The India Dialog: Redefining Healthcare

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Thousands of New Medicines Under Development Globally

8,000 New Medicines Under Development Globally



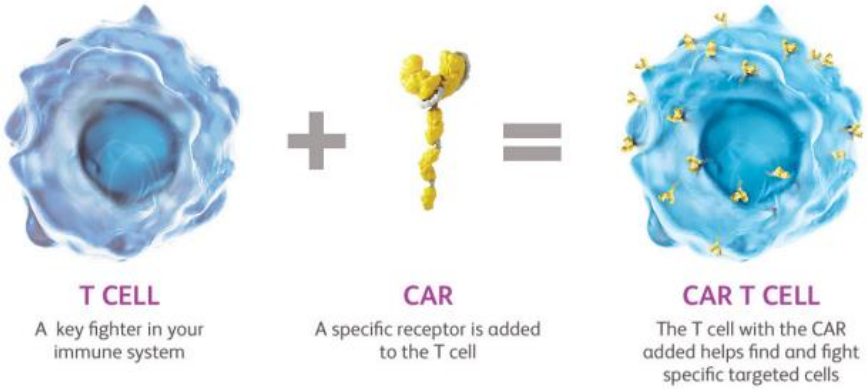
Source: PhRMA, "Chart Pack: Biopharmaceuticals in Perspective, Fall 2020"

NCDs: Common Healthcare Challenges

- Noncommunicable diseases (NCDs) like cardiovascular disease (CVD), cancer, and diabetes account for 77% of fatalities in dev. countries.
  - Developing countries bear 80% of global CVD death burden; India's rate is actually 1.6 times America's.
  - By 2050, half of Americans will receive a cancer diagnosis.
- The majority of India's healthcare expenses are related to chronic conditions including diabetes, heart disease, and COPD.

Innovative Cancer Technologies and Platforms

- Gene editing through tools like CRISPR-KAS enables alterations to an organism's DNA.
  - Tackling inherited blindness; childhood leukemia.
- Cancer immuno- (or "cell-") therapy: Treatments manufactured uniquely for each individual patient, using a patient's own T cells as the starting material.





CRISPR Gene Editing

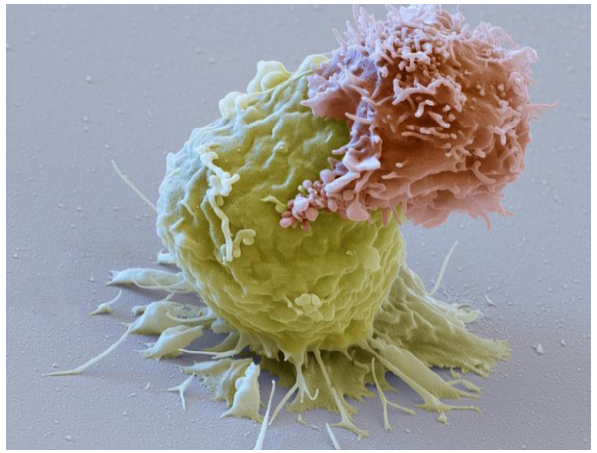
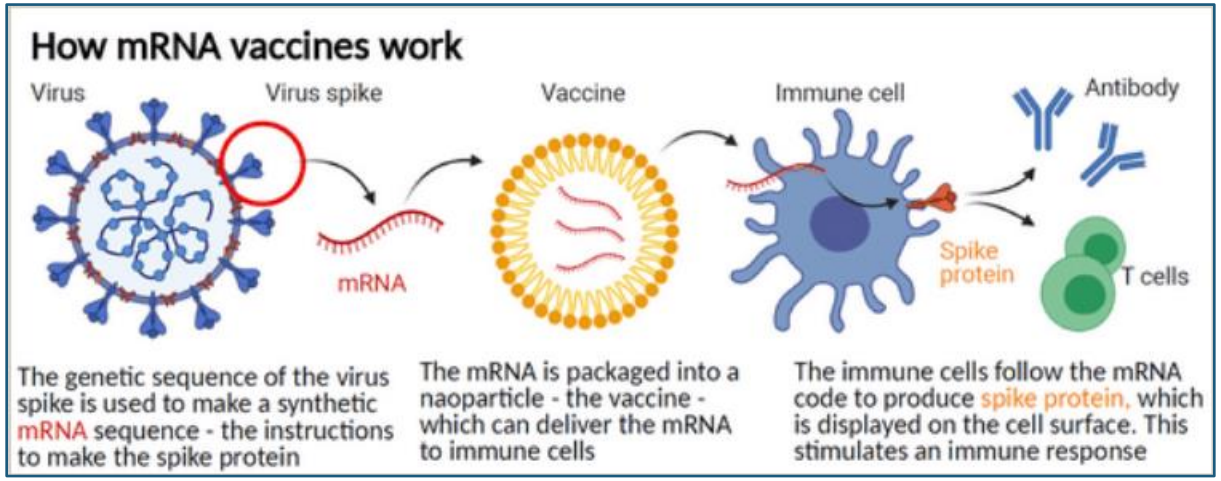
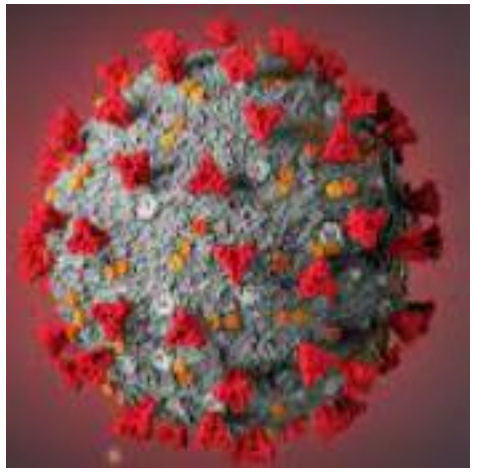


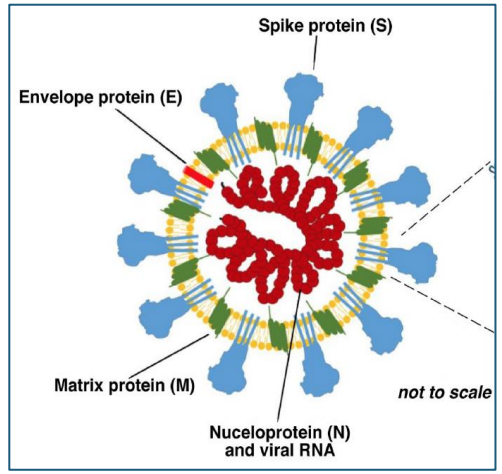
Image of a CAR-T cell (reddish) attacking a leukemia cell (green).

mRNA Unlocks Vast Potential for New Drugs and Therapies

- mRNA carries instructions for cells to make specific proteins; COVID-19 vaccines are made of mRNA (wrapped in a coating) that teaches cells how to make copies of the COVID-19 spike protein.
- There are currently 520+ ongoing clinical trials testing mRNA across more than 20 disease categories.



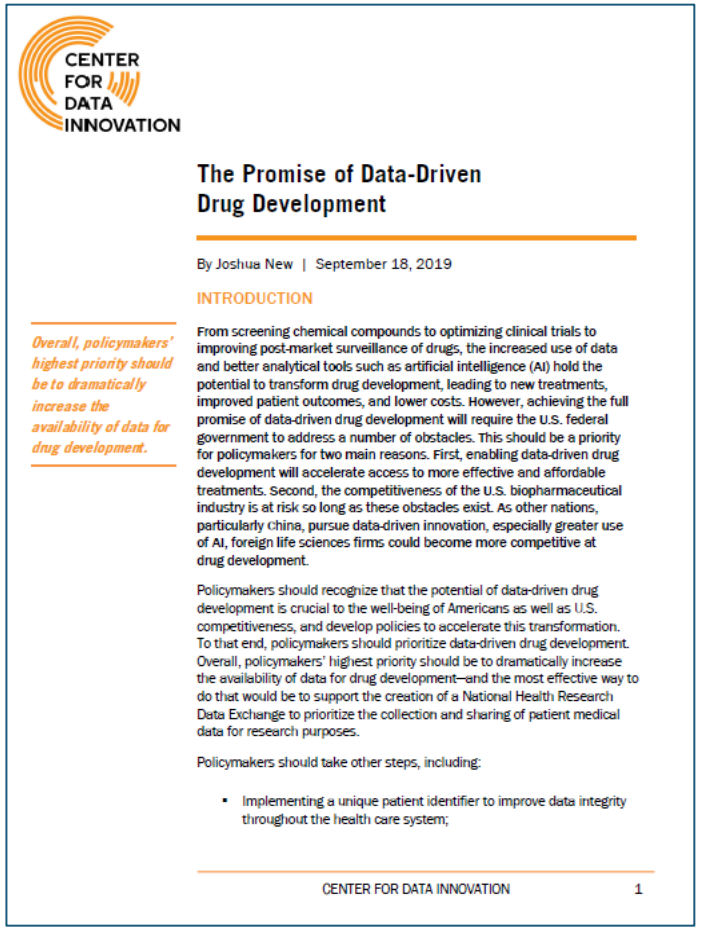




Sources: CDC, "How mRNA COVID-19 Vaccines Work"; Ernst & Young, "How mRNA Medicines Might Change the Drug Landscape"

Digital Techs Enabling Disease Detection and Drug Development

- AI/ML may decrease average cost of developing drug by $300-$400M.
- MCED uses AI to detect circulating tumor DNA through liquid biopsies.
- GRAIL's MCED can detect as many as 50 different types of cancers from a single blood draw.
- Identifies cancerous tissue with 97% accuracy and a false positive rate of less than 1%.



CENTER FOR DATA INNOVATION

The Promise of Data-Driven Drug Development

By Joshua New | September 18, 2019

INTRODUCTION

Overall, policymakers' highest priority should be to dramatically increase the availability of data for drug development.

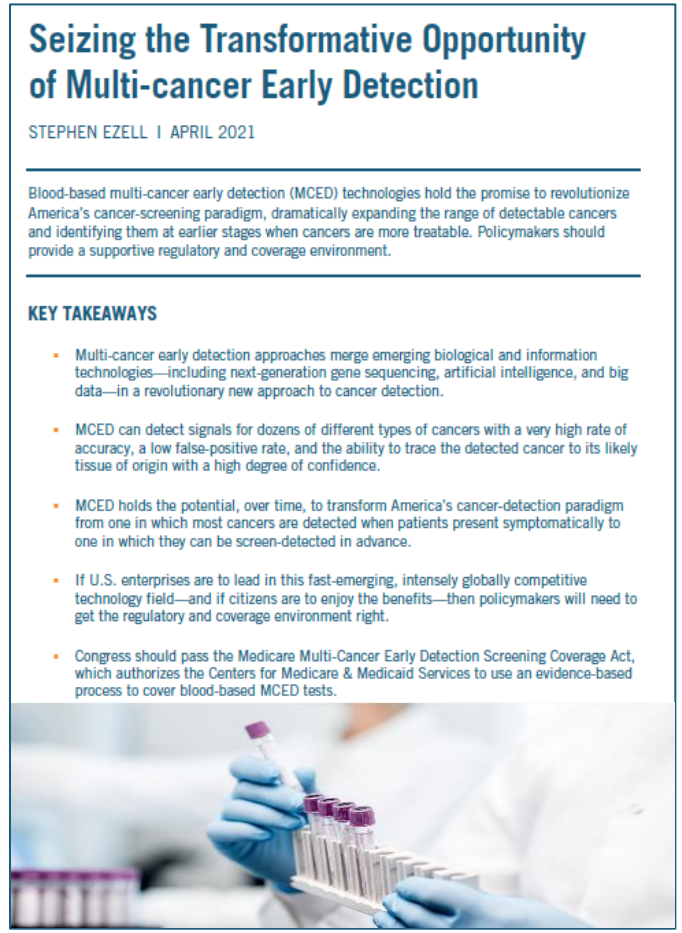
From screening chemical compounds to optimizing clinical trials to improving post-market surveillance of drugs, the increased use of data and better analytical tools such as artificial intelligence (AI) hold the potential to transform drug development, leading to new treatments, improved patient outcomes, and lower costs. However, achieving the full promise of data-driven drug development will require the U.S. federal government to address a number of obstacles. This should be a priority for policymakers for two main reasons. First, enabling data-driven drug development will accelerate access to more effective and affordable treatments. Second, the competitiveness of the U.S. biopharmaceutical industry is at risk so long as these obstacles exist. As other nations, particularly China, pursue data-driven innovation, especially greater use of AI, foreign life sciences firms could become more competitive at drug development.

Policymakers should recognize that the potential of data-driven drug development is crucial to the well-being of Americans as well as U.S. competitiveness, and develop policies to accelerate this transformation. To that end, policymakers should prioritize data-driven drug development. Overall, policymakers' highest priority should be to dramatically increase the availability of data for drug development—and the most effective way to do that would be to support the creation of a National Health Research Data Exchange to prioritize the collection and sharing of patient medical data for research purposes.

Policymakers should take other steps, including:

- Implementing a unique patient identifier to improve data integrity throughout the health care system;

CENTER FOR DATA INNOVATION 1



Seizing the Transformative Opportunity of Multi-cancer Early Detection

STEPHEN EZELL I APRIL 2021

Blood-based multi-cancer early detection (MCED) technologies hold the promise to revolutionize America's cancer-screening paradigm, dramatically expanding the range of detectable cancers and identifying them at earlier stages when cancers are more treatable. Policymakers should provide a supportive regulatory and coverage environment.

KEY TAKEAWAYS

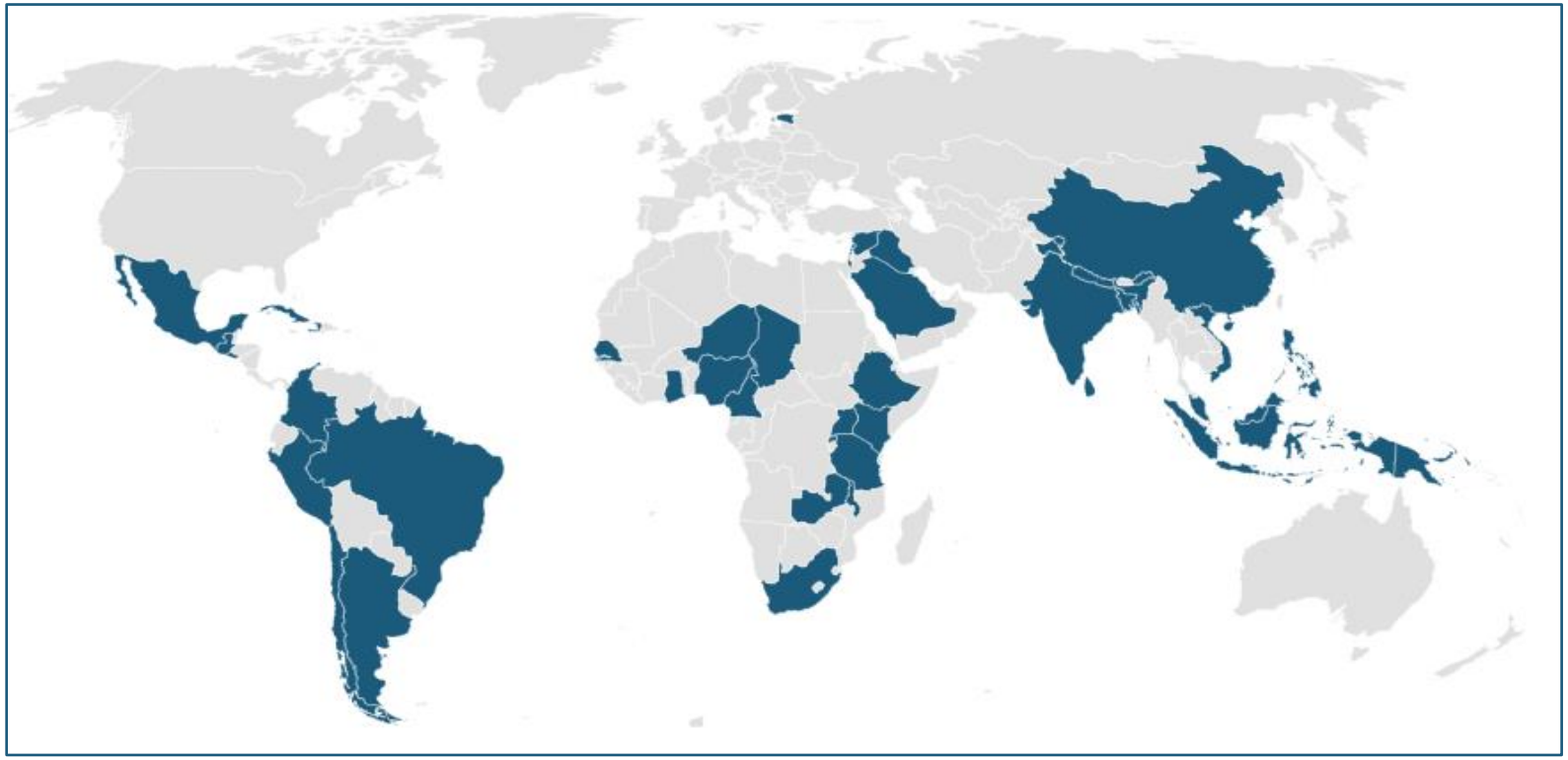
- Multi-cancer early detection approaches merge emerging biological and information technologies—including next-generation gene sequencing, artificial intelligence, and big data—in a revolutionary new approach to cancer detection.
- MCED can detect signals for dozens of different types of cancers with a very high rate of accuracy, a low false-positive rate, and the ability to trace the detected cancer to its likely tissue of origin with a high degree of confidence.
- MCED holds the potential, over time, to transform America's cancer-detection paradigm from one in which most cancers are detected when patients present symptomatically to one in which they can be screen-detected in advance.
- If U.S. enterprises are to lead in this fast-emerging, intensely globally competitive technology field—and if citizens are to enjoy the benefits—then policymakers will need to get the regulatory and coverage environment right.
- Congress should pass the Medicare Multi-Cancer Early Detection Screening Coverage Act, which authorizes the Centers for Medicare & Medicaid Services to use an evidence-based process to cover blood-based MCED tests.

Source: ITIF, "Seizing the Transformative Opportunity of Multicancer Early Detection"; ITIF CDI, "The Promise of Data-Driven Drug Development"

Innovate4Health: IP Driving Health Innovation Worldwide



- Explores how developing-country innovators are tackling on-the-ground local, regional, and global health challenges.



https://medium.com/innovate4health

Innovate4Health: The Six Challenges

- Adapting healthcare interventions for environments where resources and infrastructure are challenging;
- Developing affordable interventions to meet basic needs in challenging environments;
- Getting healthcare to the people in places where it's hard for people to come to the healthcare;
- Providing affordable, robust tests for diagnosing diseases
- Fostering health innovation in emerging economies.
- Improving HIV diagnosis and care;



Innovate4Health: Examples

- Arktek passive vaccine cooler keeps vaccines at a steady cool temperature for 30 days; supports village of 6,000.
- Portable Eye Exam Kit (PEEK) brings the optometrist's office to the patient.
- Embrace Infant Warmers save premature babies from hypothermia.
- MACi remote echocardiogram designed for India with "jugaad" principles.





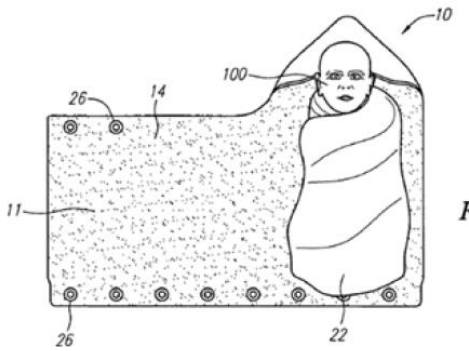


FIG. 3



Innovate4Health: India Innovator Examples

- NephroPlus' "Zero Infection Point Kit" and other improved treatment options for chronic kidney disease.
- AMRIT nanomaterial water filter remove microbial contamination as well as arsenic, iron, and other heavy metals from drinking water.
- Bharat Biotech's COVID-19 vaccine Covaxin.
- mPedigree verification system for counterfeit drugs.
- Mobile Obstetrical Monitoring device for remote patient monitoring.







The Promise of Digital Health Technologies

- Number of “digital health” products doubled in past 5 years in LMIEs, to over 165K.
- India’s telemedicine market expected to reach $5.5 billion by 2025.
- India’s “eSanjeerveni” telemedicine service handles 340,000 consultations per day.

Telemedicine

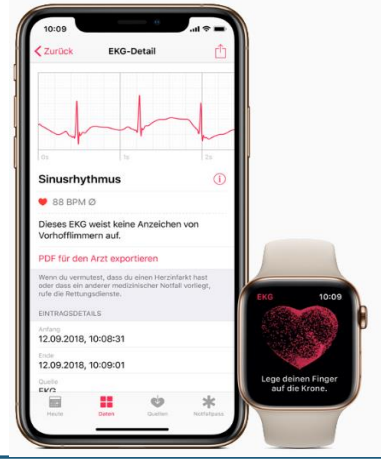


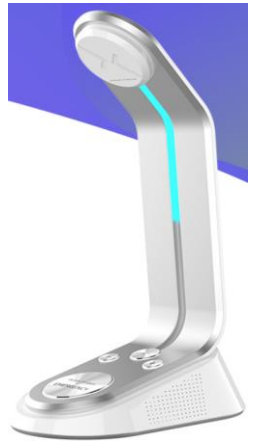
Personal Assistance Apps



Remote Monitoring Technologies







The Five "A's" of Public Health for India

1. **Awareness:** Individual knowledge of best practices for personal health.
2. **Access:** Sufficient access to medicines and public health infrastructure.
3. **Adequacy:** Of medical/healthcare personnel to serve India's society.
4. **Affordability:** Of health insurance/healthcare provision for citizens.
5. **Accountability:** Ensuring that expected standards of service are delivered.

Source: Arvind Kasthuri, "The Challenges to Healthcare in India - The Five A's" *Indian Journal of Community Medicine* (September 2018)

Recommendations for Indian Policymakers

- Recognize broad economic impact of improved healthcare delivery.
- Recognize that innovative medicines can help address health system costs.
- Recognize that deployment of digital infrastructure, and increases in societal digital skills, will be crucial to delivery of healthcare solutions at scale.
- Remove opposition to the WTO E-commerce Customs Duty Moratorium.
- Join the Information Technology Agreement (ITA)-2.
- Set a goal of becoming a “G20” life-sciences innovator.



Thank You!

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