Health Gamechangers

The Impact of Digital Technologies in Research

2023 Conference Program Guide

Lister Centre

Edmonton, Alberta

April 26 – 27, 2023

Welcome Letter from Dr. Sunil Rajput Conference Chair

Dear Colleagues,

It is my great pleasure to welcome you all to the inaugural **Health Gamechangers Conference** in Edmonton, Alberta on April 26 and 27, 2023 at the Lister Centre.

This year the topic we are focusing on is **The Impact of Digital Technologies in Research**. This conference is an opportunity for researchers and innovators to learn about the latest advances in digital technologies for health and explore challenges and opportunities in translating or commercializing health innovations.

We have an amazing schedule opening with Dr. Dean Sittig (UTHealth Houston) as our keynote speaker, Dr. Raja Mita presenting an Alberta perspective on Digital Health, 3 scientific sessions with 12 speakers from the AICE Concepts Program, 4 panel sessions with 12 speakers addressing major research topics, and an industry/ecosystem partners tradeshow with over 15 partners, and more! Details of the program schedule, abstracts, and speaker biographies can be found in the sections below.

On behalf of the organizing committee, I would like to extend a warm welcome to all attendees and express our appreciation for your participation. I believe this conference will be a valuable and enriching experience for all.

We look forward to seeing you all there!

SUNIL RAJPUT, BSc MSc PhD

Sunil Rajput

Alberta Innovates

Director (Research), Health Innovation

Health Gamechangers Conference

Conference Chair

Day 1 Schedule

HEALTH GAMECHANGERS: THE IMPACT OF DIGITAL TECHNOLOGIES IN RESEARCH	
Edmonton, AB	
Time	**DAY 1 - Wednesday, April 26, 2023**
8:00 AM - 8:45 AM	**Networking Breakfast** **Maple Leaf Room**
8:45 AM - 8:55 AM	**Opening Remarks** **Maple Leaf Room** Tim Murphy
9:00 AM - 10:00 AM	**Keynote: Why is digital so hard and what can we do about it?** **Maple Leaf Room** Dr. Dean Sittig
10:00 AM - 10:15 AM	**Alberta Perspective on Digital Health** **Maple Leaf Room** Dr. Raja Mita
10:15 AM - 10:30 AM	**Networking Break**
10:30 AM - 11:15 AM	**Scientific Session 1: Preventative Health** **Maple Leaf Room** 10:30 AM Dr. Kara Nerenberg - How is a digital approach to improving CARE (Cardiometabolic health after reproductive events) for Alberta 10:50 AM Dr. Peter Salat - Opportunistic screening of subject-specific fracture
11:15 AM - 12:00 PM	**Panel 1: Overcoming Challenges to Accessing Health Care Data** **Maple Leaf Room** Dr. Joon Lee Dr. Jeff Bakal Dr. Roger Dixon Moderator: Dr. Sunil Rajput
12:00 PM - 1:30 PM	**Networking Lunch & Industry Tradeshow** **Aurora & Prairie Rooms**
1:30 PM - 3:00 PM	**Scientific Session 2: Diagnostics** **Maple Leaf Room** 1:30 PM Dr. Yunyan Zhang - Machine learning for optimizing personalized treatment in multiple sclerosis 1:50 PM Dr. Lawrence Le - 3D intraoral ultrasound imaging 2:10 PM Dr. Desmond Pink - EVs and ML: novel diagnostic tools for bladder cancer detection 2:30 PM Dr. Cathy Lu - Proteomic biomarkers and intestinal ultrasound; innovative tools to dfifferentiate fibrostenotic from inflammatory
3:00 PM - 3:30 PM	**Networking Break**
3:30 PM - 4:15 PM	**Panel 2: Realizing Opportunity Where Knowledge Meets Digital** **Maple Leaf Room** Dr. Scott Kraft Dr. Martin Ferguson-Pell Dr. Jane Desrochers Moderator: Nicole Mardis
4:15 PM - 4:30 PM	**Closing Remarks Day** **Maple Leaf Room** Tim Murphy

Day 2 Schedule

HEALTH GAMECHANGERS: THE IMPACT OF DIGITAL TECHNOLOGIES IN RESEARCH	
Edmonton, AB	
Time	**DAY 2 - Thursday, April 27, 2023**
8:00 AM - 8:45 AM	**Networking Breakfast** **Maple Leaf Room**
8:45 AM - 8:55 AM	**Opening Remarks** **Maple Leaf Room** Dr. Sunil Rajput
9:00 AM - 9:45 AM	**Panel 3: How to Navigate Becoming a Successful Research** **Maple Leaf Room** Kelly Mottet Dr. Kristina Rinker Mark Starratt Moderator: Bindi Ferguson
9:45 AM - 10:15 AM	**Networking Break**
10:15 AM - 11:45 AM	**Scientific Session 3: Diagnostics** **Maple Leaf Room** 10:15 AM Dr. Aravind Ganesh - Automated remote image-guided diagnosis of carotid disease for stroke prevention 10:35 AM Dr. Richard Fahlman - The road to commercialization - a novel diagnostic for Myasthenia gravis 10:55 AM Dr. Julie Groizeleau - BiomeBLOOM – Digital bedside technology to detect healthy microbiome maturation in premature infants 11:15 AM Dr. Shabir Barazanjeh - Ultra-sensitive quantum imaging for biomedical applications
11:45 PM - 1:15 PM	**Networking Lunch & Industry Tradeshow** **Aurora & Prairie Rooms**
1:15 PM - 2:00 PM	**Scientific Session 4: Therapeutics** **Maple Leaf Room** 1:15 PM Dr. Dominic Sauvageau - Accelerating the development of phage-based platforms for the modulation of the gut microbiome 1:35 PM Dr. Gerald Zamponi - A new therapeutic strategy for chronic pain
2:00 PM - 2:15 PM	**Networking Break**
2:15 PM - 3:00 PM	**Panel 4: Leveraging Digital Health to Enable New Care Models in** **Maple Leaf Room** Dr. Justin Chen Dr. Maria Castro-Codesal Dr. Karen Wong Moderator: Dr. Antonio Bruni
3:00 PM - 3:15 PM	**Closing Remarks** **Maple Leaf Room** Dr. Sunil Rajput

Land Acknowledgement

We acknowledge the many First Nations, Métis and Inuit who have lived in and cared for these lands for generations. We are grateful for the traditional Knowledge Keepers and Elders who are still with us today and those who have gone before us. Alberta Innovates respectfully acknowledges that we are situated on traditional territory of the Treaty 6, Treaty 7, and Treaty 8 First Nations; home to Métis Settlements, the Métis Nation of Alberta, and Regions 2, 3 and 4 within the historical Northwest Métis Homeland. We respect the histories, languages, and cultures of First Nations, Métis, and Inuit whose presence continues to enrich our vibrant community.

April 26 - Day 1

8:00 AM Networking Breakfast

Maple Leaf Room

8:45 AM Opening Remarks

Maple Leaf Room

Tim Murphy, Vice President of Health, Alberta Innovates

9:00 AM Keynote Speaker: Why is digital so hard and what can we do about it?

Maple Leaf Room

Dr. Dean Sittig, UTHealth Houston

Digital health is here to stay. The rapid rise of these new technical capabilities comes at a time of great societal need as the world's population continues to age, chronic diseases effect more people, and the threat of new infectious diseases is increasing. These new technologies promise new means and methods for the identification, prevention, diagnosis, and treatment of acute and chronic disease as well as the promotion of health and well-being. With great opportunities come great challenges. This talk will explore 10 challenges, and what can be done to overcome them, that digital health researchers and entrepreneurs must address on their journey to designing, developing, implementing, using, and evaluating the next generation of digitally-enabled, interconnected, health information technologies.

10:00 AM Alberta Perspective on Digital Health

Maple Leaf Room

Dr. Raja Mita, Executive Director of Health Innovation, Alberta Innovates

10:15 AM Networking Break

10:30 AM Scientific Session 1: Preventive Health

Maple Leaf Room

How is a digital approach to improving CARE (Cardiometabolic Health After Reproductive Events) for Alberta women

Dr. Kara Nerenberg, University of Calgary

Problem: Cardiovascular diseases (CVD) are the most common cause of morbidity, mortality and poor quality of life for Alberta and Canadian women. Women with hypertensive disorders of pregnancy (HDP) have the highest risks of premature CVD. While CVD are largely preventable through lifestyle, women in the early postpartum period face gender-related barriers to preventative health and lack available, effective CVD prevention programs.

Solution: The novel IMPROVE-VIRTUAL HEALTH Platform addresses these gaps by integrating multiple personalized evidence-based e-health solutions into one innovative platform to provide a comprehensive model of care to support Alberta women in their preventative health journey after pregnancy.

Objectives: to co-create, integrate and evaluate a novel, evidence-based virtual platform for CVD preventative care on clinically important health outcomes and costs.

Research Approach: Year 1: Co-creation of the virtual platform technology with women with HDP. Year 2: Integration of the platform provincially into Alberta's EPIC electronic medical record (EMR) following an observational prospective cohort design. Year 3: Comprehensive evaluation of the platform's impact on health outcomes.

Anticipated Impacts: Preliminary research suggests that co-creating and integrating this novel virtual platform directly into Alberta's EMR will: 1) be scalable to reach women with HDP across Alberta and ultimately Canada; 2) improve health outcomes and quality of life of women with HDP, their families, and surrounding Alberta communities; and 3) reduce Alberta's healthcare costs. The IMPROVE- VIRTUAL HEALTH Platform will be a game-changer in reducing gender-related health inequities for Alberta and Canadian women.

Opportunistic screening of subject-specific fracture risk

Dr. Peter Salat, University of Calgary

Osteoporosis (OP) is a common multi-factorial disorder of reduced bone mass and micro-architectural deterioration, manifested clinically as increased fragility fracture risk. OP fractures are more common than heart attack, stroke and breast cancer combined. Its incidence

increases with age, affecting both sexes and all racial groups. OP is most common in postmenopausal women with a prevalence of up to 30%.

Canadian clinical practice guidelines recommend all men and women 65 and older undergo dual energy X-ray (DXA) screening but less than 20% of high-risk women and men with OP fractures had undergone DXA screening. Other limitations of DXA include its relatively low sensitivity and 2D analysis. Studies indicate that a treatment gap exists in OP of about 60-70%. Given the limitations of DXA and its relatively low utilization, a more effective screening solution is needed.

Opportunistic screening using existing CT scans represent such a possible solution. Our automated pipeline for OP screening from CT scans includes a deep learning based method for high quality bone segmentation, internal calibration to determine volumetric bone density and a finite element solver to determine bone failure loads.

Between 100 and 150 CT scans are performed per 1,000 people in many developed countries every year and the utilization of CT increases every year. A large proportion of CT scans are of people who are at high risk of OP. An economic study we commissioned has determined that opportunistic screening of CT scans with a method such as ours would be highly cost effective for patients aged 55 to 69 or 55 to 74, depending on the type of implementation.

11:15 AM Panel 1: Overcoming Challenges to Accessing Health Care Data

Maple Leaf Room

Lack of access to health data is a widely and frequently reported barrier to advancing digital in health research in Alberta. However, many researchers have found pathways or approaches to overcoming challenges often ascribed to accessing health data. In this panel, we will explore ways researchers can overcome data access challenges at either a provincial or national level.

Panelists:

- **Dr. Joon Lee,** Director of the Data Intelligence for Health Lab and an Associate Professor of Health Data Science in the Departments of Cardiac Sciences and Community Health Sciences, Cumming School of Medicine, University of Calgary
- **Dr. Roger A Dixon,** Professor in the Department of Psychology (Faculty of Science) and the Neuroscience and Mental Health Institute at the University of Alberta
- **Dr. Jeff Bakal,** Program Director for Provincial Research Data Services at Alberta Health Services which operates the Alberta Strategy for Patient Oriented Research (SPOR) data platform

Moderated by: **Dr. Sunil Rajput, Director of Research (Health Innovation), Alberta Innovates**

12:00 PM Lunch & Industry Tradeshow

Lunch - Maple Leaf Room

Industry Tradeshow - Aurora & Prairie Rooms

Showcasing our Ecosystem Development and Artificial Intelligence and Machine Learning partners. Visit our notable participants in the Aurora & Prairie rooms during the lunch and networking break.

Participants:

1:30 PM Scientific Session 2: Diagnostics

Maple Leaf Room

Machine learning for optimizing personalized treatment in multiple sclerosis

Dr. Yunyan Zhang, University of Calgary

Non-confidential Abstract: Multiple sclerosis (MS) is a common and disabling disease of the central nervous system. Over 97,000 Canadians have MS, including >14,000 Albertans. Most people begin MS with a relapsing-remitting clinical form (RRMS) at young adulthood, but no two people have the same disease course. Currently, while there are over a dozen disease modifying therapies available for RRMS, 20-50% of them with treatment continue to experience breakthrough disease activities. The goal of this project is to develop a new method based on forefront machine learning technologies to promote personalized treatment. Specifically, using both imaging and non-imaging data, the research will evaluate the 2-year treatment response of RRMS individuals who start a new therapy. Preliminary results show that our deep learning models can differentiate MS with different disease severity based on clinical and brain magnetic resonance imaging data of >100 participants. By assessing the 'texture' of clinical brain MRI, the baseline measures appear to be different between RRMS cohorts with different treatment responses at 2 years. Overall findings suggest that it is possible to identify how a RRMS person responds to a new treatment 2 years before using clinically available information. With confirmation, this research can help select the right treatment for the right person to improve prognosis, which in turn will enable reduced healthcare cost and enhanced quality of life for all individuals impacted.

3D intraoral ultrasound imaging

Dr. Lawrence Le, University of Alberta

Intraoral ultrasonography is an emerging field in dentistry mainly due to its absence of ionizing radiation and its capability to visualize soft tissue. Recent studies using 2D high-frequency ultrasound have shown promising results for the identification of dento-periodontal tissues, such as cementum-enamel junction, alveolar bone, and gingiva. The ultrasound Doppler can also monitor bone healing for implants. However, ultrasound imaging depends on the operator's skills and experience and has a limited field of view. In this work, we propose to develop a portable 3D freehand intraoral ultrasound imaging system for real-time visualization and high-precision 3D imaging. The proposed system mainly consists of a handheld in-house custom-built 23 MHz ultrasound imager with high-precision optical tracking sensors. 3D image volumes are fused by pixel-based reconstruction algorithm using 3D Slicer as the computing platform. We will illustrate the performance of the proposed system with in-vitro and ex-vivo examples. The preliminary study has shown the potential of the proposed approach to perform 3D imaging of intraoral structures. Future works on ex-vivo and in-vivo data will validate the method further.

EVs and ML: novel diagnostic tools for bladder cancer detection

Dr. Desmond Pink, Nanostics

Most bladder cancers are initially asymptomatic and have high recurrence rates making diagnosis, surveillance, and treatment challenging and expensive. Cystoscopy is the gold standard procedure for screening and surveillance, even though it is uncomfortable, invasive, and limited by cancer type.

We aim to develop a non-invasive diagnostic urine or blood test using our ClarityDX platform to screen and monitor for bladder cancer quickly and cost-effectively. The ClarityDX platform integrates disease-specific biomarker data with clinical data using machine learning to generate accurate disease signatures.

First, we will identify bladder cancer biomarkers located on extracellular vesicles blebbed from bladder cancer cells using a high-resolution cytometry assay. We have already identified 11 bladder cancer biomarkers in either blood or urine. Then we will integrate the biomarker data with key clinical data using different machine-learning approaches to define signatures for both the presence and/or aggressiveness of bladder cancer.

The ClarityDX platform is also the basis for our lead product, ClarityDX Prostate. This is advantageous from both a scientific and business perspective. Scientifically, we can use already-purchased and tested technology across our platform-based developmental pipeline. On the business side, we now understand the regulatory requirements, FDA and ISO certification processes, and how to build a lab-within-a-lab to sell ClarityDX Prostate in Canada and the US. We will apply this vast body of knowledge toward marketing our bladder cancer test as ClarityDX Bladder in the near future. At Nanostics, we translate R&D into marketable diagnostic tests to improve the lives of people at risk for cancer.

Proteomic biomarkers and intestinal ultrasound: innovative tools to differentiate fibrostenotic from inflammatory Crohn's disease

Dr. Cathy Lu, University of Calgary

Fibrostenotic Crohn's disease (CD) is a challenging phenotype often leading to surgical resection.Fibrosis and increased muscle thickening contribute to stricture formation and intestinal obstruction, occurring in 30-50% of CD patients within 10 years of disease onset. To date, physicians lack the diagnostic tools to accurately predict CD complications, such as strictures (luminal narrowing), early in their development. Timely and accurate diagnoses can support more targeted medical or surgical treatments and reduce healthcare related costs. Easily accessible and cost-effective diagnostic tools are needed to advance precision medicine to manage fibrostenotic CD patients. Currently, no biomarkers can discriminate fibrostenotic

CD from other phenotypes. Early studies suggest that protein biomarkers identified from serum profiling may differentiate CD subtypes and predict biologic therapy response. However, no studies have assessed and validated which proteins are predominantly found in patients who develop strictures. Utilizing intestinal ultrasound (IUS), an accurate and non-invasive imaging modality, which easily detects CD strictures, the serum of patients with and without strictures have been collected for proteomic characterization and validation. We seek to move our diagnostic approach forward to the clinic to better manage fibrostenotic CD patients. We have collected a

discovery cohort to enhance the diagnostic strength of our preliminary serum protein panel, and work towards validating the predictive ability of our panel in an additional cohort of patients. We aim to also optimize the detection of highly predictive proteins in our panel using clinically certified laboratory quantification approaches.

3:00 PM Networking Break

3:30 PM Panel 2: Realizing Opportunity Where Knowledge Meets Digital

Maple Leaf Room

Advances in technology and data-driven approaches are pushing the boundaries of what can be digitized, automated, and rapidly scaled up and out. Whether you are using these advances already to enhance discovery and knowledge mobilization or not, join our panelists for a discussion of the opportunities, bottlenecks, and new ecosystem supports that are available to help.

Panelists

- **Dr. Jane Desrochers**, Sr. Innovation Manager at Innovate Calgary's Life Sciences Innovation Hub
- **Dr. Scott Kraft**, Founder and Director of SPARK Alberta
- **Dr. Martin Ferguson-Pell**, Founder ELIXR

Moderated by: **Nicole Mardis, Director of Talent (Health Innovation), Alberta Innovates**

4:15 PM Closing Remarks

Maple Leaf Room

Tim Murphy, VP of Health, Alberta Innovates

April 27 - Day 2

8:00 AM Networking Breakfast

Maple Leaf Room

8:50 AM Opening Remarks

Maple Leaf Room

Dr. Sunil Rajput, Director of Research, Alberta Innovates

9:00 AM Panel 3: How to Navigate Becoming a Successful Research Entrepreneur

Maple Leaf Room

A lively and candid discussion about the panelists' experiences and journey in advancing research into a viable business opportunity.

- **Dr. Kristina Rinker**, Founder & CSO of Syantra Inc. and Professor at the University of Calgary
- **Kelly Mottet**, COO of Mach32 and Director of QA & Regulatory Affairs at Innovative Trauma Care
- **Mark Starratt**, Founding and Managing Partner of KASTx Ventures

Moderated by: **Bindi Ferguson, Director of Commercialization (Health Innovation), Alberta Innovates**

9:45 AM Networking Break

10:15 AM Scientific Session 3: Diagnostics

Maple Leaf Room

Automated remote image-guided diagnosis of carotid disease for stroke prevention

Dr. Aravind Ganesh, University of Calgary

Stroke is the second leading cause of death and disability worldwide. Around 690,000 adults experience an ischemic stroke and 240,000 experience a transient ischemic attack(TIA) each year in the United States alone. Around 1 in 5 events are caused by disease in the internal carotid artery, most often due to cholesterol-laden plaque but also due to other conditions like dissection and webs. Early, accurate detection and management of carotid disease is essential to reduce the high up-front risk of recurrent strokes in these patients, particularly since the effectiveness of preventative treatment erodes with delays of just a few days. Urgent head-and-neck vascular imaging, most commonly with computed tomography angiography (CTA), is now the standard-of-care for acute stroke patients. Expert neuro-radiologists can detect carotid disease from these scans. However, interpretation of CTA scans is challenging for frontline generalist physicians and even for general radiologists, with routine reports at best assessing only critical vessel stenosis but often missing other equally important pathologies. Rapid, accurate diagnosis and characterization of carotid disease is a key gap in healthcare delivery and an opportunity to prevent disabling strokes. The time is ripe for a novel approach that integrates Machine Learning-based algorithms to detect carotid pathologies on CTA imaging. We are using a comprehensively characterized imaging dataset to develop an image-guided software platform solution capable of automatically and rapidly detecting patients with potentially symptomatic carotid disease. Thereby, we can identify high-risk patients who merit urgent admission to stroke centres for further monitoring, workup, or revascularization. This solution addresses an unmet clinical and commercial need in stroke imaging technology and will help strengthen Alberta's position as a leader in the diagnosis and prevention of stroke.

The road to commercialization - a novel diagnostic for Myasthenia gravis

Dr. Richard Fahlman, University of Alberta

Challenges in the diagnosis of Myasthenia Gravis result from the nonspecific symptoms of the disease and the limited sensitivity of the currently utilized blood test. Delays in diagnosis can often lead to multi-year delays in patients receiving appropriate treatment for this autoimmune disease. These delays in diagnosis and treatment result in unnecessary impacts to patients and additional costs to health care systems.

To circumvent these potentially extensive delays in diagnosis, we report on our discovery of a novel blood protein biomarker identified by the computational analysis of proteomic data. Additionally, our current progress on the path of development and commercialization of a novel blood test for Myasthenia Gravis will be presented. With our final objective being to deliver a simple “paper” based blood test that can be used in any clinical setting.

BiomeBLOOM – Digital bedside technology to detect healthy microbiome maturation in premature infants

Dr. Julie Groizeleau, University of Calgary

Prematurity is the leading cause of infant mortality worldwide. Approximately one million babies die from the consequences of prematurity across the globe every year. Premature infants are at a higher risk of developing acute and chronic life-threatening conditions, which impose a strenuous socioeconomic burden on individuals, families, and healthcare systems. Notably, in Canada, 30 000 babies are born too early (1 in 10), costing an estimated 8 billion for the healthcare system.

One crucial factor influencing infant health development is the collection of microbes that inhabit their intestines, known as the gut microbiome. We have observed that infants born prematurely have an underdeveloped, immature gut microbiome that can increase the risk of life-threatening conditions. While microbial therapies can safely restore microbiome maturation in preterm infants and decrease the risk of developing critical health conditions, the lack of clinical methods to promptly diagnose microbiome maturation prevents the development of personalized therapies.

By developing BiomeBLOOM, an actionable digital point-of-care device that can timely monitor microbiome maturation in preterm infants, we aim to unlock controlled, personalized microbiome therapies to improve health outcomes and reduce healthcare expenditures in this vulnerable pediatric population, thereby reducing the burden of prematurity.

Ultra-sensitive quantum imaging for biomedical applications

Dr. Shabir Barzanjeh, University of Calgary

In close relation with accurate diagnosis and treatment, we aim to develop high-resolution non-invasive quantum sensors and to implement the proof-of-concept of a quantum scanner for biomedical imaging/sensing and clinical applications. The planned research-development stages will include detailed experimental investigations, validation, building prototype systems, and ultimately commercialization of ultrasensitive quantum sensors for better understanding and diagnosis of diseases and identifying more targeted therapeutic strategies. Our approach relies on exposing biological samples to very weak optical light in which instead of probing a biological sample with intense radiation, one could retrieve the same or even better visibilities by using a small number of quantum-correlated photons. This fundamental distinction will lead to next-generation non-invasive quantum technologies for applications involving fragile and photodegradable materials.

11:45 AM Lunch & Industry Tradeshow

Lunch - Maple Leaf Room

Industry Tradeshow - Aurora & Prairie Rooms

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Participants:

1:15 PM Scientific Session 4: Therapeutics

Maple Leaf Room

Accelerating the development of phage-based platforms for the modulation of the gut microbiome

Dr. Dominic Sauvageau, University of Alberta

As our understanding of the role played by the gut microbiome in many diseases and conditions – from Crohn's disease and ulcerative colitis to diabetes and asthma – grows, a number of strategies are being developed to modulate its composition towards healthy conditions. However, the control and stabilization of healthy microbiomes proves challenging and there is clear need for platform technologies that can rapidly be adapted to patients and diseases.

One strategy to modulate the gut microbiome is through the use of viruses of bacteria called bacteriophages (phages). The specificity of phages towards a given bacterium means they can be used to target pathogenic strains without impeding on beneficial ones, a clear advantage over many other approaches. Our project thus aims to leverage the potential of phages to develop a platform for accelerated phage-based gut microbiome modulation products. To do so, we adopt a full product life-cycle approach, in which all aspects of the technology – including the design of methods and elements for genetic modifications to improve phage properties, the development of smart delivery systems, and the control of host-phage population dynamics in complex cultures – are considered in product development. These activities are catalyzed by digital tools for comparative genomics and population models, among others.

The work serves as a proof-of-concept towards a novel approach to tackle microbiome-associated diseases, accelerate product development and pave a way to personalized microbiome therapeutics.

A new therapeutic strategy for chronic pain

Dr. Gerald Zamponi, University of Calgary

Chronic pain can be a debilitating condition for which there are currently insufficient treatment options and which affects more than 20 percent of the adult population. During chronic pain states, there are persistent changes in peripheral and central nervous system neuronal circuits that process pain related information. This includes an aberrant upregulation in the expression of Cav3.2 T-type calcium channels in sensory neurons. This in turn leads to enhanced neuronal activity and communication with neurons in the dorsal horn of the spinal cord that send signals to the brain, where pain is perceived as an unpleasant sensation. Our laboratory has

discovered a new mechanism by which Cav3.2 channel expression is enhanced following nerve injury or peripheral inflammation. We showed that that these insults trigger an increased expression of the deubiquitinase USP5 which associates with Cav3.2 channels and prevents their normal degradation. The end result of this process is an accumulation of Cav3.2 channels, and thus a persistent pain state. We have used this information to develop a new therapeutic approach for inflammatory and neuropathic pain by targeting the interaction between USP5 and Cav3.2 pharmacologically. We identified a series of novel series of small organic molecules that disrupt the USP5/Cav3.2 complex, and demonstrated that this leads to analgesia in various mouse models of chronic pain. This technology lies at the heart of our spinoff company Zymedyne Therapeutics.

2:00 PM Networking Break

2:15 PM Panel 4: Leveraging Digital Health to Enable New Care Models in Alberta

Maple Leaf Room

The *Partnership for Research and Innovation in the Health System (PRIHS)* is a collaboration between Alberta Innovates and Alberta Health Services, developed out of a shared commitment to develop research and innovation activities that contribute to health system sustainability in Alberta. Our panel of three diverse *PRIHS Digital Health* Grant awardees are leveraging promising digital health solutions to overcome care gaps in Alberta's health system to improve health care quality, health outcomes, and overall value for those living in Alberta.

- **Dr. Maria Castro Codesa**l, Pediatric Respirologist, Assistant professor, University of Alberta
- **Dr. Justin Chen**, Division of Infectious Diseases, Department of Medicine, Associate Clinical Professor, University of Alberta
- **Dr. Karen Wong,** Associate Clinical Professor, Departments of Medicine and Gastroenterology, University of Alberta

Moderated by: **Dr. Antonio Bruni, Director of Health System Transformation (Health Innovation), Alberta Innovates**

3:00 PM Closing Remarks

Maple Leaf Room

Dr. Sunil Rajput, Director of Research, Alberta Innovates

Speaker Biographies

Aravind Ganesh, M.D. DPhil FRCPC

Aravind Ganesh is a Vascular and Cognitive Neurologist. He completed his MD at the University of Calgary, followed by a DPhil in Clinical Neurosciences at the University of Oxford's Centre for Prevention of Stroke and Dementia as a Rhodes scholar. He completed his neurology residency in Calgary, followed by a combined fellowship in stroke and cognitive neurology, funded by Alberta Innovates and the Canadian Institutes of Health Research. He is a Fellow of the Canadian Stroke Consortium, and is actively involved in the development of best-practice guidelines for stroke and dementia care. His clinical research is focused on the imaging, natural history, prevention, and treatment of stroke and cognitive impairment. He has received New Investigator Awards from the Heart and Stroke Foundation of Canada and the Alzheimer Society of Canada, as well as the Henry J. M. Barnett Scholarship for outstanding contributions as a new researcher in the field of stroke.

Cathy Lu, M.D.

Dr. Cathy Lu is a gastroenterologist and Clinical Assistant Professor at the Cumming School of Medicine at the University of Calgary. She has completed a joint advanced IBD fellowship at the University of Alberta with specialization in intestinal ultrasound at the University of Calgary. She is an executive committee board member of the STAR (Stenosis, Therapy, and Anti-Fibrotic Research) Consortium and leads the development of the ultrasound index for Crohn's disease strictures. She has also served as a member of the scientific committee for IBUS (the International Bowel Ultrasound Organization), the Canadian Association of Gastroenterology, and a member at large for CIRC (Canadian IBD Research Consortium). In 2022, Dr. Lu received the Crohn's and Colitis Canada Women in IBD Emerging Research Award. Her primary research interests are in fibrostenotic Crohn's disease, intestinal ultrasound, and translational research with scientists identifying biomarkers in diagnosis, monitoring, and treatment response in IBD.

Dean F. Sittig, Ph.D.

DeanF. Sittig is a Professor in the School of Biomedical Informatics at the University of Texas Health Science Center in Houston, TX. He received his PhD in Medical Informatics from the University of Utah. His research interests center on design, development, implementation, and evaluation of all aspects of clinical information and communication systems with a special emphasis on electronic health records and clinical decision support. He has spent his career working to improve our understanding of both the factors that lead to success, as well as, the

unintended consequences associated with various forms of health information technology. He has spent considerable time studying various aspects of computer-based provider order entry with clinical decision support including factors that lead to success as well as the unintended consequences of their use. Most recently he has focused his efforts on developing guidelines for the safe and effective implementation and use of electronic health records (EHRs) that are based on an 8-dimension socio-technical model that he developed with Hardeep Singh. This work led to the development of the SAFER guides that were designed to help healthcare organizations conduct pro-active risk assessments of their EHRs. He recently co-authored the following books, “Improving Outcomes with Clinical Decision Support: An Implementer's Guide, Second Edition”, “Clinical Information Systems: Overcoming Adverse Consequences”, “SAFER Electronic Health Records: Safety Assurance Factors for EHR Resilience”, and most recently “Clinical Informatics Literacy: 5000 Concepts That Every Informatician Should Know”. For a listing of most of Dean F. Sittig’s peer-reviewed scientific articles see: https://www.ncbi.nlm.nih.gov/myncbi/1LEad2guGRFAa/bibliography/public/.

Desmond Pink, Ph.D.

As the CSO of Nanostics Inc., I lead the science team in the preclinical and clinical development of novel biomarkers for urological cancer screening and diagnosis, as well as translational activities to develop innovative technologies to improve patient outcomes. For much of the last decade, I developed high-resolution flow cytometry (and orthogonal instrumentation) protocols for translating the analysis of small particles from patient samples toward clinical applications. Specifically, we analyze extracellular vesicles and viruses from complex biofluids such as blood and urine. At Nanostics, we aim to blend the regulatory and quality requirements into the R&D process to expedite innovation toward commercial application.

Dominic Sauvageau, Ph.D., P.Eng.

Dr. Sauvageau is an Associate Professor in the Department of Chemical and Materials Engineering at the University of Alberta. He obtained his BEng, MEng, and PhD in Chemical Engineering at McGill University. His PhD work focused on host-phage interaction and the development of advanced bioprocessing strategies for phage production. Following his PhD, he studied the toxicity and steroidogenesis of diester plasticizers and their metabolites in human cell lines. In 2008, he joined Laborium Biopharma, a biopharma start-up company, as an Upstream Process Lead. He joined the University of Alberta in 2011 as an Assistant Professor before being promoted to Associate Professor in 2017. In 2018-2019, he was an Honorary Visiting Academic Fellow at the University of Leicester, UK. He is co-founder and CTO of Zilia, a Med-tech company combining imaging, spectroscopy and artificial intelligence for the non-invasive assessment of biomarkers in the human eye. He is Engineering Biology lead at the

Bioconversion Databank Foundation. He is also on the scientific advisory board of companies involved in health, synthetic biology and energy. He is the recipient of Early Career Researcher and Discovery Grant Accelerator Awards from the Natural Sciences and Engineering Research Council of Canada (NSERC). He received the Provost's Award for Early Achievement of Excellence in Undergraduate Teaching and the Faculty of Engineering Undergraduate Teaching Award at the University of Alberta.

Jeff Bakal, Ph.D., P.Stat

Jeff Bakal PhD, P.Stat. is the Program Director for Provincial Research Data Services at Alberta Health Services which operates the Alberta Strategy for Patient Oriented Research (SPOR) data platform. He has over 20 years of experience working with Health Services data and Randomized Clinical Trials. His current interests are in developing statistical methodology for time-to-event data and the development of classification tools to assist in patient decision making processes.

Joon Lee, Ph.D.

Dr. Joon Lee is the Director of the Data Intelligence for Health Lab and an Associate Professor of Health Data Science in the Departments of Cardiac Sciences and Community Health Sciences, Cumming School of Medicine, University of Calgary. He holds a PhD in Biomedical Engineering from the University of Toronto and a BASc in Electrical Engineering from the University of Waterloo. He also completed a Postdoctoral Fellowship in Medical Data Science at MIT. His research applies data science, machine learning, and artificial intelligence to a variety of problems in medicine and public health including intensive care, cardiology, public health surveillance, and food marketing.

Roger A Dixon, Ph.D.

Dr. Roger A Dixon is a Professor in the Department of Psychology (Faculty of Science) and the Neuroscience and Mental Health Institute at the University of Alberta. He works extensively with big, multimodal, and dynamic (longitudinal) health data pertaining to brain/cognitive aging and neurodegenerative diseases. Recently explored data sets include (1) Canadian Consortium on Neurodegeneration in Aging (CCNA), (2) Victoria Longitudinal Study (Alberta, BC), (3) Alzheimer's Disease Neuroimaging Initiative (USA), (4) PATH Through Life (Australia), (5) BioCog Parkinson's Study (Alberta) and others. In CCNA, he serves on the Research Executive Committee and is Co-Lead (with MN Rajah, McGill) of the Biomarkers in Aging and

Neurodegenerative Disease national research team and its Neuroinformatics Network. A central team aim is to develop and apply a variety of data-driven analytics related to artificial intelligence (eg., machine learning, latent class growth models) to address heterogeneity and promote precision in brain health and dementia. Recognitions include: (1) Canada Research Chair (Tier 1), (2) USA National Institutes of Health MERIT Award (two terms), (3) Research Scientist (Tenured), Max Planck Institute (Berlin), (4) Baltes Award, Outstanding Career Research in Aging (American Psychological Association), and (5) Visiting positions (eg., Karolinska Institutet, Stockholm).

Scott Kraft, M.D.

Dr. Scott Kraft is the Founder and Director of SPARK Alberta, which aims to bring Alberta academic institution Digital Health innovations into clinical practice. Dr. Kraft received his MD at the University of Saskatchewan and completed his neurology training at Memorial University of Newfoundland where he also received a Master of Sciences in Clinical Epidemiology. His career has focused on the design and implementation of digital tools to enhance clinical outcomes and clinician efficiency. His clinical practice concentrates on Parkinson's disease and other Movement Disorders.

Gerald W Zamponi, Ph.D.

Dr. Gerald Zamponi received his undergraduate training in Engineering Physics from the Johannes Kepler University, followed by a PhD in Neuroscience at the University of Calgary and postdoctoral work at the University of British Columbia. He is currently a Professor and Senior Associate Dean for Research in the Cumming School of Medicine at the University of Calgary. His research addresses how ion channels and receptors contribute to neurological disorders such as chronic pain, and deciphers the brain circuits that process pain signals. The translational impact of his research is evident from his co-founding of NeuroMed Pharmaceuticals and Zymedyne Therapeutics. He has published over 350 articles, has given more than 280 invited lectures. He was an AIHS Scientist and CIHR Investigator, and is currently a Canada Research Chair. He is an elected Fellow of the Royal Society of Canada, the Canadian Academy of Health Sciences, and the National Academy of Inventors (USA).

Jane Desrochers, Ph.D.

Jane Desrochers is a Sr. Innovation Manager at Innovate Calgary's Life Sciences Innovation Hub. Jane supports and connects innovators and innovation-driven startups with all the phenomenal

resources that the #abtech ecosystem has to offer. She has a PhD in biomedical engineering and 15+ years of experience in designing and delivering innovation education, which she leans on to create and execute programs that mitigate risk for innovators and emerging startups so they can avoid catastrophic failures and learn, pivot and grow quickly. Jane is fortunate to work at the intersection of industry and academia to support the best and brightest innovators to translate cool tech into real solutions for compelling problems. Away from the office, you'll likely find her out in the wild, hiking or biking with family and friends.

Julie Groizeleau, Ph.D.

Dr. Groizeleau is a Research Associate and project coordinator at the University of Calgary. She works in Dr. Marie-Claire Arrieta's laboratory, whose research program involves studying children's clinical samples to understand the role of microbes in various diseases and develop solutions such as BiomeBLOOM. Dr. Groizeleau holds an MSc in Immunology, Microbiology, and Infectious Diseases from the Pasteur Institute - Université de Paris, and a PhD in Microbiology and Infectiology from the University of Copenhagen, where she studied bacterial biofilms of cystic fibrosis. She joined the University of Calgary in 2017 as a postdoctoral fellow and later worked as the coordinator for IMPACTT, the Pan-Canadian Microbiome Research Core before joining Dr. Arrieta's team in late 2021. Dr. Groizeleau combines her expertise in microbiology, project coordination and management to brings clinical research discoveries to the real-world and improve the health of people.

Justin Chen, M.D.

Dr. Chen received his MD degree at the University of British Columbia, followed by training in Internal Medicine and Adult Infectious Diseases at the University of Alberta. He is an associate clinical professor and has been on staff as an infectious diseases consultant at the University of Alberta Hospital since 2017. In 2018, Dr. Chen established the University of Alberta Hospital, Mazankowski Alberta Heart Institute, and Kaye Edmonton Clinic Antimicrobial Stewardship Program as the Site Medical Director. Since then, he and his team have led numerous quality improvement and educational initiatives to improve and optimize antimicrobial prescribing and management of infectious diseases at their site.

Karen Wong, M.D.

Karen Wong is a gastroenterologist with specialty training in Inflammatory Bowel Disease. She completed her gastroenterology fellowship in London, Ontario before returning to University of

Alberta for IBD fellowship and joined the Division of Gastroenterology in 2012. She completed intestinal ultrasound training in Calgary and Luneburg, Germany. Her areas of clinical and research interest include IBD, digital health in medicine, intestinal ultrasound and fecal transplantation. She has been the provincial physician trainer for Lumens since the introduction of Connect Care. She is an examiner for the Royal College of Physicians and Surgeons in Gastroenterology.

Kelly Mottet, M.Sc

Kelly Mottet is a medical device start-up aficionado, who is passionate to bring life to new products. Kelly has a positive attitude, and always finds a way to get things done! She excels in fast-paced environments, leading the team with agility in challenging environments. MACH32 is the third medical device start-up for Kelly, with previous success in North American and European markets, and it shows. Kelly makes sound decisions and inspires the team to perform at a high level to meet her vision of success.

Kristina Rinker, Ph.D.

Kristina is a professor in the departments of biomedical engineering and physiology and pharmacology at the University of Calgary. She is also Co-Founder and Chief Scientific Officer of Syantra, a precision health biotechnology company with a new diagnostic blood test platform that has a detection test for breast cancer available across Canada. She's also a member in the Charbonneau Cancer Institute, former lead of the Early Cancer Detection Initiative, a Parex Innovation Fellow and a Lab Scientist with Creative Destruction Labs-Rockies. She received her PhD from North Carolina State University with postdoctoral work at Duke University in Biomedical Engineering.

Lawrence Le, Ph.D., MBA

Lawrence H. Le received his PhD in Earth Physics and MBA in Finance and Technology Commercialization from the University of Alberta, Edmonton, AB, Canada. He held a Natural Sciences and Engineering Research Council of Canada (NSERC) postdoctoral fellowship at the Schlumberger-Doll Research Laboratory, Ridgefield, CT, USA. Dr. Le is a Clinical Professor leading the graduate program in the Department of Radiology and Diagnostic Imaging and a senior Medical Physicist with Alberta Health Services, Edmonton, AB. He is also a senior Visiting Scholar with the Center for Biomedical Engineering, Fudan University, Shanghai, China.

Maria Castro-Codesal, Ph.D., M.D.

Dr. Maria Castro is an Associate Professor in the Division of Respiratory Medicine, Department of Pediatrics at the University of Alberta. She completed her clinical fellowship in Pediatric Respiratory and Sleep Medicine in 2014-2015 at the University of Alberta followed by her PhD studies in 2019 with a thesis looking at trends and outcomes of children requiring home non-invasive ventilation. Since, Dr Castro has grown her interest in translational research to implement best evidence-based practice to the complex care of children with chronic breathing problems requiring ongoing breathing support. Further, Dr Castro and her team are working on the implementation of available digital health solutions and changes in practice that facilitate the transition of care for these children from the medical system to their homes and communities. Currently, Dr. Maria Castro is the team lead for the Stollery Pediatric Home Ventilation Program and principal investigator for a PRIHS7 grant aiming to develop a provincial evidence-based care pathway for children requiring tracheostomy.

Mark Starratt ICD.D, FEA, BComm

During his 25 years in the wealth management industry, Mark held a number of leadership roles within major financial firms. For over 12 years, he served as Director, Wealth Management, and Portfolio Manager with Richardson GMP Ltd. and was First Vice President with a major bank-owned brokerage firm for more than a decade. Since retiring in 2018, Mark was the lead of a single-family office based in Alberta for two years while also building a new company in the health innovation ecosystem. Combining his passion for supporting scientific innovation with his years in the financial industry, Mark co-founded KASTx Ventures, a Calgary-based venture capital firm working with world-leading biotechnology start-ups. He currently serves as the company's Founding and Managing Partner, which recently celebrated its third birthday and has since grown its team to include over 16 members. Mark is also on the Dean's Advisory Board at the Cumming School of Medicine and on the Investment Committee of the University of Alberta's newly launched Innovation Fund. Mark was a Director of the Paralympic Foundation of Canada for over four years, and, in April 2013, he and his wife Jennifer formed The Starratt Family Foundation to advance neuromuscular disease education and research and help improve accessibility for those with disabilities. Mark is also a passionate Rotarian and became one of the youngest District Governors in the Rotary world in 2008, representing Southern Alberta and Western Saskatchewan. In 2025, he will serve as the co-chair of the Host Organizing Committee for the Rotary International Convention.

Martin Ferguson-Pell, Ph.D.

Dr. Martin Ferguson-Pell completed a BSc in physics (1973) at Exeter University in the UK and then a Ph.D. in biomedical engineering at the University of Strathclyde (1977). He has held academic appointments in Glasgow, New York and London UK. In 2007 he was appointed Dean of the Faculty of Rehabilitation Medicine at the University of Alberta. He designed and developed the Rehabilitation Robotics Laboratory which opened in 2012. His team has established a sophisticated extended reality (XR) development program that is advancing the integration of AI into XR simulations. He founded ELIXR in 2019 to take on the challenge of ensuring that XR is used effectively in training and education where complex simulations and 3D constructs represent particular challenges for learners.

Richard Fahlman, Ph.D.

Dr. Fahlman is a biochemistat the University of Alberta whom specializes in the application of advanced proteomic techniques to both clinical and fundamental biological investigations. Education: B.S. Simon Fraser University Ph.D. Simon Fraser University (2001) Postdoctoral: NorthWestern University (USA) (2001-2004) UBC (2004-2006) Current Positions: Professor Department of Biochemistry, University Alberta Chief Executive Officer (CEO): Decipher Medtech (Edmonton, AB) Chief Scientific Officer (CSO): E3 Therapeutics (Edmonton, AB)

Shabir Barzanjeh, Ph.D.

My research goals are directed toward both experimental and theoretical studying of quantum imaging and sensing for biomedical applications. With a strong background in the field of superconducting circuit QED obtained RWTH Aachen, I received Marie Skłodowska Curie fellowship to work as a postdoctoral fellow at the Institute of Science and Technology Austria to experimentally develop quantum sensors. I was one of the first to develop the notion of quantum radar (sensor) and proposed the prototype microwave quantum illumination (sensor).

Yunyan Zhang, Ph.D., M.D.

Zhang has a MD from China specializing in neuroradiology and PhD in Biomedical Engineering devoted to imaging informatics from the University of Calgary. She has done both postdoctoral and clinical fellowships at UBC and UCalgary respectively, along with funding from the Multiple Sclerosis Society of Canada (MS Canada) and industry. The main focus of Zhang's research is on development and evaluation of novel neuroimaging and computational methods to promote precision medicine, including machine learning/deep learning techniques. One major goal is to improve brain and mental health, as seen in those with inflammatory demyelinating and neurodegenerative disorders. Research in Zhang lab is currently funded by several agencies including NSERC, CIHR, MS Canada, and Alberta Innovates.