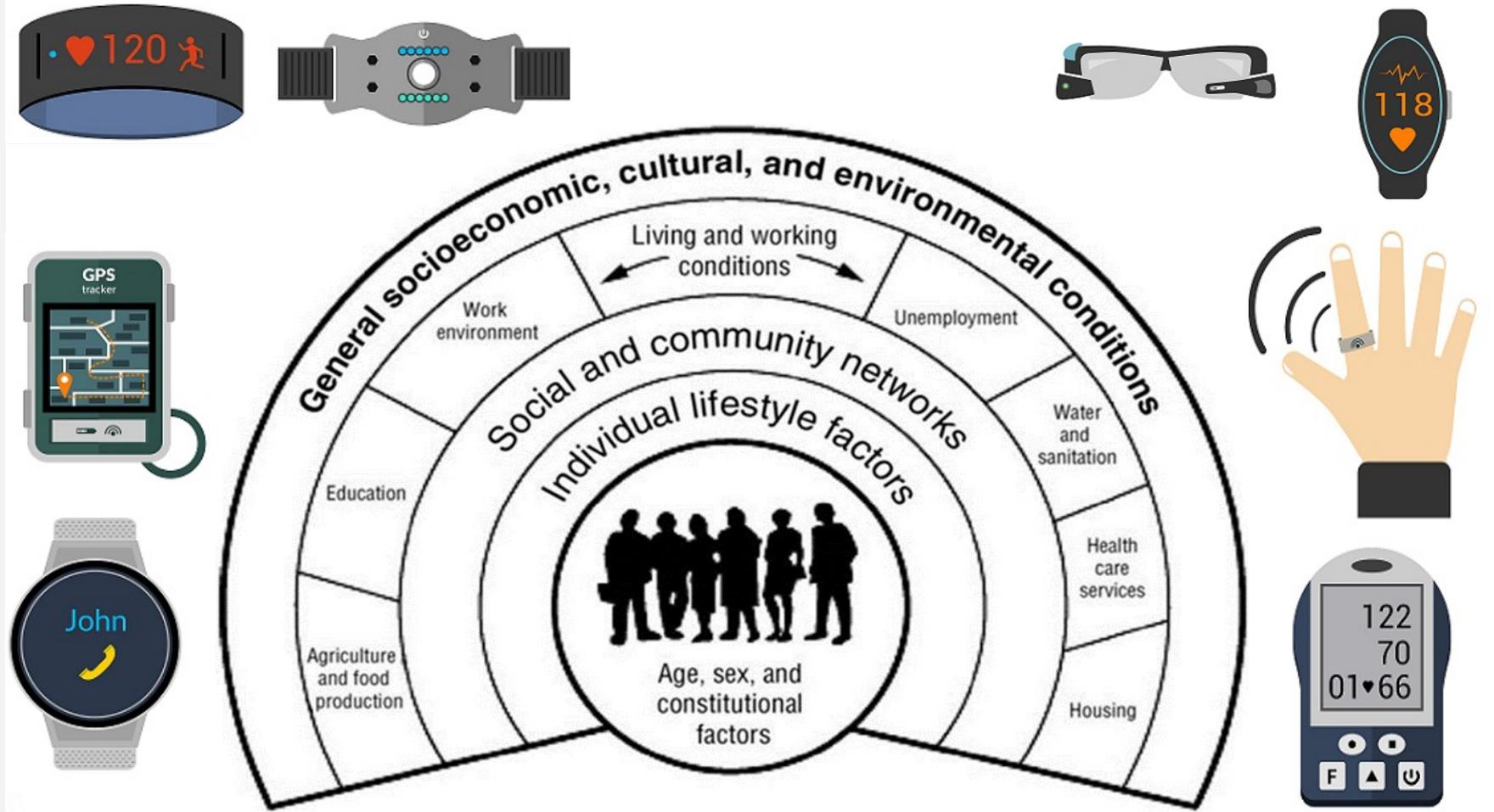
You need to own your data; it should be a civil right

It could save your life



“All illnesses have some heredity contribution. It's been said that genetics loads the gun and environment pulls the trigger.”

~Francis Collins, NIH Director



Source: Dahlgren and Whitehead (1991)

Focus Genetic tests often overused and misinterpreted, sometimes with tragic consequences



The latest genetic test isn't always the most effective way to identify conditions such as Down Syndrome. (JGI/Tom Grill/Getty Images/Blend Images RM)

MAY 8, 2017, 5:00 AM

One of every three genetic tests examined by a team of researchers at the San Diego Naval Medical Center shouldn't have been prescribed, a finding that adds to growing body of evidence suggesting that genetic tests are routinely overused and often misinterpreted.

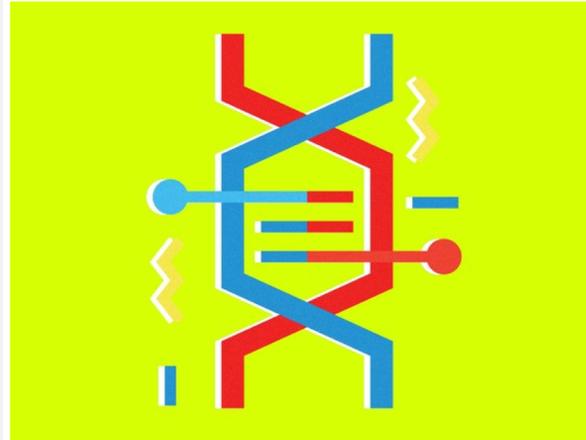
The Loopholes in the Law Prohibiting Genetic Discrimination



GINA only applies to health insurance and employment, but a new Republican bill would weaken even those protections.

SARAH ZHANG | MAR 13, 2017 | HEALTH

THE HOUSE HEALTH PLAN MAKES YOUR GENES A PREEEXISTING CONDITION



GETTY IMAGES

nature International weekly journal of science

Genomics is failing on diversity

Alice B. Popejoy & Stephanie M. Fullerton

12 October 2016

An analysis by Alice B. Popejoy and Stephanie M. Fullerton indicates that some populations are still being left behind on the road to precision medicine.

“Technology is neither radical nor revolutionary unless it benefits every single person. Every. Single. Person.” DJ Patil, White House Chief Data Scientist



Let's Connect

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Luna Newsletter: lunadna.com