MEDCAN

LIVE WELL, FOR LIFE.

The Patient of the Future:

Can we deliver on the promise of Precision Prevention?

Dr. James Aw, Chief Medical Officer

October 2018

Precision Prevention

1 Patient of the future: current trends and disruptors in healthcare on an individual and systemic level
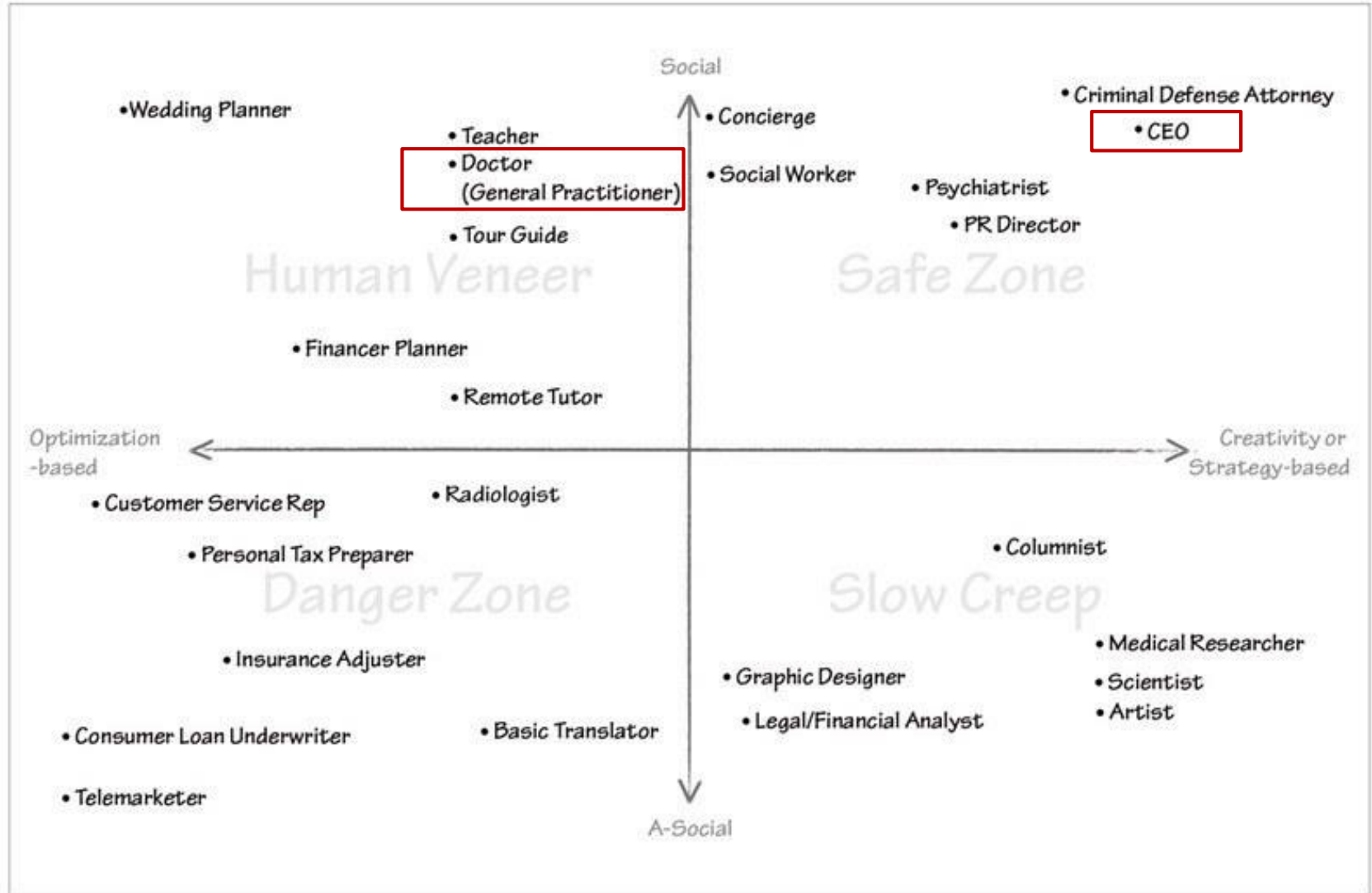
2 Medcan Highlights: current projects which demonstrate value-based care and precision prevention
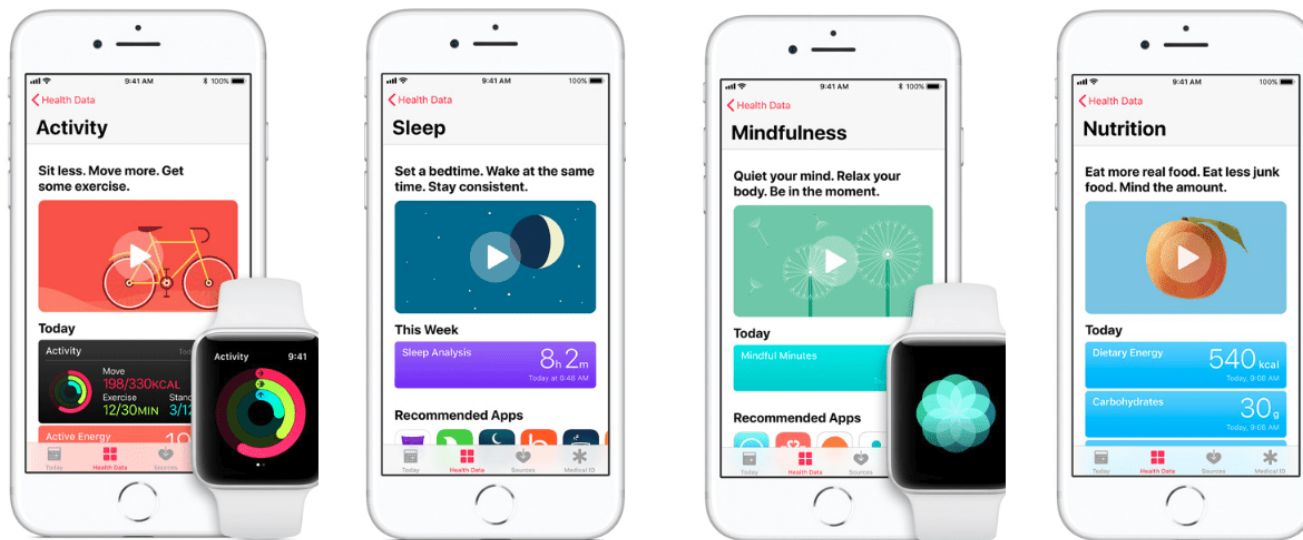
3 Looking forward: Obstacles and challenges; key impacts and next steps on achieving precision prevention

The patient of the future…

Predict
Diagnose
Treat
Monitor
Inform

Social

• Wedding Planner

• Criminal Defense Attorney

• Concierge

• CEO

• Teacher

• Doctor
(General Practitioner)

• Social Worker

• Psychiatrist

• Tour Guide

• PR Director

Human Veneer

Safe Zone

• Financer Planner

• Remote Tutor

Optimization-based ← → Creativity or Strategy-based

• Radiologist

• Customer Service Rep

• Columnist

• Personal Tax Preparer

Danger Zone

Slow Creep

• Insurance Adjuster

• Medical Researcher

• Graphic Designer

• Scientist

• Legal/Financial Analyst

• Artist

• Consumer Loan Underwriter

• Basic Translator

• Telemarketer

A-Social

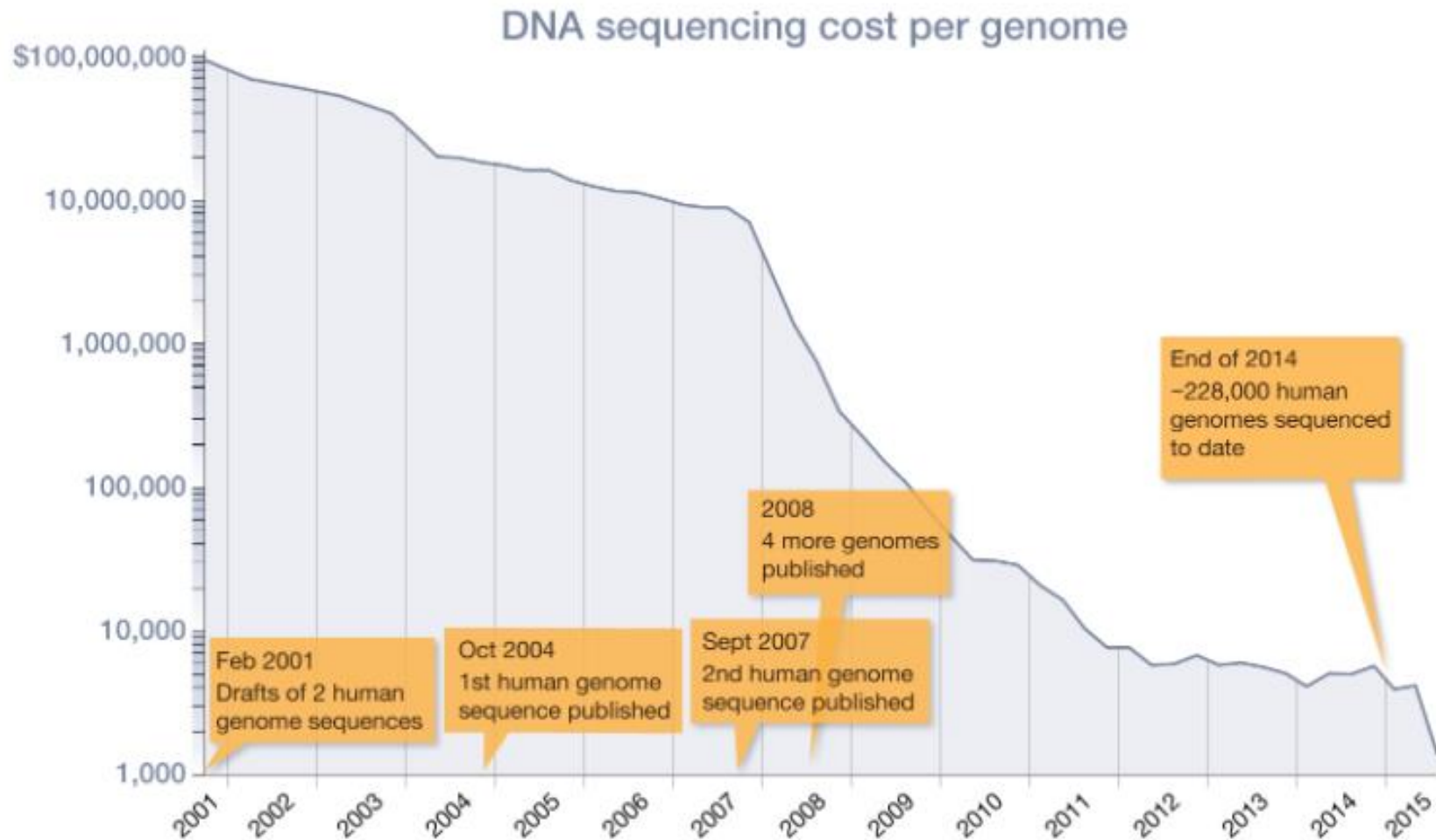https://aisuperpowers.com/ai-and-you/ai-and-your-job

Rise of big data: patients want access to healthcare data

- Disruption of technology: wearable devices to track healthcare outcomes and encourage behavioural changes (e.g. Apple Watch, FitBit, Dexcom)

- Genetic Testing (more affordable "at-home DNA tests", whole genome sequencing); pharmacogenomics; population screening for BRCA mutations

Advances in technology leading to lower costs:
Next Generation Sequencing (NGS)

DNA sequencing cost per genome

Feb 2001
Drafts of 2 human
genome sequences

Oct 2004
1st human genome
sequence published

Sept 2007
2nd human genome
sequence published

2008
4 more genomes
published

End of 2014
~228,000 human
genomes sequenced
to date

Patients as both consumers and providers of data

Distinctively designed, comprehensive indication of your UV exposure.

The outer circle and bar turn fully pink when you reach the daily UV limit for sensitive skin, based on data from the World Health Organization.

The inner circle and dot show the current UV exposure in real-time.

Estimated product delivery: November 2018

- Patients as the source of data – E.g. Programmable tattoos: the future of wearables

https://logicink.com/

Looking at Outliers: Wellderly Study

- 8 year-long accrual and analysis of whole genome sequences of healthy elderly people known as the "Wellderly" to discover genetic secrets behind lifelong health

- Wellderly group had significantly lower genetic risk for Alzheimer's and coronary artery disease demonstrating that protection against cognitive decline is a genetic component of healthy aging

- Results suggest healthy aging is an overlapping but distinct phenotype from exceptional longevity that may be enriched with disease-protective genetic factors
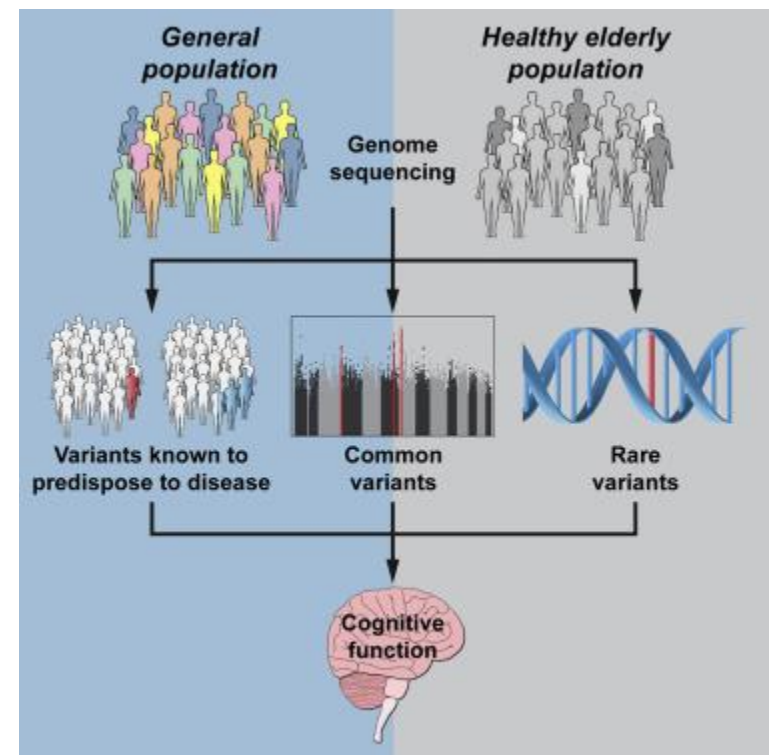
April 2016

Corporations disrupting healthcare in 2018

Apple Watch Series 4 can detect AFib and perform an ECG

Amazon, Berkshire Hathaway, And JP Morgan Are Forming A Healthcare Mega-Company

Fitbit targets employers and health plans with Care

- More corporations are choosing to get involved in healthcare for their customers and employees

Healthcare expanding reach into communities

- Google's Sidewalk Labs: designing a "smart town" piloted in Toronto to tackle challenges of urban growth

- Combining urban design with technology to achieve new standards of sustainability, affordability, mobility, and economic opportunity

- Healthcare is now playing a role in urban design and expanding its reach beyond individual patients to large communities
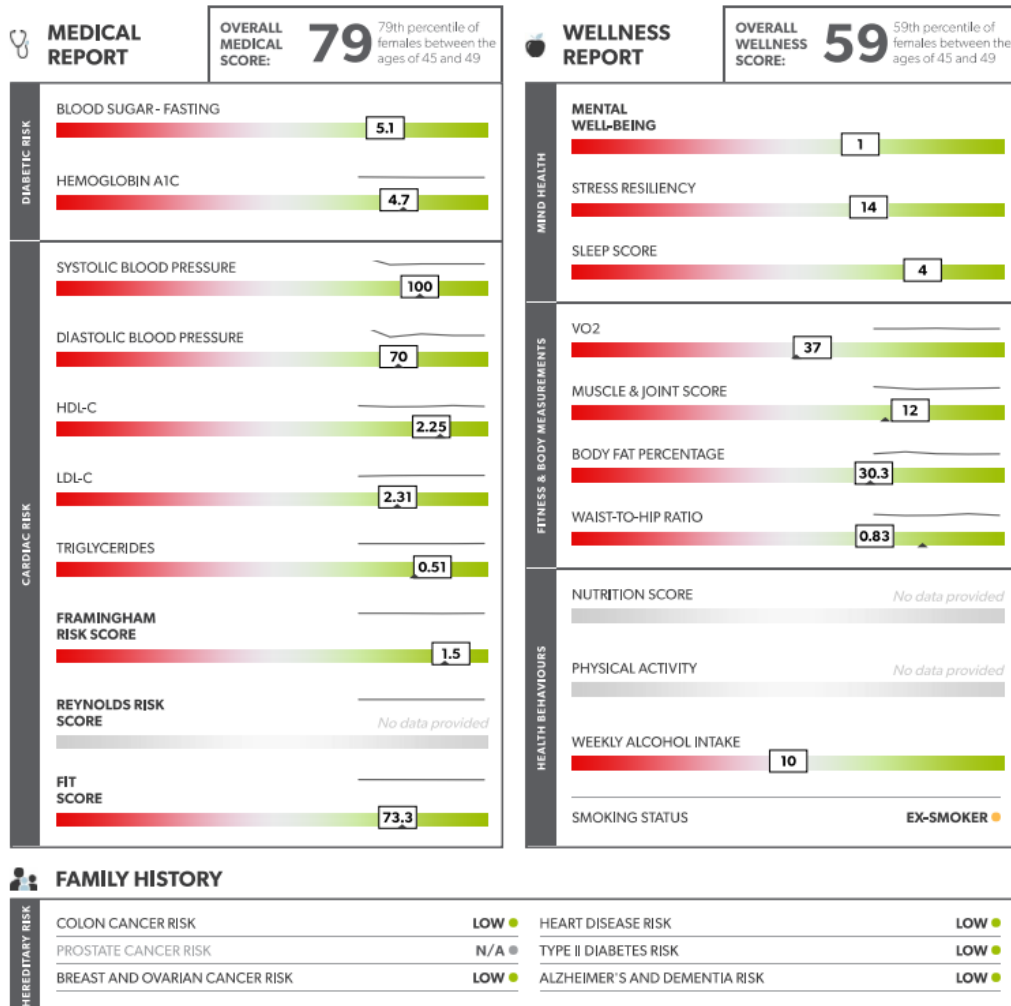

SIDEWALK
TORONTO

Medcan Projects

Highlighting Medcan's initiatives which provide value-based care based on new trends within the healthcare industry.

Patient engagement and behavioural change

- Studies show that patients have low retention and memory of what their doctor says in a visit

- Goal was to develop a one-page summary of a patient's medical and wellness health that is **simple, engaging,** and drives **behavioural change**

- Visualizes medical and wellness data captured from client's Annual Health Assessment (e.g. blood pressure, glucose, cholesterol, VO2, nutrition)

Quantification of biological health

- Mind Station: AHA Station which incorporates memory and cognition test to help clients identify insights, propose strategies, and recommend resources to address obstacles to good mind health and performance

- Liver Health: live well assessment that provides patients with a comprehensive screening of both their liver function and liver fattiness

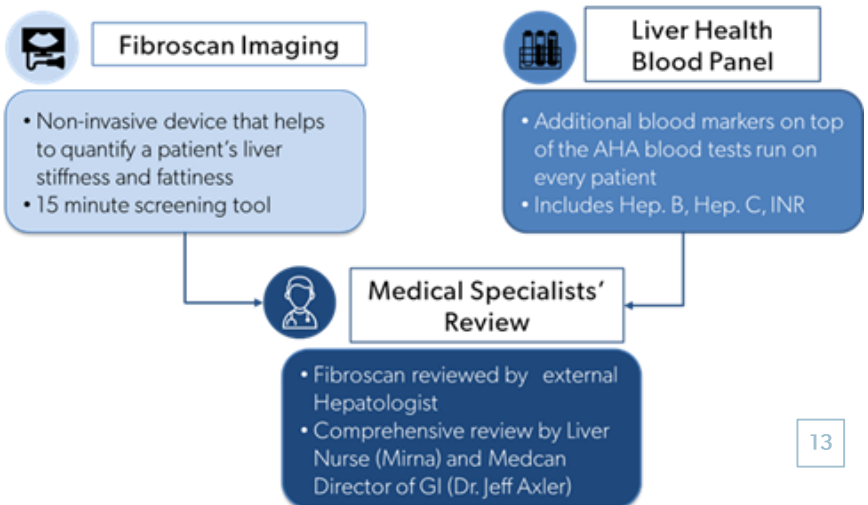- Demonstrates ways to **quantify** mind and liver health which has not previously been done
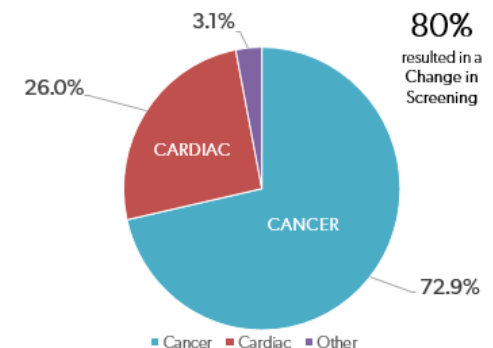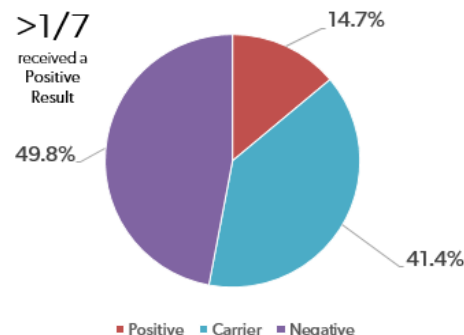
Precision prevention: proactive genetic screening

- Launched September 2017: proactive 139-gene panel for actionable Mendelian disorders through third-party Invitae
    - Objective: increase understanding of genetic variation associated with human disease and integrate genetics into mainstream medicine to proactively prevent and/or minimize burden of disease

- Proactive Genetic Screening service includes:
    - Initial consultation with genetic counsellor for family history review and informed consent
    - Post-screening consultation to review results and implications for client's health risks and medical management
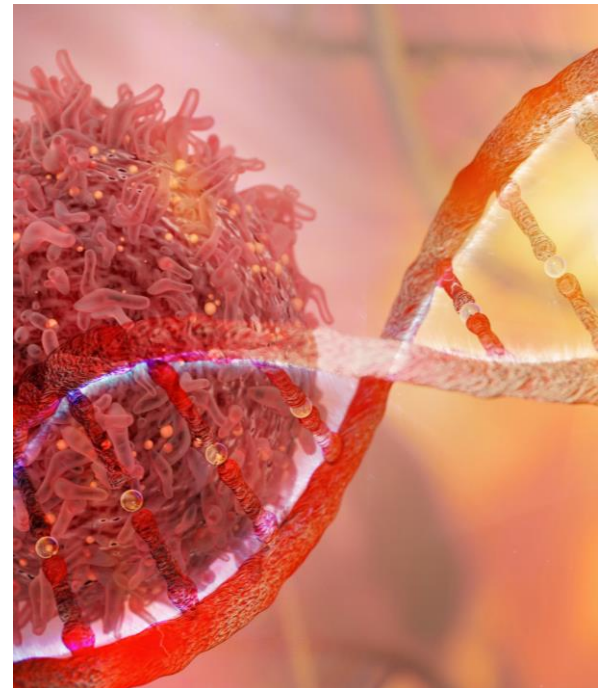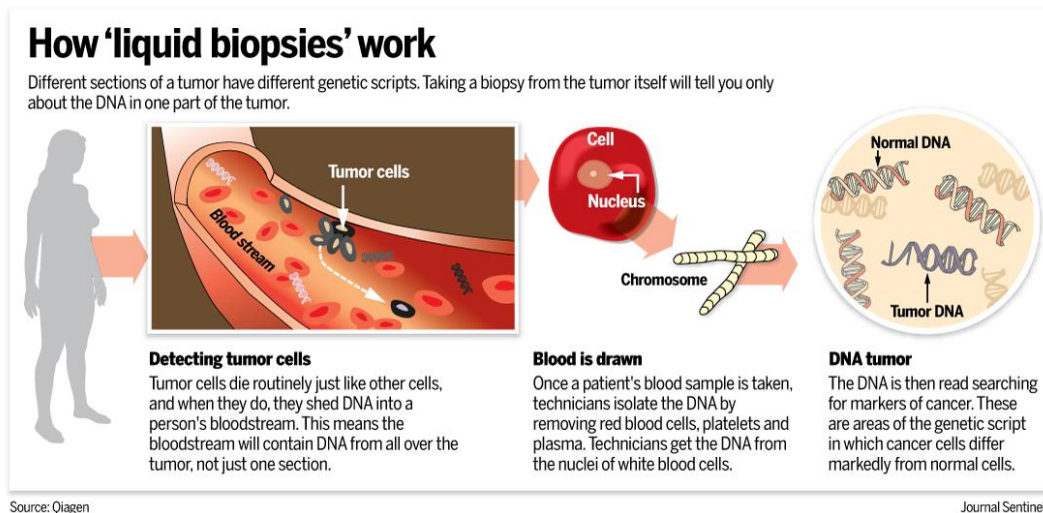
DEMOGRAPHIC INFORMATION	
Gender	n (%)
Male	500 (52.6)
Female	450 (47.4)
Age range (y)	Average age (y)
21 to 81	50.5
Self-reported ethnicity	n (%)
Ashkenazi Jewish	45 (4.7)
Asian (East, South, Middle East)	84 (8.8)
Black/Caribbean	7 (0.7)
Caucasian	743 (78.2)
Mixed/Other	71 (7.5)

>1/7 received a Positive Result

14.7%
49.8%
41.4%

- Positive - Carrier - Negative

80% resulted in a Change in Screening

3.1%
26.0% CARDIAC
72.9%
CANCER

- Cancer - Cardiac - Other

Data until September 18, 2018

14

Early disease detection models

- Increased awareness of liquid biopsies: non-invasive blood tests to detect circulating tumour DNA
    - Post-cancer monitoring
    - Determining effectiveness of cancer treatment and/or recurrence

How 'liquid biopsies' work

Different sections of a tumor have different genetic scripts. Taking a biopsy from the tumor itself will tell you only about the DNA in one part of the tumor.

Detecting tumor cells
Tumor cells die routinely just like other cells, and when they do, they shed DNA into a person's bloodstream. This means the bloodstream will contain DNA from all over the tumor, not just one section.

Blood is drawn
Once a patient's blood sample is taken, technicians isolate the DNA by removing red blood cells, platelets and plasma. Technicians get the DNA from the nuclei of white blood cells.

DNA tumor
The DNA is then read searching for markers of cancer. These are areas of the genetic script in which cancer cells differ markedly from normal cells.

Source: Qiagen

Journal Sentinel

Stewardship reporting: health insights for corporate populations

- Comprehensive report that demonstrates importance of Medcan's service offerings, specifically in regards to clinical outcomes for valued corporate clients

- Report includes information about service utilization; clinical outcomes; and patient satisfaction and engagement

- Clinical outcomes section provides deeper dive on clinical metrics across employee population and is reviewed by physician to provide key findings and recommendations
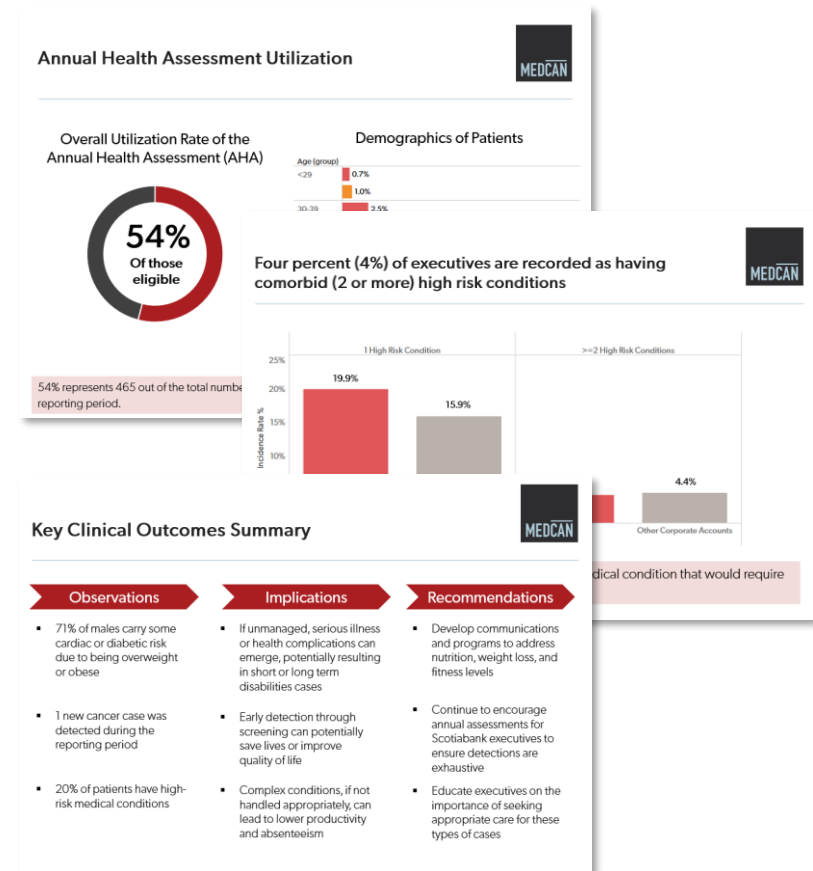
Looking Forward

Can we deliver on the promise of precision and prevention? What barriers and obstacles do we face? What are the key impacts?

Transformative time in Healthcare: hype?

"The Gartner Hype Cycle provides a graphic representation of the maturity and adoption of technologies and applications, and how they are potentially relevant to solving real business problems and exploiting new opportunities." -- *Gartner*
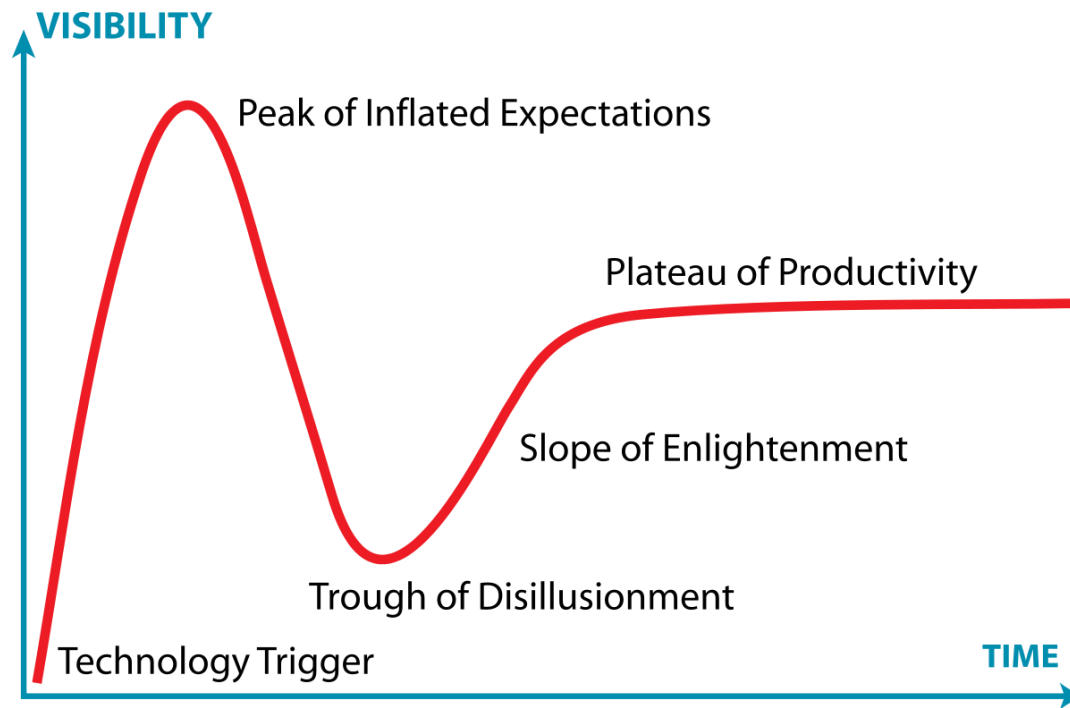
Shift towards value-based care

- Increasing value of healthcare delivery by:
  - Achieving better healthcare outcomes
  - Improving system performance
  - Being innovative
  - Incorporating team-based care

- Adopting a patient-centred approach which improves the quality of care and overall patient experience
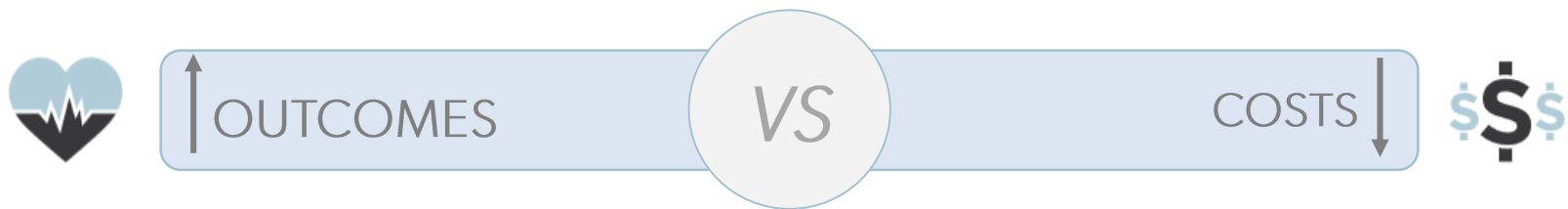
OUTCOMES VS COSTS

Improving healthcare outcomes while reducing costs to increase healthcare value

Expectation vs. reality

Barriers and obstacles

1. Policy-makers/Government/Industry/Individuals: who pays for all of this?
   - Cost: will this just be for those who can afford it?

2. Physician engagement: Who will deliver all of these services?
   - Physician burnout is rising
   - Physicians are overwhelmed with disruption of technology and big data

3. Ethics:
   - Increased information leads to challenges with data privacy

Big data as a risk to patients

Can too much information be harmful to patients?

- Increased use of wearable sleep tracking devices to monitor sleep patterns; patients are relying more on objective data collected through trackers to understand their experience of sleep

- Inferred correlation between sleep tracker data and daytime fatigue may lead to perfectionistic quest for ideal sleep

- "Orthosomnia" is a condition where patients are pre-occupied or concerned with improving or perfecting their wearable sleep data

John Hancock: healthcare data disrupting the insurance industry

NEWS

## John Hancock pushes fitness tracking for life insurance policies

By **Andrew Hobbs** - September 21, 2018

John Hancock will give its life insurance customers a discount for trying to stay healthy. They just need to hand over some personal data to receive it.

Privacy and consumer advocates have raised questions about whether insurers may eventually use data to select the most profitable customers, while hiking rates for those who do not participate.

When will we reach the plateau of productivity?

"The Gartner Hype Cycle provides a graphic representation of the maturity and adoption of technologies and applications, and how they are potentially relevant to solving real business problems and exploiting new opportunities." -- *Gartner*
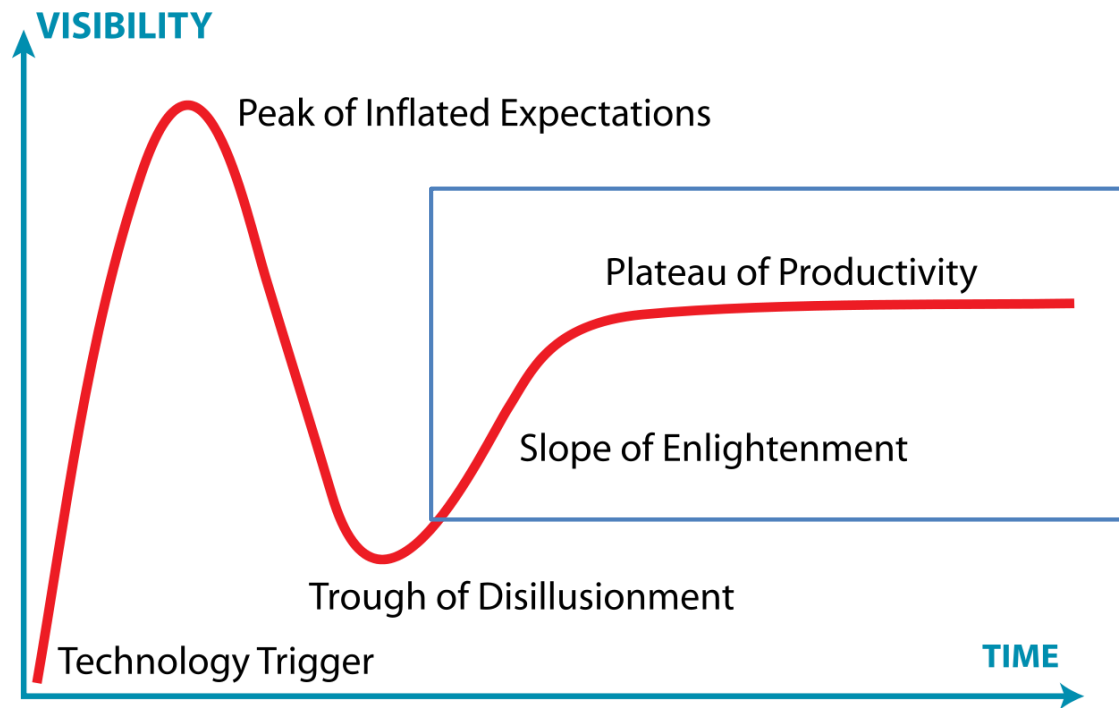
# Big data has the potential to improve health outcomes

Landmark Digital Medicine Trial: Patient-Generated Data Improve Cancer Survival

Eric J. Topol, MD

❝ I never expected that the validation for patient-generated data in digital medicine would be manifest in oncology with survival as the primary outcome. ❞

Mobile-Friendly Web Application Extends Lung Cancer Survival

Overall Survival Results of a Trial Assessing Patient-Reported Outcomes for Symptom Monitoring During Routine Cancer Treatment
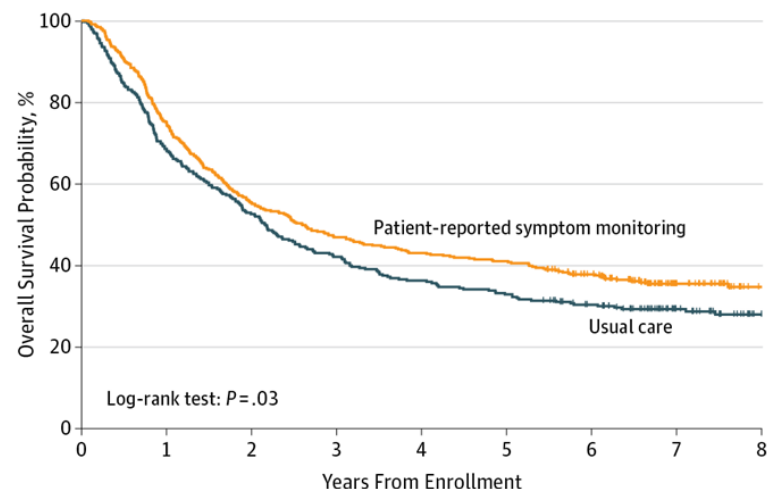
- Trends of big data and artificial intelligence will happen no matter what
- Need to focus on using these technologies correctly to achieve value-based care

Pharmacogenomics demonstrating importance of focusing on health economics

- In Canada, there are an estimated **200,000** severe adverse drug reactions per year

  - Claiming **10,000** to **22,000** lives

  - Costing **$13.7** to **$17.7 billion**

  - **25%** of all hospitalizations are related to medications

  - **70%** of ADRs are preventable
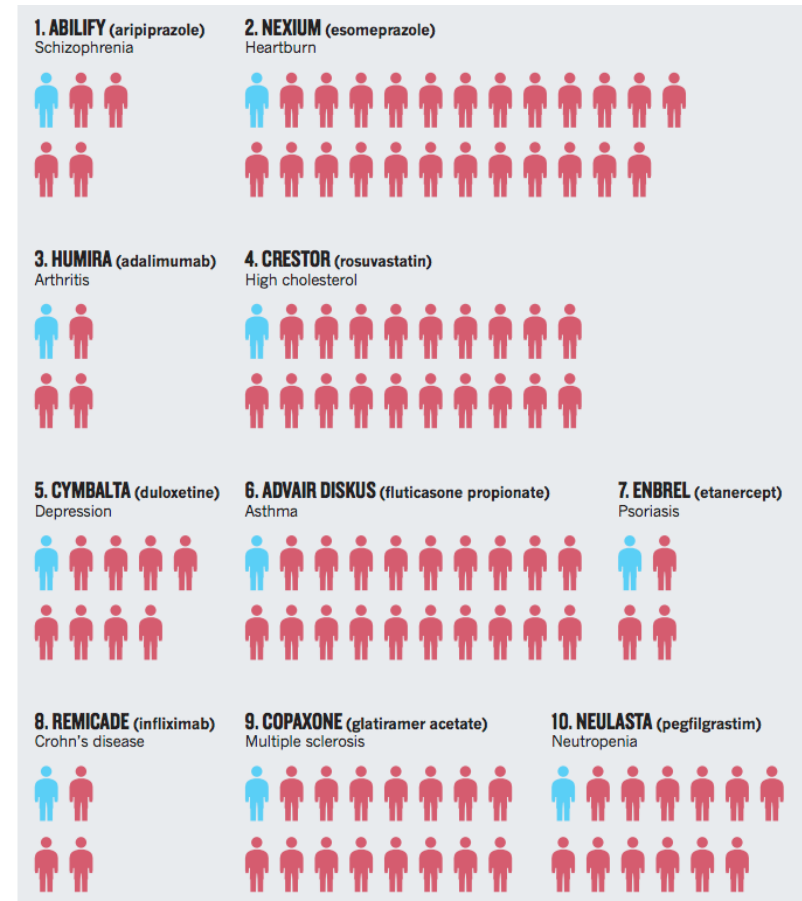
Patients teach future doctors about the art of communication

- Patients want to get more involved in their care

- What can we learn from our patients?

- Patient-focused programs: e.g. Patients as Teachers Program
  - Emphasizing the importance of the human experience in the practice of medicine and delivery of care
  - Program which uses patient-centred approach by organizing sessions led by cancer survivors who share their personal stories and perspectives on their illness with undergraduate medical school students at the University of Toronto in partnership with St. Michael's Hospital

https://www.patientasteacher.com/

Focusing on non-communicable diseases

- Non-communicable Diseases Action Plan 2013 – 2020
- World Health Organization's Sustainable Development Goal for 2023

A **25%** relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases.

At least **10%** relative reduction in the harmful use of alcohol, as appropriate, within the national context.

A **10%** relative reduction in prevalence of insufficient physical activity.

A **30%** relative reduction in mean population intake of salt/sodium.

A **30%** relative reduction in prevalence of current tobacco use in persons aged 15+ years.

A **25%** relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances.

Halt the rise in diabetes and obesity.

At least **50%** of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes.

An **80%** availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilities.

VOLUNTARY GLOBAL TARGETS | WHO Global NCD Action Plan 2013-2020

By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well being.

SUSTAINABLE DEVELOPMENT GOALS

Task-shifting care in remote Kenyan community

- Incorporating task shifting (Medcan Naweza):
  - Empowering CHWs to undertake health tasks traditionally done by nurse or clinician
  - E.g. CHW responsible for screening patients over 40 for high CVD risk by taking blood pressure and glucose measurements and utilizing mHealth tool to receive risk scores for each individual
  - Positive feedback from community on CHW program, demonstrating that CHWs are capable of taking on more roles through task-shifting in remote communities

Transforming Health Care from the Ground Up

MEDCAN

- Instead of waiting for top-down solutions from federal policy changes, industry needs transformation from the bottom up

- Telehealth systems scale well and save money by reducing patient transfers
    - Adopt a collaborative model of healthcare delivery which respects the capabilities of all healthcare workers
    - Need to win over doubters and overcome resistance from legacy stakeholders

"But it is important to understand that it's not just about the technology. It's about people and process. It takes nurturing. It takes relationships and partnerships."

- Emphasizing the importance of primary care and investing in proper IT platforms (using private capital)
    - Using community-based "health coaches" to educate patients and monitor care in outpatient settings (task-shifting)
    - Establishing a capacitation system focused on value

Iora's goal was not to deliver health care but to empower patients.

What can healthcare institutions do?

1. Data stewardship strategy – governance of outcomes data

2. Define prevention intervention – programs, services

3. Find ways to amplify patients' voices – surveys, focus groups

4. Create an effective implementation strategy – make it easy for both the provider and the user

5. Learn from outliers – identify lessons from those who don't fit traditional models of care

6. Research policy – incorporate healthcare economics to drive down costs

Can we deliver on the promise of precision prevention?

"The best way to predict the future is to CREATE it."