

**McGill Faculty of Medicine & Health Sciences**

**Strategic Research Plan**

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**Interdisciplinary Strengths & Research Infrastructure  
In Response to Pressing Health Challenges**

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## Introduction

Research at the Faculty of Medicine & Health Sciences (FMHS) accounts for about 60% of the total research funding at McGill. FMHS researchers are internationally recognized for their strengths in a diverse range of fundamental, clinical, and applied science and social science fields. They also contribute significantly to the university's teaching mission, involving undergraduate, graduate, and post-doctoral trainees in research, and providing future healthcare professionals opportunities to gain experience in research. This integrated approach not only advances scientific knowledge but also ensures that the next generation of healthcare professionals is well-prepared to engage in cutting-edge research and adopt new approaches in their clinical practice. The FMHS Strategic Research Plan (SRP) complements the University's SRP and those of individual units, departments, schools, or research institutes located on campus or in affiliated teaching hospitals.

The SRP emphasizes research areas where our investigators are anticipated to have maximum impact on the training of the next generation of scientists and professionals and the advancement of knowledge that will improve the health of, and health care delivery for, the population of Québec and the world. Key areas have been identified through consultations with faculty members, stakeholders, and assessments of current and future healthcare challenges. The priorities reflect a balanced focus on discovery research, clinical translation, public health, and interdisciplinary approaches, ensuring that our efforts lead to improvements in both fundamental knowledge and practical healthcare delivery.

From an implementation standpoint, the SRP guides FMHS-level decision-making regarding research, including priorities for faculty, staff and student recruitment and support, space allocation, investments in research infrastructure, other financial support, and fundraising. The plan identifies strategic priorities for the coming years, focusing on areas that will benefit from Faculty-level attention, while acknowledging that **not all research activities within the Faculty are encompassed here.**

The rapidly evolving nature of health-related research, including the transformative and potentially disruptive effects of technological advances, makes it imperative that the SRP be periodically revised and updated. This ensures that the SRP remains responsive to emerging challenges and opportunities, keeping FMHS at the forefront of health innovation. The present revision was coordinated by Faculty leadership, incorporating feedback from a broad spectrum of faculty members and stakeholders.

## **Discovery Research to Address Pressing Health Challenges**

We aim to build on disciplinary excellence in fundamental, clinical, and populational research and promote interdisciplinary work that connects these strengths. This dual emphasis ensures that FMHS can continue to innovate across the entire spectrum of health research, from basic discovery to clinical application. We identify four key themes where strong existing research capacity aligns with pressing health challenges. These themes represent areas where FMHS is uniquely positioned to make a significant impact.

### ***Infection & Inflammation as Persistent Threats***

Infectious diseases remain top health threats locally and globally, as illustrated by the COVID-19 pandemic. FMHS will continue to study infections, their diagnosis and treatment, focusing on existing and new pathogens as well as anti-microbial resistance. Major related topics include antibiotic overuse, mechanisms of inflammation, and their role in chronic inflammatory disorders, such as inflammatory bowel syndrome, multiple sclerosis, arthritis, and asthma. The influences of the microbiome and external factors including pollution, climate change, and migration in modulating infection and immunity, are increasingly emerging as important avenues within this theme.

FMHS is also a leader in HIV research and related areas, with significant contributions such as leading the new CIHR Pan-Canadian Network for HIV/AIDS and Sexually Transmitted and Blood Borne Infections (STBBI). HIV and STBBIs continue to pose a significant public health challenge, and FMHS researchers are dedicated to advancing fundamental understanding, improving prevention, and working towards ending related epidemics.

Interdisciplinarity and translation will be promoted through new and established research hubs: McGill's International TB Centre, and the research centres on Antimicrobial Resistance, Viral Diseases, Structural Biology, and the Microbiome. The newly established Pandemics and Emergencies Readiness Lab will also serve as a hub for pandemic prevention. The McGill Interdisciplinary Initiative in Infection & Immunity (MI4) will play a key coordinating role in this area.

FMHS is committed to building equitable partnerships with colleagues in the Global South to advance this research agenda.

### ***Cancer as a Complex Global Challenge***

Cancer remains a leading cause of premature death around the globe, with increasing prevalence in developing countries. FMHS aims to yield breakthroughs in prevention, early detection, and delineating mechanistic pathways that offer novel therapeutic targets. Clinical research emphasizes interactions between cancer and chronic co-morbidities such as obesity or diabetes, and focuses on patient-centered outcomes addressing quality of life. FMHS is particularly focused on understanding genetic and environmental interactions, which can spur both high-impact prevention strategies and new precision diagnostics. These efforts require more consideration of biological variations and social inequities affecting cancer risk and treatment outcomes within diverse populations.

FMHS multidisciplinary teams are encouraged to study the complex interactions between endocrine, metabolic, and immune systems in the pathophysiology of cancer. This approach facilitates the translation of research findings into improved clinical care, enhancing patient outcomes. Established units such as the Goodman Cancer Institute, the McGill Centre for Translational Research on Cancer, the Gerald Bronfman Department of Oncology and related FMHS networks will continue to catalyze these efforts.

### *Understanding the Brain to Heal the Body and the Mind*

Chronic conditions of the nervous system, whether in the domain of neurology or psychiatry, affect individuals across all age groups. With an aging population, more people are being affected by neurodegenerative diseases. The COVID-19 pandemic has had enduring repercussions on mental health, especially in youth. Chronic pain and addiction continue to impose major burdens on both individuals and society. Individuals with neurodevelopmental disorders require improved early interventions to help them thrive.

FMHS researchers have considerable strengths in these areas, advancing neurobiological knowledge at the molecular, cellular and systems levels, in relation to complex symptoms and behavior. More work is needed to identify robust disease markers and transfer these to clinical use, alongside better rehabilitation strategies and care delivery models that address patient and family needs.

FMHS researchers are encouraged to integrate neuroscience knowledge across various scales—from genes to cells, neural circuits, the neurovascular system, brain networks, and ultimately, behavior. Emerging treatments for neuropsychiatric disorders, such as different forms of neurostimulation, represent promising research areas that warrant further exploration.

It is also crucial to recognize the role of primary care and geriatrics in addressing neurological and psychiatric conditions. Family doctors are often the first point of contact in detecting, diagnosing, and managing conditions like dementia. FMHS aims to strengthen collaboration with primary care providers and geriatricians to ensure comprehensive and patient-centered approaches in our research endeavors.

Established hubs of neuroscience research at McGill, including the Montreal Neurological Institute, the Douglas Mental Health University Institute, and cross-cutting units such as the Brain Repair and Integrative Neuroscience Program at the RI-MUHC, the Azrieli Centre for Autism Research, the Alan Edwards Centre for Research on Pain, and the FRQ-supported Centre for Research on Brain, Language & Music, among others, provide a rich ecosystem for such cross-cutting research.

### *Unlocking RNA For Enhanced Diagnoses and Novel Therapies*

Recently discovered classes of non-coding RNAs have essential roles in gene expression and are often impaired in patients afflicted, for example, with genetic disorders, cancer, or infectious disease. Mutations in their expression can be used to generate clinical biomarkers to identify and stratify patients (diagnostics) and monitor disease progression (prognostics). Moreover, there is remarkable potential for harnessing the breadth and flexibility of RNA function to treat and cure a

variety of human diseases, from viral and parasitic infections to cancer. As highlighted by the COVID-19 pandemic, which demonstrated that RNA-based therapeutic compounds can be rapidly identified, synthesized, and optimized. Driven by genomics platforms, the promising rapid delivery of novel treatment interventions to silence or edit genes, replace defective proteins, and improve cell-based therapeutics are rapidly emerging. FMHS is committed to promoting research and partnerships that expand global access to mRNA platforms, ensuring that their benefits reach all populations globally.

The combination of large and diversified data repositories and biobanks with advanced computing, biochemical and biophysical modeling and machine learning are revolutionizing high-dimensional genotyping and phenotyping for patient stratification. FMHS researchers are encouraged to explore the full potential of these approaches for both fundamental research on biological mechanisms at all scales, and next-generation clinical trials. Priorities include the discovery of disease biomarkers and therapeutic targets to assist in individualized treatment decisions and the monitoring of their outcomes. An additional priority is to ensure access to the advances made available by these innovations in a more equitable manner globally.

### *Personalizing Cardiovascular & Respiratory Health*

Cardiovascular and respiratory diseases account for a significant proportion of global morbidity and mortality, placing an immense burden on healthcare systems and economies in Quebec, across Canada, and worldwide. At McGill University, pioneering research in this field enables the development of innovative treatments and preventive strategies, significantly improving patient outcomes and quality of life. By exploring the molecular, genetic, and clinical aspects of cardiovascular and respiratory health, our research contributes to shaping precision medicine approaches, facilitating early detection, and driving advancements in personalized therapies. Integrating research on these conditions will strengthen our capacity to address chronic diseases comprehensively, leveraging our existing infrastructure and expertise to improve patient outcomes. Continued investment in cardiovascular and respiratory sciences is essential for positioning McGill at the forefront of global health challenges and ensuring a healthier future for generations to come.

### *Strategy: Discovery Research*

We will leverage both established and developing areas of FMHS excellence by fostering greater interactions between core disciplines to maximize the translational impact of biomedical and health research towards improved patient outcomes. Consequently, the FMHS cultivates innovative synergies among fundamental biomedical and behavioral researchers, experts in clinical research, data and computational scientists, bio-engineers, industry specialists, and health and social policy experts. Integrated multi-omic approaches (e.g. large-scale genomics, transcriptomics, proteomics, metabolomics, machine learning and data driven bioinformatics) are a key research priority linked to the creation and curation of patient and data repositories that better represent the diversity of McGill's RUISSS (Réseau Universitaire Intégré de Santé et Services Sociaux).

Our commitment to interdisciplinary collaboration is exemplified by several key initiatives. While the list below is not exhaustive, it showcases the diversity and potential of current collaborative efforts aimed at inspiring further interdisciplinary projects across McGill and beyond.

- **RNA Sciences and Structural Biology:** McGill's recent CFREF award for the “DNA to RNA” (D2R) program (2023 - 2030) charts a path for an interdisciplinary approach in RNA-based therapeutics development. This major program integrates novel computational techniques, analytics, and a robust network of clinical, pharmaceutical, and biotechnological partners to support research spanning cancer, genetic disorders, and infectious diseases. By combining bio- and chemical-engineering with genomics and RNA research expertise, D2R is positioned to establish a pipeline from discovery to commercialization and clinical application. Additionally, the FRQS-funded Centre de recherche en biologie structurale (CRBS) examines protein structure and function at the atomic level, partnering with the Facility for Electron Microscopy (FEMR). Embracing structural biology alongside artificial intelligence and data science methodologies enables FMHS researchers to unravel complex biological puzzles related to health and disease.
- **Precision and Regenerative Medicine:** The McGill Regenerative Medicine Network and the Montreal Neurological Institute's Early Drug Discovery Unit are at the forefront of stem cell research, particularly induced pluripotent stem cell technology, for discovering and testing novel therapeutic avenues and drugs. These units are poised to multiply the impact of the new CERC in Regenerative Lung Medicine to advance regenerative medicine through cell replacement therapies for damaged organs and tissues. Other interdisciplinary efforts towards advancing mechanical and stem cell engineering for tissue replacement and the creation of innovative materials and devices are highly supported. FMHS encourages researchers to pursue interdisciplinary bioengineering initiatives to facilitate developments in these areas, ensuring their swift translation into clinical settings.
- **Cancer and Cardiovascular Health Research:** The Goodman Cancer Institute and hospital-based Research Units are pushing the boundaries of precision cancer treatment, focusing on exploiting cancer vulnerabilities, immuno-profiling, and leveraging patient-derived models. Multidisciplinary teams are also encouraged to address various aspects

of cardiovascular and neurovascular health, including cardio-kidney-diabetes interactions, venous thromboembolism, and precision hypertension.

- **Interdisciplinary Initiatives:** The establishment of the new CERC in Metabolism and the Brain will significantly enhance our comprehension of the gut-brain axis. The international Modern Diet and Physiology Research Centre (MDPRC), focused on neurometabolic science, positions FMHS as a frontrunner in the interdisciplinary exploration of diet's impact on health. This type of research direction defines an inspiring FMHS template to promote cross-disciplinary studies and addresses critical issues relevant to the Faculty, including the health of underserved and vulnerable groups who are disproportionately affected by comorbidities.
- **Strategic Cohorts & Biobanks:** The COVID-19 pandemic underscored the complex interplay between infections and various body systems, necessitating a multidisciplinary response. Creating high-quality patient cohorts with broad, detailed phenotyping is essential for recognizing, documenting, and studying the factors responsible for disease progression and treatment response. The Quebec COVID-19 Biobank, led by McGill's CERC in Genomic Medicine, exemplifies the ambitious and systematic research methodology we advocate. Similarly, The Neuro's Open Science Biorepository and Patient Registry (C-BIG), the Early Drug Discovery Unit (EDDU), and the Douglas Brain Bank provide access to diverse data types centered on patients, including bio-specimens, imaging, genetics, patient-derived cell lines, and comprehensive clinical information. In cardiovascular health, the Courtois Cardiovascular Signature Program (cvsignature.ca), contributes a prospective biorepository for deep phenotyping, combining genomics, proteomics, imaging, digital health, gut microbiome, environmental, sex and gender, and social determinants to develop personalized signatures of cardiovascular health. FMHS researchers are encouraged to emulate these models to leverage the vast diversity of accessible data to continue pushing the boundaries of scientific discovery to improve patient care.
- **Open Science:** FMHS is committed to advancing Open Science practices to accelerate discovery and innovation across all areas of health research. By sharing data, resources, and findings openly, and inspired by the trailblazing experience led by The Neuro and the Tanenbaum Open Science Institute, FMHS fosters a culture of collaboration that breaks down barriers between disciplines, institutions, and countries, thereby enhancing the impact of research.

## Evidence-based innovation in healthcare

### *Health Services, Organizations, and Policy Research*

FMHS is committed to advancing research on health services, organizational dynamics, and healthcare policy to improve healthcare delivery systems at both local and global levels. This focus on health services research complements our strengths in fundamental, epidemiological, and clinical research, providing a holistic approach to addressing health challenges. By understanding how health services are organized, delivered, and experienced by patients, FMHS aims to generate actionable insights that inform policy and improve healthcare outcomes. Key areas include primary care models, health services evaluation, health professions education, and the impact of healthcare policies on vulnerable populations.

FMHS is also committed to advancing clinical trials, epidemiologic studies, and population health research to bridge the gap between research and practice. Utilizing big data from health administrative databases and clinical data repositories, we aim to develop and support learning health systems that continuously evolve based on data-driven insights. These efforts will ensure that research findings are translated effectively into practical healthcare improvements. FMHS will continue to support initiatives to deploy the infrastructure necessary for large-scale clinical and epidemiological studies, enabling breakthroughs in disease prevention, diagnosis, and management.

### *Transforming Discovery into Healthcare Impact*

Effective healthcare improvements often stem from a continuum between foundational research and practical clinical questions and applications. FMHS is committed to fostering increased collaboration across all its Schools, Research Centres, Institutes, and affiliated healthcare institutions. We aim to enhance interactions among diverse research groups and establish partnerships that span the entire spectrum of research, innovation, and practice. This includes laboratory scientists, clinical investigators, health professionals, and patients, forming novel alliances with the potential for high-impact innovation.

These interdisciplinary groupings are instrumental in training the next generation of health researchers and health care professionals within a dynamic and productive environment. Central to our implementation strategy is the translation of research findings into tangible health benefits, health professions education, and improved treatments. While knowledge translation can take various paths, we advocate for a structured approach that encompasses basic laboratory research, clinical trials, implementation of innovations, person-centered outcomes, and broader impacts on families and communities.

Overall, FMHS recognizes the growing importance of value-based healthcare, which aims to optimize patient health outcomes, patient experiences, effectiveness and efficiency of care, workforce well-being and safety, and health equity. Implementation science helps understand the broader implications of innovations on these interdependent outcomes. In particular, sustainable change requires collaboration between researchers, healthcare providers, and patients to co-design and implement solutions that address identified needs. FMHS is committed to using implementation science principles to guide these efforts, ensuring that research findings translate effectively into practice and contribute to systemic, lasting improvements.



### *Driving Quality and Equity in Health Services*

Healthcare systems are perpetually evolving, embracing innovative care approaches, integrating new technologies, and striving for quality improvement to achieve safer, better, and more equitable care for everyone. Key areas include primary care models, health services evaluation, and the impact of healthcare policies on vulnerable populations. Evidence-based decision-making and policy development, which apply across the full spectrum of care—encompassing primary to quaternary care, prevention, rehabilitation, and self-care, are essential to drive improvements. Engaging with various community groups, including vulnerable populations, is critical to the success of these efforts.

Equity is a core priority in all research conducted at FMHS. This includes ensuring equitable access to research opportunities, diverse representation in research studies, and addressing health disparities through our work. FMHS is dedicated to embedding equity considerations across all research themes, from conceptualization to implementation, ensuring that our research reflects and serves the diverse communities it impacts. FMHS is also committed to addressing health disparities globally, ensuring that our research and quality improvement initiatives benefit vulnerable communities everywhere.

To drive quality and equity in health services, it is crucial to engage a wide range of stakeholders, including decision-makers, managers, clinicians, and other healthcare staff. Quality improvement initiatives often require organizational or practice changes that can impact many facets of healthcare delivery. Ensuring that these changes are sustainable requires buy-in and active participation from all individuals involved in healthcare delivery.

FMHS also recognizes that health services alone are not sufficient to address the complex health needs of individuals and communities. Social services play a vital role in addressing broader social determinants of health, such as housing, education, and economic stability. FMHS aims to provide a more holistic approach to health that addresses both medical and social needs. This approach will ensure more sustainable and equitable health outcomes, particularly for vulnerable populations facing multiple barriers to well-being.

*Strategy: Evidence-Based Innovation*

Through the following concerted strategies, FMHS aspires to not only bridge the gap between research and clinical practice but also to continuously adapt and improve healthcare in response to both local and global health needs.

- **Implementation Science and Knowledge Translation:** Effective healthcare innovation requires a robust focus on implementation science to ensure that innovations are not only developed but also effectively delivered and scaled. This includes using co-design approaches that engage patients, communities, and healthcare providers in sustaining implementation. Knowledge translation at FMHS will prioritize collaborative and bottom-up processes to ensure that research findings meet the needs of diverse populations and contexts.
- **Translation to Clinical Practice:** The pathway to clinical application involves validating disease models in human studies, assessing diagnostic and therapeutic prospects, and obtaining regulatory approval for healthcare innovations. Subsequent phases focus on disseminating these advancements to key stakeholders—patients, healthcare providers, and regulatory bodies—to foster community integration and uptake. This inclusive strategy also entails evaluating implementation hurdles, gathering evidence of success and areas for improvement, and utilizing population research to monitor outcomes, all while considering demographic and socio-cultural shifts. Innovative graduate programs ensure that researchers trained at McGill have the knowledge and skills necessary to link research, practice, and policy.
- **Interdisciplinary approaches to health equity, bioethics, and policy research:** The School of Population and Global Health and the newly established Department of Equity, Ethics, and Policy (DEEP) are instrumental in advancing interdisciplinary approaches to health equity, bioethics, and policy research. Future initiatives in those areas should leverage their leadership, networks and expertise, promoting evidence-informed policy solutions and person-centered care.

## **Inclusive healthcare innovation to address local & global unmet health needs**

### ***Personalized Care for a Diverse Society, Emphasizing Prevention***

The integration of diverse perspectives into biomedical and health sciences research is a crucial factor for improving prevention and clinical care. These perspectives encompass a broad spectrum of biological variants, historical experiences with care systems, and cultural values, all of which require deeper exploration, understanding, and application. Inclusive healthcare must encompass all demographic groups, ensuring that no population is excluded from access to quality care. Sexual orientation minorities and individuals with disabilities are often disproportionately affected by health disparities, facing both systemic barriers to care and exclusion from research analyses. FMHS is committed to addressing these disparities by ensuring that our research and healthcare initiatives include and represent these groups.

Considering these factors is essential for enhancing health-related behaviors and outcomes. FMHS is dedicated to advancing research in this area to develop and implement evidence-based strategies that encompass all facets of patient experience. The aim is to provide actionable insights and solutions that integrate patient preferences and cultural safety, with rigorous evidence to provide high-value prevention and care.

Prevention is a critical focus in addressing the rapid aging of the population, rising rates of chronic diseases, and declines in mental health. FMHS will prioritize preventive research to develop and implement strategies that improve health outcomes and reduce healthcare burdens. This includes studying social determinants of health, developing public health interventions, and creating models for early disease detection and intervention. FMHS will also prioritize research that focuses on promoting healthy lifestyles, preventing disease, and addressing the social determinants of health. This includes studying effective ways to engage communities in health promotion activities and developing interventions that are culturally sensitive and tailored to specific populations.

### ***Health Challenges From a Changing Environment***

The interconnected nature of health has become increasingly evident, especially in the wake of the COVID-19 pandemic and other health emergencies. FMHS is committed to addressing global health challenges, with an emphasis on the impact of environmental changes. Our research on environmental health will consider both local and global contexts, examining the effects of climate change, pollution, and other factors on population health.

Specifically, the health implications of environmental pollution and climate change are monumental. Climate change, in particular, poses significant health risks through environmental disasters and the emergence of new pathogens, leading to increased incidence of infectious diseases and contamination of food, air and water. These challenges often disproportionately impact the most vulnerable communities, exacerbating health inequities. Research priorities in this domain include studying the health effects of air pollution, the health risks associated with environmental changes, including exposure to environmental and occupational chemicals. This research will inform exposure modeling and global policy development and allow FMHS researchers to leverage their expertise against emerging pathogens.

*Strategy: Inclusive Healthcare Innovation*

McGill is committed to fostering innovative research and training approaches that embrace the diversity of Canadian patient experiences and the environmental determinants of health:

- **Acknowledging the Diversity of Patient Experiences:** FMHS will pursue a comprehensive understanding of the diversity of patient experiences and use this knowledge to enhance care quality. This effort will involve multidisciplinary collaborations, potentially extending beyond our Faculty, and will benefit from the expertise of our Indigenous Health Professions Program. Innovations, particularly those emerging from McGill's new D2R program (see above) and collaborations with the CIHR-funded Network Environment for Indigenous Health Research (QcNEIHR) at the Faculty of Agriculture & Environmental Sciences, will catalyze progress in this area. A critical aspect of this work is the conscious effort to eliminate bias related to sex, sexuality and gender identity, age, culture, religion, and race in both research and clinical practice. This commitment is vital not only to this strategic focus but also across all of McGill's biomedical and health sciences research endeavors.
- **Global Health** is a vital area of expertise at FMHS, reflecting the interconnectedness of health issues worldwide. We aim to build on FMHS strengths in global health research, to advance health equity. FMHS seeks to foster equitable health outcomes and contribute to global health policy development.
- **Engagement with Socio-Economic Realities:** Addressing the socio-economic factors influencing health, including access to quality care as well as the implications of demographic and cultural shifts, form an integral part of the strategy, aiming to develop and evaluate innovative healthcare delivery methods for diverse global populations. The Department of Family Medicine, along with the Ingram School of Nursing, the School of Communication Sciences & Disorders, the School of Physical & Occupational Therapy and the School of Population and Global Health, are poised to collaborate with healthcare and community partners in crafting and testing innovative care delivery models for diverse groups, thereby ensuring healthcare advancements are inclusive and equitable.
- **Social Equity and Indigenous Health:** Engaging and collaborating with experts in health inequities and partnerships with Canada's Indigenous communities are central to our mission. We will work with community partners to integrate Indigenous ways of knowing into our research with these communities. These efforts aim to enhance health outcomes for underserved populations and tackle ethical, legal, and social challenges, including public perception, discrimination, and equitable access. The goal is also to inform policy recommendations to governmental bodies.

FMHS is committed to advancing beyond standard commitments to Truth and Reconciliation by integrating Indigenous ways of knowing into our research practices, when appropriate. We recognize that traditional knowledge and holistic approaches are essential components of effective health research, particularly when working with Indigenous communities. In such contexts, FMHS research will prioritize collaboration with Indigenous knowledge holders, elders, and communities to ensure that their voices are central to the research process.

FMHS will also explore innovative approaches to community-driven research, where Indigenous communities are not just participants but active leaders and co-creators in research. This includes focusing on areas that are important to Indigenous health, such as chronic disease prevention, mental health, and cultural resilience. FMHS researchers are encouraged to create new pathways for collaboration that genuinely reflect and respect Indigenous perspectives, ensuring that our research practices are not only inclusive but transformative.

- **Climate Change and Environmental Health:** FMHS aims to establish a leading Centre for Climate Change and Planetary Health. This centre will address the vast challenges posed by climate change and environmental degradation, focusing on sustainable solutions to protect and improve both planetary and human health. The field of Planetary Health, emphasizing the interconnections between the environment and health, will guide our efforts to ensure a healthy, equitable future for all.

## Cross-cutting priorities

### *Embracing & Leveraging the Digital Era*

Deploying transformative methods and tools is paramount for advancing healthcare research and clinical practice. FMHS researchers and units are encouraged to explore partnerships with the IT industry to develop innovative analytical and technological solutions for both discovery research and clinical applications. Emphasizing patient empowerment, we aim to integrate electronic health records with digital portals, wearable devices, and smartphone apps. These tools will not only facilitate patient access to clinical data but also support a new generation of diagnostics, and personalized wellness strategies. Spearheaded by the McGill researchers of the FRQS Digital Health Network (Réseau de santé numérique), these initiatives promise to both transform patient care and deliver new and powerful research methodologies.

The federation of data and knowledge enabled by information technology, alongside the rapid evolution of artificial intelligence and data science towards generative models and tools, is set to transform healthcare. This digital evolution presents new technological and ethical challenges. The growing precision and volume of "omics" data are pivotal for generating large-scale biological datasets, turning each patient into a significant data source. These developments enable analyses of health and disease determinants with unprecedented sensitivity and specificity. FMHS, in collaboration with its affiliated hospitals, is poised to leverage these advancements to enhance research and clinical outcomes.

Moreover, realizing the potential of multi-dimensional data necessitates active research in computational methods. This includes a broad array of disciplines such as applied mathematics, computational biology, engineering, and computer science. McGill's longstanding expertise in these areas, bolstered by initiatives like the Strategic Initiative in Computational Medicine and the Quantitative Life Sciences (QLS) graduate program, underscores our commitment to innovation. Focus areas include mathematical and statistical modeling, multivariate analytics, and dynamical systems theory, addressing various scales from individual biological systems to population health.

### *A Stronger Research Infrastructure*

To set the stage for future-ready research infrastructure that is both innovative and sustainable, FMHS acknowledges the importance of core facilities in advancing research. These facilities are essential in providing cutting-edge technology, services, and expertise to our research community. These facilities also support the University's teaching mission by providing McGill undergraduate and graduate students with access to advanced technologies and shared resources, facilitating hands-on learning and research experiences. However, sustaining the operations of these facilities poses significant challenges, in terms of financial and human resources – an issue experienced by all research-intensive academic institutions across Canada.

FMHS has made strides in securing more sustainable funding for core facilities in 2024, yet the resources remain insufficient. We will continue to work towards an appropriate business model, including by implementing an integrated system for improved management through professional software, to bolster the operational efficiency of these essential resources. Although the need for increased central funding is apparent, financial enhancements alone may not suffice. FMHS is

committed to working with all stakeholders to reassess the organization and promotion of core facilities, aiming to extend their reach within McGill and to a greater number of potential external partners, enhancing their visibility and impact.

An integral part of enhancing the long-term sustainability of our core facilities is recognizing and valuing the talents of specialized personnel and support staff who are the backbone of these operations. Developing and offering attractive career options and paths is crucial for attracting and retaining this talent. Addressing this need involves creating a supportive environment that recognizes their contributions to research advancements and provides opportunities for professional growth and stability.

Successful implementation of the SRP relies on strong administrative and operational support. FMHS recognizes that, to move from planning to action, administration units must be well-equipped and staffed to support the ambitious initiatives laid out in the SRP. FMHS will work closely with administrative teams to identify areas for improvement, enhance operational processes, and provide the necessary support to ensure that our research priorities are effectively actualized.

### *Recruitment and Retention of Talent*

The recruitment of talented students and early-career investigators is crucial. Prioritizing both excellence in fundamental domains and interdisciplinary collaboration, as highlighted in the present herein. We aim to integrate measures of success and potential to enhance our research priorities. Financial support for graduate students and postdocs remains a priority, complemented by the growth of existing and the development of new cross-disciplinary training programs such as the Integrated Program in Neuroscience (IPN) and QLS.

Supporting new faculty members as they establish their laboratories at FMHS and begin their independent careers is also important. FMHS will work to provide more competitive research start-up packages, including funding and space allocations, and equitable support programs to ensure that talented recruits thrive at McGill, contributing to collective success.

FMHS remains committed to creating an environment that not only attracts top talent but also supports their long-term success and professional development. This strategy ensures that our Faculty can thrive and contribute meaningfully to advancing our research priorities.

### *Strategy: Cross-Cutting Priorities*

- **Digital Health:** We continue to embrace digital health initiatives, highlighted by the recent establishment of a FRQS Digital Health Network co-led by FMHS researchers, and the newly launched Data Science Center at SPGH. This underscores the commitment to spearheading initiatives that leverage digital solutions for improved patient care and research methodologies.
- **Machine Intelligence & Data Repositories:** FMHS encourages advanced analytical and information technologies for both discovery research and clinical applications, emphasizing patient empowerment and partnership in both the research mission and the delivery of care through digital tools. We also acknowledge the transformational potential of artificial intelligence and data science in healthcare, emphasizing the need for research and training in computational methods to unlock novel insights from large-scale biological and healthcare datasets.
- **Interdisciplinary Bioengineering Translational Efforts:** The FMHS will focus on developing novel therapeutics and biomedical devices, including advancements in person-specific stem cell engineering and bioengineering, with encouragements towards commercialization and clinical translation.
- **Engagement with the Private Sector:** Collaboration between academia and industry partners is essential for translating innovative research into real-world applications that benefit patient care on a global scale. FMHS recognizes the importance of building partnerships with health startups and industry leaders to facilitate the movement of discoveries from the laboratory to the public. These collaborations not only enhance the impact of our research but also provide new funding opportunities that support ongoing research and educational initiatives.
- **Funding for Research Infrastructure:** We continue to advocate for and secure increased funding from the University's central administration to ensure the long-term sustainability of core facilities.
- **Restructuring for Efficiency:** We plan to evaluate the current organization of core facilities to identify potential efficiencies across disciplines and technologies to optimize resources and services. For instance: Imaging & Microscopy, Genomics & Bioinformatics, Disease and Other in-vivo Models, Cellular & Molecular Biology, Structural Biology & Biochemistry, Data repositories & Biobanks.
- **Career Development for Platform Staff:** FMHS plans to implement staff development programs for core facility personnel, offering clear career paths and professional growth opportunities. This could include training programs, leadership development, and pathways to permanent positions, underscoring the value of their expertise to the institution.
- **Prioritizing Recruitment and Retention of Talent:** A critical aspect of FMHS's strategy is the targeted recruitment of young investigators and the support for new faculty members through competitive research start-up packages and integrated training programs,



emphasizing interdisciplinary collaboration and the development of cross-disciplinary training programs.

- **Cultural Safety:** FMHS recognizes the importance of Cultural Safety in all aspects of health research, education, and clinical practice. Cultural Safety involves creating an environment where Indigenous Peoples and all patients feel respected and safe, free from discrimination and judgment. FMHS is committed to ensuring that faculty and staff understand and implement Cultural Safety in their interactions with Indigenous Peoples, patients, and research participants. This commitment extends to how we conduct research with Indigenous Peoples and other marginalized groups, ensuring that all research practices are grounded in respect, reciprocity, and Cultural Safety.