Research Institute in Oncology and Hematology

STRATEGIC PLAN 2018-2023

CancerCare Manitoba
ActionCancerManitoba

University of Manitoba

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Message from the Director of the Research Institute in Oncology and Hematology

On behalf of the Research Institute in Oncology and Hematology (RIOH), I am proud to present the 2018-2023 Strategic Plan.

I would like to thank the Strategic Planning Committee members, RIOH scientists, staff, and external stakeholders who contributed feedback to help shape the strategic plan. My hope is that these efforts will position RIOH to respond to opportunities and challenges in the years ahead while remaining engaged, innovative, and forward-thinking.

Through the strategic planning process, we developed consensus on research priorities, guided the allocation of research funding, and prioritized research infrastructure improvements over the next five years. We re-examined our strategic priorities against the current research landscape, and considered areas in which RIOH could have the most significant role.

Over the next five years, we will focus on three major strategic directions including developing multidisciplinary teams, enhancing infrastructure platforms, and identifying research themes. We will review our strategic plan regularly as we move forward.

Increased collaboration amongst RIOH's areas of expertise, as well as with colleagues from the University of Manitoba, Shared Health, and across research environments in Manitoba and Canada, will be essential to remain competitive.

This plan was presented to the CancerCare Manitoba Board of Directors, CancerCare Manitoba Foundation, and the Rady Faculty of Health Sciences at the University of Manitoba. If you have any questions about the strategic plan, please contact me at neil.watkins@umanitoba.ca.

I look forward to working with you as we advance the initiatives set out in our new strategic plan.

Sincerely,

D Neil Watkins, MBBS, PhD, FRACP
Director, Research Institute in Oncology and Hematology
Chief of Research, CancerCare Manitoba
Professor, Department of Internal Medicine, Rady Faculty of Health Sciences, University of Manitoba

1. EXECUTIVE SUMMARY

The goal of the Research Institute in Oncology and Hematology (RIOH) strategic planning exercise was to develop consensus on research priorities and investment in infrastructure over the next five years.

Three major strategic directions were identified: developing multidisciplinary teams, enhancing infrastructure platforms and identifying research themes. Multidisciplinary teams will promote research excellence by building connections with the clinical and academic partners at CancerCare Manitoba (CCMB), Shared Health, Regional Health Authorities, and the University of Manitoba (UofM). Research platforms that support basic science, translational research, clinical trials, and epidemiology will be critical to support this multidisciplinary approach. Identification of research themes such as early detection, precision medicine, and health care innovation will maximize return on investment. Flexibility will be essential in order to adapt to the rapidly changing cancer research landscape.

This plan describes the research opportunities identified by RIOH researchers and stakeholders and outlines the implementation strategies needed to meet the objectives of the plan. This plan also reflects the contribution of the CancerCare Manitoba Foundation (CCMF) as an essential partner in the past and future success of the RIOH.

2. BACKGROUND

The number of new patients in Manitoba with cancer or blood disorders is expected to rise by approximately 3% per annum in the next 10-20 years[1]. As treatments improve, the number of Manitobans living with cancer or blood disorders is also expected to increase[2]. Research across the translational spectrum will be an essential part of cancer control strategies that are effective and sustainable.

The Manitoba Institute of Cell Biology (MICB) was established in 1969 as a joint venture of CCMB and the UofM to support research excellence in cancer and blood disorders for Manitobans. In its 50 year history, MICB has been recognized for its success in discovery-based and clinical research, and for the establishment of translational research platforms including the Genomic Centre for Cancer Research and Diagnosis (GCCRD), the Manitoba Tumour Bank (MTB), the Chronic Lymphatic Leukemia cluster, the Manitoba Breast Cancer Research Group and the Mammalian Functional Genomics Centre. In 2016, MICB expanded its scope by formally integrating a clinical research program into its structure to further enhance its translational research program. As a result, CCMB and the UofM created RIOH, expanding the number of principal investigators from 19 to 53.

RIOH is uniquely positioned because most patients in the province that are screened for, or diagnosed with cancer and blood disorders are cared for by CCMB. RIOH is supported by a long-standing partnership with CCMF, which provides funding for infrastructure, equipment, education, and training. Scientists and their trainees receive additional research funds from Research Manitoba, the Tri-Council Agencies (CIHR, SSHRC, NSERC), and other local or national funding agencies.

Provincial screening programs for colorectal, breast and cervical cancer fall under the auspices of CCMB. The alignment and coordination of population-based screening programs and cancer registries with the province-wide care and treatment of patients present a unique foundation for research. Expertise in population-based cancer research, health services research, patient experience, and investigator-initiated trials bridge an identified gap between RIOH's basic scientists and clinicians. Therefore, RIOH is poised to facilitate the translation of basic and preclinical findings from the laboratory to the clinic through multidisciplinary collaborations.

3. LEADERSHIP

From 2016-2019, Dr. Sri Navaratnam, President and CEO of CCMB, was the acting RIOH Director, supported by Dr. Marshall Pitz (Clinical Research Lead) and Dr. Spencer Gibson (Cell Biology Lead). In June 2019, Dr. Neil Watkins was appointed as RIOH Director and Chief of Research at CCMB. Dr. Watkins played a major role in the completion of this strategic plan.

4. ALIGNMENT

4.1 Manitoba Institute of Cell Biology Strategic Plan (2012-2015)

RIOH's strategic priorities included maintaining excellence in basic sciences and translational research, expanding the research scope to include the entire cancer spectrum, increasing collaboration, recruiting and retaining highly qualified personnel, supporting platforms and technologies, and improving communications. RIOH's strategic goals were to facilitate the translation of basic and preclinical findings from the laboratory into the clinical setting through multidisciplinary collaborations between basic scientists and clinicians in order to have a meaningful impact on cancer control.

4.2 Manitoba Cancer Plan: Delivering Excellence (2016-2021)

RIOH's research and activities are guided by the Manitoba Cancer Plan (2016-2021) Strategic Direction: "Toward a Broadened Scope and Enhanced Strength of Research." This plan includes four objectives:

(i) expand the scope and strength of research; (ii) provide state-of-the-art laboratories and research technology platforms; (iii) improve collaborations to enhance cancer and blood disorders research; (iv) increase the complement of highly-qualified personnel.

4.3 University of Manitoba Strategic Plan (2015-2020)

The University's strategic plan reaffirms that all areas of research are critical and important. In addition, investment in signature areas is needed to compete globally and emerge as an international leader[3]. Strategic research themes include fundamental research, high-performance structures and processes, integrative research in health and well-being, and population and global health.

4.4 University of Manitoba - Rady Faculty of Health Sciences Strategic Plan (2016-2021)

The Faculty's strategic plan identifies several areas that harmonize with the goals of RIOH. These include the recruitment of high-quality research personnel, state-of-the-art research platforms, and sustainable funding strategies. Interdisciplinary research environments, collaborative research clusters, integration of basic and clinical science, senior faculty mentorship, and streamlined research support services are all directly relevant to the success of RIOH.

4.5 Canadian Institutes of Health Research (CIHR) - Institute of Cancer Research (ICR) Strategic Research Priorities (2015-2020)

The Canadian Institutes of Health Research's (CIHR) Institute of Cancer Research (ICR) identified three strategic research priorities for 2015-2020: (i) high fatality cancers; (ii) health economics and health services research in cancer control; and (iii) cancer risk factor disparities and prevention service inequities.[4]

4.6 Research Institute External Review (2017)

In January 2017, a team of external reviewers assessed RIOH's infrastructure, platforms, and advised on the positioning of research efforts with a view to cultivating success within the Canadian cancer research landscape. Their recommendations were considered in the development of RIOH's strategy.
A summary of their proposals is as follows:

- Consider thematic alignment of translational impact across the four CIHR pillars of biomedical, clinical, health service and population health.
- Develop an explicit strategy for the organization of working groups that include clinicians, the Clinical Trials Unit, biobanks, the Manitoba Cancer Registry and laboratory scientists.
- Invest in bioinformatics and data analysis expertise.
- Review existing platforms in terms of the relevance, services provided, management structure, and financial support.
- Encourage robust participation of surgical research as part of clinical practice.
- Take advantage of linking cancer registry data and other local databases.
- Leverage the expertise and functions of the Clinical Trials Unit (CTU) within RIOH to support investigator-initiated trials.

5. STRATEGIC PLANNING PROCESS

The goals of the strategic planning exercise were to develop consensus on research priorities, guide the allocation of research funding, and prioritize research infrastructure improvements over the next five years. The results of these discussions identified existing successful research teams and platforms, new emerging areas of research, opportunities to improve outcomes for patients, and ways to establish RIOH's reputation for innovative research. Improved utilization of resources and the fostering of a vibrant, multidisciplinary research environment are instrumental in moving RIOH forward in the next five years.

The planning process was managed by a ***Strategic Planning Committee:***

Dr. Gary Annable	Research Officer, RIOH
Dr. Shantanu Banerji	Senior Scientist, RIOH Director of Precision Oncology and Advanced Therapeutics, CCMB Medical Oncologist, Department of Medical Oncology and Hematology, CCMB Assistant Professor, Department of Internal Medicine, UofM
Dr. Harvey Chochinov	Senior Scientist, RIOH Distinguished Professor, Department of Psychiatry, UofM
Dr. Kathleen Decker	Scientist, RIOH Assistant Professor, Department of Community Health Sciences, UofM
Dr. Spencer Gibson	Lead Cell Biology, RIOH Professor, Departments of Biochemistry & Medical Genetics, and Immunology, UofM
Dr. Tom Hack	Senior Scientist, RIOH Director, Psychosocial Oncology and Cancer Nursing Research, St. Boniface Hospital Professor, College of Nursing, UofM
Dr. Mary-Ann Lindsay	Research Officer, RIOH
Dr. Eilean McKenzie-Matwiy	Research Officer, RIOH
Dr. Leigh Murphy	Senior Scientist, RIOH Co-Director, Manitoba Tumour Bank Distinguished Professor, Department of Biochemistry & Medical Genetics, UofM
Dr. Sri Navaratnam	President and CEO, CCMB
Dr. Marshall Pitz	Lead Clinical Research, RIOH Chief Medical Information Officer, CCMB Medical Oncologist, Department of Medical Oncology and Hematology, CCMB Associate Professor, Department of Internal Medicine, UofM
Ms. Ashley Sitarz	Administrative Assistant, RIOH
Dr. Ryan Zarychanski	Senior Scientist, RIOH Hematologist, Department of Medical Oncology and Hematology, CCMB Assistant Professor, Department of Internal Medicine and Community Health Sciences, UofM

The first step in the development of the plan was to conduct an online survey of RIOH's strengths, weaknesses, and future directions. The survey was sent to RIOH scientists, members, trainees, staff, and external partners. Forty-three per cent of scientists/members responded.

Research Officers then conducted over 20 one-on-one or group discussions with RIOH scientists and external stakeholders. This provided additional insights for use in the plan. Results from the survey and the consultations were presented by Dr. Gibson and Dr. Pitz at a RIOH seminar on May 30, 2018.

The survey results and consultation feedback provided a framework for discussions at the Strategic Planning Retreat held on June 12, 2018, where over 100 RIOH appointed scientists, staff, CCMB clinicians and CCMB Department Heads joined external stakeholders from CCMF, Shared Health, Research Manitoba and the UofM to further discuss and evaluate RIOH's priorities. The goal of the retreat was to prioritize the research themes and platforms that would guide RIOH's direction for the next five years. Dr. Stephen Robbins, Scientific Director for the CIHR Institute of Cancer Research, moderated the discussion and helped to define research priorities.

Three concurrent breakout sessions were held to discuss key research platforms that were previously identified through the survey and consultations as critical in supporting research priorities. These sessions included

discussions about the development of an integrated clinical research database, filling the existing gaps in data analytics at RIOH, and the expansion of the biobank. Objectives and key performance indicators were identified for each strategic direction.

A draft strategic plan was presented to RIOH's Scientific Advisory Board on September 18, 2018, and RIOH researchers on September 26, 2018. The final plan was presented to the CCMB Board of Directors, CCMF and the Rady Faculty of Health Sciences at the University of Manitoba.

6. STRATEGIC DIRECTION 1: DEVELOPING MULTIDISCIPLINARY TEAMS

6.1 Background

National and international granting agencies have moved away from individual grants to a focus on multidisciplinary research projects. Increased collaboration with the UofM, Shared Health, and elsewhere will be essential to remain competitive. Researchers need to make connections in order to develop robust research proposals that integrate platforms, infrastructure, and multidisciplinary expertise. The knowledge gained can both enhance and accelerate the development of innovative and sophisticated research proposals in discovery, therapeutics, patient experience, and health services.

The CLL Research Cluster has a long history of funding success, training, investigator-initiated trials, biobanking and maintaining clinical databases. The experience of this team should inform the development of other disease-specific research teams. The Manitoba Breast Cancer Research Group was recognized by the External Review Committee in 2017 as having a high likelihood of success if it expanded to incorporate the expertise of additional breast cancer clinicians and clinical researchers in medical, surgical and radiation oncology. The neuro-oncology research team was the successful recipient of the 2018 CCMF multidisciplinary grant. The Acute Care Hematology research group continues to be successful in leading local, national and international research projects. Developing robust multidisciplinary teams and research would increase opportunities for additional, external funding through national and international research competitions.

6.2 Objectives

- Change the focus of RIOH research from individual investigators to multidisciplinary research teams.
- Increase competitiveness for research funding from external granting agencies.
- Increase leadership and participation in national and international research consortia.

6.3 Operational Strategies

- Incentivize multidisciplinary team meetings and collaborations.
- Identify innovative opportunities for team-based research.
- Recruit early and mid-career scientists and clinician scientists as future leaders of multidisciplinary research programs.

6.4 Key Performance Indicators

- Increase in the amount of grant funding received for multidisciplinary team research.
- Achieve success in Tri-Council and pan-Canadian funding for collaborative team grant applications.
- Demonstrate translational impact through publication, implementation, and changes in clinical practice.

7. STRATEGIC DIRECTION 2: ENHANCING INFRASTRUCTURE PLATFORMS

7.1 Background

Optimization and integration of existing platforms and investment in new platforms should increase the research capacity of RIOH. While the wish list for new technologies and platforms is long, narrowing the selection was required in the current fiscal environment. The selection was based on research strengths,

existing platforms, five-year research priorities, and current gaps in resources. Platforms identified for further development include:

- The Manitoba Tumour Bank
- *In vivo* models
- An integrated clinical research database
- A data analytics platform
- Expansion of the Clinical Trials Unit

7.2 The Manitoba Tumour Bank

7.2.1 Background

The Manitoba Tumour Bank (MTB) began as a breast tumour bank in 1993 and then in 2006 expanded its mandate to include additional solid tumours and leukemia. The current inventory includes samples from over 7,000 solid tumours, 2,000 blood samples, and an additional 4,000 blood samples from patients with chronic lymphocytic leukemia. Other services include tissue microarray construction, tissue block sectioning, antibody optimization, immunohistochemistry, and scoring.

The MTB is a core biobank facility that provides essential support for the acquisition, storage, processing, and distribution of blood and tissue samples. It provides a critical research service with a well-curated and clinically annotated biobank repository. The acquisition of biobank samples is a logistic challenge that requires organizational and human resources. Episodes of care that can provide access to bankable material, such as surgery and interventional radiology, largely occur outside CCMB. This requires navigating a complex ethical and regulatory environment with multilateral agreements that govern material transfer, data sharing, intellectual property, biosafety, ownership, governance, and privacy.

Resources are also needed to identify and consent patients for biobanking, as well as coordination with pathologists and sample procurement, transport and storage. In keeping with challenges facing biobanks worldwide, sample collection is heavily biased towards surgical cases, thus underrepresenting disease site groups where the tumour is inoperable at presentation and is therefore diagnosed by core biopsy or fine needle aspiration. The widespread use of patient-derived xenografts and organoid models in cancer research has increased the requirement for access to fresh tumour samples for researchers.

7.2.2 Objectives

- Enhance the collection of non-surgical specimens.
- Enhance the collection of live specimens.
- Prioritize project-specific collections.

7.2.3 Operational Strategies

- Work with Shared Health and UofM to develop shared policies and procedures with the goal of implementing a master agreement to allow the sharing of materials and data.
- Focus on project-specific collection with defined endpoints rather than routine banking of surgical specimens.
- Work with multidisciplinary research teams to prioritize project-specific collections.

7.2.4 Key Performance Indicators

- Establish a MTB working group that reports to the RIOH Director.
- Execution of a research agreement between CCMB, Shared Health, and UofM that defines its governance and promotes the exchange of data and materials between each partner.
- Increased revenue to better leverage CCMF funding.

7.3 *In Vivo* Models

7.3.1 Background

In vivo models are an essential component of high-impact cancer research. Genetically engineered mouse models have revolutionized the understanding of tumour suppressors, oncogenes and cancer cell-of-origin. These immunocompetent models are an essential platform for the preclinical assessment of novel immunotherapeutics. In parallel, patient-derived xenograft (PDX) models generated in immunodeficient mice are now considered the gold standard for preclinical and translational cancer research and drug development

Over the last decade, RIOH's capacity to invest access mouse models has contracted. By contrast, programs in mouse gene editing, transgenic technologies, and small animal imaging have expanded at the UofM Rady Faculty of Health Sciences. Lack of investment in animal models limits the capacity of RIOH researchers to publish their findings in high-impact journals. It also limits the translational impact of discoveries in human samples or *in vitro* models. Integration of preclinical data from human samples, cell culture models, PDX models, and genetically engineered mouse models is a hallmark of publications that lead directly to the clinical translation of novel therapies or biomarkers.

At present, cancer researchers order immunodeficient mice as needed. This is expensive, inefficient and limits RIOH's capacity to generate PDX models as fresh samples become available. The establishment of genetically engineered mouse models requires a long-term commitment to providing infrastructure to support gene targeting, breeding and animal housing.

7.3.2 Objectives

- Develop a PDX program at RIOH.
- Expand the use of genetically engineered mouse models.
- Leverage UofM resources in gene editing and *in vivo* imaging.

7.3.3 Operational Strategies

- Establish a RIOH core facility to breed and supply immunodeficient mice.
- Recruit researchers with expertise in *in vivo* models.
- Leverage CCMF support and pan-Canadian funding agencies to expand infrastructure that supports *in vivo* models.

7.3.4 Key Performance Indicators

- Integration of *in vivo* models in multidisciplinary research projects and successful pan-Canadian funding applications.
- Increased translational impact if preclinical research publications.
- Contract research projects based on private sector access to unique *in vivo* models.

7.4 Integrated Clinical Research Database

7.4.1 Background

The "Manitoba advantage" refers to the historical success of the province in collecting patient health care utilization, pharmaceutical, and health outcomes data. The Cancer Registry (Maxon), the Manitoba Tumour Bank (ATiM) and CCMB's electronic medical record system (ARIA) form the foundation of patient care and research datasets. In addition, there are a large number of unique databases developed and maintained by researchers for project-specific research. Each of these databases is resourced independently through project-specific research grants.

Optimization and centralization of research data together with the integration of existing databases and resources are required to improve and increase research capacity. It is clear from the comparison of data collected that a large degree of duplication occurs due to a lack of integration. A robust, secure and integrated software platform and the effective use of available resources would support and streamline all research projects at RIOH, including basic and translational, population-based, and investigator-initiated research.

7.4.2 Objectives

- Develop an integrated database solution that aligns with cancer registry and clinical dataset requirements.
- Eliminate duplication in data capture, storage, and analysis.
- Develop a provincial data sharing governance framework.

7.4.3 Operational Strategies

- Harmonize ethical, regulatory and privacy requirements with CCMB, Shared Health, and UofM.
- Centralize data capture and management resources.
- Seek provincial and national funding for data projects that support clinical and research innovation.

7.4.4 Key Performance Indicators

- Decrease the number of research databases at RIOH.
- Attract provincial and national funding for database infrastructure and related projects.
- Lead provincial and pan-Canadian projects that focus on database integration.

7.5 Data Analytics

7.5.1 Background

Strong data analytics encompassing computational biology, bioinformatics, and biostatistics is essential to support high-quality research. Computational biology is the development of algorithms and tools to understand biological systems and relationships. Bioinformatics is the application of informatics and data management techniques (computer and information sciences) to biology, particularly with respect to genomics and next-generation sequencing. Biostatistics is the application of statistics to medicine and health and includes study design, statistical considerations, analysis, and data interpretation.

Genomics research and technology have transformed the cancer research landscape in the last decade. Importantly, the access to next-generation sequencing technologies such as exome sequencing, whole genome sequencing, RNAseq, ChIPseq and single cell genomics has shifted the emphasis on sequencing capacity to large, centralized centres that can provide high-quality services at competitive prices. As a result, demand at the level of RIOH has shifted towards the need for bioinformatics and computational support for analytic pipelines. RIOH currently has very limited capacity in bioinformatics and computational biology.

7.5.2 Objectives

- Identify the specific biostatistical, bioinformatics and computational biology needs of RIOH scientists.
- Build analytical expertise within RIOH.
- Collaborate with UofM and external partners to enhance RIOH data analytics capacity.

7.5.3 Operational Strategies

- Strengthen collaboration with the Centre for Health Innovation (CHI) and the Manitoba Centre for Health Policy (MCHP).
- Facilitate membership in RIOH for external computational biologists, bioinformaticians, and biostatisticians.
- Recruit data analytics personnel to RIOH.

7.5.4 Key Performance Indicators

- Develop RIOH membership criteria for external computational biologists, bioinformaticians, and biostatisticians.
- Recruitment of researchers with expertise in biostatistics, bioinformatics, and computational biology.
- Identification of requirements for computing, data storage, and information technology support necessary to build capacity in biostatistics and bioinformatics.

7.6 Clinical Trials and Clinical Research

7.6.1 Background

The Clinical Trials Unit (CTU) at CCMB conducts Phase I to III clinical trials across all disease site groups, including pediatric cancers. The establishment and growth of the CTU have been strongly supported by CCMF. As is the case across Canada, the CTU's business model focuses on sponsored trials in order to build revenue, capacity, expertise and provide training opportunities for clinical and research staff at CCMB. The CTU facilitates and coordinates clinical research in the areas of prevention, treatment, palliation, and quality of life. The CTU currently employs 40 staff who service the clinical trial needs of 14 disease site groups. In the last five years, the CTU has activated 130 adult, 36 pediatric and 53 bone marrow transplantation trials.

Integral to the success of RIOH is support for investigator-initiated trials and clinical research. Typically, this research activity is funded by peer-reviewed grants or CCMF. Due to funding constraints, these projects are not financially viable from the standpoint of the CTU and struggle to access infrastructure support for study activation, enrolment, consent, data management, analytics, and biostatistics. The development of a core resource for investigator-initiated clinical research beyond the CTU will be needed in the next five years.

7.6.2 Objectives

- Build capacity for sponsored clinical trials and investigator-initiated clinical research.
- Increase revenue by expanding the CTU sponsored trial portfolio.
- Enhance support for investigator-initiated clinical research.

7.6.3 Operational Strategies

- Develop a business plan for the CTU that increases revenue and expands its sponsored trial portfolio.
- Identify areas for collaboration between RIOH and the CTU.
- Enhance the participation of the CTU leadership in RIOH, and the participation of RIOH scientists in the activities of the CTU.

7.6.4 Key Performance Indicators

- The CTU becomes a self-sustaining, profitable enterprise.
- Increase the number of patients at CCMB that participate in sponsored clinical trials.
- Increase the number of patients at CCMB that participate in investigator-initiated clinical research projects.

8. STRATEGIC DIRECTION 3: IDENTIFYING RESEARCH THEMES

8.1 Background

The centralization of cancer care, treatment, population-based screening programs, province-wide cancer registries, and tumour biobanking allows RIOH to undertake research across the cancer continuum, from discovery, treatment, and patient-reported outcomes, to health services research, population health, palliative care, and policy. Identification of research priorities will emphasize collaboration and encourage researchers to focus on innovative research that significantly improves patient outcomes.

8.2 Early Detection

8.2.1 Background

The early detection of cancer can significantly decrease treatment complexity, improve treatment response, reduce cancer-related morbidity and mortality, and improve survival. Manitoba is well placed to lead research into early cancer detection since the provincial screening programs (BreastCheck, ColonCheck, CervixCheck) are operated by CCMB. The development of a provincial lung cancer screening program is also being evaluated. In addition, the Manitoba Cancer Registry collects information on all cancer diagnoses in the province including age and stage.

Existing research programs investigate the molecular understanding of the onset of carcinogenesis and develop new and highly sensitive screening or early detection technologies. These programs subsequently identify biological, environmental, and genetic risk factors, palliative care and patient outcomes. The Manitoba Tomorrow Project (MTP) is an innovative, longitudinal, population health study transforming future health research. This project will recruit 10,000 Manitobans between the ages of 35-69 who have not been diagnosed with cancer, collect self-reported lifestyle and risk information as well as blood and urine samples that will be frozen for future biological assessment. MTP researchers will follow up and check in with participants periodically throughout the next 50 years in a similar fashion. Data from the MTP will be combined with data from 300,000 Canadians from other provinces allowing researchers to begin to better understand and connect lifestyle, social factors, genetics and environment, and put this knowledge toward preventing and reducing rates of cancer and chronic disease for Canadians.

8.2.2 Opportunities

- Identification of biological markers of environmental carcinogen exposure.
- Development of risk-based screening strategies.
- Identification of genetic predisposition and carcinogenesis.
- Epidemiologic models for screening and health disparity in remote and Indigenous communities.
- Cost-benefit analyses of early cancer detection.

8.3 Precision Medicine

8.3.1 Background

Significant progress has been made in our understanding of the molecular biology of cancer which has led to the development of targeted therapies. The reduction in mortality and increase in survival for many cancer patients over the previous 25 years is evidence of this success. However, patients diagnosed at a more advanced stage have a poorer prognosis and lower survival rates and represent a group of cancers in which robust biomarker development can directly impact outcomes.[5]

Rapid progress in the discovery of targeted therapies based on defined driver mutations represents a major unmet clinical, implementation and research need in Manitoba. The development of the Provincial Clinical Genomics Testing Laboratory will share patient genomics and clinical biomarkers with the Cancer Registry. When linked to other CCMB and province-wide sources of health care use and health outcomes information, a wealth of research opportunities exist in Manitoba for researchers.

Despite recent advances in novel treatments such as immunotherapy, advanced and recurrent cancers remain difficult to treat. Approximately 70% of all cancer patients are treated with radiation therapy. However, preclinical research in radiobiology has contracted in the last two decades at the expense of drug development research. Moreover, grant funding is now overwhelmingly directed at preclinical drug development rather than basic and translational studies aimed at understanding the mechanisms of the radiation response in normal and malignant cells. Further innovative research into the underlying biology of metastatic disease, biomarker discovery and analysis, stem cell research, genomics, imaging, clinical radiotherapy, drug resistance, novel treatments, and patient experience and patient management is required. CIHR identified difficult to treat/high fatality cancers, including metastatic disease, as one of their research priorities. Advanced disease represents an area in urgent need of robust, validated biomarkers that inform the use of existing and novel therapies.

8.3.2 Opportunities

- Cancer genomics
- Cancer imaging and radiomics
- Radiobiology
- Immunotherapeutics
- Next Generation Sequencing
- Tumour microenvironment

8.4 Health Care Innovation

8.4.1 Background

Ongoing alignment with new research priorities from external granting agencies will continue to be accommodated accordingly. Significant new findings and emerging research areas could also stimulate new research themes for RIOH. Rapid progress in preclinical and translational research requires an ongoing commitment to health care innovation to improve quality and efficiency.

The deployment of immune checkpoint inhibitors has transformed the treatment of melanoma and holds great promise for patients with advanced lung, kidney, and head and neck cancers, as well as in cancers from multiple primary sites that exhibit a microsatellite instability phenotype. However, many translational challenges remain, including the high cost of these new therapies, the need for accurate biomarkers, and the management of autoimmune toxicities.

Leveraging translational and clinical expertise to change practice and improve outcomes should be a core mission of RIOH. Established knowledge gaps in the implementation of best practice, real world evidence are barriers to the effective implementation of health care delivery in patients with cancer and blood disorders. Patient-reported outcomes are also an emerging priority in the field. Leadership in academic, pan-Canadian clinical trials funded by CIHR or other competitive grant schemes is highly competitive and requires provincial leadership on the part of RIOH.

Health services research has emerged as a major priority for provincial and federal funding agencies. Projects that aim to improve efficiency, patient outcome, reduce costs and generate sustainable funding models are a high priority. The need for innovation in this area is particularly acute in Manitoba, where geographical and cultural challenges complicate the delivery of efficient, high-quality cancer care. Established expertise in RIOH combined with initiatives in population oncology, database development, health services research, MBTelehealth, health economics, and real-world evidence represents a major opportunity for RIOH in the next five years.

As cancer therapies improve, the health system must adapt to provide care for increasing numbers of cancer survivors. Challenges include decisions around surveillance and follow up, detection and management of second malignancies, and long-term morbidity and mortality related to treatment. In addition, the rapidly developing field of psycho-oncology has emphasized the large knowledge gap in our understanding of how cancer patients deal with their diagnosis and the consequences of their treatment. Finally, increasing demand for end-of-life care and supportive care represents a research and health services challenge and a research priority.

8.4.2 Opportunities

- Evidence-based practice implementation
- Psycho-oncology
- Acute care hematology
- Health economics
- Palliative care
- Patient experience

9. GLOBAL OPERATIONAL PLAN

9.1 Background

RIOH has a central office offering support to scientists in their research efforts. Current research support available through the central office includes grant applications, proposal development, budgeting, study initiation document preparations including regulatory/ethics submissions, database setup, hiring research

staff and grant administration. Other support positions including research nurses and research assistants exist within RIOH under various platforms. The research workload is high and the current central office structure is insufficient to address the increasing demands of all scientists. Reactive practices have become common and in turn, have increased stress within the system.

9.2 Operational Priorities

9.2.1 Reorganization of the Research Office

RIOH leadership has recognized the need for change. Centralizing resources under common procedures and activities would result in improved performance of the organization. A plan to reorganize available resources is currently in development. The outcome of this reorganization is expected to increase and streamline the support available to scientists to meet the objectives outlined in this document.

9.2.2 Improving Research Management

With the continued increases in the number of new research projects occurring at RIOH, it has now become critical that the process for launching new studies becomes more streamlined and efficient. Opportunities exist to centralize, standardize, and streamline many of the steps required to process and activate a research project. A project to review and revise the current process is underway and will be formally implemented in 2020. Optimization of protocol review, agreement processes, data management, and feedback to researchers is a high priority. Also, the implementation of research governance strategies to manage reporting and compliance requirements in an increasing stringent regulatory environment is urgently needed.

9.2.3 Diversification of Funding Support

CCMF provides support to RIOH through infrastructure and operating grants. RIOH will recommend to CCMF revisions to the granting structure to support the research and infrastructure priorities identified in this plan. The suggested revisions will align with the research themes and directives identified, including stipulations for new innovative pilot programs and multidisciplinary research grants.

The reliance of CCMF financial support for infrastructure will continue in the absence of indirect cost support from federal and provincial sources. However, operating grant support needs to increase from sources outside of CCMF. Priorities in this area include (i) improving the success rate for CIHR grant applications; (ii) exploring new sources of funding, such as the Terry Fox Research Institute; and (iii) as high priority, the development of commercial partnerships that support contract research agreements for preclinical and translational research that is beyond the scope of the CTU.

9.2.4 Engagement with Consumer Advocates

Consumer advocates are patients, relatives or caregivers that inform medical research. Direct involvement of consumer advocates is now an essential component of translational research projects in cancer and blood disorders. Consumers also have an increasing role to play in provincial and pan-Canadian funding applications, and many international grant agencies now require consumer advocates to be a part of the application team. Building a network of consumer advocates in collaboration with CCMF will be needed in the next five years.

9.2.5 Training and Education

Training the next generation of investigators is critical to the sustainability of RIOH. Policies and procedures that identify mentors to support mid-career and early-career investigators along with students will be required. Programs that educate researchers on grantsmanship, research communication and leadership skills will improve the academic and financial security of RIOH.

10. REFERENCES

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