

OPEN SKIES

Department of Surgery Newsletter

Vol.4 No.2

March 2017



2nd Year Medical Student, Ali Jamal, testing the U of S Virtual Reality Brain



UNIVERSITY OF
SASKATCHEWAN



Regina Qu'Appelle
HEALTH REGION



This issue of OPEN SKIES highlights the crucial role of technology in the practice of surgery. The members of our Department are applying new technological tools to the treatment of patients, the Nano-Knife and cochlear implant programs are clear examples of these advancements. Potential disruptive technologies such as 3D printing, virtual reality (VR) and remote presence robotic technology are also being pioneered by our faculty in collaboration with computer experts, engineers and imaging specialists. The Remote Presence Medicine Program at the University of Saskatchewan is an international leader in applying remote presence robotic technology for point-of-care delivery of medical services to remote communities. The development of virtual reality modules for teaching and surgical planning are innovative advances and are being assessed for their effectiveness.

An exciting project is the establishment of an "art of the senses" ENT clinic at St. Paul's hospital where patients will receive art, music and writing therapies to enhance and accelerate their recovery. This program aligns well with our Surgical Humanities Program that promotes a holistic approach to the treatment of our patients and the practice of surgery. Finally, the use of technology is an integral part of our academic mission that promotes the exposure of our residents and students to the latest technological advances.

Ivar Mendez, MD, PhD, FRCS, FACS
F.H. Wigmore Professor of Surgery

OPEN SKIES newsletter is a publication of the Department of Surgery at the College of Medicine, University of Saskatchewan.

It is distributed to all surgical faculty, residents and collaborators of the Department of Surgery, as well as surgical teaching centres in Canada and abroad.

Would you prefer an e-mail only version of this newsletter?

Email open.skies@usask.ca with "SUBSCRIBE"

in the subject line and future issues will be emailed to you.

OPEN SKIES Credits

Editor

Dr. Ivar Mendez

Contributors

Dr. Ivar Mendez

Sprockety

Dr. Mike Moser

Dr. Nael Shoman

Dr. Anil Sharma

St. Paul's Hospital Foundation

Scott Adams

RUH Foundation

Design/Digital Production

Department of Surgery

Communications

DEPARTMENT OF SURGERY

College of Medicine

University of Saskatchewan

107 Wiggins Road, Suite B419

Health Sciences Building

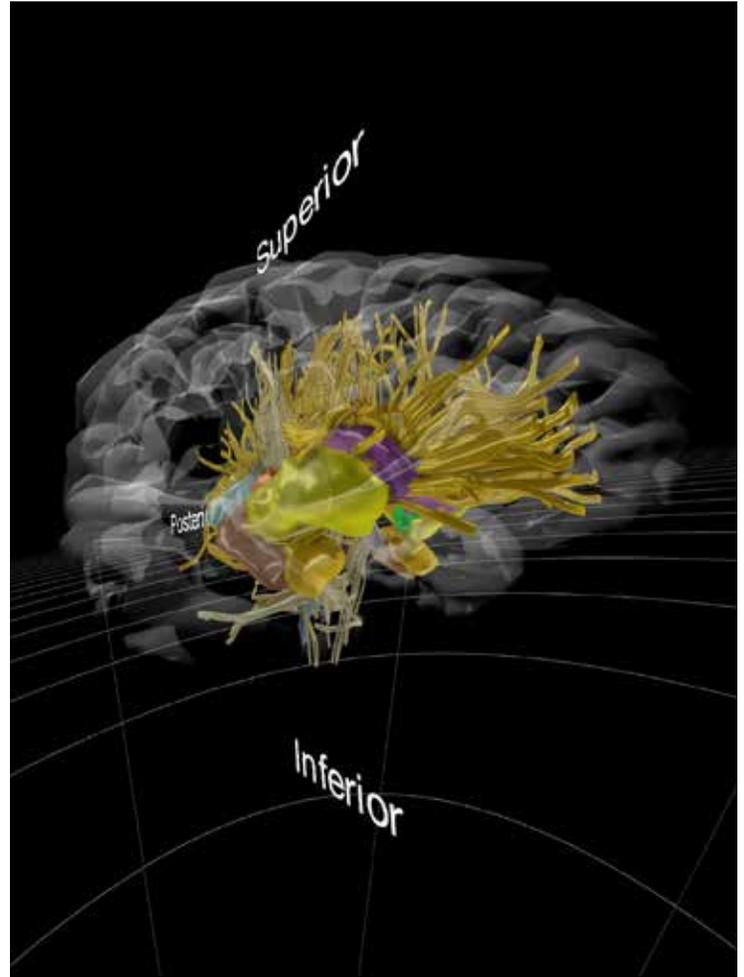
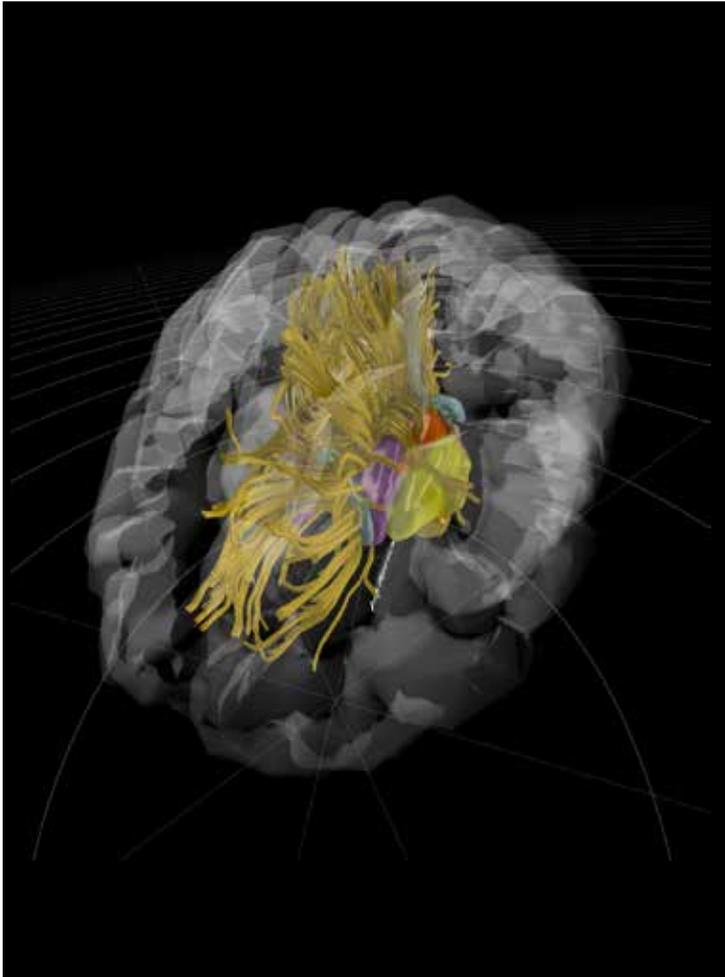
Saskatoon, SK S7N 5E5

TEL: 306.966.7323

FAX: 306.966.8026

Email: open.skies@usask.ca
www.medicine.usask.ca/surgery

VIRTUAL REALITY TECHNOLOGY

*Screen Captures of Virtual Reality Brain*

In partnership with a Saskatoon technology company Sprockety, we have developed a virtual reality (VR) brain module that has the potential to be used for neurosurgical planning as well teaching neuroanatomy. The VR brain has been built from MRI images from a normal brain as well as a patient's brain with a tumor. The structures have been rendered using sophisticated computer algorithms. For example, the white matter tracks have been rendered from Diffusion Tensor Images (DTI) and accurately depict the mass effect of a brain tumor distorting their normal anatomical layout.

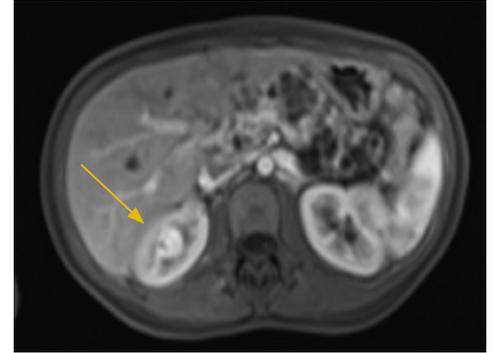
The observer, wears VR goggles and can immerse himself or herself in the virtual reality world of the brain. The VR brain can be moved in any direction, enlarged or shrunk. The observer can virtually walk inside the brain and observe all the structures of the brain. A virtual menu allows for labeling of the brain structures and pathways as well as for making them appear and disappear at will to study and understand their spatial relationship with each other and a pathological process such the mass effect of a brain tumor.

We are currently conducting studies to assess the VR brain value for neuroanatomy teaching for medical students and its potential for surgical planning of complex neurosurgical cases.

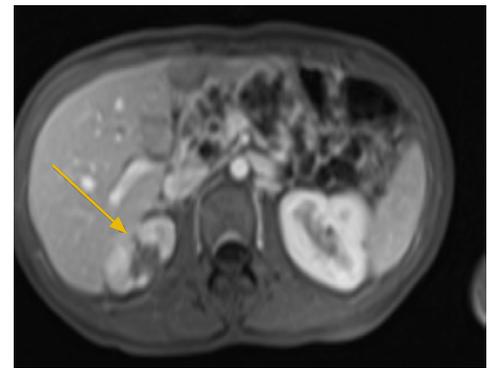
The VR team under the leadership of Dr. Mendez is composed of Ali Jamal, Annalyse Kudryk, Jennifer Mann and Ron Nguyen (Medical Students), Chelsea Ekstrand (PhD Candidate, Department of Psychology), Luis Bustamante (Robotics Engineer, Department of Surgery) and Bruce Cory and Tod Baudais (Sprockety).



NanoKnife® with Dr. Chris Wall, Interventional Radiologist and Dr. Mike Moser, Surgeon



Pre-operative CT slide of a kidney



3 months after NanoKnife®

Saskatoon recently became one of the first centres in Canada to treat patients using Irreversible Electroporation (IRE), also known as NanoKnife®, a tumor ablation technology that destroys cells without heat or radiation. The NanoKnife generates a large (2000 V), but very brief (70 microseconds) electrical current between electrodes that are placed around a tumor, and this current ‘punches’ tiny (nanometer size) holes into cell membranes, leading to cell death. Since there is no heat, the non-cellular connective tissue scaffolding is not affected, and the potential for injury to collagen-rich structures such as ducts, ureters, blood vessels, and nerves is minimal.

A pilot study supported by the St. Paul’s Hospital Foundation led to our group performing the first IRE treatment of a pancreatic and a renal cell cancer in Canada in the fall of 2015. Since then, our group has used NanoKnife in 14 cases and early follow-up supports the efficacy and safety of this technology. With funding from the Saskatoon Health Region, a clinical trial of IRE for small renal tumors close to major vessels or the ureter is underway, a collaborative work between the Departments of Surgery and Diagnostic Imaging (Drs. Jana, Domes, Wall, and Moser). Treating these centrally-located tumors with NanoKnife has the potential of avoiding nephrectomy and even avoiding the need for dialysis in some of these patients.

An American study of 200 patients with stage III pancreatic cancer undergoing NanoKnife reported zero cases of pancreatitis and a median survival of 25 months (9-12 months in historical controls). Recently, our Minister of Health has approved coverage for Saskatchewan residents with locally advanced pancreatic cancer to undergo NanoKnife treatment.

NanoKnife has been used in the treatment of liver, prostate, lung, and brain tumors and has the potential for use on just about any small, localized tumor. A visionary St. Paul’s Hospital Foundation, Saskatoon Health Region, and Ministry of Health, and the collaborative environment that exists between Oncology, Interventional Radiology, and Surgery were crucial in Saskatoon pioneering this new technology that is likely to improve the survival and the quality of life of many cancer patients.

ART OF THE SENSES ENT CLINIC AT ST PAUL'S

05



Dr. Anil Sharma, ENT Surgeon

Patients who are experiencing a temporary or permanent loss of a sense can greatly benefit from the healing therapies of art, music and writing. These therapies are crucial to healing and adjusting to a new way of life.

At St. Paul's Hospital, these therapies are delivered through the Healing Arts Program, to which patients are referred by their health care provider. Therapy is provided in the Healing Arts studio, in common areas, or at the bedside for patients that have more acute needs.

At the new ENT Clinic, Healing Arts Program staff will visit every patient who requires a hospital stay prior to their surgery to discuss how healing art therapies may benefit them as part of their daily post-operative and recovery process. Dr. Sharma and other staff of the ENT Clinic will also be actively conducting ongoing research in order to gain insight about the types of patients who could benefit most from healing art therapies. This research will help determine the medical management of St. Paul's Hospital ENT patients over the long-term.

In addition to advancing patient recovery, Dr. Sharma believes the arts can contribute to developing more compassionate, caring and observant medical practitioners. Having Healing Art Therapies as part of the daily practice at the Clinic will work to further advance this understanding with physicians, and with medical residents working there.

The creation of an ENT clinic will provide a way for specialists to accurately diagnose and treat ear, nose and throat disorders efficiently and right at the patient bedside. New equipment at the ENT Clinic will mean that a number of less complex treatments can be handled right in Ambulatory Care, bypassing the need to go through the Operating Rooms. Patient care will also be advanced at the ENT Clinic. The Clinic will provide a single site for patients to be evaluated by their entire health care team. This means that the ENT specialist, speech pathologist, arts therapist and other caregivers can provide the necessary care in just a single visit, meaning that patients will not need to come back again and again for different appointments, which will significantly improve the patient experience.

The Integration of the Healing Arts with the ENT Clinic means that more patients will receive art, music and writing therapy, which has been shown to lead to faster recovery, particularly for ENT patients.



*Marlessa Wesolowski, Healing Arts Program
(Images Credit: Electric Umbrella)*

**For more information or to contribute contact
St. Paul's Hospital Foundation**

*Dr. Nael Shoman, Neuro-otologist Surgeon**Implantable Hearing Device*

The Saskatchewan Cochlear Implant Program is the provincial center for implantable hearing devices, including cochlear implants, bone anchored hearing devices, and middle ear implants. The program is based in Saskatoon, and functions out of Royal University Hospital, Saskatoon City Hospital, and the Saskatchewan Hearing Aid Plan (HAP). The program initiated in 1994, with full preoperative assessments and evaluations, as well as postoperative activations and rehabilitation. Throughout the years, the surgical component was carried out in Edmonton where patients would meet the surgeon then come back for their surgery at a later date. In 2013, Saskatchewan's first adult cochlear recipient was done at St Paul's Hospital, and in early 2014 the first pediatric cochlear implant patient received surgery at Royal University Hospital. From then on, all patients in Saskatchewan who are deemed potential cochlear implant candidates have had their assessments, surgical procedures, activations, and rehabilitation, done locally in Saskatoon. The first North American Oticon Neuro System cochlear implant surgery was performed at St. Paul's Hospital in Saskatoon in August 2016. Currently, the program includes one neurotologist, three adult implant audiologists, and two pediatric implant audiologists.

As with cochlear implants, Saskatchewan residents also went to Edmonton for surgical placement of the Cochlear BAHA™. In 2013, BAHA surgery was started in Saskatoon, and the program has since expanded to offer other bone anchored hearing devices. These include the Oticon Ponto™, as well as the MedEl Bonebridge™ and the Cochlear Attract™ transcutaneous bone conduction devices. The Bonebridge became Health Canada approved for children in September 2015, and Saskatoon has since implanted one of the largest number of pediatric patients of all Canadian implant centers.

The Saskatchewan Implant Program continues to develop innovative measures to improve access to all patients who may potentially benefit from implantable hearing devices, building on a strong foundation of infrastructural support and audiological experiences spanning over two decades.

TELEROBOTIC ULTRASOUND SYSTEM

07



Remote Site Ultrasound Examination



Central Site Expert Sonographer

In many rural and remote communities, ultrasound imaging is simply not available due to a lack of radiologists, technologists and infrastructure. As a result, in some cases patients, both inpatients and outpatients, must travel or be transferred to secondary or tertiary care centres. This can delay diagnosis and subsequent treatment, burden patients and their families and increase healthcare costs.

Our team led by Dr. Ivar Mendez along with Dr. Paul Babyn, Dr. Brent Burbridge and Scott Adams has trialled a telerobotic ultrasound system to perform remote abdominal and obstetrical ultrasound studies. Using a telerobotic ultrasound system, a sonographer could remotely control all fine movements of the ultrasound transducer including rotating, rocking and tilting by manipulating a mock transducer at a central site. The sonographer communicated in real time with the patient and an assistant at the patient's site through a videoconferencing system, the assistant does not need expertise. In our studies, we compared head-to-head direct conventional ultrasonography and robotic ultrasound examinations. These studies demonstrated the feasibility of remote robotic ultrasound examinations.

In the coming months we plan to establish remote ultrasound clinics in two remote underserved northern Saskatchewan communities. We believe a network of telerobotic ultrasound systems in rural, remote or low-volume centres established in partnership with local communities will fill an unmet need in providing timely access to ultrasound services for both routine and emergent cases. Remote presence technologies such as robotic ultrasound imaging may improve equality in healthcare delivery in both industrialized and developing countries. This will be important in the delivery of healthcare services in a timely, cost-effective fashion in the future.

SURGERY FAMILY WAITING ROOM



*Newly Renovated Royal University Hospital Surgery Family Waiting Room
(Generously donated by the Royal University Hospital Foundation)*



NEW APPOINTMENT IN SURGERY

Dr. John Shaw has been appointed Head of the Division of General Surgery. He is a Clinical Professor in General and Hepatobiliary Surgery working at the Royal University Hospital since 2009. He has served as the Assistant Program Director in General Surgery since 2014. His General Surgery Residency, Hepatobiliary Fellowship, Masters of Medicine in Surgery were completed at Groote Schuur Hospital and the University of Cape Town in South Africa. He became a full time Hepatobiliary Consultant, Lecturer and was Program Director for general surgery at the University of Cape Town prior to immigrating to Canada with his family in 2009. He has completed his Canadian equivalency exams (LMCC and the FRCS) and has a number of peer-reviewed journal publications and book chapters to his name. He is married with two daughters and is happy to call Saskatoon home.