Virtual Health Hub
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September 29, 2025

Selection Committee
Geoffrey Ogram Memorial Research Grant

Dear Members of the Selection Committee,

I am writing to submit my Letter of Intent for the Geoffrey Ogram Memorial Research Grant in support of our proposed study, "Remotely Operated Mobile Low-Dose CT for Equitable Lung Cancer Screening in Underserved Communities".

Lung cancer remains the leading cause of cancer death in Canada, and while low-dose CT (LDCT) screening reduces mortality through early detection, equitable access continues to be a major challenge. Rural, remote, and Indigenous communities face geographic barriers, limited imaging infrastructure, and difficulty recruiting and retaining medical radiation technologists. These structural barriers contribute to lower screening participation, delayed diagnoses, and poorer outcomes in populations already disproportionately affected by lung cancer.

The Virtual Health Hub (VHH) has pioneered remote diagnostic imaging solutions to address similar access challenges. Through our telerobotic ultrasound program, we have demonstrated that imaging can be performed safely, effectively, and in culturally safe ways with direct remote supervision without the on-site presence of technologists. Our partnership with the Saskatchewan Indian Institute of Technologies has led to the development of a training program for Indigenous community members to gain skills as virtual care assistants to support remote imaging, thereby building community capacity. Building on this proven framework, we now propose to extend the model to lung cancer screening by deploying a mobile LDCT unit operated in real time by certified technologists at the VHH, supported locally by trained community-based assistants. This model directly addresses human resource shortages while building local capacity, offering a potentially scalable, sustainable, and culturally-safe solution to improve screening access. This sets our project apart from others which have utilized mobile CT scanners but require technologists to travel with the scanner and do not necessarily build local Indigenous community capacity.

The overarching research question guiding this project is: *Can remotely operated mobile LDCT provide a feasible, culturally acceptable, and cost-effective approach to expanding equitable lung cancer screening access for underserved northern Indigenous communities?* To answer this, we will pursue three objectives: (1) to evaluate feasibility of remotely operated mobile CT for lung cancer screening in northern Indigenous communities, focusing on technical quality and operational readiness; (2) to assess acceptability and cultural safety from the perspectives of patients, families, and communities; and (3) to determine health system impacts, including lung

cancer detection rates, screening participation, travel reductions, and economic impact through a cost-consequence analysis.

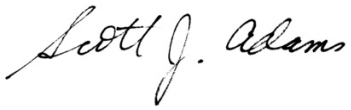
This project directly aligns with the mandate of the Geoffrey Ogram Memorial Research Grant to accelerate innovations in early detection and reduce the burden of lung cancer across diverse populations. By generating rigorous evidence on feasibility, cultural safety, and system-level outcomes, this research will provide critical knowledge for the equitable expansion of lung cancer screening in Canada. In the short term, it will test a novel, community-driven delivery model; in the longer term, it has the potential to reduce late-stage diagnoses, lower mortality, and improve quality of life for underserved populations.

We are requesting $25,000 to support research personnel, data collection, analysis, and community engagement activities. Infrastructure and equipment for the mobile LDCT unit are secured through other sources, ensuring that Geoffrey Ogram Memorial Research Grant funds are dedicated entirely to the research.

As an early career researcher, I bring a growing track record of research in lung cancer screening, health services research, and remote imaging. I completed my MD, PhD, and residency in radiology at the University of Saskatchewan, studying as a Vanier Scholar and receiving the Governor General's Gold Medal, followed by clinical and research fellowships at Harvard Medical School, Massachusetts General Hospital, and Stanford University, where I further developed expertise in lung cancer screening. I am joined by two senior researchers, Dr. Ivar Mendez and Dr. Brent Burbridge, as co-applicants.

Thank you for considering our application. It would be a privilege to contribute to the legacy of Geoffrey Ogram by advancing innovations that bring lung cancer screening to communities who need it most.

Sincerely,



Scott Adams, MD, PhD, FRCPC
Director of Research, Virtual Health Hub

Remotely Operated Mobile Low-Dose CT for Equitable Lung Cancer Screening in Underserved Communities

Background and Rationale

Lung cancer is the leading cause of cancer death in Canada and globally, and outcomes are strongly dependent on stage at diagnosis.[1,2] Screening with low-dose CT (LDCT) has been shown to reduce mortality by 20-24% through early detection,[3,4] yet equitable access to LDCT screening remains a major challenge.[1] Rural, remote, and Indigenous communities face barriers that limit participation, including geographic distance from screening centres, lack of local imaging infrastructure, and difficulty recruiting and retaining medical radiation technologists.[5,6] These challenges result in delayed diagnoses, reduced screening uptake, and a higher likelihood of late-stage disease.[7] Provincial screening programs, while important steps forward, are typically concentrated in fixed urban sites, leaving most rural and northern populations with limited access. Without innovative delivery models that address these barriers, inequities in lung cancer detection will continue to widen, particularly for Indigenous communities that already experience disproportionately high lung cancer burden and poorer outcomes.[8,9]

The Virtual Health Hub (VHH) has pioneered remote diagnostic imaging solutions to address persistent gaps in access to care for rural, remote, and Indigenous communities.[10–12] Through its implementation of telerobotic ultrasound, the VHH has demonstrated that imaging can be performed safely and effectively without the physical presence of technologists, using direct remote supervision paired with local community-based assistants.[10] This model has shown clinical quality, high patient satisfaction, cost-effectiveness, and cultural safety.[10–12] Building on this framework, we now propose to extend remote imaging to lung cancer screening by deploying a mobile CT unit operated in real time by certified CT technologists located at the VHH. This innovation directly addresses the shortage and uneven distribution of medical radiation technologists and CT scanners in rural and northern regions. Instead of relying on hard-to-recruit and retain on-site staff, the model trains and employs local community members as virtual care assistants to support patient preparation and strengthen community capacity, while expert CT technologists perform the scan remotely. The implementation and evaluation of this model of care advances the goal of the Geoffrey Ogram Memorial Research Grant to accelerate research that reduces the burden of lung cancer and optimizes patient care across diverse populations. The overarching research question for this project is: Can remotely operated mobile LDCT provide a feasible, culturally acceptable, and cost-effective approach to expanding equitable lung cancer screening access for underserved northern Indigenous communities?

Objectives

1. To evaluate the feasibility of remotely operated mobile CT for lung cancer screening in northern Indigenous communities, focusing on technical quality and operational readiness.
2. To assess acceptability and cultural safety of mobile LDCT screening from the perspectives of patients, families, and communities.
3. To determine health system impacts of remotely operated mobile LDCT screening, including lung cancer detection rates, screening participation rates, patient travel, and economic impact using a cost-consequence analysis.

Methods

Study Design and Setting. We will conduct a mixed-methods evaluation of remotely operated mobile LDCT lung cancer screening in four northern Saskatchewan Indigenous communities

(Pelican Narrows, Sandy Bay, Deschambault Lake, and Southend). Approximately 200 participants meeting provincial lung cancer screening eligibility criteria will be enrolled between December 2025 and August 2026. The evaluation will be guided by the Pan-Canadian Digital Health Evaluation Framework[13] to consider domains at the micro, meso, and macro levels and ensure assessment from patient, provider, community, and system perspectives. In partnership with Indigenous advisors, we will embed OCAP® principles for governance of data, interpretation, and knowledge translation.

Intervention. A self-contained mobile CT unit will be deployed to partner communities. Scans will be acquired under real-time supervision by technologists at the Virtual Health Hub, supported locally by trained community-based virtual care assistants. Images will be interpreted by radiologists at the VHH, and abnormal findings will be managed through existing provincial lung cancer screening pathways.

Objective 1: Feasibility will be evaluated across technical and operational domains. Technical quality will include image adequacy, radiation dose indices, and repeat-scan rates. Operational performance will include session completion, throughput, and time-stamps for key workflow steps. Data sources will be scanner system logs, RIS/PACS metadata (modality worklists, report turnaround), and operational records from the scheduling and teleoperations platforms.

Objective 2: Acceptability will be assessed using brief post-screening surveys and semi-structured interviews with participants, family members, virtual care assistants, and community health staff. Instruments will cover access, communication, comfort, and perceptions of cultural safety; interview guides will be co-developed with Indigenous advisors. Interviews will be audio-recorded, transcribed verbatim, and analyzed thematically by two coders, with member-checking and advisor input to ensure contextual accuracy and cultural relevance.

Objective 3: Health system outcomes will be derived from linked operational and clinical data. Outcomes include lung cancer detection rate among screened participants, screening uptake within the local eligible population, and reductions in travel distance/time compared with fixed-site screening. Given the pilot horizon, we will perform a cost-consequence analysis rather than a full cost-utility study. We will quantify direct costs of delivering mobile remote LDCT using a micro-costing approach. We will compute cost per participant screened and cost per positive screen for the mobile-remote model and compare these with (1) a fixed-site pathway and (2) a mobile pathway with on-site technologists, using observed or published unit costs and travel distances. An incremental cost analysis will estimate the additional (or avoided) cost per additional person screened. Scenario analyses will explore variability in travel distances, session throughput, and staffing models.

Team and Research Environment

The project will be led by the Virtual Health Hub, an Indigenous-led national centre for innovation in virtual care and diagnostics. The team brings extensive expertise in both lung cancer screening and remote imaging. PI: **Dr. Scott Adams, MD, PhD, FRCPC** is a cardiothoracic radiologist, clinician-scientist, and health services researcher with expertise in lung cancer screening and remote diagnostics. He serves as Director of Research at the VHH. Co-I: **Dr. Ivar Mendez, OC, MD, PhD, FRCSC, FACS, FCAHS** is Director of the VHH and a pioneer in virtual care innovation. Co-I: **Dr. Brent Burbridge, MD, FRCPC** is Director of Medical Imaging for the VHH and has decades of experience in diagnostic imaging. The team has published extensively on remote imaging and lung cancer screening. Longstanding relationships with Indigenous communities provide the foundation for co-design, trust, and implementation.

References

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Impact Statement

This project has the potential to exert a sustained and transformative influence on lung cancer research by providing the first evidence on the feasibility, acceptability, and health system impact of remotely operated mobile low-dose CT (LDCT) for lung cancer screening. While LDCT has been previously demonstrated to reduce mortality through early detection, its benefits are not equitably realized, as many rural, remote, and Indigenous populations face structural barriers that prevent participation in screening programs. By directly addressing the human resource and geographic challenges that limit access, this project introduces a new paradigm for delivering early detection: one that leverages remote operation by trained technologists combined with local community assistants to extend specialized imaging capacity to underserved populations. This sets our project apart from others which have utilized mobile CT scanners but require technologists to travel with the scanner and do not necessarily build local Indigenous community capacity.

In the short to medium term, the proposed research will advance lung cancer screening by generating high-quality evidence on whether remote operation of mobile CT units can maintain technical quality, achieve patient and community acceptability, and deliver measurable system efficiencies. Demonstrating feasibility in this context will accelerate the translation of scientific knowledge on LDCT effectiveness into real-world outcomes by making screening more accessible to underserved populations. Early indicators of impact—including lung cancer detection rates, reductions in travel burden, and health system economic impact—will provide the basis for scaling this model nationally and internationally.

The expected long-term impact is substantial. By enabling earlier detection in populations with high lung cancer burden, this model has the potential to reduce the incidence of late-stage disease, improve survival, and decrease overall mortality. At the same time, reducing the need for long-distance travel and providing culturally safe care close to home will improve patient quality of life and promote trust in health systems. Beyond direct clinical outcomes, the research will also advance the broader field of cancer screening by demonstrating how remote imaging innovations can overcome systemic inequities in access. In this way, the project will not only contribute to reducing the burden of lung cancer but also promote a major shift in how screening and prevention strategies are delivered in underserved communities.

Public Summary

Lung cancer is the leading cause of cancer death in Canada. The key to saving lives is catching it early, before symptoms develop and when treatment is most effective. Screening with low-dose CT (LDCT) can detect lung cancer at an earlier stage and has been shown to reduce deaths. However, many Canadians do not have access to this life-saving test. People who live in rural, remote, and Indigenous communities face unique challenges, including long travel distances to hospitals, limited access to CT scanners, and difficulty recruiting and retaining trained medical staff. These barriers mean that people in these communities are less likely to participate in screening programs and more likely to be diagnosed with lung cancer at a later, harder-to-treat stage.

Our team has been working to solve similar challenges in medical imaging. We have successfully introduced "remote imaging" models, where highly trained technologists perform scans from a distance using secure technology, while local community assistants help patients on site. We have already shown that this model works for ultrasound, with excellent results in terms of safety, quality, cost savings, and community acceptance. Building on this experience, we are now proposing to extend the model to lung cancer screening.

This project will be the first in Canada to test a remotely operated mobile CT unit. The mobile CT scanner will travel directly to northern and Indigenous communities. Inside the unit, patients will be welcomed and supported by trained community-based assistants. The actual CT scan will be performed remotely in real time by technologists located at the VHH, using secure connections. Radiologists will interpret the scans and share results through existing cancer care pathways.

The project will focus on three main areas. First, we will test whether this approach is technically feasible, safe, and reliable. Second, we will work with patients, families, and communities to understand how acceptable and culturally safe this new model is, and how it can be improved. Third, we will measure the broader impact on the health system, including whether it reduces the need for travel, lowers costs, and increases the number of people able to access lung cancer screening.

In the short term, this project will generate new knowledge on how to bring life-saving lung cancer screening closer to home for people who need it most. In the longer term, the findings will help inform how provinces across Canada could expand lung cancer screening in ways that are equitable, sustainable, and culturally appropriate. By combining technology with community engagement, this project has the potential to reduce deaths from lung cancer, improve quality of life for patients and families, and build stronger healthcare systems that serve all Canadians.

Budget

Personnel ($18,000)

Research Assistant (0.3 FTE, Master's level, $15,000): A Master's-level research assistant will be responsible for participant coordination, consent, data collection, and entry, as well as supporting qualitative interviews with participants and community members. This individual will have prior training in health services research and experience with Indigenous community-based research methods. The assistant will be supervised by the PI and co-investigators.

Community Honoraria ($3,000): Honoraria will be provided to community partners, including Elders and patient advisors, for their contributions to co-design, co-implementation, and co-evaluation. This allocation acknowledges the critical role of Indigenous knowledge and perspectives in ensuring cultural safety and acceptability of the intervention.

Travel and Community Engagement ($5,000)

Travel costs will cover investigator and research assistant trips to northern communities for co-design sessions, data collection, and dissemination of results. This includes mileage and accommodation. Community visits are essential to maintain trust, support co-design, and ensure two-way communication.

Data Analysis ($2,000)

Funds will support transcription of interviews and statistical consultation as needed.

Total Requested: $25,000

Other Funding Sources

This project is part of an initiative to establish remotely operated mobile CT scanning in northern Saskatchewan, supported through internal Virtual Health Hub infrastructure (remote imaging systems) and the Saskatchewan Indian Institute of Technologies (virtual care assistant training). These resources cover equipment and operational infrastructure but do not fund research personnel, data collection, analysis, or community engagement activities. The research activities proposed here are not supported by other sources and are therefore appropriate for Geoffrey Ogram Memorial Research Grant funding.

Applicants

Principal Investigator

Scott Adams, MD, PhD, FRCPC is a radiologist at Royal University Hospital, assistant professor at the University of Saskatchewan, and Director of Research for the Virtual Health Hub. He has substantial experience in lung cancer screening, community-based participatory research, and remote imaging technologies. Dr. Adams received his MD and PhD from the University of Saskatchewan, studying as a Vanier Scholar and receiving the Governor General's Gold Medal. Following residency in Diagnostic Radiology at the University of Saskatchewan, he completed clinical and research fellowships in cardiovascular and thoracic imaging at Stanford University, Harvard Medical School, and Massachusetts General Hospital. He completed a Master of Education degree in Higher Education at the University of Toronto and received an Honors Certificate in Medical Education from the Stanford University School of Medicine. Dr. Adams' clinical and research interests are focused on lung cancer screening and improving access to care for underserved populations. His work has been published in leading journals such as *The Lancet* (including a first-authored paper on lung cancer screening), *Journal of the American College of Radiology*, and the *Canadian Medical Association Journal*.

Co-Investigators

Ivar Mendez, OC, MD, PhD, FRCSC, FCAHS is Director of the Virtual Health Hub. He is an internationally recognized pioneer in virtual care with more than a decade of experience in the use of remote presence robotics technology for health care to remote populations. Dr. Mendez received his MD and PhD in Anatomy from the University of Western Ontario, London, Ontario where he also completed his post-graduate training in Neurosurgery. His research Fellowship was done at the Department of Medical Cell Research, University of Lund, Sweden. From 2000 to 2012, Dr. Mendez was the Chairman and Founding Member of the Halifax Brain Repair Centre, the most comprehensive neuroscience research institute in Atlantic Canada. Dr. Mendez was the Head of the Division of Neurosurgery at Dalhousie University and the QEII Health Sciences Centre in Halifax for more than a decade. In 2013 Dr. Mendez moved to Saskatchewan and was the Fred H. Wigmore Professor and Provincial Head of Surgery at the University of Saskatchewan and the Saskatchewan Health Authority until December of 2022. Dr. Mendez has taken an active role in humanitarian and global health issues. Dr. Mendez received the Health Canada - 2011 Contribution to the Improvement of the Health of Canadians Award and The Queen Elizabeth II Diamond Jubilee Medal in 2012. In 2014, St. Mary's University in Nova Scotia awarded Dr. Mendez a Doctor of Science (honoris causa) degree for his contribution to Neuroscience and was inducted as a fellow into the Canadian Academy of Health Science (CAHS). In 2016, he received the Government of Canada Public Service Award of Excellence for the use of remote presence robotic technology to improve healthcare in the North and in Indigenous Communities. In 2022 Dr. Mendez was awarded the Queen Elizabeth II Platinum Jubilee Medal and was appointed an Officer of the Order of Canada for his pioneering work in the use of remote telemedicine and robotics to revolutionize the delivery of health and patient care in Canada and worldwide. In January 2023, Dr. Mendez was appointed as the Director of the Virtual Health Hub.

Brent Burbridge, MD, FRCPC is a radiologist at Royal University Hospital and Professor Emeritus in the College of Medicine at the University of Saskatchewan. He is also Director of

Medical Imaging with the Virtual Health Hub. In his 30 years at the College of Medicine, he has served in leadership positions such as Program Director and Department Head. He has contributed to multiple remote imaging innovations with a strong publication record.