Moving Beyond Big Data and AI to Realize the Dream of Precision Medicine

January 23, 2020

Sema4: A patient-centered health intelligence company

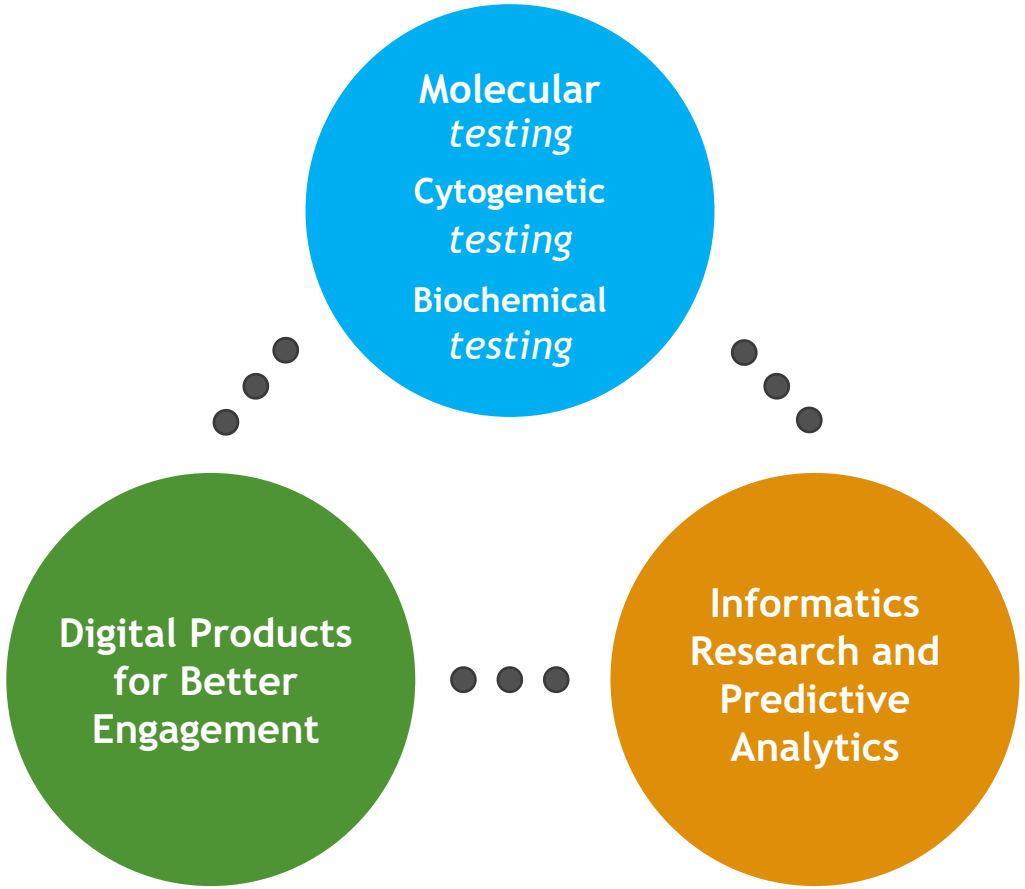
Use data analytics to develop **predictive models** of human health

Define optimal individualized health course trajectories to **improve patient outcomes**.

Deliver information-driven insights to pharma/biotech companies to **accelerate drug development** of precision medicines.

Sema4: Patient-centered predictive health company

- Spun out of Mount Sinai, a **premier research and patient care organization and one of largest healthcare systems in US**, in 2017
- **Interdisciplinary team** of scientists, data engineers, and clinicians, transforming future of healthcare through **data-driven insights (~850 Employees; ~150 PhD/MD level scientists)**
- One of **largest clinical genomics labs** in the world
  - >150,000 advanced DNA tests run/year
  - Test volume more than doubling yearly
- Founded on idea that more information, deeper analysis, and increased engagement will **improve diagnosis, treatment, and prevention of disease**



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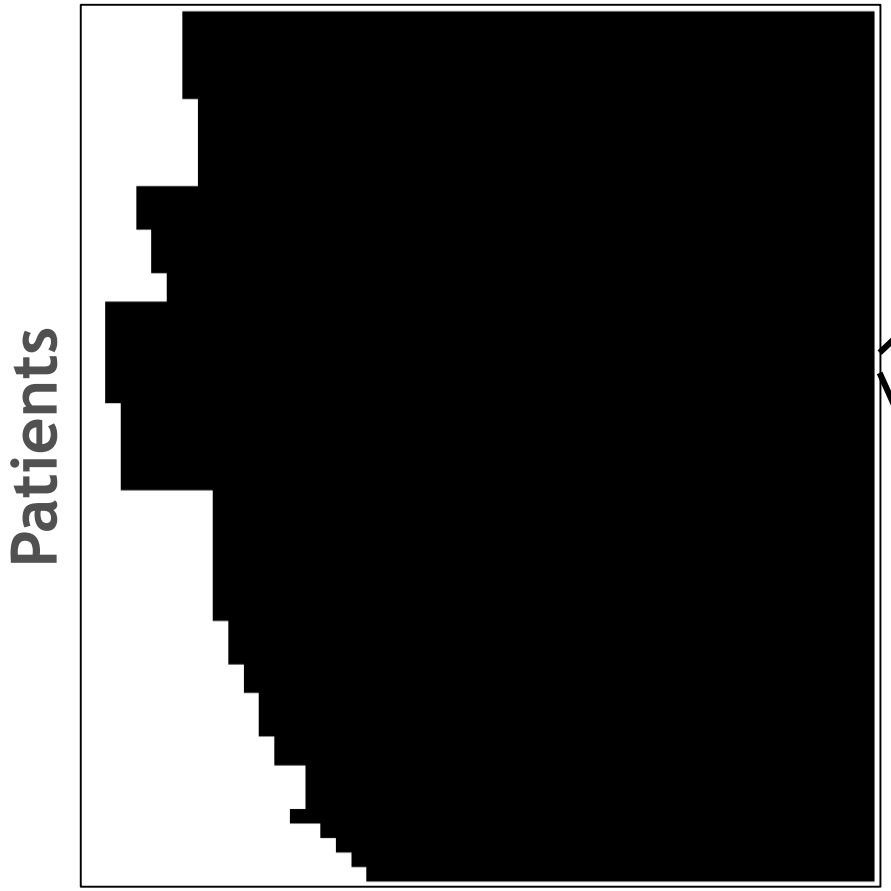
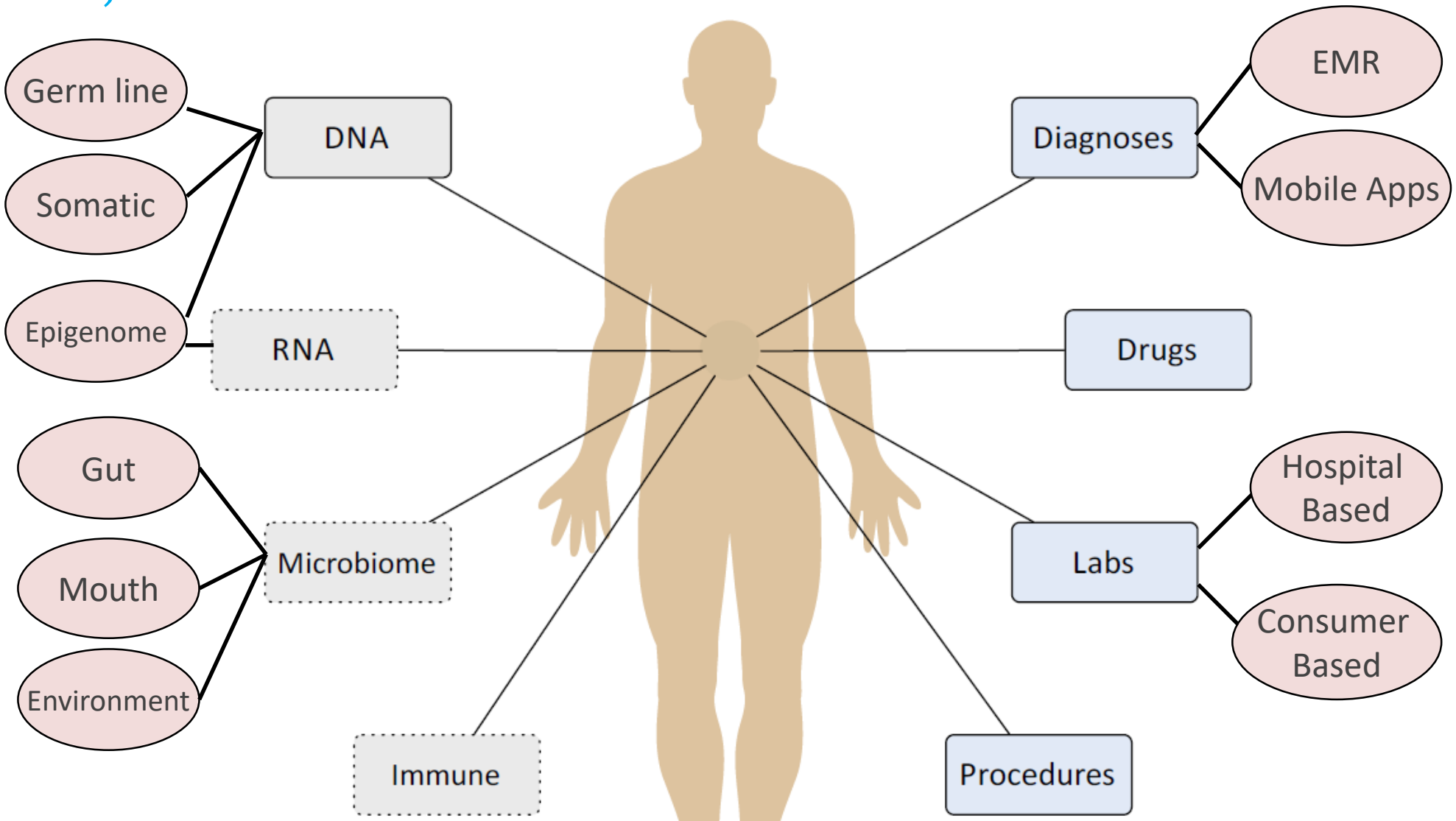
Healthcare decisions are binary, ignoring that every individual is unique and therefore requires unique healthcare recommendations

Characterizing Disease Status Over Time in Patient Population

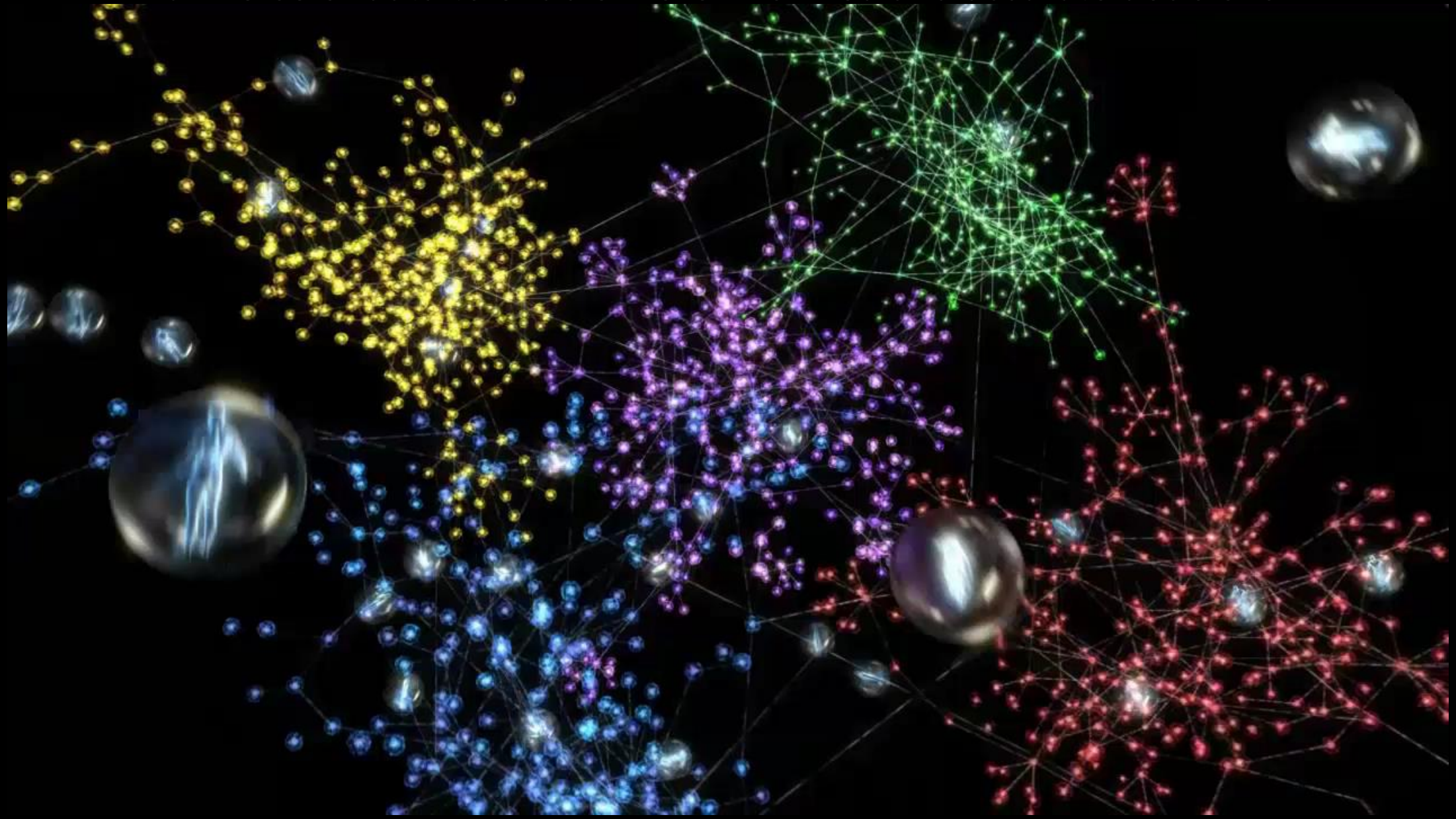


Individual patient, tracked over time, defined as well or sick based on simple, binary biomarker

With increasing amounts of data from advanced technologies generated on patients, we can do better



Our AI-driven models make maximal use of individual patient data, in the context of the digital universe of data to enable more informed and accurate decisions



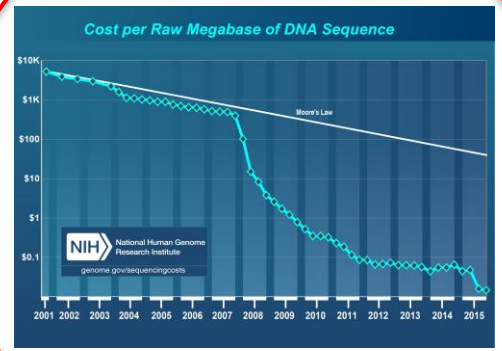
Rapid technology advances → massive scales of data informing on individuals

Mobile + Social Networks

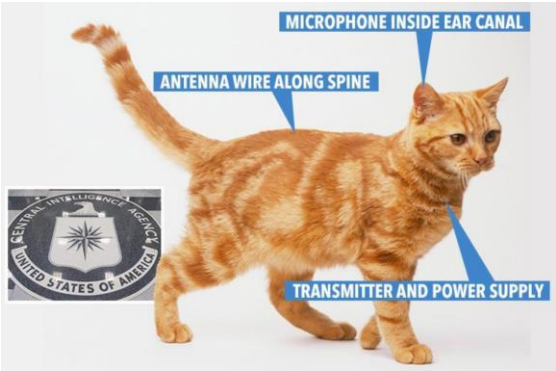
The Cloud

Big Data Analytics

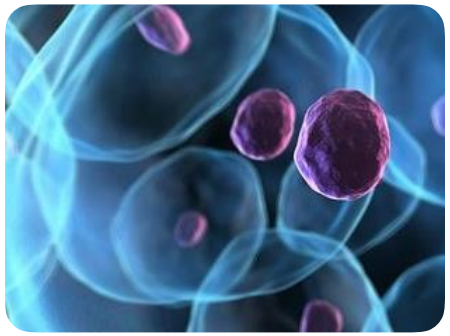
Only technology I am aware of that is moving at super Moore's law speed



Next-Gen Genomics



FUR YOUR EYES ONLY **CIA 'implanted microphones into CATS' in a bizarre attempt to spy on Russia**

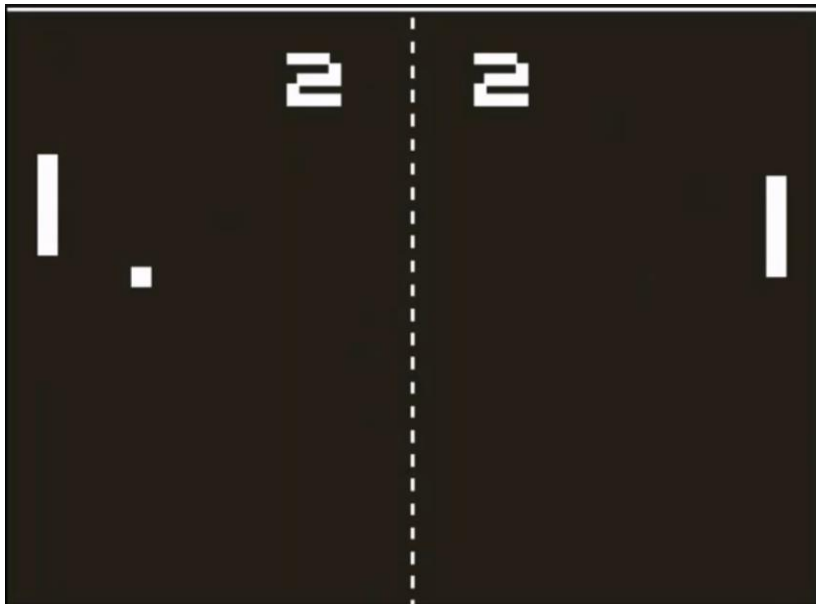


Advanced Materials

3D Printing

The "Internet of Things"

Starting in the 70's…

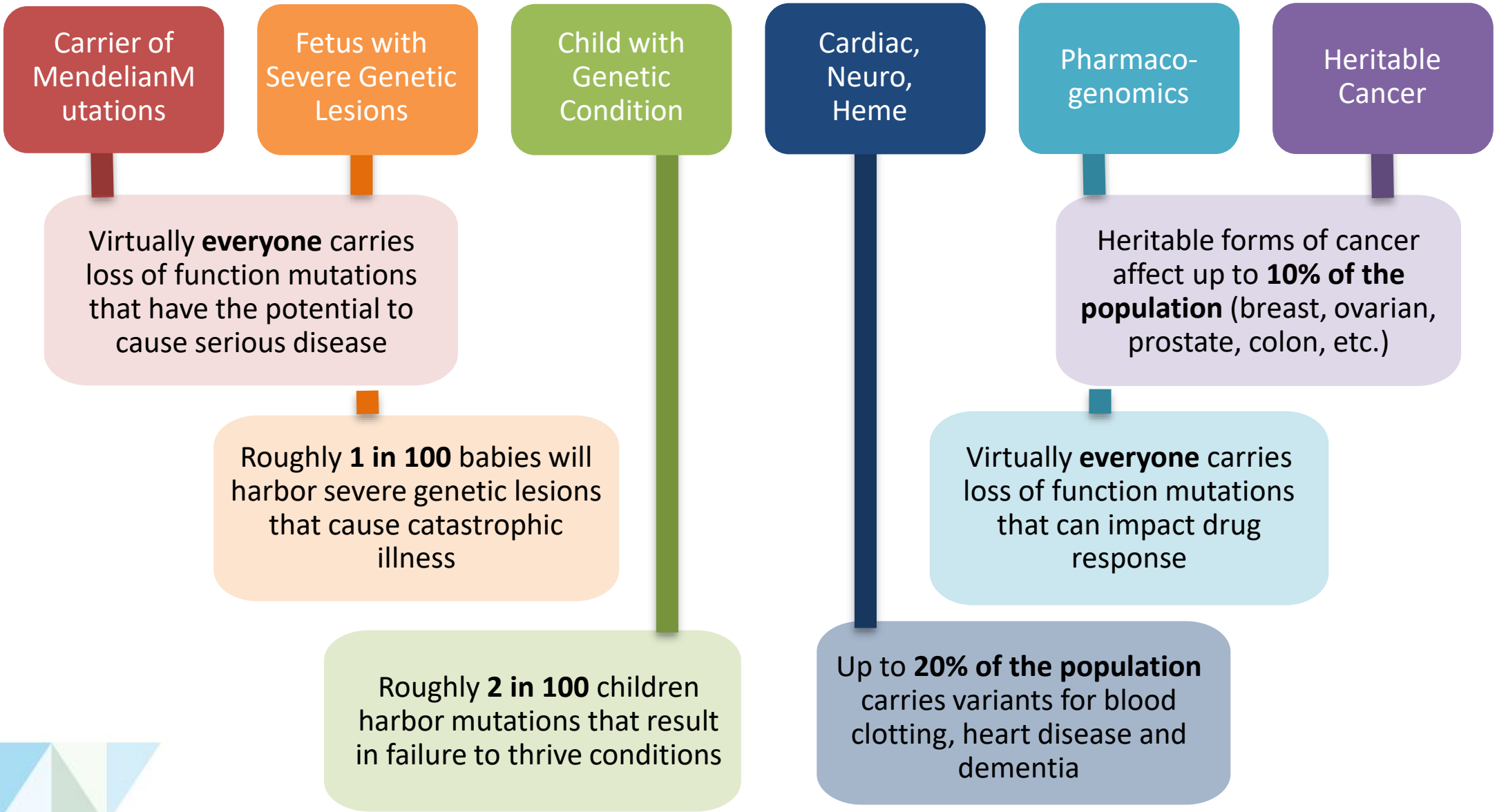


And then the 80's…

On through to today…

What does it mean to move at Super Moore's Law pace? Well consider moving at a Moore's Law pace…

Technologies like NGS have led to enough new knowledge in the past decade that everyone would benefit from sequencing today



Sema4 conducts advanced genetic testing during key stages in patients' lives

Focus of these materials

Pre-pregnancy & Pregnancy*

Carrier Screening:
- Enhanced reports
- Personalized residual risk

NIPT:
- Targeted and expansive screening

Prenatal:
- Diagnosis for high risk pregnancies
- Cytogenomic analysis

IVF:
- Reference agreement for PGT-A and PGT-M

Expanded Carrier Screening (> 500 Genes)

Our Expanded Carrier Screen provides insight into carrier status to help patients make informed family planning choices

Conditions covered span: cardiovascular, endocrine, hematologic, hepatic, immunodeficiency, metabolic, neurological, pulmonary, renal, and skeletal conditions

*Majority of testing volume; additional detail on reproductive health tests on following slide

Pediatric

Natalis:
- Supplemental newborn screening

Diagnostic panels:
- Hearing and vision loss
- Cardiac defects
- Primary immunodeficiency/IBD
- Neurodevelopmental panels including Noonan syndrome and ASD
- Skeletal dysplasias/Limb defects
- Microcephaly
- Diagnostic Exome

Hereditary Cancer (>100 Genes)

Genetic testing for hereditary cancer can help determine if a patient carries a genetic change that increases their risk for certain cancers

Testing panels analyze genes associated with brain, breast, colon, melanoma, ovarian, pancreatic, and prostate cancers

Adult/Oncology

Hereditary Cancer:
- Multigene panels across cancer types

Molecular Oncology:
- Solid Tumor and Heme Onc
- Somatic and Germline profiling
- Whole transcriptome profiling
- Comprehensive Pan-cancer

Pharmacogenomic Panels

Genomic Health Screening

Solid/Liquid Tumors (Whole Exome/Transcriptome)

Designed to help identify appropriate targeted therapies and clinical trials for patients with solid tumors

20+ genes found in	115+ genes included in	15+ genes associated with
15+ guidelines	**800+ clinical trials**	**30+ targeted therapies**
for solid tumor genetic testing	worldwide	that are approved by the FDA

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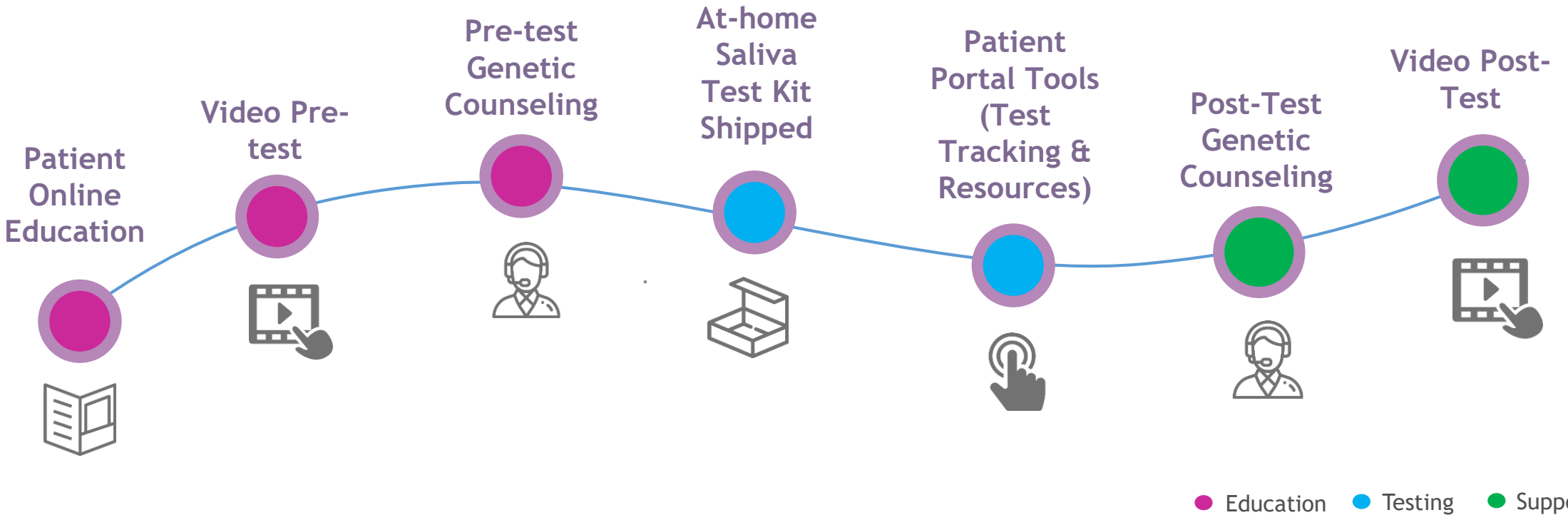
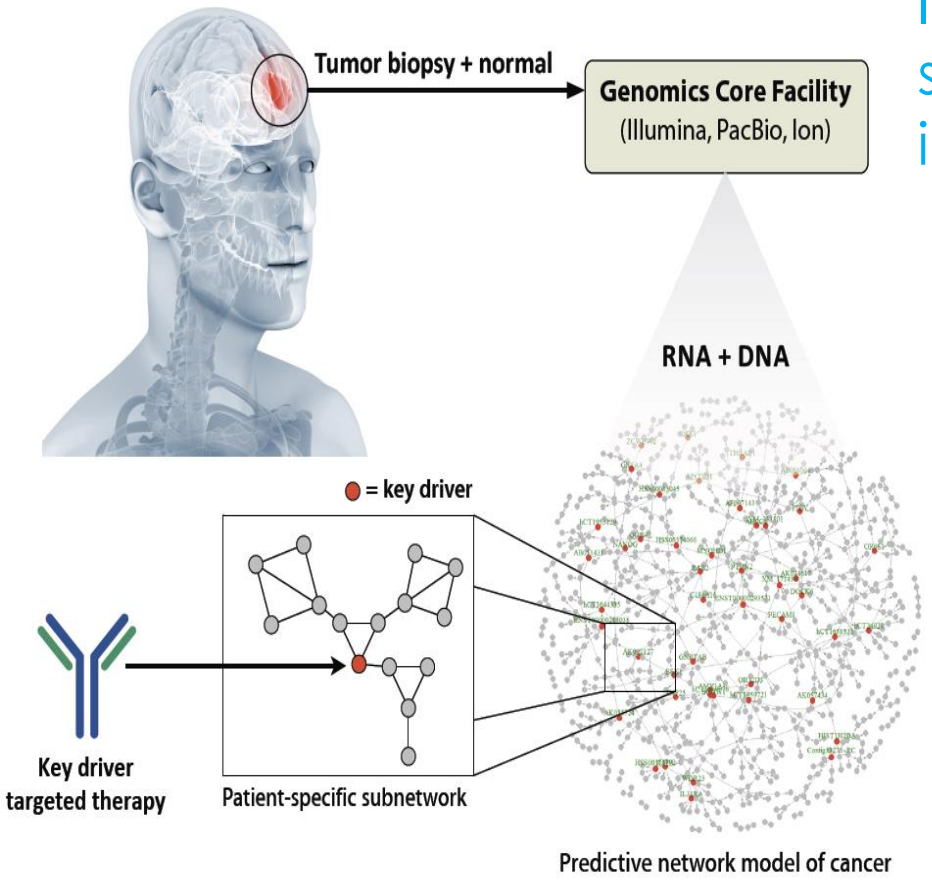
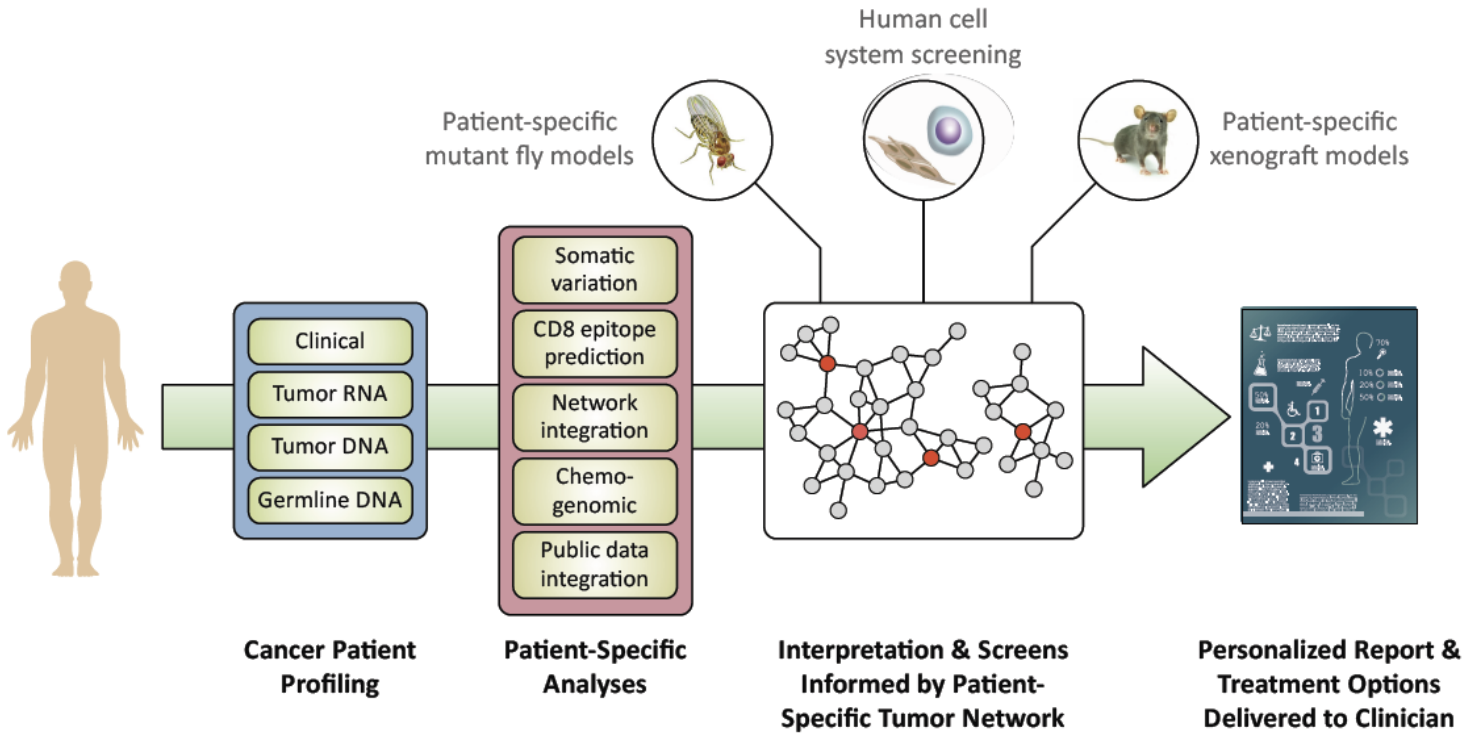
Convenient At Home Genetic Testing, Education & Support



In areas like cancer, sophisticated data matched with sophisticated AI and machine learning approaches to inform diagnosis and treatment

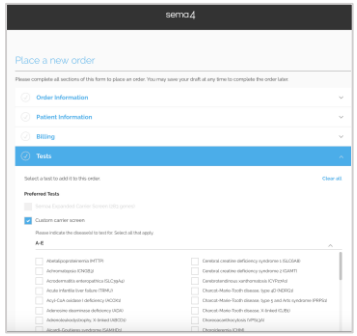
Patient tumor and germline are profiled, key drivers identified, tumor constructed in avatar models, those models taken through HTS for identification of drug cocktail



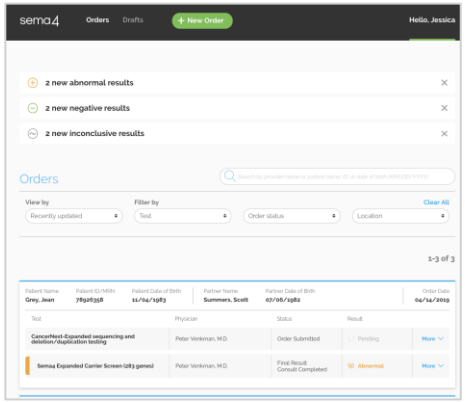


Sema4: driving differentiated insights

1 Place Order*

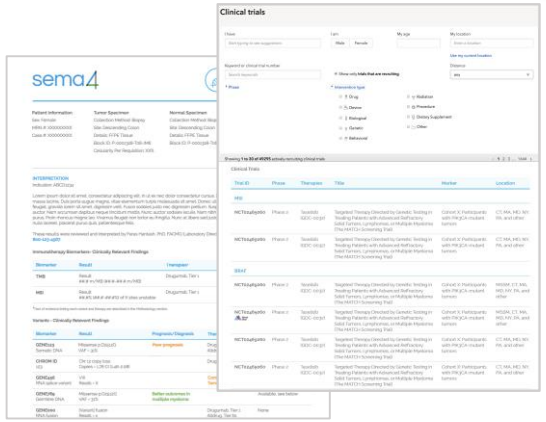


2 Track Samples



3 Review Results

- Clinical trials
- Therapy , prognosis
- VUS



4 Interactive Results & Analytical Updates

- FDA approved therapies
- Clinical trials eligibility
- Relevant publications
- Practice level statistics

5 Patient Journey & Cohort Builder

- Compare to relevant cohorts
- Review your patient files longitudinally

6 Drill Deeper/ Unique Sema4 Modeling†

- Pathway driven recommendations to further personalize treatment decisions

Equity in Comprehensive Testing Starts With Affordable Access

Robust In-network Payer Contracts (covering > 200 million lives in the U.S.)

Align with our patient and provider focused goals

Support for providers

- Workflow integration
- Dedicated Customer Success Team
- Ethical billing practices
- Expansive pre-authorization services
- Digital tools to engage results easily and securely
- Proactive genetic counseling

Support for patients

- National payor network
- Patient-friendly billing policies
- Benefits investigation service
- Digital tools keeping data secure and patients in control
- Proactive genetic counseling
- Affordable discounted or free rates for those in need