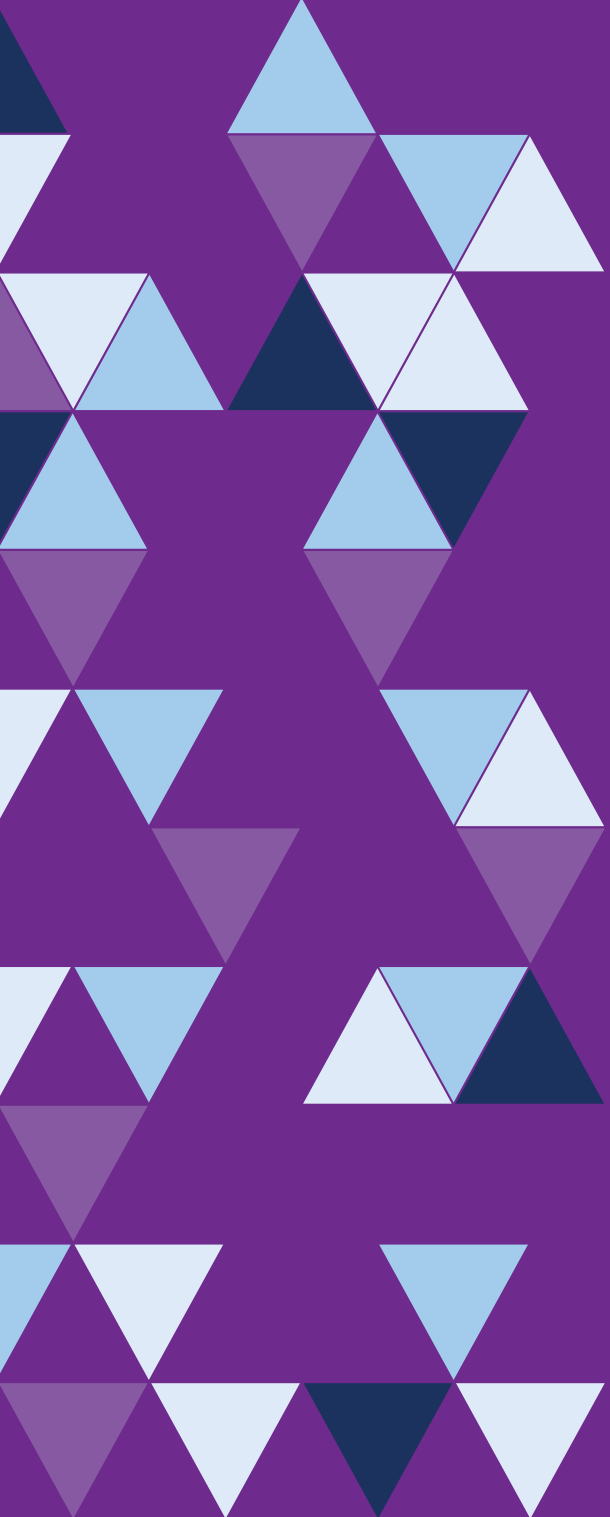
camh

Research Plan

Inspire Hope through Discovery

2018–2023



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CAMH Research

Creating a Vision

Brain diseases and disorders are the leading cause of disability in the country, directly affecting one in three Canadians as well as their family members, friends, colleagues and caregivers.[1] Substance misuse and addictions also place a huge burden on those affected, most dramatically in Canada's ongoing increases in terms of per capita consumption of narcotics (e.g. opioids).[2] CAMH's overarching strategy, Vision 2020, outlined our commitment to better understand brain structure and function to learn what causes mental illness;[3] to improve prevention, treatment, and management of illness through clinical research; and to drive research, policy and social change by understanding societal factors that contribute to mental illness. The domains of CAMH research will drive a research agenda based on cross-discipline and cross-division "big questions" that guide our work through this research plan and future years. As an academic health sciences centre, CAMH's core mandate is to provide the best care for the patients of today, as well as hope for the future. Research generates knowledge for CAMH and beyond, and provides this hope.

Our Vision

Inspire Hope by Discovering the Causes of and Cures for Mental Illness

Strategic Directions

1. Revolutionize the Understanding of the Brain and the Causes, Biomarkers and Treatments of Mental Illness.
2. Transform CAMH so that every Patient, Clinician and Stakeholder Becomes a Partner in Research.
3. Use Evidence to Drive System and Social Change to Optimize Care.

Domains of Discovery

- Fundamental mechanisms (physiological, biological, social and developmental) in mental illness and brain health.
- Precise and personalized diagnosis, prevention, care and treatment options that transform outcomes.
- Preventive and policy interventions that reduce the burden of mental illness, including addictions, across populations.

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1 Brain Canada Foundation (2016). *The Brain: A Space of Discovery, Annual Report 2016*. Retrieved from http://braincanada.ca/files/BrainCanada_AnnualReport_2016_EN.pdf

2 International Narcotics Control Board (2016). *Report of the International Narcotics Control Board for 2016*. Retrieved from https://www.incb.org/documents/Publications/AnnualReports/AR2016_E_ebook.pdf

3 In this document, "mental illness" is used as the overarching term for the full scope of CAMH's work, serving people living with the full spectrum of physiological, biological, genetic, social and environmental interactions, including substance use and addiction.

Context

A Changing Paradigm

Across the globe, there is a shift in the understanding of mental illness. Advances in brain science have challenged existing knowledge of how psychiatric disorders are classified and treated. Advances in neuroimaging, non-invasive brain stimulation, molecular tools and bioinformatics, combined with a growing understanding of the interconnectivity among the brain, social factors and physiology, are changing the historical way of thinking about, preventing and responding to mental illnesses and addiction. Internationally, scientists and clinicians are looking at mental illnesses through new lenses, and are exploring the mechanisms that cause changes in brain function that in turn lead to changes in behaviour and cognitive function. For the first time, there are opportunities to classify and respond to disorders based on these underlying mechanisms, with the realistic hope of creating true precision medicine, an approach to treatment that accounts for individual differences.

In recent years, there have been dramatic shifts in substance use and misuse as well as policy changes, such as the opioid crisis and cannabis legalization. Through the Canadian federal initiative responding to the opioid crisis, and ongoing cannabis policy work, CAMH is actively contributing to ongoing research.

Research Support

Recently, the Naylor report noted that Canada's investment in neuroscience is only 40 per cent of what it is in the USA, adjusting for the size of our economy.[4] At the same time, CAMH has an opportunity to bring recent advances in neuroscience to bear. The visionary gift from the Campbell Family to support talent and infrastructure has enabled CAMH researchers to be increasingly successful at peer-reviewed Federal, Provincial and international grant competitions. In 2016 alone, 12 CAMH researchers received CIHR fellowship awards, representing an outstanding 41 per cent success rate. The combination of philanthropic support and public grant funding have enabled CAMH research to be on the innovative boundary of new discoveries and treatments.

Digital and Technological Advances

Global breakthroughs in understanding mental illness are coming from a surprising new source—big data. Through the establishment of the Krembil Centre for Neuroinformatics, CAMH is now well positioned as a leader in brain science using the power of big data analytics, artificial intelligence and machine learning, and multi-scale brain modelling in order to bridge the levels of the structure and function of the brain—from genes to circuits to behaviour. One aim to better understand who is at risk of developing brain disorders is to shift the focus from treatment to prevention of disease burden.

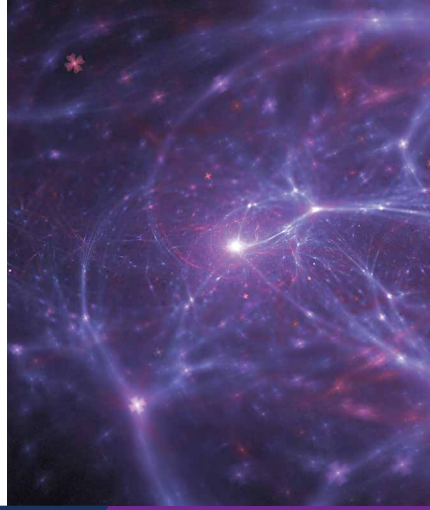
4 Advisory Panel for the Review of Federal Support for Fundamental Science (2017). *Investing in Canada's Future: Strengthening the Foundations of Canadian Research*. Retrieved from http://www.sciencereview.ca/eic/site/059.nsf/vwapj/ScienceReview_April2017-rv.pdf/$file/ScienceReview_April2017-rv.pdf

Mobile devices like smartphones and tablets, and the creation of digital apps are also helping the community, physicians and researchers develop novel ways to access resources, monitor progress and improve mental health.

Policy and System Landscape

Ontario's Comprehensive Mental Health and Addictions Strategy is the ongoing whole government approach that demonstrates promise and a collective response to mental illness across multiple ministries working together on shared priorities (i.e. reducing stigma, increasing community supports, early youth interventions and access to services).[5] Recent announcements, such as funding towards psychotherapy programs in Ontario, and the federal Budget 2017, which includes 5 billion dollars over 10 years to support mental health initiatives across Canada,[6] also positively signal government commitment to investment in mental illness.

In this landscape, CAMH has numerous ongoing collaborations across the mental health care system, with community-based agencies, First Nations communities and various levels of government, in conducting collaborative research on communities, populations, global health and health systems.



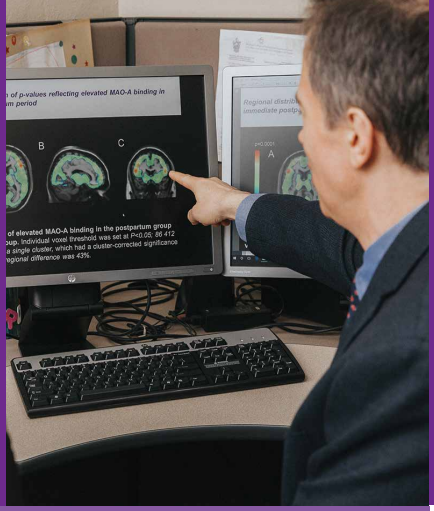
Longest ongoing drug, alcohol and mental health student surveys in Canada.



5 Ministry of Health and Long-Term Care (2011). *Open Minds, Healthy Minds: Ontario's Comprehensive Mental Health and Addictions Strategy.* Retrieved from http://www.health.gov.on.ca/en/common/ministry/publications/reports/mental_health2011/mentalhealth_rep2011.pdf

6 Office of the Prime Minister of Canada (2017). *Statement by the Prime Minister for World Mental Health Day.* Retrieved from https://pm.gc.ca/eng/news/2017/10/10/statement-prime-minister-world-mental-health-day

Specializing in genetic and molecular bases of mental illness and their treatments.



Research Imaging Centre is the first in the world fully dedicated to mental illness research.

A Leader in Mental Health Research



Largest pool of DNA collected by any mental health institution globally.



Temerty Centre for Therapeutic Brain Intervention established the largest brain stimulation centre in Canada.

A Leader in Mental Health Research

CAMH is a leader in many significant arenas of research, and in translating knowledge into clinical and community practice as well as public policy. We are well positioned to continue to lead, as the largest mental health and addictions research facility in Canada with expertise in basic, clinical and social science studies of mental illness. Our scientists have access to a diverse patient population across the lifespan that represents a breadth of disorders.

We have established international status and continue to excel in the following:

- Our Research Imaging Centre within the Campbell Family Mental Health Research Institute is the first and among the few brain imaging facilities in the world fully dedicated to mental illness research. Scientists in the Azrieli Centre for Neuro-Radiochemistry **developed several of the chemical probes currently used in PET neuroimaging** around the world.
- CAMH houses world-leading research laboratories specializing in genetic and molecular bases of mental illness and their treatments, including the first epigenetics lab focused on mental illness. The Tanenbaum Centre for Pharmacogenetics has the **largest pool of DNA collected by any mental health institution globally**, with 34,000 donated patient samples to date.
- Since 1977, CAMH has been monitoring provincial drug, alcohol and tobacco use, with the later addition of mental health indicators, among students and adults in the **longest ongoing addiction and mental health surveys in Canada**.

Our past research plan "Transforming Lives through Research" guided the growth and development of our research enterprise in 2013–2017. During that time period, through our donor-funded research programs, we advanced many of our key priorities:

- CAMH announced the inception of the Krembil Centre for Neuroinformatics—a **centre devoted to harnessing the power of high-performance data computing** to model solutions to clinical problems, and to change the trajectory of mental illness research.
- Temerty Centre for Brain Intervention established the **largest brain stimulation centre of its kind in Canada** with one of the world's highest concentrations of scientists running treatment studies for depression, autism, anorexia nervosa and Alzheimer's dementia.

- Tanenbaum Centre for Pharmacogenetics established the first-of-its-kind public/private partnership with a global industry leader in psychiatric pharmacogenetics. CAMH delivered **genetic testing to 9,000 patients** who were **referred by 3,000 doctors**, providing **personalized care and pharmacogenetic samples** for current and future research.
- Researchers within the Campbell Family Mental Health Research Institute together with Queen's University **identified 26 new genes linked to intellectual disability** in the largest Canadian and international study of its kind.
- As part of a federal initiative responding to the opioid crisis, CAMH was **selected as the Ontario hub for research into opioid misuse**, with three other hubs across the country.
- We advised the federal government on the **legalization of cannabis**.
- CAMH provided expertise via various high-impact publications on a series of **global studies on the burden of mental illness**, which have been cited thousands of times.
- Created tanslational centres including:
  - Cundill Centre for Child and Youth Depression
  - The Margaret and Wallace McCain Centre for Child, Youth and Family Mental Health
  - Slaight Family Centre for Youth in Transition
  - Temerty Centre for Therapeutic Brain Intervention

This current research plan, "Inspiring Hope through Discovery," builds on progress to date and propels CAMH forward as the leader in mental health and addictions research.



Vision

Inspire Hope through Discovery

CAMH research has a long-term vision based on revolutionizing the global understanding and treatment of mental illness:

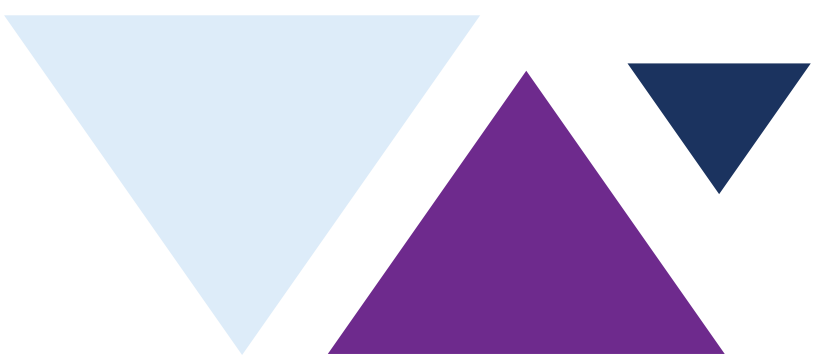
Inspire Hope by Discovering the Causes of and Cures for Mental Illness

SIGNIFICANCE TO PATIENTS AND FAMILIES

- Patients at CAMH will have access to current evidence, research-informed prevention and treatment regardless of their point of entry or provider.
- We will join collaborative efforts around the province, country and world to share access to leading practices in care and treatment.
- We will translate our research discoveries into new disease prevention, diagnostic and therapeutic options for patients at CAMH and around the world.

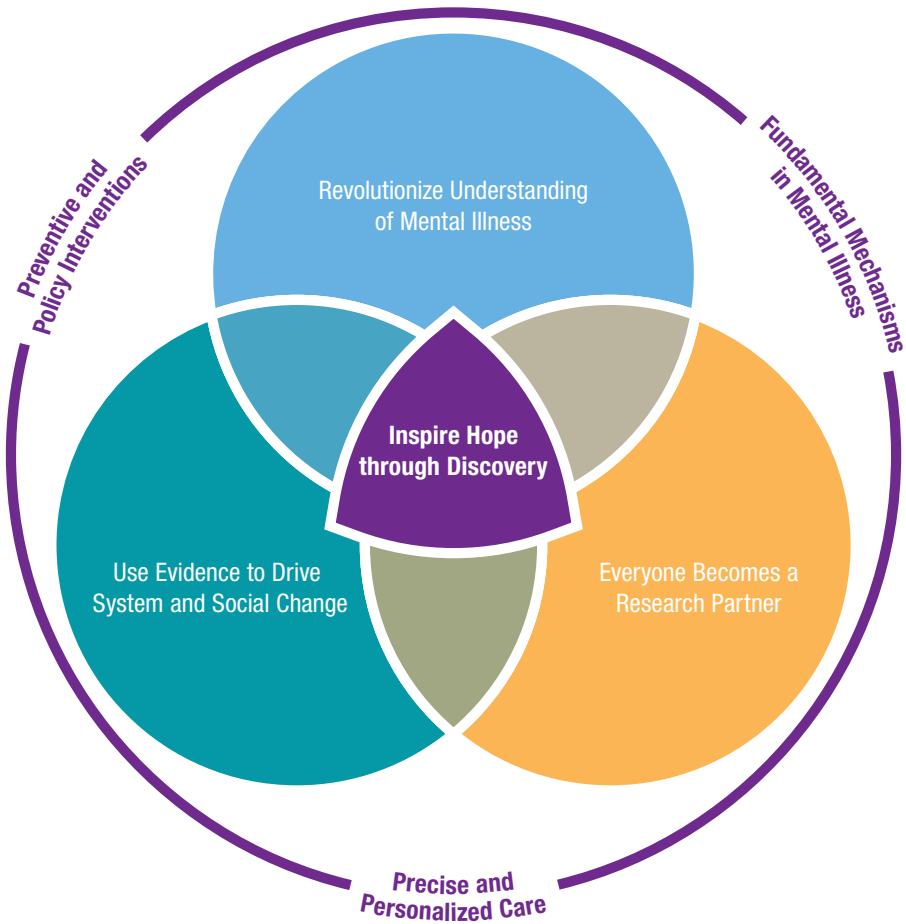
SIGNIFICANCE TO SCIENTISTS AND RESEARCHERS

- We will understand what causes mental illness.
- We will continue to discover new ways to effectively prevent and treat mental illnesses.
- Everyone associated with CAMH will recognize that they are contributing to knowledge that generates hope and recovery.
- Trainees and young scientists will see CAMH as *the* place to develop strength in methodologies and analytical thinking.



CAMH Research Plan

2018–2023



Strategic Directions

1. Revolutionize the Understanding of the Brain and the Causes, Biomarkers and Treatments of Mental Illness

Goal

Harness the unique set of resources within the Campbell Family Mental Health Research Institute (scientific expertise, access to patients and community, collaborative partnerships and the capacity for large-scale and longitudinal studies) to focus on the most important and relevant questions that will contribute to a greater understanding of the healthy brain, the pathophysiologies of brain illness and the progression to illness. Change our view of the brain as a set of information-processing circuits. We will study and disseminate a modernized conceptualization of mental illness that links to perspectives from the brain, the rest of the body, the social context and environment, and the lifespan. Work towards correcting the scarcity of novel treatments.

Strategic Priorities

i. Drive research that furthers our understanding of how the brain functions:
   - Define cellular- and molecular-based changes in brain networks.
   - Understand the influence of genetic and epigenetic markers of brain illnesses.
   - Identify and validate new biological targets and molecular mechanisms implicated in mental illnesses.
   - Fast-track research using the power of big data, artificial intelligence and brain modelling.

ii. Generate novel treatments with emphasis on precision medicine.

iii. Accelerate the process of new drug discovery and novel therapeutics.

iv. Advance leadership in brain imaging research, and in the development of new PET radiotracers.

We will

- Focus on precise and personalized diagnosis, prevention, care and treatment options informed by biological insights.
- Develop novel options to treat and care for patients with severe and persistent mental illness.
- Leverage CAMH's diverse patient population to develop a comprehensive database on mental health and addictions, based on a CAMH-wide protocol to gather a core set of data from every patient.
- Undertake longitudinal studies across the lifespan to:
  - study social, developmental, physiological and biological causal factors in mental illness;
  - study developmental trajectories of mental illness and their connections with other medical conditions.

2. Transform CAMH so that every Patient, Clinician and Stakeholder Becomes a Partner in Research

Goal

Create a dynamic system where research questions are identified and knowledge is developed in collaboration among stakeholders, including people with lived experience, patients, family members, community partners, clinicians, front-line staff and scientists. Everyone working at or connected with CAMH will be a part of our knowledge development and discovery. Patients will experience CAMH care as informed, empowering and optimistic, and will see their value in partnering and contributing to research that will create hope, recovery and cures for people with their conditions.

Strategic Priorities

i. Invigorate research culture so that all CAMH patients and staff have a role in advancing discovery at CAMH.

ii. Expand clinical research at CAMH by growing capacity for internal and external collaborations.

iii. Translate CAMH discoveries into new clinical treatments.

We will

- Create a comprehensive, supportive core infrastructure for common research-specific activities that can be leveraged across every unit at CAMH, enabling scientists to focus on their research.
- Embrace people with lived experience as partners in the design and implementation of CAMH research studies.
- Develop common, consistent outcomes co-created with patients and caregivers to:
  - predict mental illness onset, development, and treatment response;
  - measure the efficacy of research treatments and practices at CAMH;
  - provide better treatment for CAMH, the community and across the system.
- Create a model for community-based research that engages the community and emphasizes the mechanisms of wellness.

3. Use Evidence to Drive System and Social Change to Optimize Care

Goal

Drive the translation of research evidence towards influencing prevention, early risk assessment, non-invasive and meaningful diagnostic tests, and curative or ongoing treatments that maximize quality of life. Build upon our current research expertise with communities, populations, global health and health systems to develop and evaluate prevention and intervention initiatives. Explore genetic-based underpinnings to further our understanding of suicide.

Strategic Priorities

i. Share CAMH research and discoveries with our community partners and policy makers.

ii. Build our expertise in implementing discoveries, and sustain translation of new knowledge into innovation and practice.

iii. Elucidate the interaction between key social determinants and individual genetics.

iv. Find solutions that reduce suicide risks and support recovery.

We will

- Pool data across research areas (e.g. imaging, genetics, socio-demographics) to model information and implement solutions to clinical problems.
- Study the influence of genetics and social determinant factors in research studies on underserved populations.
- Produce population health solutions that address prevention and treatment for current and future substance use and addiction-related issues (opioid, cannabis, etc.).
- Work with partners, including government, to target preventative and early intervention opportunities (e.g. schools, camps).



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