DEPARTMENT OF MEDICAL IMAGING

ANNUAL REPORT 2018-2019

UNIVERSITY OF SASKATCHEWAN
College of Medicine
DEPARTMENT OF MEDICAL IMAGING
MEDICINE.USASK.CA

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COLLEGE OF MEDICINE
MIYO-MASKIHKÍY

VISION

We are leaders in improving the health and well-being of the people of Saskatchewan and the world.

MISSION

As a socially accountable organization, we improve health through innovative and interdisciplinary research and education, leadership, community engagement, and the development of culturally competent, skilled clinicians and scientists. Collaborative and mutually beneficial partnerships with Indigenous peoples and communities are central to our mission.

VALUES AND PRINCIPLES

The College of Medicine community is committed to acting in accordance with the following values:

- collegiality;
- fairness and equitable treatment;
- inclusiveness;
- integrity, honesty and ethical behaviour; and
- respect.

The College of Medicine believes in the following principles:

- academic freedom;
- collaboration;
- commitment to community;
- different ways of knowing, learning and being;
- diversity, equality and human dignity;
- excellence;
- a healthy work and learning environment;
- innovation, curiosity and creativity;
- openness, transparency and accountability;
- reconciliation; and
- sustainability.

FIVE-YEAR STRATEGIC PLAN (2017-2022)
STRATEGIC DIRECTIONS

STRENGTHEN RESEARCH CAPACITY

Leverage expertise and opportunities while performing research across the breadth of biomedical sciences, clinical medicine, health systems, and health of populations to create an environment where research can excel.

EDUCATION

Enhance quality and methods of teaching, learning and scholarship. Focus education and training to develop clinicians that excel at meeting the needs of the province, are culturally competent, and are imparted with leadership ability to drive health system transformation.

SOCIAL ACCOUNTABILITY AND COMMUNITY ENGAGEMENT

Address the priority health concerns of the communities the college is mandated to serve, incorporating authentic community engagement and mutually beneficial partnerships. Focus on equity and community engagement by interweaving social accountability throughout the college's operations.

INDIGENOUS HEALTH

Respond to the Calls to Action in the Truth and Reconciliation Report and work in a mutually beneficial and collaborative manner with the Indigenous peoples of Saskatchewan to define and address the present and emerging health needs in Indigenous communities.

EMPOWER AND ENGAGE FACULTY

Focus on support, development and engagement of all faculty members to foster mutually beneficial relationships and empower faculty members as role models for future clinicians and scientists.

DISTRIBUTED MEDICAL EDUCATION

Foster a province wide college.

Implement a sustainable, well-resourced framework that will result in quality community partnerships, successful and comparable students across all sites, elevated community health, and better graduate retention in communities.

INTEGRATION AND ALIGNMENT WITH THE HEALTH SYSTEM

Focus on aligning our strategic and operational plans with Saskatchewan health system strategies andplans to enhance integration between the clinical environment and the college.

SCHOOL OF REHABILITATION SCIENCE

Establish and implement the School of Rehabilitation Science.

ENABLERS

People, partnerships and relationships, and organizational capacity are instrumental to advancing the College of Medicine strategic plan.

SASKATCHEWAN HEALTH AUTHORITY

VISION

Healthy People, Healthy Saskatchewan

MISSION

We work together to improve health and well-being. Every day. For everyone.

VALUES

- **SAFETY:** ***Be aware.*** Commit to physical, psychological, social, cultural and environmental safety. Every day. For everyone.
- **ACCOUNTABILITY:** ***Be responsible.*** Own each action and decision. Be transparent and have courage to speak up.
- **RESPECT:** ***Be kind.*** Honour diversity with dignity and empathy. Value each person as an individual.
- **COLLABORATION:** ***Be better together.*** Include and acknowledge the contributions of employees, physicians, patients, families and partners.
- **COMPASSION:** ***Be caring.*** Practice empathy. Listen actively to understand each other's experiences.

PHILOSOPHY OF CARE: Our commitment to a philosophy of Patient and Family Centred Care is at the heart of everything we do and is the foundation for our values. This philosophy of care is in essence our culture – who we are, the shared purpose that brings us all together and how our patients and families experience care every day. Through meaningful engagement and co-creating mutually beneficial partnerships among employees, physicians, patients, families, clients and residents, together we ensure a seamless health system that supports *Healthy People, Healthy Saskatchewan.*

Saskatchewan Health Authority

Saskatchewan Health Authority

HEALTH SYSTEM STRATEGIC PLAN (2019-2020)

Better Health | Better Care | Better Value | Better Teams

GOALS:

Goal 1: Connected care for the people of Saskatchewan

Establish collaborative teams of health professionals, including physicians, and community partners to provide fully integrated services to meet the health needs of individuals and communities, reducing reliance on emergency and acute care services.

STRATEGIES

- Improve team based care in the community
- Improve access to mental health and addiction services
- Enhance team based care in the hospital and ensure seamless patient care at all points in the health system

Goal 2: Deliver safe and high quality health care

Create a health system culture that promotes patient and staff safety.

STRATEGIES

- Enhance the culture of safety and continuous improvement
- Strengthen appropriateness of care
- Improve cultural responsiveness in the health care system

Goal 3: Establish physicians as leaders in the health care system

Physician knowledge and experience is essential to improve the design of health care services, and to promote shared accountability for health system performance.

STRATEGIES

- Enhance physicians' role in the management and governance of the health system

Goal 4: Improve system-wide coordination and alignment of services

Integrated business systems and standardized processes will enhance effectiveness and ensure Saskatchewan residents experience high quality care across the province.

STRATEGIES

- Integrate business systems and delivery of health services

VISION: Healthy People, Healthy Saskatchewan

MISSION: We work together to improve health and well-being. Every day. For everyone.

VALUES: We value safety, accountability, respect, collaboration and compassion.

PHILOSOPHY OF CARE: Our commitment to a philosophy of Patient and Family Centred Care is at the heart of everything we do and provides the foundation for our values.


SIEMENS

PROVINCIAL HEAD 2018/19 SUMMARY REPORTING

July 2018 to June 2019

It has been my pleasure to serve as the Interim Provincial Head for this past year. We made significant strides in the creation of the administrative framework of the provincial department; the creation of the Executive Committee and network to inform and make decisions. The appointment of the directors and Area Leads; Terms of Reference for the Executive Committee; creating more defined processes and direction aligned with the Saskatchewan Health Authority and the College of Medicine.

We are in the development of a strategic plan, through the departmental Executive Committee that will have provincial coordination and oversight while allowing and supporting local high quality care and engagement. Using common principles to build this program, such as transparent leadership, administrative accountability and stability, we want to promote a culture of ongoing education and learning with quality improvement in a cultural safe environment.

There have been an incredible number of changes locally and potential threats provincially and nationally to our profession the last few years that have left our radiologists, technologists, administrators and staff in an emotionally unsettled state with many people experiencing and demonstrating features of "burn – out" and change fatigue. This leads to cultural and collegial disengagement and negatively affects our ability to deliver the best care to our patients. We see this issue as a departmental priority to stabilize and create the environment to reengage our faculty, staff, technologists and employees and participate in the development of our provincial department.
Another related priority is to promote a culture of value in the clinical context. To foster and reward interdisciplinary interactions around patient care and academic initiatives; medical decision support and professional behavior reflecting that a patient is at the centre of our business actively providing essential support to the medical decisions through imaging interpretation.

At the end of this academic year we also underwent another departmental review which will cover the last year and a half since the creation of the SHA and our Provincial Department. We look forward to the guidance and recommendations that report will offer. This past year has been a good start, but more work needs to be done and I invite all the members of the department to participate in the building of the future of Medical Imaging in the Province.

Provincial Head:
Sheldon Wiebe

Executive Assistant, Finance & Departmental Admin:
Kristin Atkinson

Saskatoon Provincial Director:
Shane Timm

Administrative Assistant:
Sheri Sheetka

Provincial Support Director:
Richard Dagenais

Administrative Assistant:
Sheri Sheetka

Saskatoon Area Chief of Staff:
Eileen Dahl
John Froh

Grant Stoneham

- Royal College of Physicians and Surgeons of Canada
  - Member and Vice-Chair of Specialty Committee for Diagnostic Radiology
  - Member of Sub-specialty Committee and Inaugural Chair of Exam Board for Interventional Radiology
  - Member of Assessment Committee
- College of Physicians and Surgeons of Saskatchewan (CPSS)
  - Vice-President of Council

Administrative Assistant:
Teri Wiwchar

Saskatoon Area Lead(s):
Kyle Moulton
Nicolette Sinclair

Saskatoon Managers
Darin Humphreys, RUH
Christine Dawson, RUH PET/CT, NucMed & BMD
Marla Komaransky, SPH
Brenda Lock, SCH

Saskatoon Supervisors
Royal University Hospital (RUH)
St. Paul's Hospital (SPH)
Saskatoon City Hospital (SCH)

Cathy Bailey, Office Coordinator (SPH)
Jo-Anne Couture, General X-Ray (SCH)
Janis Dodds, Quality & Safety (SCH)
Dana Gilchrist, General X-Ray & IR (SPH)
Brian Heck, Vascular (RUH)
Melanie Hilkewich, CT (SPH)
Lauren James, PACS Administrator (RUH)
Maureen Kral, Ultrasound (SCH)
Scott Mildenberger, PET/CT
Ryan Ostrowski, Technician (RUH)
Melissa Ostrowski, Informatics (SCH)
Darrel Schneider, CT (SCH)
Suzanne Simonot, Ultrasound (RUH, SPH)
Lori Toews, CT (RUH)
Doug Wenzel, MRI (RUH, SPH, SCH)

Executive Director:
Bryan Witt

Administrative Assistant:
Nicole Harris

Vice President Provincial Programs:
Corey Miller

Executive Assistant:
Coralee Prodehl

Physician Executive:
Paul Babyn

Administrative Assistant:
Lisa Vass

Postgraduate Medical Education Admin Support
Prachi Bandivadekar
Patricia Young

University Medical Imaging Consultants (UMIC)
Cliff Bell
Brent Burbridge
Leslie Chatterson
Hamid Dabirzadeh
Anita Dhir
Tasha Ellchuk
Derek Fladeland
Josh Gitlin
Geoff Karjala
David Leswick
Kyle Moulton
Haron Obaid
Sacha Oomah
Rob Otani
Farid Rashidi
Carl Rodgriguez
Michael Shepel
Grant Stoneham
Peter Szkup
Tina Theoret
Ian Waddell
Sheldon Wiebe

Research & Adjunct Faculty
Curtis Caldwell
Humphrey Fonge
Edward Haacke
Albert Hanson
Robert Lewis
Steven Machtaler
Andre Obenaus
Arash Panahifar
Ekta Walia
Michal Wesolowski

Associated Radiologists (AR)
Aatif Parvez
Adarsh Patel
Anne Kenny
Carolyn Flegg
Chris Wall
Chris White
Cory Tremeer
David Horne
Don McIntosh, Chair ACMI / SCH MI Head
Andrew Scott
Ivan Norval, SPH MI Head
Geoffrey Marshall
Heather Gordon
Jeff Bird
Maxine Beck
Nicolette Sinclair
Preman Jacob
Todd Ross
Tom Waslen
Tyson Mack

Division of Nuclear Medicine
Abdulaziz Almgrahi, Director PET/CT Program
Sundeep Nijjar, Division Head
Rajan Rakheja

North

Provincial Director:
Maria McLaren

Northwest Area Chief of Staff:
Melissa McGee
Lyle Williams

Northeast Area Chief of Staff:
Jordan Wingate
Randall Friesen

North West Area Lead:
Position Vacant

North-East Area Lead:
Meng Lim

Managers:
Yun Lai, Transition Lead – Prince Albert
Corinne Delparte, Prince Albert
Colais Fransoo, Prince Albert
Candace McPhee, Lloydminster
Dwayne Friesen, Melfort

Supervisors:
Dorla Watt, La Ronge
Cathy Chabot, Nipawin
Penny Burroughs, Meadow Lake
Barb McGillis, Maidstone
Ashley Conacher, Turtleford
Cingy Reigert, Ile a La Crosse

Radiologists (Prince Albert)
Meng Lim
Cesar Chavarria
Tiffany Buglass

Rural

Provincial Director:
Patti Shirkey

Southwest Area Chief of Staff:
Hein de Klerk
Ivo Radevski
Peter John Vertue

Southeast Area Chief of Staff:
Mofolashadé Onaolapo
Ajibola Ogunbiyi

South-West Area Lead (Moose Jaw):
Greg Kraushaar

South-East Area Lead (Yorkton):
Paul Russell

Managers:
Karen Ochitwa, Transition Lead - Weyburn
Tamye Miller, Moose Jaw
Donna Wotherspoon
Karen Chopuik, Yorkton
Cheryl Bear, Kamsack

Supervisors:
Wanda Lizee, Gravelbourg
Alex Shirley, Moose Jaw
Sandy Hodgins, Kindersley
Phyllis Shewchuk, Yorkton
Dale Scherle, Melville
Raelene Stewart, Swift Current
Andrea Barteski, RIS/PACS Admin - Yorkton
Twyla Babyak, Esterhazy
Ernie Hordichuk, Kamsack
Nancy Wyonzek, Canora
Leona Chopty, Preeceville

Radiologists (Moose Jaw):
Greg Kraushaar
Abraham Du Toit
Uzma Shaheen

Radiologists (Swift Current):
Sabina Khan
Djordje Boskov

Radiologists (Yorkton):
Paul Russell

Regina

Provincial Director:
Renee Simoneau

Regina Area Chief of Staff:
Juliet Soper

Administrative Assistant:
Charissa Amyotte

Regina Area Lead:
Kunal Goyal

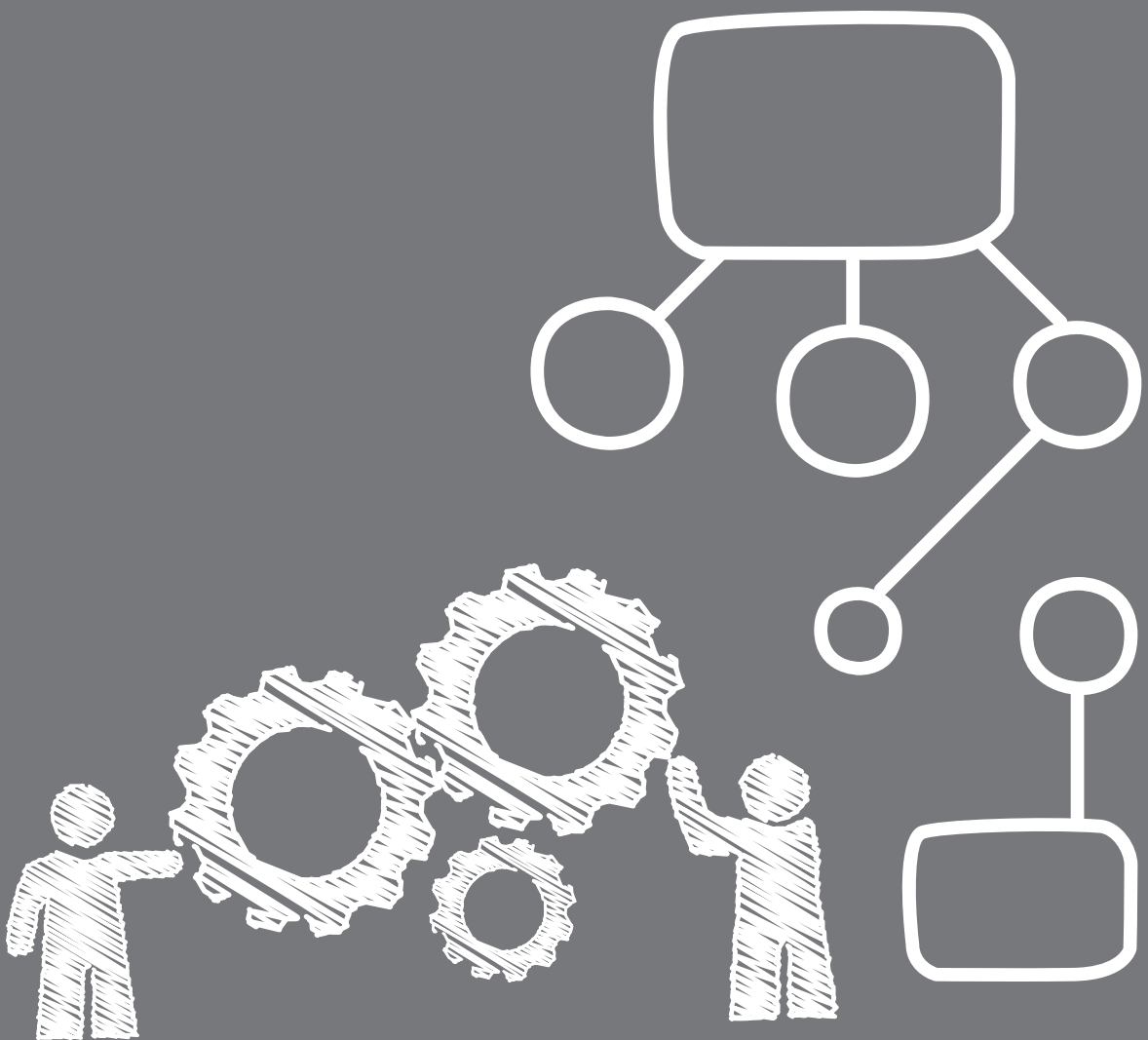
Administrative Assistant:
Karen Lawlor

Managers:
Rhonda Eberle, Information Systems & Clerical Staff
Kristin Frombach, Pasqua Site & Breast Assessment
Dawn Leippi, MRI, IR, Recovery, U/S, Prostate Assessment & Nursing
Wade Peters, CT, NucMed & Regina General Hospital

Supervisors:
Ben Essien, NucMed
Delanna Busch, Pasqua NucMed
Tricia Ducharmie, Pasqua CT
Hallie Halldorson, RGH CT
Cathie Harper, Breast Centre
Orrey Hiebert, IT Support
Michelle Selinger, Interventional
Todd Ramsay, RGH/Pasqua MRI
Daryl Shewchuk, Pasqua
Milissa Rodgers, RGH Ultrasound
Rex Wan, Pasqua Ultrasound & Prostate Assessment

Radiologists:
Winston Adams
K. Boroto
Neil Gordon Devitt
Adriana Gourgaris
Kunal Goyal
Joanne Hillis
Albert Jeon
Patricia Jo
Neil Kapoor
Brian Le
Chong Lim
Siok Ping Lim
Mohammed Nayeemuddin
A Ojo
Rajesh Patel
Kiat Tan
Douglas Belton, Associate
Srirupa Desai, Associate
Rudiger Von Ritschl, Associate
Daniel Bai, Associate

Division of Nuclear Medicine
Glenn Ollenberger
Vijay Trivedi



PGME TRAINING

HOW TO APPLY

Application for University of Saskatchewan entry level positions in Royal College of Physicians & Surgeons of Canada specialty training programs or first-year Family Medicine training programs must be made through the **Canadian Resident Matching Service (CaRMS)**. CaRMS is a not-for-profit organization that works in close cooperation with the medical education community, medical schools and students to provide an electronic application service and a computer match for entry into postgraduate medical training throughout Canada.

POSTGRADUATE MEDICAL EDUCATION OFFICE

The Postgraduate Medical Education office (PGME) is committed to working with residents to ensure that their educational experience during the time they spend at the University of Saskatchewan will provide them with the best possible program to meet their needs in relation to their future career goals. The role of the PGME office is one of coordination - with residents, with teaching hospitals, various stakeholder agencies and with departments and program directors.
More

Information:

medicine.usask.ca/residents/about-pgme.php

POSTGRADUATE MEDICAL EDUCATION

Diagnostic Imaging residency program at the University of Saskatchewan is a five-year training program. Each year consists of 13 four-week blocks. The first year is a basic clinical training year with two dedicated rotations to introduce the residents to Diagnostic Imaging including Anatomy and Diagnostic Ultrasound. PGY2-5 years are composed of radiology core rotations based on Specialty/ Subspecialty Training Requirements (STRs) set by The Royal College of Physicians and Surgeons of Canada and includes a research block, radiology-pathology course (AIRP) and 4 elective rotations.

The teaching curriculum at our department is composed of multiple layers. Residents rotate through three hospitals (Royal University, St. Paul's and City hospitals) as well as multiple outpatient clinics associated with these three hospitals including rotations in breast imaging and obstetrical ultrasound blocks. On each rotation, the residents will be exposed to direct/one on one case read out/ review with staff radiologist as well as discussion around recent interesting cases and preparation and involvement in referring physician consults. The residents will be exposed to further training during their assigned call schedule with main involvement in urgent and emergent cases from the emergency department and multiple inpatient wards. Residents are actively involved and contribute to off service residents and medical students teaching during their rotations as part of departmental teaching contribution to PGME office.

Academic half days are scheduled on a regular weekly basis, through which residents are exposed to dedicated lectures provided by staff radiologists including different subspecialties. Academic half days schedule is designed the way that it fully represents and satisfies all CanMEDS roles requirements. The residents are expected to undertake two complete research projects during their five years of their training.

Multiple interdisciplinary rounds are implemented in residency training curriculum based on specific rotations mainly involving senior rotations. The interdisciplinary rounds include Stroke, Gynecology Oncology, ILD, Chest, Lung Cancer, General Tumor Board, Hepatobiliary, Rectal Cancer and Thyroid rounds.

As part of residents teaching curriculum, the residents are extensively evaluated throughout their rotations. Residents are assigned to write yearly ACR exam as well as yearly departmental and the national OSCE exams.

Farid Rashidi MD, CCFP, FRCPC

Program Director and Assistant Professor of Radiology,

Department of Medical Imaging

Royal University Hospital,
University of Saskatchewan

Phone: (306) 655-2396
Fax: (306) 655- 2370
Email: farid.rashidi@saskhealthauthority.ca

For More Information:

https://medicine.usask.ca/department/clinical/medical-imaging.php#ResidencyProgram

RESIDENTS SUMMARY

A discussion on strengths and challenges of the department was held at a resident academic half-day on May 15, 2019. A draft capturing the discussion was subsequently distributed to residents for their review and comments to ensure that the submission represented the views of residents across all years. The submission is organized based on the core mandates of the department as represented through teaching, research, and patient care.

Teaching

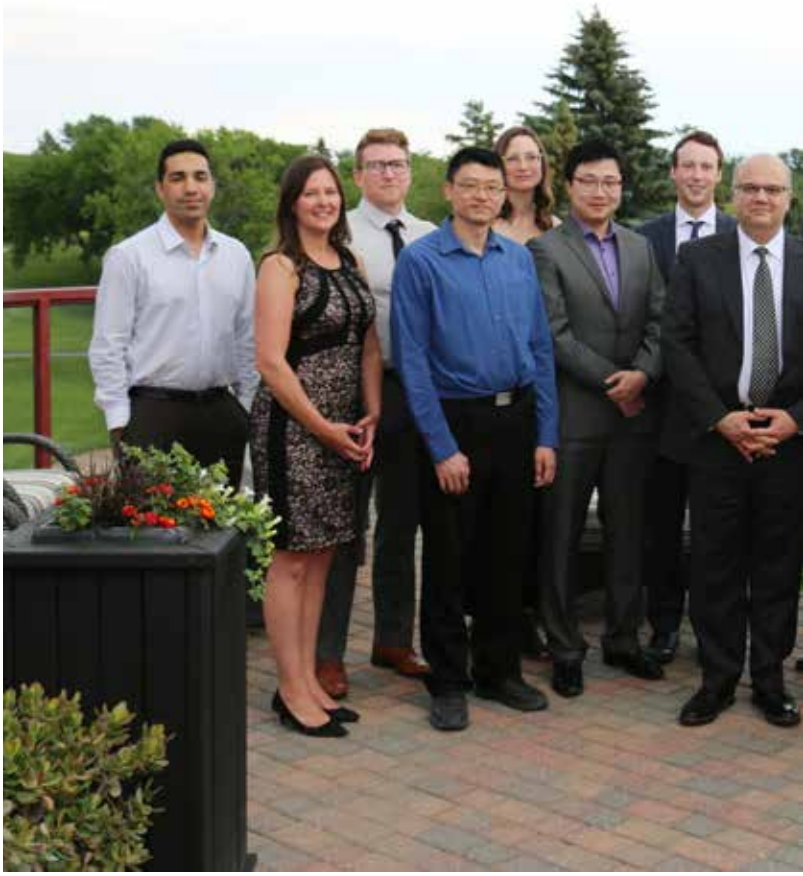
Residents felt a good balance was achieved between teaching and service expectations. As the department evolves, increased opportunities for subspecialty teaching have been embraced and general rotations have been replaced with subspecialty rotations allowing for a high quality education experience. Residents felt that the lack of any diagnostic radiology fellowship programs at the University of Saskatchewan offered opportunities to have early exposure to procedures and involvement in higher level cases, strengthening residency training.

Residents praised the Program Director's leadership of the Diagnostic Radiology residency program, and there have been a number of recent changes which have enhanced teaching and learning and the resident experience. Lines of communication were perceived to be open and effective, with residents feeling supported and welcome to speak with the Program Director and Interim Provincial Head at any time. Productive working relationships with most faculty members were appreciated by residents.
A formal 2-year curriculum is in place for academic half-day, with much of the curriculum organized by subspecialty area. However, it was noted that a number of unexpected cancellations by faculty members, sometimes due to clinical service demands, can disrupt the planned curriculum. Further development of a clinically relevant imaging physics curriculum—and increased faculty complement to deliver this curriculum—is a potential opportunity for academic half-days.

Residents appreciated efforts in organizing a resident retreat—funded through non-departmental funds—and noted the potential benefits of other resident-led initiatives to improve resiliency and wellness. Mentorship opportunities or a mentorship program for residents early in their training may be of benefit particularly during PGY-1 when rotations are mostly off-service.

Research

Residents felt supported in completing research requirements as required by the Royal College, with most residents going beyond minimum



Back Row from Left: Raza Naqvi, Matt Wright, Mia Du Rand, Gage Watson, Gra
Front Row from Left: Leanne Langford, Jimmy Wang, Yang Du, Kavita Kanga, S
Resident missing from photo: Samuel Pike

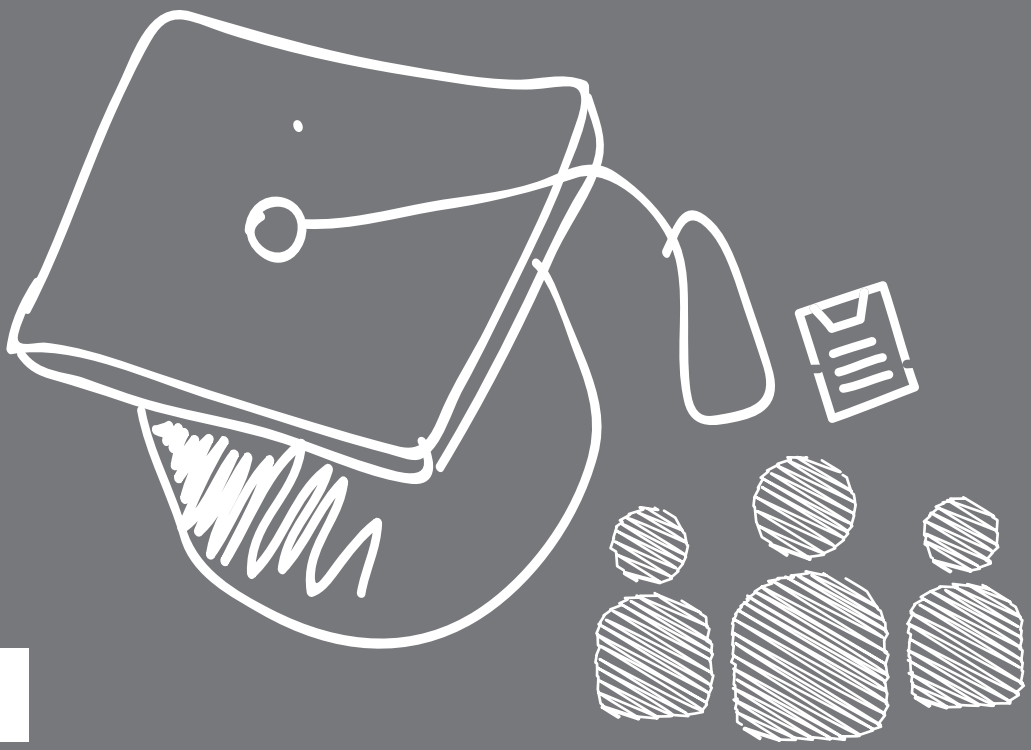
requirements. Semi-annual resident round tables were appreciated by residents as an opportunity to discuss current projects and receive feedback from peers and senior faculty members.

Journal clubs have been enhanced with a presentation at each session by a basic scientist with research interests relevant to medical imaging and imaging science; these efforts have been led by a basic science faculty member in our department.

Patient Care

Call duties have been challenging for residents due to the significantly increased frequency of call (due to a smaller cohort of residents) and the continually increasing volume of imaging studies performed after-hours. The decreased number of residents participating on the call schedule resulted from a temporary decreased allocation of Ministry funded PGME training positions for Diagnostic Radiology and the departure of two residents from the program. The many interdisciplinary rounds which Medical Imaging faculty and residents regularly participate in (e.g. stroke, chest, interstitial lung disease, lung cancer, general tumor, pediatric tumor, head and neck, hepato-pancreato-biliary, and breast rounds), were appreciated for their potential to improve patient care and the learning opportunities they provide.

eme Bell, Luhe Yang, Neil Kalra, Scott Adams
arah Melendez



UNDERGRADUATE MD PROGRAM

The undergraduate medical education program is a fully accredited four-year program leading to the Medical Doctor (MD) degree. After earning the MD degree you are eligible to apply for postgraduate training in the discipline of your choice. 10 per cent of first-year spaces are reserved for Indigenous students.

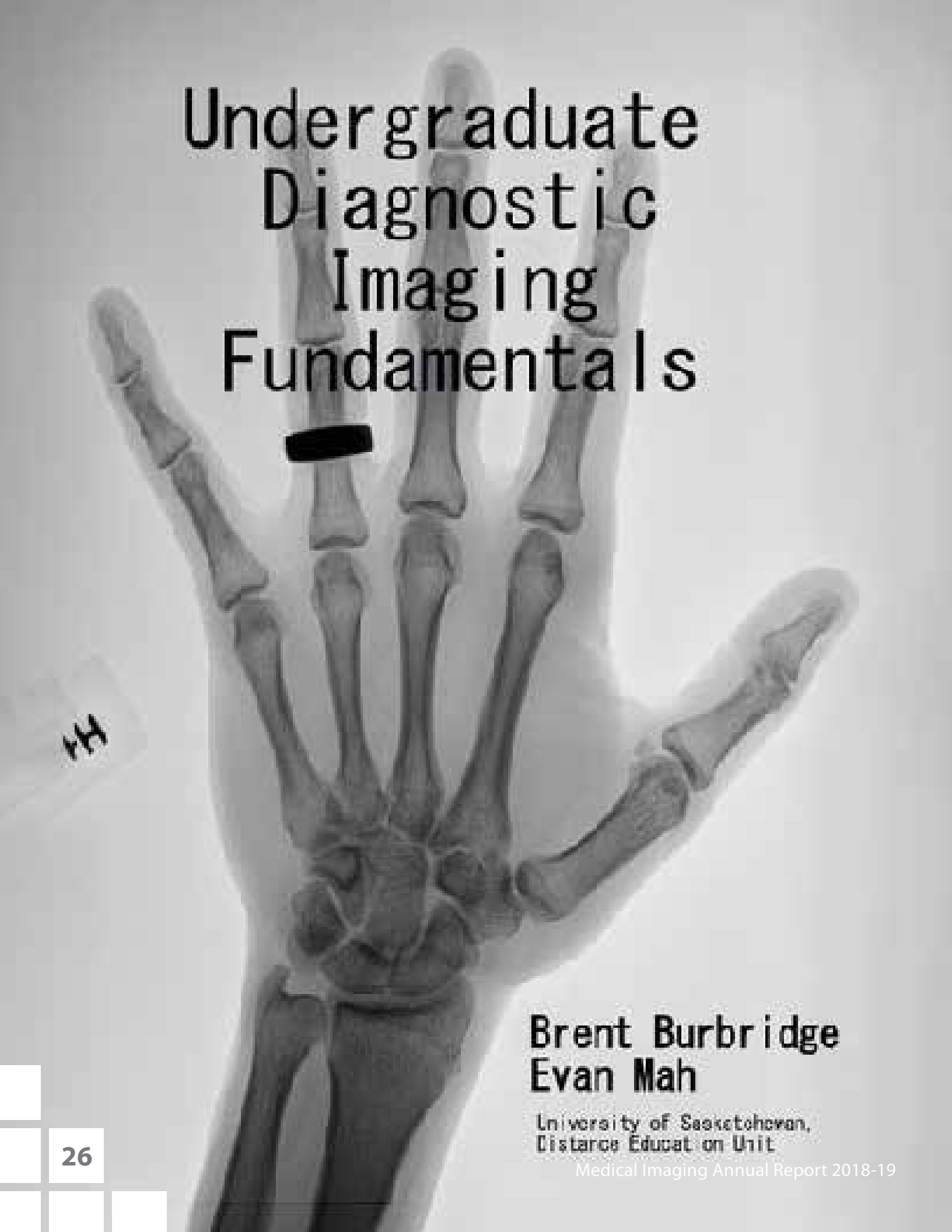
UNDERGRADUATE MEDICAL EDUCATION - SASKATOON OFFICE

The UGME office administers the undergraduate M.D. program in the College of Medicine.

Address:

Suite B526, Health Sciences Building
University of Saskatchewan
Phone: (306) 966-6135
Website:

https://medicine.usask.ca/programs/undergraduate-md.php


Undergraduate
Diagnostic
Imaging
Fundamentals
Brent Burbridge
Evan Mah
University of Saskatchewan,
Distance Education Unit

Undergraduate Medical Education in Medical Imaging University of Saskatchewan

Members of the Department are continuing to provide teaching at the Undergraduate level for some of the Clinical Courses in the later years of Medical School.

Teaching Philosophy:
Medical Imaging is pivotal in the diagnosis and treatment of a wide variety of medical conditions. Medical Imaging provides the Undergraduate students with a broad exposure to imaging in an attempt to broaden their understanding of the impact imaging has in patient care.

Student Encounters:

In the formal curriculum of the College of Medicine, Dr. Burbridge has established a minimum Medical Imaging Curriculum for Undergraduate Medical Students that has been accepted by the Curriculum Committee of the College. We are working to integrate this in a vertical manner in the already established Medical School Curriculum which remains a challenge. Currently, Medical School content in Imaging is being presented by non-radiologists and is mostly being provided by current course lecturers which is course specific.

This new digital undergraduate program is novel and places the undergraduate program for Medical Imaging back with the radiologists. The online image viewing platform for vetted PACS-like teaching cases that all faculty have access to. (https://mistr.usask.ca/odin/) Faculty can also integrate this viewer into Blackboard Learn if they wish to incorporate Imaging into their teaching content.

The most substantial contact non-radiologists have with Undergraduate Students comes in the form of half-day "shadowing" encounters and Electives. The shadowing consists of a medical student spending dedicated time with a radiologist (4 hours). This is informal and not evaluated. The Elective rotation consists of a two-week block of time spent involved in an independent study, assigned readings, radiologist observerships, attendance at rounds, and preparation of a teaching file case (PowerPoint).

The students participate in a pre-test, a post-test, and are formally evaluated on their performance in these tests and other activities during their Elective. An "end of Elective Evaluation Form" for each student is completed by Dr. Burbridge using a rotation specific evaluation form in One45. The students are then invited to evaluate the Elective experience.

The students are aware of, and have access to, the approved Medical Imaging Curriculum in the form of an online eBook, "Undergraduate Diagnostic Imaging Fundamentals" (https://openpress.usask.ca/undergradimaging/).

Brent Burbridge MD, FRCPC
UGME Coordinator and Professor of Radiology,
Department of Medical Imaging
Royal University Hospital,
University of Saskatchewan
Phone: (306) 655-2410
Fax: (306) 655- 2370
Email: brent.burbridge@usask.ca

For More information:
https://medicine.usask.ca/department/clinical/medical-imaging.php#UndergraduateProgram

RESEARCH

COLLEGE OF MEDICINE

Research plays a critical role in the success of the College of Medicine, fostering academic growth and discovery among faculty and students to create a foundation for new knowledge.

RESEARCH THEMES & STRATEGIC PLAN

Strategic Plans developed at both the College and University levels serve as steering mechanisms to guide the focus of the Office of the Vice-Dean Research to signature research themes. By offering support for researchers, and strategically investing in key research areas that show promise of growth, we seek to position the College among the most distinguished in Canada.

STRATEGIC PLAN

The Office of the Vice-Dean Research (OVDR)'s Strategic Plan is a derivative of the College of Medicine (CoM)'s Five-Year Strategic Plan, and aligned with the University of Saskatchewan's resolution to continue investing in research. The OVDR supports the University's strategic priorities by strengthening research capacity, promoting research across an amplitude of disciplines. Our research community specializes in investigating critical topics in biomedical sciences, clinical medicine, health systems, and health of populations.

The Office of the Vice-Dean Research is committed to serving all members of our research community by offering support and resources. If you have any comments or questions, or you would like to offer any feedback, please Contact Us, and our staff will be happy to assist you.

Office of the Vice-Dean Research
College of Medicine
University of Saskatchewan
Office 2D01, Health Sciences Building
107 Wiggins Road
Saskatoon, SK S7N 5E5
(306) 966-8119

RESEARCH GRANTS

from Residents and Faculty
July 1, 2018 – June 30, 2019

University of Saskatchewan Department of Medical Imaging members' names in bold

"Research Grants recorded below are only those reported to the Department for the 2018-19 year"

2018

Title: Development and evaluation of a remote robotic ultrasound clinic model to improve access to medical imaging in northern and Indigenous communities.
Agency: Saskatchewan Health Research Foundation and Saskatchewan Centre for Patient-Oriented Research.
Principal Investigator: Mendez I
Co-Principal Investigator: **Burbridge B**
Co-Investigator: **Adams SJ, Babyn P, Stoneham G,** Ramsden V, McKinney V, Penz E
Amount Awarded: $154,153
Duration: 2018-2020

Title: Targeting insulin growth factor receptor in Herceptin resistant breast cancer with novel alpha particle_labelled antibody drug radioconjugates.
Agency: Canadian Breast Cancer Foundation
Principal Investigator: **Humphrey Fonge**
Amount Awarded: $366,500.00
Duration: September 2015 to August 2018.

Title: Targeting non-responsive Her2-positive breast cancer with novel anti-Her3 alpha-particle labelled antibody drug radioconjugates.
Agency: Saskatchewan Health Research Foundation (SHRF)
Principal Investigator: **Humphrey Fonge**
Amount Awarded: $120,000.00
Duration: September 2015 to August 2018.

2019

Title: Improving lung cancer diagnosis with novel artificial intelligence imaging analytics.
Agency: Saskatchewan Health Research Foundation and Saskatchewan Centre for Patient-Oriented Research.
Principal Investigators: **Babyn P,**
Co-investigators: **Adams SJ, Burbridge B, Stoneham G**, Mendez I, Penz E, Tyan C-C, Longo J, Zarzeczny A, Skrapek C, Belitski K
Amount Awarded: $179,686.00
Duration: 2019-2021.

Title: Production, processing and evaluation of pharmaceutical-grade 225Ac and 67Cu for cancer theranostics
Agency: Sylvia Fedoruk Centre, Operating Grant,
Principal Investigator: **Humphrey Fonge**
Co-investigators: Eric Price, Ekaterina Dadachova, Patrick Causey, Valery Radchenko
Amount Awarded: 165,000
Duration: 04/2019 to 03/2021

Title: Alpha particle-labeled antibody-drug radioconjugates for radiotherapy of metastatic colorectal cancer (mCRC)
Agency: Canadian Institute for Health Research (CIHR),
Principal Investigator: **Humphrey Fonge**
Co-investigators: Clarence R. Geyer
Amount Awarded: $872,100.00
Duration: 05/2019 – 04/2024

Title: Molecular imaging of prostate cancer using ^{68}Ga-PSMA PET/CT – a clinical trial
Principal Investigator: VarunKumar Bathini
Co-principal investigators: **Humphrey Fonge, Rajan Rakheja**
Co-investigators: Clarence R. Geyer
Amount Awarded: $14,000.00
Duration: 05/2019 – 04/2020

Title: Non-clinical pharmacology with linac-produced pertechnetate
Agency (research contract): Canadian Isotope Innovation Corp
Principal Investigator: **Humphrey Fonge**
Amount awarded: $120,000.00
Duration: 01/2019 – 04/2020

Title: Conversion from Unresectable to Resectable Liver Metastases in Patients with Liver-Only Metastatic Colorectal Cancer Treated with FOLFOXIRI Plus Bevacizumab. The Conversion Trial.
Agency: Cancer Research / Cancer | Health Services and Policy Research
Principal Investigator: Dr. Shahid Ahmed
Co-investigators: Dr. H. Chalchal, Dr. R. Kanthan, **Dr. R. Rakheja,** Mrs. L. Dwernychuk, Dr. D. Le, Dr. N. Sari, Dr. D. Gill, Prof. H. Lim, Dr. A Zaidi, **Dr. Josh Gitlin,** Dr. M. Moser
Amount Awarded: $100,000.00
Duration: 3 years – Start: September 12, 2018

KNOWLEDGE TRANSLATION ACTIVITIES - APPROVED CLINICAL TRIAL APPLICATIONS (CTA)

Health Canada approved CTA

Evaluation of ^{89}Zr-DFO-nimotuzumab for non-invasive imaging of EGFR+ cancers by Positron Emission Tomography (PET)
Approval ID: HC6-024-c219924
Principal Investigators: **Rajan Rakheja MD**, Vijay Kundapur MD, Tahir Abbas MD, **Sundeep Nijjar MD, Almgrahi Abdulaziz MD, and Humphrey Fonge PhD.**

Research Ethics Board approved CTA

Investigation of the Sensitivity and Specificity of ^{68}Ga-HBED-CC-PSMA PET/CT in Prostate Cancer
Approval ID: REB ID: # 130
Principal Investigators: **Rajan Rakheja MD**, Varunkumar Bathini MD, **Sundeep Nijjar MD, Almgrahi Abdulaziz MD**, Nayyer Iqbal MD, Ali El-Gayed MD, **Humphrey Fonge PhD.**

Diagnosis of Parkinson's disease and related disorder using [^{18}F]FDOPA
Approval ID: REB ID: Bio # 18-56
Principal Investigators: **Rajan Rakheja MD,** Ali Rajput MD, Alex Rajput MD, **Humphrey Fonge PhD.**

Evaluation ^{89}Zr-DFO-nimotuzumab for non-invasive imaging of EGFR-positive cancers by PET/CT.
Approval ID: REB ID: Bio-17-288
Principal Investigators: **Rajan Rakheja MD,** Vijay Kundapur MD, Tahir Abbas MD, **Sundeep Nijjar MD, Almgrahi Abdulaziz MD,** and **Humphrey Fonge PhD.**

PRESENTATIONS

from Residents and Faculty
July 1, 2018-June 30, 2019

University of Saskatchewan Department of Medical Imaging members' names in bold

"Presentations recorded below are only those reported to the Department for the 2018-19 year"

2018

Kanthan R, Baniak N, **Adams S**, Lee C-H, Chibbar R. Immunohistochemical and molecular characterization of extra-pelvic endometrial stroma sarcomas. XXXII Congress of the International Academy of Pathology, Dead Sea, Jordan, 2018.

Yi X, Adams SJ, Babyn P, Elnajmi A. Automatic catheter detection in pediatric X-ray images using a scale-recurrent network and synthetic data. International Conference on Medical Imaging with Deep Learning, Amsterdam, 2018.

Wiebe, Sheldon Choosing Wisely Conference; University of Saskatchewan, Division of Continuing Medical Education, Saskatoon, Saskatchewan, June 2-3, 2018

Moulton KM. Imaging of Multiple Sclerosis, Demyelinating Diseases, and Important Mimics. MS Education Day (Invited Speaker). August 3rd, 2018. Saskatoon, SK.

Moulton KM. Imaging in Acute Ischemic Stroke. Stroke Education Day (Invited Speaker). September 24, 2018. Yorkton, SK.

Moulton KM. 4D CTA: Current Techniques and Applications. Neurosciences Grand Rounds (Invited Speaker). November 2nd, 2018. Saskatoon, SK.

Adams S, Burbridge B, Mendez I, **Babyn P.** Assessment of a Telerobotic Approach for Prenatal Ultrasound Imaging. RSNA December 2, 2018, Oral Presentation.

Alizadeh E, Solomon VR, Gonzalez C, Bernhard W, Makhlouf A, Barreto K, Geyer CR, **Fonge H,**. (2018). 89Zr-labeled domain II specific anti-EGFR ScFv-Fc antibody fragment for imaging and monitoring of response to anti-EGFR treatment by PET. Society of Nuclear Medicine Molecular Imaging, Philadelphia, United States

P. Causey, D. Bureau, K. Leeder, R. Perron, S.V. Hartimath, **H. Fonge.** (2018). Production of a Thorium/ Actinium Generator at the Canadian Nuclear Laboratories. Society for Nuclear Medicine Molecular Imaging, Philadelphia, United States

2019

Pike, S. Neonatal cranial ultrasound. Podium presentation. May 2019. SAMIM/SADMS annual conference.

Sabri, Ali. Role of Breast Density in Risk & Detection Rate. April 2019. 35th Iranian Society of Radiology Conference.

Sabri, Ali. Approach to Non Mass Enhancement in Breast MRI. April 2019. 35th Iranian Society of Radiology Conference.

Sabri, Ali. I did the Biopsy, What is Next? Pathology Report Assessment by Radiologist. April 2019. Iranian Society of Radiology Conference.

Sabri, Ali. Lung Cancer and Imaging, New Approach for Gene Positive Cancers. April 2019. Iranian Society of Radiology Conference.

Naqvi S, Leswick D, Beavis C, Mondal P, Bryce R. Comparison of knee MRIs ordered by orthopedic surgeons and general practitioners. Canadian Association of Radiologists Annual Meeting, Montreal, QB 2019.

Naqvi S, Bharadwaj S, Kennedy R, Bigsby R, Babyn P, Tyan C. The Effect of Coordinated Investigations for Rural Lung Cancer Patients on Traveling and Time to Staging Completion. American Thoracic Society Annual Conference, Dallas, TX, 2019.

Burbridge B, Penz E, Wirth I, **Naqvi S.** The Clinical and Economic Impacts of Choosing a Diagnostic Imaging Examination – CT PE Case Study. Choosing Wisely Annual Conference, Saskatoon, SK, 2019 (date pending)

Bell GDM, Moulton KM. Implementation of a tailored MR Stroke protocol. Canadian Association of Radiologists Annual Meeting, Montreal, 2019.

Najafi Semnani A, Fotouhi R, Zhang Q, **Obaid H, Adams S.** Haptic force feedback for a teleoperated sonography system. (accepted for presentation at the 2019 Canadian Society for Mechanical Engineering International Congress, London ON)

Adams SJ, Tang R, Henderson R, **Babyn P.** Patient perspectives and priorities regarding artificial intelligence in medical imaging. Canadian Association of Radiologists Annual Scientific Meeting, Montreal, 2019.

Yi X, Adams SJ, Henderson R, **Babyn P.** Deep learning for automatic multi-catheter detection on pediatric radiographs. Canadian Association of Radiologists Annual Scientific Meeting, Montreal, 2019.

Adams SJ, Burbridge B, Babyn P, Mendez I. Access to ultrasound imaging: Qualitative study in northern, remote Indigenous communities in Canada. Association of University Radiologists Annual Meeting, Baltimore, 2019.

Adams SJ, Mendez I, **Babyn P, Burbridge B.** Long distance ultrasound imaging: Technical developments, clinical applications, and integration of telerobotic ultrasound systems into clinical practice. Association of University Radiologists Annual Meeting, Baltimore, 2019.

Nguyen XV*, **Adams SJ*,** Hobbs S, Ganeshan D, Wasnik A. Radiologist as lifelong learner: Strategies for ongoing education. Association of University Radiologists Annual Meeting, Baltimore, 2019. *Co-presenters.

Adams SJ, Hunter B, **Babyn P.** Demonstrating the value of artificial intelligence in medical imaging: Strategies for economic evaluation of artificial intelligence algorithms. Association of University Radiologists Annual Meeting, Baltimore, 2019.

Bell G, **Moulton KM.** Implementation of a Tailored MR Stroke Protocol. Canadian Association of Radiologists Annual Scientific Meeting. April 11-14, 2019. Montreal, QC.

Obaid, Haron. Advances in MRI Imaging of Sports Injuries. International Society in MR in Medicine (ISMRM). May 12, 2019. Montreal, OQ

Solomon VR, Alizadeh E, Causey P, Makhlouf. A, Barreto K, Bernhard W, Wilson JJ, Geyer CR, **Fonge H.** (2019). Targeted alpha particle therapy of EGFR-positive breast cancer using site-specifically labeled 225Ac–dN-SpyCatcher-SpyTag-nimotuzumab. Targeted Alpha Therapy 11 (TAT11), Ottawa, Canada Conference

Khan BAA, Causey P, Solomon VR, Bernhard W, Barreto K, Wilson JJ, Geyer CR, F**onge H.** (2019). Biparatopic targeting of epidermal growth factor receptor positive breast cancer cells using domain I/II and domain III specific antibody conjugates. Targeted Alpha Therapy 11 (TAT11), Ottawa, Canada.

Barreto K, Causey P, Solomon VR, Bernhard W, Sutherland A, Wilson JJ, Geyer CR, Sadowski I, **Fonge H.** (2019). Depleting the latent HIV-1 cell population using 225Ac-labeled anti-CD4+targeted radioimmunoconjugates. Targeted Alpha Therapy 11 (TAT11), Ottawa, Canada.

PUBLICATIONS, PAPERS AND ABSTRACTS

from Residents and Faculty
July 1, 2018-June 30, 2019

University of Saskatchewan Department of Medical Imaging members' names in bold

"Publications recorded below are only those reported to the Department for the 2018-19 year"

2018

Adams SJ, Burbridge B, Badea A, Kanigan N, Bustamante L, **Babyn P,** Mendez I. A crossover comparison of standard and telerobotic approaches to prenatal ultrasound imaging. *J Ultrasound Med.* 2018 Nov;37(11):2603-2612.

Baniak N, **Adams S,** Chibbar R, Lee C-H, Kanthan R. Hepatic endometrial stromal sarcoma. *Pathol Res Pract.* 2018 Oct;214(10):1726-1731.

Burbridge B, Adams S, Burbridge C. Computed tomography frequency and power injection utilization for a cohort of cancer patients with arm ports. *J Rad Med Imag.* 2018 Mar;1:1002.

Adams SJ, Rakheja R, Bryce R, **Babyn PS.** Incidence and economic impact of incidental findings on 18F-FDG PET/CT imaging. *Can Assoc Radiol* J. 2018 Feb;69(1):63-70.

Hernández-Ronquillo L, **Adams SJ,** Ballendine SA, Téllez-Zenteno JF. Epilepsy in an elderly population: classification, etiology and drug-resistance. *Epilepsy Res*. 2018 Feb;140:90-94.

Adams SJ, Kirk A, Auer RN. Adult-onset leukoencephalopathy with axonal spheroids and pigmented glia (ALSP): Integrating the literature on hereditary diffuse leukoencephalopathy with spheroids (HDLS) and pigmentary orthochromatic leukodystrophy (POLD). *J Clin Neurosci.* 2018 Feb;48:42-49.

Adams SJ, Burbridge BE, Badea A, Langford L, Vergara V, Bryce R, Bustamante L, Mendez IM, **Babyn PS.** Initial experience using a telerobotic ultrasound system for adult abdominal sonography. *Can Assoc Radiol* J. 2017 Aug;68(3):308-314.

Wang, J., Ellchuk, T., Otani, R., Groot, G. and **Babyn, P.** (2018) Online TI-RADS Calculator. *Open Journal of Radiology*, 8, 175-180. doi: 10.4236/ojrad.2018.83020.

Adams S, Burbridge B, Badea A, Kanigan N, Bustamante L, **Babyn P,** Mendez I. A Crossover Comparison of Standard and Telerobotic Approaches to Prenatal Ultrasound Imaging. Published online April 24, 2018, Journal of Ultrasound in Medicine 2018;37 (11): 2603-2612.https://doi.org/10.1002/jum.14619

Burbridge B, Adams S, Burbridge C. Computed Tomography Utilization For a Cohort of Breast and Colon Cancer Patients with Arm Ports. J Radiol Med Imaging. 2018; 1: 1002. http://meddocsonline.org/journal-of-radiology-and-medical-imaging/Computed-tomography-frequency-and-power-injection-utilization-for-a-cohort-cancer-patients-with-arm-ports.pdf

Vanderby Sonia, Badea Andreea, Pena-Sanchez Juan-Nicolas, **Kalra Neil,** Babyn Paul. *A Day in the Life of MRI: The Variety and Appropriateness of Exams Being Performed in Canada.* The Canadian Association of Radiologists Journal (CARJ). Volume 69(2); pg. 151-161. May 2018.

Brent Burbridge, Chris Plewes, **Grant Stoneham, Peter Szkup, Rob Otani, Paul Babyn,** Rhonda Bryce. Randomized Clinical Trial Evaluating Complications and Complication-Related Removal of Arm-Situated Power-Injectable and Non-Power-Injectable Totally Implanted Venous Access Devices among Cancer Patients. *J Vasc Interv Radiol.* 2018 May; 29(5):648-656.

Hadju I, Michel B, Al-Dulaymi M, Wasan K, **Fonge H*,** Badea I* (2018). A ^{89}Zrlabeled lipoplex nanosystem for image-guided gene delivery: design, evaluation of in vitro stability and in vivo behaviour. Int J Nanomedicine. 2018 Nov 21;13:7801-7818. **Corresponding authors.*

Alam K, Brabant M, Solomon VR, Barreto K, **Fonge H*,** Geyer CR*. A novel synthetic trivalent single chain variable fragment (Tri-scFv) construction platform based on the SpyTag/SpyCatcher protein ligase system. BMC Biotechnol. 2018 Sep 10;18(1):55. **Corresponding authors.*

El-Sayed A, Bernhard W, Barreto K, Gonzalez C, Hill W, Pastushok L, **Fonge H***, Geyer CR*. Evaluation of Antibody Fragment Properties for Near Infrared Fluorescent Imaging of HER3-Positive Cancer Xenografts. Theranostics. 8(17): 4856-4869. **Corresponding authors.*

Lee Y, **Goyal K,** Prasad B. Acute Kidney Injury in a 31-year-old Male as a Consequence of Multiple Myeloma. Cureus. 2018 Jun 26;10(6)

Prasad B, Giebel S, Garcia F, **Goyal K,** Shrivastava P, Berry W. Successful Use of Renal Denervation in Patients With Loin Pain Hematuria Syndrome-The Regina Loin Pain Hematuria Syndrome Study. Kidney Int Rep. 2018 Feb 2;3(3)

2019

Nguyen XV, A**dams SJ,** Hobbs S, Ganeshan D, Wasnik A. Radiologist as lifelong learner: Strategies for ongoing education. *Acad Radiol.* 2019 May 6. doi: 10.1016/j.acra.2019.03.019.

Yi X, Adams SJ, Babyn P. Automatic catheter detection in pediatric X-ray images using a scale-recurrent network and synthetic data. *J Digit Imaging.* 2019 Apr 10. doi: 10.1007/s10278-019-00201-7.

Baniak N, **Adams S,** Lee C-H, Chibbar R, Kanthan R. Extrapelvic metastases in endometrial stromal sarcomas: a clinicopathological review with immunohistochemical and molecular characterization. *Int J Surg Pathol.* 2019 Apr;27(2):208-215.

Adams S, Burbridge B, Babyn P. I. Mendez. Access to ultrasound imaging: Qualitative study in northern, remote Indigenous communities in Canada. Work in Progress.

Burbridge B, Bryce R. Venous Doppler ultrasound findings 3 months after arm port implantation thrombosis by port type within a randomized, controlled trial. Journal of the Association for Vascular Access, 2019, 24 (1): 21 – 28. https://doi.org/10.1016/j.java.2018.28.001

Uppal J, **Burbridge B,** Arnason. T. Bilateral osteonecrosis of the hip in panhypopituitarism:Case Report. BMJ Case Reports, published online Feb. 22, 2019. http://dx.doi.org/10.1136/bcr-2018-227471

B**urbridge B,** Burbridge C, Costa J, Carter Y. ODIN: Adaptation of an HTML 5 compatible DICOM viewer for MIRC-TFS, Enhancing the Incorporation of Clinical Images into the Health Science Curriculum. Medical Science Education, January 3, 2019 online. https://doi.org/10.1007/s40670-018-00679-w

Hartimath SV, El-Sayed AM, Bernhard W, Makhlouf A, Hill W, Salomon VR, Parada AC, Barreto K, Geyer CR, **Fonge H***. Therapeutic potential of nimotuzumab PEGylated maytansine antibody drug conjugates against EGFR positive xenograft. Oncotarget. 2019;10(10):1031-1044. **Corresponding author.*

Bernhard W, El-Sayed A, Barreto K, Gonzalez C, **Fonge H***, Geyer CR*. Near infrared imaging of epidermal growth factor receptor positive xenografts in mice with domain I/II specific antibody fragments. Theranostics 2019; 9(4): 974-985. **Corresponding authors.*

Hartimath SV, Alizadeh E, Solomon VR, Chekol R, Hill W, Parada AC, Barreto K, Geyer CR, **Fonge H***. Preclinical evaluation of 111In-labeled PEGylated maytansine nimotuzumab drug conjugates in EGFR-positive cancer models. J Nucl Med. 2019 Jan 17. pii: jnumed.118.220095. doi: 10.2967/jnumed.118.220095. [Epub ahead of print]. **Corresponding authors.*

Bharathikumar VM, Barreto K, Hill W, Hogan D, Sutherland AR, Kosalik A, **Fonge H**, Decouteau JF, Geyer CR. Next-generation sequencing-guided and reconstruction of antibody CDR combinations from phage selection outputs. Nucleic Acids Res. 2019;47(9):e50. doi: 10.1093/nar/gkz131.

Makhlouf A, Hadju I, Hartimath SV, Alizadeh E, Wharton K, Wasan K, Badea I, **Fonge H***. ^{111}In-labeled glycoprotein non-metastatic b (GPNMB) targeted gemini surfactant-based nanoparticles against melanoma: in vitro characterization and in vivo evaluation in melanoma mouse xenograft model. Mol Pharm. 16(2): 542-551. **Corresponding author.*

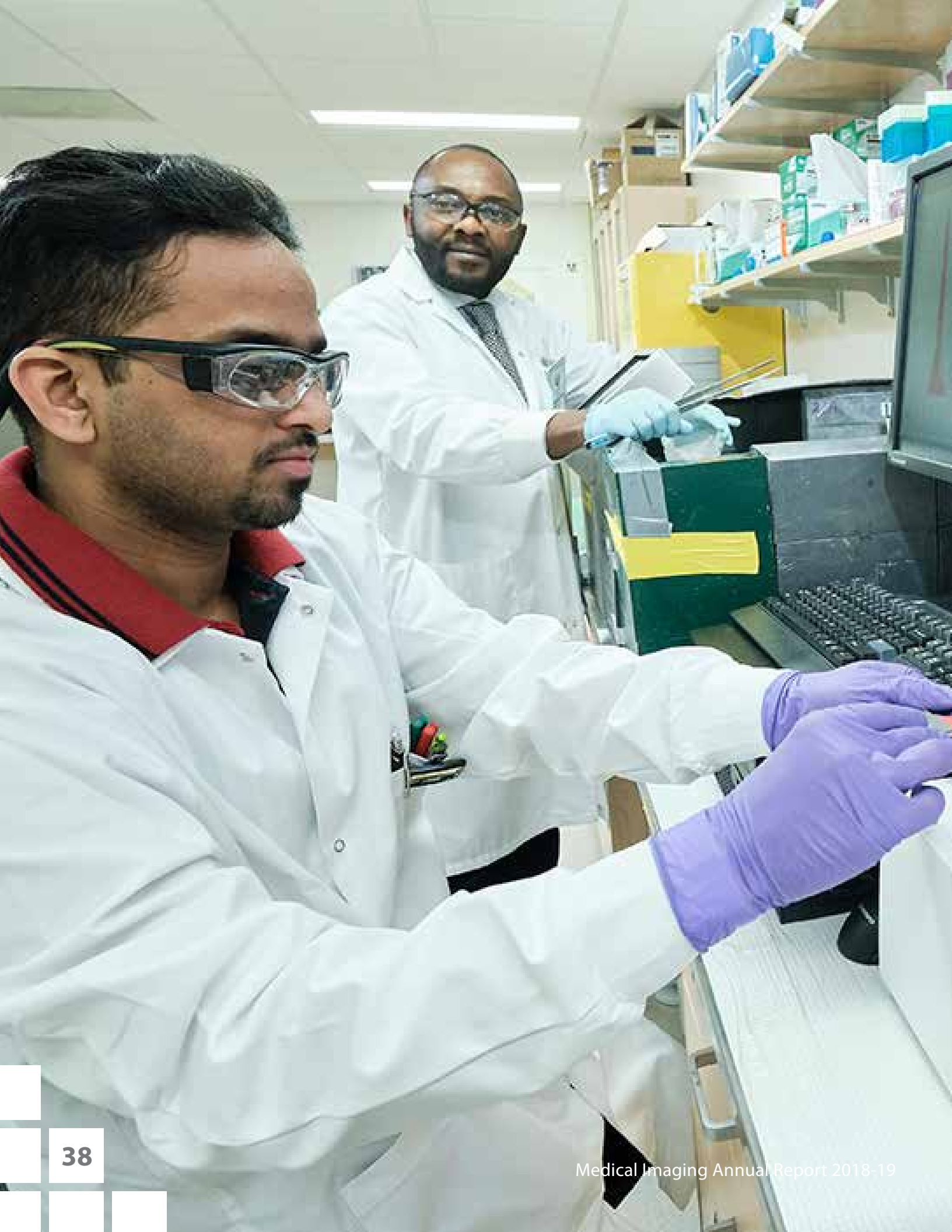
Solomon VR, Gonzalez C, Alizadeh E, Bernhard W, Hartimath SV, Barreto K, Geyer CR, **Fonge H***. ^{99}mTc(CO)3+ labeled domain I/II-specific anti-EGFR (scFv)2 antibody fragment for imaging EGFR expression. Eur J Med Chem. 157: 437-446. **Corresponding author.*

Alam MK, El-Sayed A, Barreto K, **Fonge H***, Geyer CR*. Site-specific fluorescent labeling of antibodies and diabodies using spyTag/spyCatcher system for in vivo optical imaging. Mol Imaging Biol. 2019;21(1):54-66. **Corresponding authors.*

Sean K. Sethi, Shawn J. Kisch, Kiarash Ghassaban, Ali Rajput, Alex Rajput, **Paul S. Babyn,** Saifeng Liu, **Peter Szkup, E.Mark Haacke.** Iron quantification in Parkinson's disease using an age-based threshold on susceptibility maps: The advantage of local versus entire structure iron content measurements. Magnetic Resonance Imaging 55 (2019) 145-152.

Prasad B, Berry W, **Goyal K**, Dehghani P, Townsend RR. Central Blood Pressure and Pulse Wave Velocity Changes Post Renal Denervation in Patients With Stages 3 and 4 Chronic Kidney Disease: The Regina RDN Study. Can J Kidney Health Dis. 2019 Feb 13;6: 2019.

Wolfmueller Z, **Goyal K**, Prasad B. Bilateral renal artery stenosis as a cause of refractory intradialytic hypertension in a patient with end stage renal disease. BMC Nephrol. 2019 Jan 14;20(1):19



COLORECTAL CANCER CELLS KILLED BY ASSASSIN ANTIBODY, USASK TEAM FINDS

A novel treatment for advanced colorectal cancer—using a radioactive antibody that attaches to cancer cells and kills them—is being developed by researchers at the University of Saskatchewan's (USask) College of Medicine.

February 15, 2019

Colorectal cancer is the second leading cause of death from cancer in North America and is often diagnosed at an advanced stage, after it has spread to other parts of the body. Patients with advanced colorectal cancer generally have a life expectancy of around 24 to 30 months.

A USask team of researchers led by **Dr. Humphrey Fonge**, an Assistant Professor in the College of Medicine's Medical Imaging department, has created an assassin antibody with attached radioactive molecules which cling to colorectal cancer cells and destroy them.

"I have designed a molecule that will attach itself to colorectal cancer cells and destroy them, with little to no impact on neighbouring healthy cells," Fonge said. "This could transform outcomes for many colorectal cancer patients including, those at the advanced stages of the cancer."

The assassin antibody attaches itself to a specific protein which appears on colorectal cancer cells, and then kills it.

"This is a personalized medicine approach enabling us to treat the cancer in a very pinpointed way, while sparing healthy tissue," he said. "It is a novel radio-immunotherapy approach."
The five-year research program has been awarded $872,100 by the Canadian Institutes of Health Research (CIHR)—one of five USask health research programs awarded a total of $4.9 million by the CIHR in its fall 2018 funding competition.

Fonge said that the evaluation of the antibody in mice has been very promising and he hopes to move to human trials in two years.

"We are very encouraged by our initial results in mice," he said.

The assassin antibody kills the colorectal cancer cell by releasing high energy to the DNA of the cell. Current antibody drug therapies can slow down the spread of colorectal cancer, but do not destroy the existing cancer cells.

The USask research team, which includes post-doctoral trainee Behlol Khan, is planning to study whether the assassin antibody could be used to treat other cancers, including breast and pancreatic cancers, which express the same protein.

Colorectal cancer patients are often diagnosed when the cancer is advanced and has spread, relying on scans to determine whether tumours have grown or have slowed down following treatment.

The protein found in colorectal cancer cells makes the cells spread in an uncontrolled manner. They can double in number every few hours, leading to the rapid spread of this type of cancer.

The USask team is developing another antibody which will allow doctors to specifically track the spread of colorectal cancer cells and the growth of tumours, enabling earlier diagnosis and targeted personal treatment.

To speed diagnosis, this antibody will attach itself to colorectal cancer cells, allowing them to be identified and monitored for spread. But unlike the assassin antibody, it will not destroy the cancer.
The research team uses the university's Saskatchewan Centre for Cyclotron Sciences, which is managed by the Fedoruk Centre at USask.

ARTIFICIAL INTELLIGENCE AND MEDICAL IMAGING PATIENT-ENGAGEMENT WORKSHOP

Artificial intelligence (AI) has generated great interest in medical imaging, with potential applications ranging from assisting with patient scheduling, image acquisition and post-processing, triaging of exams for interpretation, detection of pathological findings, and automated interpretation of findings.

While there is significant interest among the radiology community regarding the potential of AI in medical imaging, there has been less attention regarding patients' views of having AI as part of their imaging care, and what priorities are most important to patients.

A patient engagement workshop was hosted by Dr. Paul Babyn and Dr. Scott Adams on October 13, 2018 in Saskatoon to better understand patients' perspectives on the potential role of AI in medical imaging, and inform research and clinical implementation of AI in medical imaging in Saskatchewan.

Invitations to participate in the workshop were sent to patient and family advisors through the Saskatchewan Health Authority's Patient and Client Experience office, Health Quality Council of Saskatchewan, and disease-specific local and national patient advocacy groups.

Seventeen individuals from various geographic regions within Saskatchewan, urban and rural communities, and Indigenous and non-Indigenous perspectives participated in the workshop.

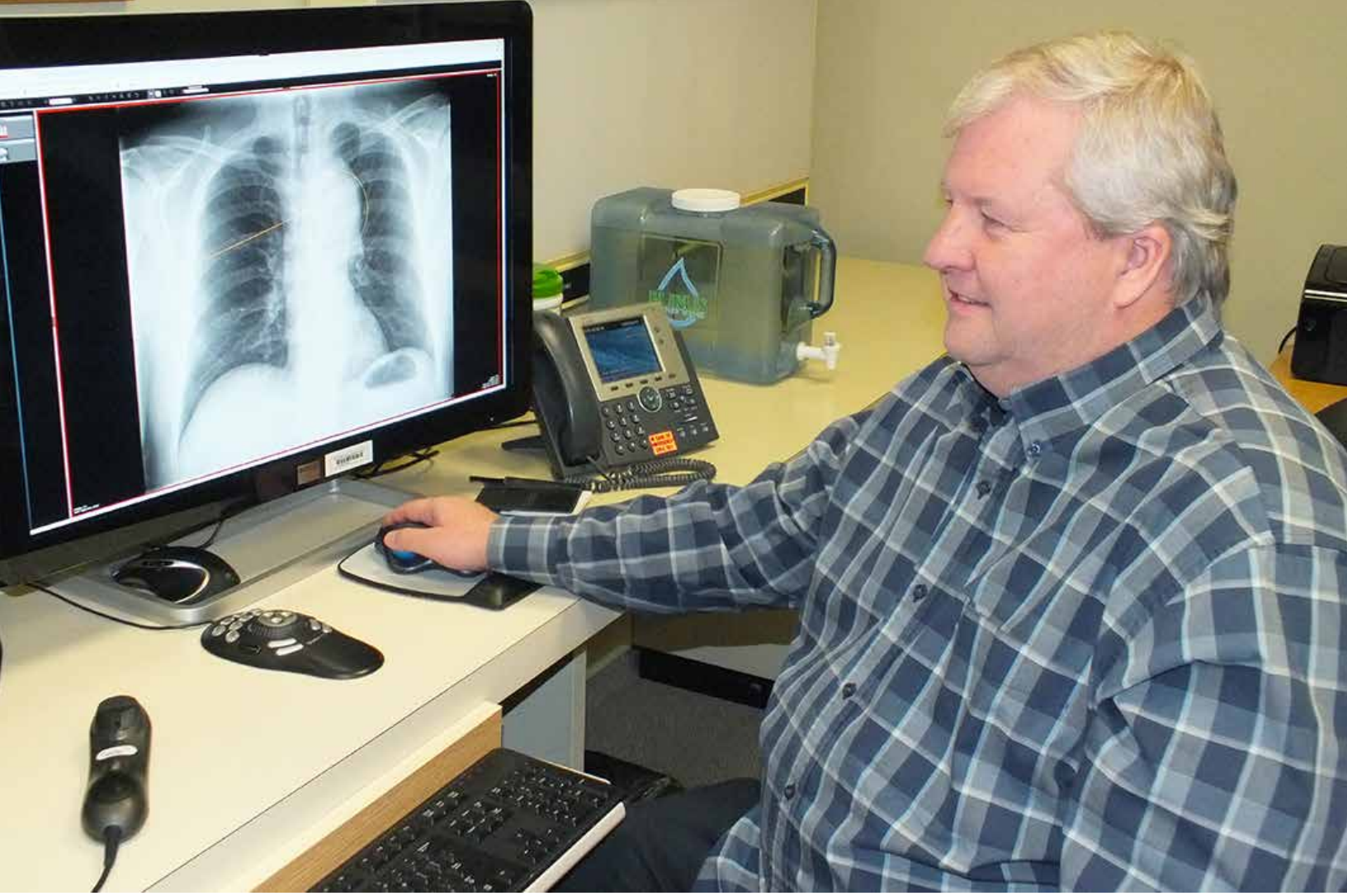
While initial patient perceptions of AI were captured in the themes of fear of the unknown, trust, human connection, and cultural acceptability, patients identified numerous priority areas important to patients for improvement in radiology—including improving access to imaging and reducing wait times, reducing time to diagnosis, increasing diagnostic accuracy, improving communication, and empowering patients —which could be enhanced through AI.

Patients were comfortable with sharing de-identified imaging data for AI development as long as appropriate safeguards were in place. In addition to traditional diagnostic accuracy measures, participants wanted to ensure that downstream impacts of AI on patients' health and well-being were included in assessments of AI.

Findings from the workshop will help inform research and clinical advancements in medical imaging in Saskatchewan and beyond, ensuring that Saskatchewan residents have access to quality medical imaging that is patient-centered and empowers them to achieve optimal health outcomes.

Dr. Paul Babyn,
Physician Executive – Provincial Programs
Saskatchewan Health Authority

Dr. Scott Adams,
PGY-2
Medical Imaging Residency Program
University of Saskatchewan



USASK RESEARCHER CREATES NEW MEDICAL IMAGING TECHNOLOGY

As health care has evolved, medical imaging such as X-rays, CT scans, ultrasounds and MRIs have become increasingly important for diagnosis and treatment of patients. Through these imaging studies, health care professionals can learn how diseases are manifest to improve patient care.

March 4, 2019

A University of Saskatchewan (USask) research team has created unprecedented new solutions that enable medical students and other health care professionals to access high-quality diagnostic images and clinical information for teaching and learning—while protecting patient confidentiality.

"The way we manage images and use them for teaching has changed," said Dr. Brent Burbridge of the USask College of Medicine's Medical Imaging Department.

A big reason for this has been that digital images have replaced the traditional film images that were displayed on lightboxes. Today, digital images can be accessed on laptops, tablets and smartphones.

There have been downsides to the migration from physical to digital images. First, all confidential patient information has to be removed before the images can be used to teach students and residents. And second, there were problems with the portability and quality of the images available for teaching.

That is where Burbridge and his team come in.

They have developed software that enables images to be stored in a database with information such as patient age, gender and diagnosis. As well, information that could potentially identify the patient is removed by their software during image storage, protecting patient confidentiality.

Next, they created an image viewing tool called ODIN—a repository of high-quality images, that can be annotated and downloaded, or reviewed in the online viewer, simulating a clinical workstation.

"One of the strengths of ODIN is its integrated search tool," said Burbridge. "So, if you're giving a lecture on tuberculosis, you type 'tuberculosis' into the search panel and all the cases we've created that having anything to do with tuberculosis come up. The teacher, or student, can review the cases and determine whether any of the images are useful for what they need."

ODIN is short for Online DICOM Image Navigator. DICOM (Digital Imaging and Communications in Medicine) is the international standardized file format used for the creation, storage and communication of images in the clinical environment.

Until ODIN was developed, medical educators were only able to use lower quality JPEG copies of the DICOM images. These images had to be cropped or blacked out to remove identifiable patient information before use in teaching. Also, the ability to zoom in on the JPEG images without a loss of resolution limited their usefulness in some situations.

There is added benefit to Burbridge's research—creation of a free online textbook. Users can see images related to a variety of medical topics in an organized curriculum. The images can be seen in low quality JPEG format but can also be viewed in the higher resolution DICOM format by clicking the ODIN weblink associated with the case.

Burbridge's work was recently published in Medical Science Educator, a U.S.-based journal that focuses on teaching sciences which are fundamental to modern medicine and health.

To ensure that the technology continues to evolve and grow, Burbridge is working with Innovation Enterprise (IE) to raise awareness of the technology and explore potential industrial partnerships and out-licensing opportunities. IE is the USask unit charged with maximizing the impact of knowledge-intensive innovations developed by researchers.

"We want to push forward," said Burbridge. "We want to enhance what we're doing—to improve it. Like any software, it needs refreshing. It needs new functionality."

The research was made possible with funding provided by SaskTel through the Royal University Hospital Foundation, and the USask College of Medicine.

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Luxsonic
PIONEERING VIRTUAL REALITY
RSNA
Start-Up Showcase

LUXSONIC RSNA 2018 EXHIBIT VIRTUAL REALITY SOFTWARE

Luxsonic was at RSNA 2018 to exhibit, SieVRt, Canada's first virtual reality medical imaging software. Our goal is to transform the way in which physicians work and collaborate with medical images. Imagine a full radiology reading room that you can take anywhere in a highly portable package! At RSNA, we had over 150 attendees try SieVRt and provide us with amazing feedback. We are looking forward to showing our progress at RSNA 2019.

Luxsonic is a leading developer of virtual reality medical software, based in Saskatoon with a satellite office in Toronto. It was founded by Dr. Mike Wesolowski, PhD, an Adjunct Professor of Medical Imaging at the UofS.

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AWARDS AND ACHIEVEMENTS RESIDENTS, FACULTY & STAFF

U OF S MEDICAL IMAGING DEPARTMENT

AWARDS AND ACHIEVEMENTS

from Residents, Faculty & Staff
July 1, 2018 – June 30, 2019

Congratulations to **Kristin Atkinson**, Executive Assistant on her convocation in Business Administration at the Edwards School of Business.
Kristin Atkinson has successfully completed the Leadership Development Program with the Edwards School of Business, UofS – July 2018.
And also received her Administrative Professional Certification, P.A. Douglas & Associates Training Conference– Orlando, Florida – May 2019

Congratulations to **Dr. Haron Obaid** on your Promotion to Full Professor

Vice-Dean Research's Prize for Resident Research in Medical Imaging

Dr. Scott Adams: PGY-2 was awarded $500 for his outstanding dedication to research during his residency

Research Presentation Awards

'Stuart Houston Award for Medical Imaging Research at the University of Saskatchewan' is awarded annually for the best resident research project. $750.00 prize was co-sponsored by Associated Radiologists and University Medical Imaging Consultants

This year it was awarded to: **Dr. Leanne Langford**, PGY-2 for her presentation:

"Determining Residual Gastric Volume in Healthy Children using Ultrasound"

Determining Residual Gastric Volume in Healthy Children using Ultrasound

Leanne Langford[1], Krissie Urmson[2], David Leswick[1], and Tara Sander[2]

Departments of Medical Imaging[1] and Anesthesiology[2], University of Saskatchewan

Research study

OBJECTIVE: Fasting guidelines currently recommend clear fluids up to 2 hours before a procedure in order to reduce pulmonary aspiration risk. It is known that gastric volumes of <1.5mL/kg do not present an increased risk of pulmonary aspiration. Do current fasting guidelines correlate with safe gastric volumes or can fasting times be decreased?

METHODS: This was a prospective study using healthy volunteers aged 1-14 years, who followed ASA fasting guidelines prior to data collection. Gastric ultrasound was performed to determine the antral cross-sectional area. Following baseline measurements, participants consumed 250mL of a clear fluid and gastric volumes were then calculated at 30, 60, 90 and 120 minutes using the formula: Volume (mL) = -7.8 + (3.5 x RLD CSA) + (0.127) x age (months). The primary outcome was to determine the mean gastric volume/weight at 30, 60, 90, and 120 minutes.

RESULTS: Thirty healthy children participated in this study. The mean gastric volume/weight (ml/kg) at baseline was 0.51 mL/kg. The mean gastric volume was 1.55mL/kg at 30 minutes, 1.17 mL/kg at 60 minutes, 0.76 mL/kg at 90 minutes, and 0.59 mL/kg at 120 minutes.

CONCLUSION: Our results confirm that a healthy child's gastric contents are < 1.5mL/kg after 60 minutes, suggesting that current fasting guidelines could be liberalized.

An Honorable mention was given to **Dr. Scott Adams**, PGY-2 for his project, "Patient Perspectives and Priorities Regarding Artificial Intelligence in Medical Imaging" and to **Dr. Raza Naqv**i, PGY-3 for his project "*Comparison of Surgical Intervention Rates for Knee MRI's Ordered by General Practitioners and Orthopedic Surgeons".*

Patient Perspectives and Priorities regarding Artificial Intelligence in Medical Imaging

Scott J. Adams[1], Rachel Tang[2] and Paul Babyn[1]

Department of Medical Imaging[1] and Social Sciences Research Laboratories[2], University of Saskatchewan

Research Project

OBJECTIVE: To better understand patients' perceptions of artificial intelligence (AI) and patients' priorities for AI in medical imaging to inform the development and clinical implementation of AI in medical imaging.

METHODS: A patient engagement workshop was hosted with 17 participants from urban, rural, and remote communities throughout Saskatchewan, Canada, representing Indigenous and non-Indigenous perspectives. Facilitated roundtable discussions were conducted to better understand patients' perceptions of AI and patients' priorities for AI in medical imaging. Concepts from roundtable discussions were coded using NVivo 11 and analyzed using thematic analysis.

RESULTS: Patients' perceptions of AI were captured in the following three themes: fear of the unknown, trust (including uncertainty of what and whom to place trust in—AI or radiologists), and the importance of a human connection when using AI. Patients' priorities for improvements in medical imaging included improving communication, shortening time to diagnosis, reducing wait times, increasing diagnostic accuracy, empowering patients, and increasing access to diagnostic imaging and screening. Enthusiasm and willingness for AI to be used in medical imaging were related to patient age, with greater enthusiasm among younger patients. Patients were comfortable with sharing de-identified imaging data for AI development as long as appropriate safeguards were in place.

CONCLUSIONS: Patients' initial perceptions of AI may lead to reluctance for AI to be used in medical imaging, suggesting the need for patient education efforts. Patients identified numerous areas for improvement in medical imaging which could be enhanced through AI, potentially informing the prioritization of AI use cases.

Comparison of Surgical Intervention for Knee MRIs Ordered by General Practitioners and Orthopedic Surgeons

S Raza Naqvi[1], Cole Beavis[2], Prosanta Mondal[3], Rhonda Bryce[3] and David Leswick[1]

Departments of Medical Imaging[1], Orthopedic Surgery[2] and Community Health and Epidemiology[3], University of Saskatchewan

Research Project

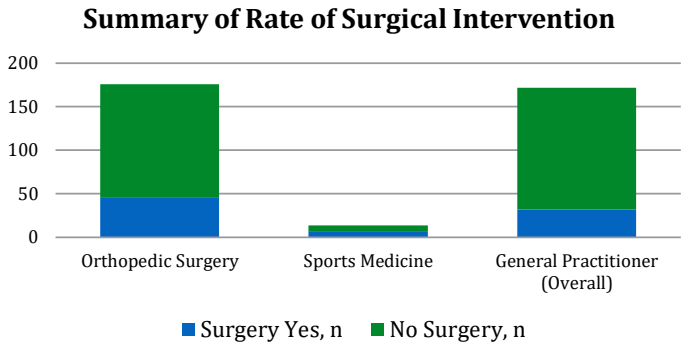
INTRODUCTION: Currently in our health region, access to ordering knee MRIs is limited to specialists. However, general practitioners (GPs) can also order knee MRIs by seeking radiologist's approval or by following up on radiologist's recommendations on knee radiographs and/or ultrasound.

PURPOSE: To compare the surgical outcomes of patients that are referred for MRI directly by orthopedic surgeons versus GPs; and to further analyze the outcomes of subset of patients who attain knee MRIs due to various levels of radiologists' recommendations on prior imaging.

METHODS: Retrospective study of 363 patients referred by GPs (n=173), orthopedic surgeons (n=176), and sports medicine (n=14) for knee MRIs in Saskatoon during 2017. Radiologist recommendations for GP cases were grouped as "verbal discussion" of the case or by comment on previous imaging (follow-up of a specific structure, follow-up of a joint effusion, or general statement to get MRI if concerned). Chi-square testing and multivariable logistic regression were used to compare patients by surgical intervention status.

RESULTS: The intervention rate was higher for orthopedic referrals (26%). Overall intervention rate for GPs referrals was 19%, but by recommendation subgroup (verbal discussions or follow-up of specific findings) were 21% and 24% respectively. Mean patient age was higher in GP referrals (46 vs. 38), and older age was associated with less frequent surgery.

CONCLUSION: Surgical intervention following MRI is highest for patients referred by orthopedic surgeons, but some GP referred subgroups are similar. Lower intervention rates among GP patients appear partly attributable to older patient age.



The Best Practice Quality Improvement (PQI) award was won by **Dr. Raza Naqvi,** PGY-3 for his project "The Effect of Coordinated Investigations for Rural Lung Cancer Patients on Traveling and Time to Staging Completion." This $250.00 prize was co-sponsored by Associated Radiologists and University Medical Imaging Consultants.

The Effect of Coordinated Investigations for Rural Lung Cancer Patients on Traveling and Time to Staging Completion

Raza Naqvi[1], Steven Bharadwaj[2], Renee Kennedy[2], Richard Bigsby[2], Paul Babyn[1], C (Anderson) Tyan[3]

Department of Medical Imaging[1], Division of Thoracic Surgery[2], Division of Respirology, Critical Care and Sleep Medicine[3], University of Saskatchewan

PQI Project

INTRODUCTION: In Saskatchewan, the initial diagnostic and staging of the lung cancer patient's journey requires multiple specialized investigations to be completed in Saskatoon. With rural population making up a third of the Saskatchewan's total population, many lung cancer patients are expected to travel long distances. In this study, we aimed to assess the effect of coordinated investigations for rural lung cancer patients on the number of trips to Saskatoon and time to staging completion.

METHODS: In consultation with the thoracic surgery group, we identified grouping diagnostic and staging investigations on a single day as a driver for change. We then approached multiple departments to assess their limitations in completing their prospective testing. Inclusion criteria included patients with high suspicion of lung cancer and those who live more than 100 km away from Saskatoon. A lung cancer diagnostic form (Figure 1) was created to assist with inter-departmental communication. The intervention was implemented in March 2018 and prospective data was collected till March 2019.

RESULTS: 48 biopsy-proven lung cancer patients were included in our baseline data. In the post-intervention period, 43 lung cancer cases were identified. The pre and post-intervention days to staging completion reduced from 37 to 20 days (p=0.001). The pre and post-intervention unique number of trips to Saskatoon reduced from 3.4 to 2.9 trips (p=0.012).

CONCLUSION: The improved inter-departmental communication has resulted in a shift for the better in the number of trips made to Saskatoon and days to staging completion.

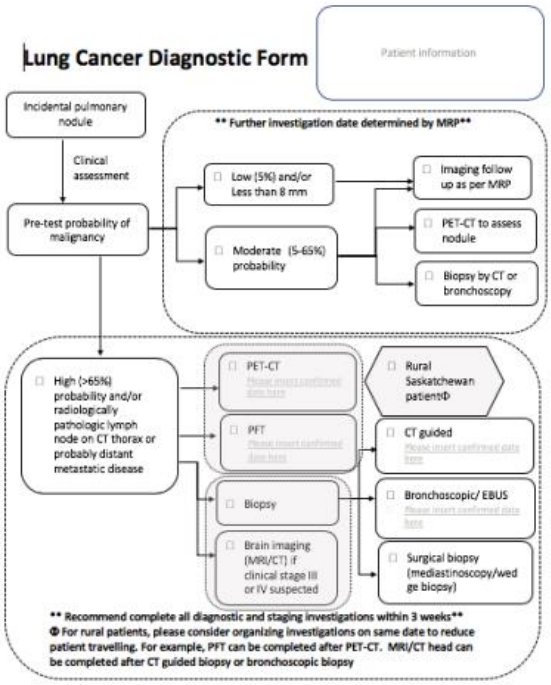


Figure 1: Lung Cancer Diagnostic Form

Honorable mention went to Dr. Graeme Bell, PGY-3 for his project "Implementation of a Tailored MRI Stroke Protocol."

Implementation of a Tailored MRI Stroke Protocol

Graeme Bell and Kyle Moulton

Department of Medical Imaging, University of Saskatchewan

Quality Assurance Project

OBJECTIVE: Patients with acute stroke benefit from prompt diagnosis and treatment. Frequently used MR protocols at our institution contain sequences that add time but do not routinely contribute clinical information in the setting of stroke. There is growing recognition that a core set of specialized MR sequences (DWI, FLAIR, and SWI) is sufficient for making the diagnosis. Through local implementation of a dedicated "stroke" protocol, this initiative aims to achieve reduction in MR acquisition times. A secondary objective assesses for associated reduction in patient wait times.

METHODS: The formalized stroke protocol was implemented in January 2018. Our RIS database was searched for MR brain exams performed for stroke, collecting and reviewing five months of pre-intervention and ten months of post-intervention data, from Sep 2017 – Nov 2018. Two-sided t-tests were performed to test for differences between groups.

RESULTS: Of 477 total MR stroke exams preformed, 393 met inclusion criteria. The fast stroke protocol was used in 115/264 (56.4%) cases post-intervention compared to 8/129 (6.2%) pre-intervention. This resulted in significantly reduced acquisition times, with mean pre- and post-intervention acquisition times of 13.47 and 10.79 minutes, respectively ($p<0.001$). No difference in the rate of non-diagnostic studies between groups was observed. There was no significant difference in turnaround time ($p=0.935$).

CONCLUSIONS/IMPLICATIONS: Introduction of a specialized stroke protocol decreased MR acquisition times thereby improving the stroke imaging pathway at a primary stroke centre. Efforts will be made to further increase local adoption of the new protocol. Dissemination of these findings will encourage similar quality and throughput initiatives.

Congratulations to **Dr. Scott Adams**, PGY-2 in winning the RSNA Roentgen Research Award

Radiological Society of North America Roentgen Resident/Fellow Research Award

This award recognizes "outstanding residents and fellows who have advanced radiologic research. Recipients of this award have published in peer-reviewed journals, presented work at regional and national meetings, received a research grant or contributed to the success of a departmental research program."

The $500 Best Non-Clinician Researcher Presentation Award was won by Una Goncin for her project *"Contrast-Enhanced Perfusion Imaging in Teloest Model Organisms, Rainbow Trout (Onchorhynchus mykiss)."*

Best Clinical Teacher of the Year Award

The Best Clinical Teacher award will be awarded to a radiologist or scientist who has been voted the best teacher by the current cohort of residents in the Royal College program. The Chief Resident obtains the vote from the residents prior to June 1st of each year. **This year's award was given to both Dr. Derek Fladeland & Dr. Jeffrey Bird.**

Best Researcher of the Year Award

The Best Researcher Award will be awarded to one radiologist or scientist who has been voted the best researcher by the Medical Imaging Adjunct Professors. Nominations will be sent to the Chair of the Academic Council prior to the end of April of each year. **This year's award was given to Dr. Steven Machtaler.**

2017 CoMRAD Award Symposium held on February 4, 2019

1st Place – a tie between Audrey Zucker-Levin – Neuroplasticity and function in amputees
Congratulations to **Dr. Scott Adams** (on behalf of **Dr. Haron Obaid**) – *"Development and evaluation of a robotic ultrasound imaging system for musculoskeletal imaging to increase access to care for rural and remote populations."*

CoMRAD College of Medicine Research Awards

The Office of the Vice-Dean Research (OVDR) is proud to offer a competitive funding opportunity open to all faculty members with a primary academic appointment in the College of Medicine (CoM). The primary purpose of the CoMRAD is to provide seed funding for novel pilot and/or feasibility studies that will facilitate future applications to external funding sources on provincial, national, and global levels.

CoMRAD projects are for one year only, and faculty's academic appointment must continue through the end of the full granting period in order to be eligible.

All applications must be uploaded to the **SharePoint** site. No paper copies will be accepted.

For more information: https://medicine.usask.ca/research/comrad.php

Canadian Radiological Foundation Leadership Scholarship presented to Dr. Scott Adams, PGY-2

This award supports Canadian Association of Radiologists' members in developing "leadership skills to become radiology leaders of tomorrow who will shape the future of radiology to ensure quality, elevate service and deliver extraordinary patient care. ... Selection of the scholarship recipient [is] based on the qualities of the candidate that demonstrate that he or she has exceptional leadership potential."

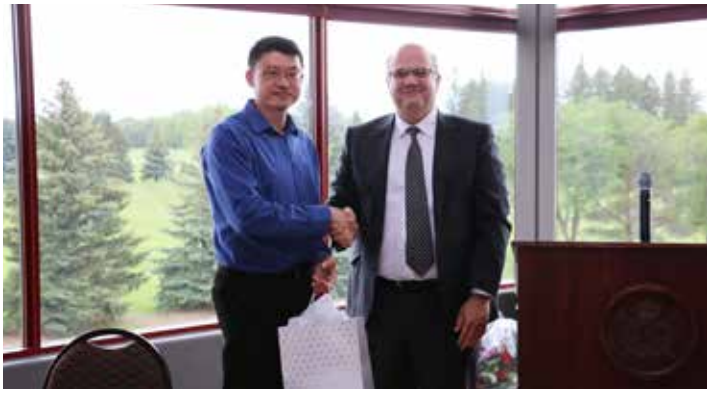
CONGRATULATIONS AND FAREWELL TO OUR PGY-5 RESIDENTS!!!

Dr. Sarah Melendez, Dr. Neil Kalra and Dr. Gage Watson and Dr. Jimmy Wang

Dr. Sarah Melendez

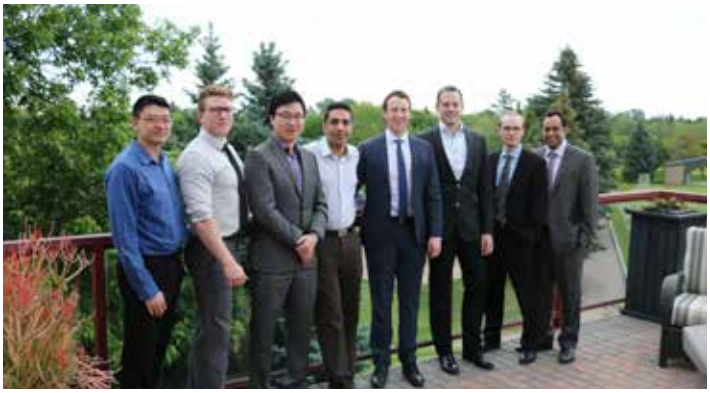
Dr. Gage Watson

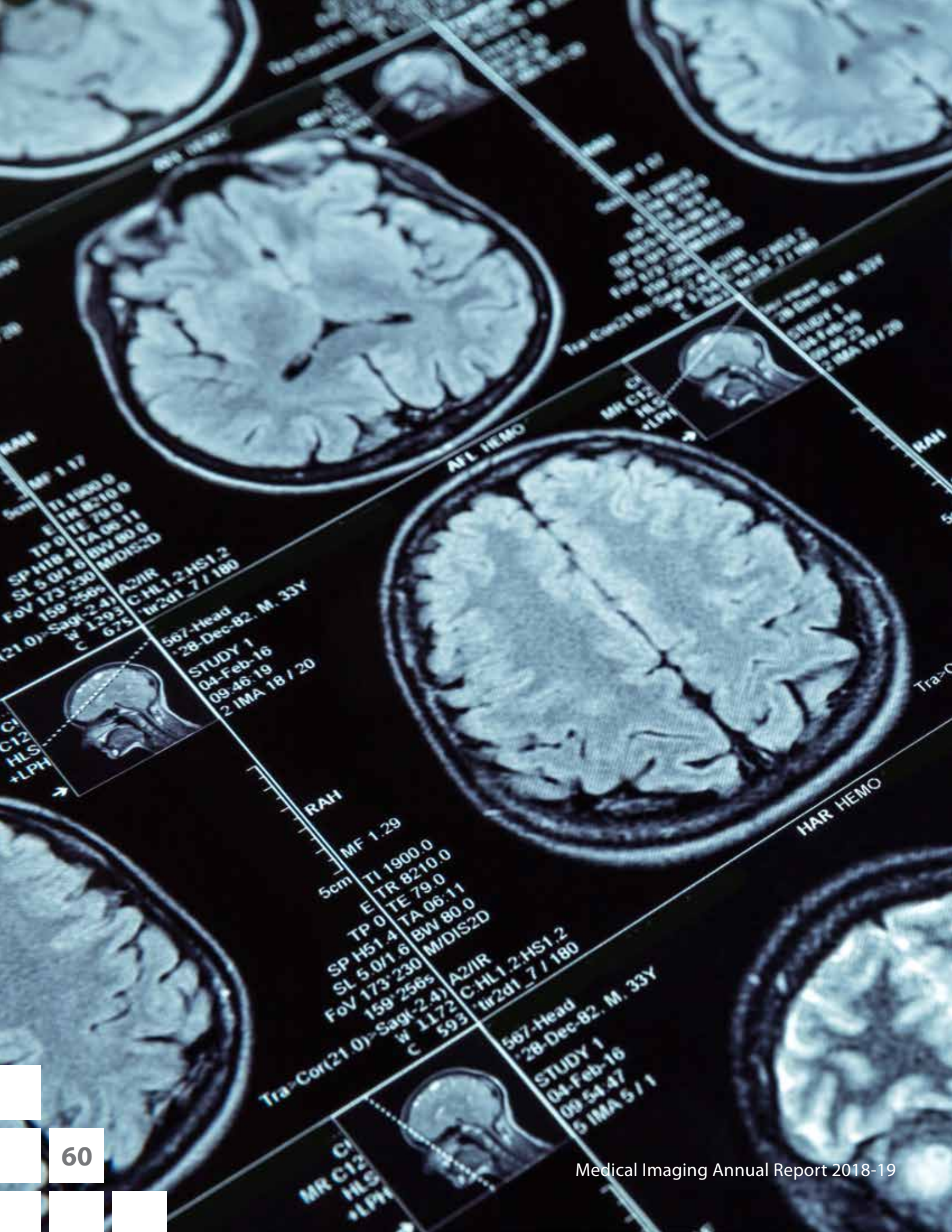
Dr. Neil Kalra



Dr. Jimmy Wang

RESIDENTS FAREWELL & AWARDS DINNER – JUNE 14, 2019

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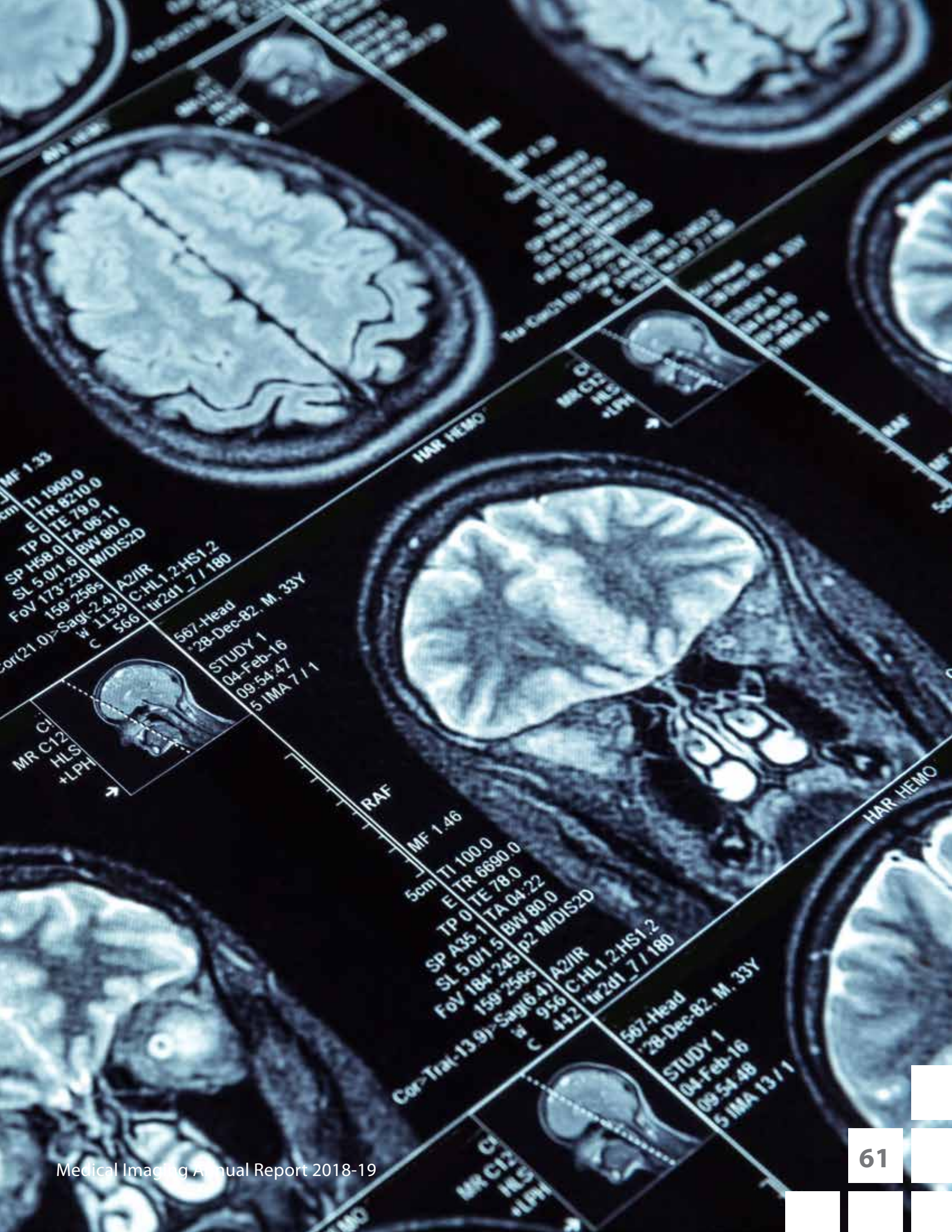
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