



The post-antibiotic world:
How ready are we, really?

+ *Working your way* into industry

MADE
by McGill



PHOTO BY JON ROU

Scalpel... sponge... wand

by Philip Fine



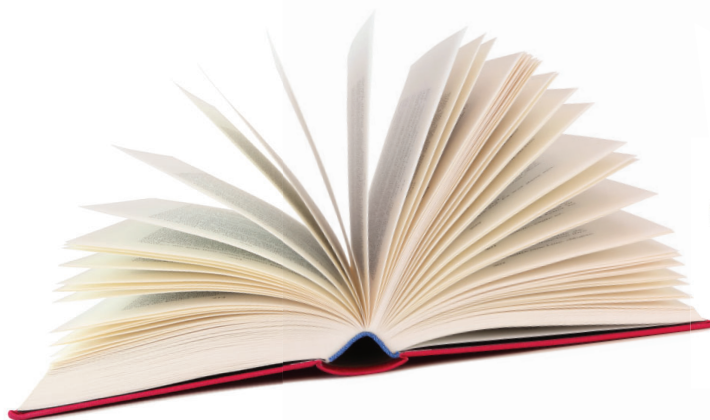
As a pediatric orthopedic surgeon, John Hsu, MDCM'61, used a few tricks to convince his young patients to be examined. Literally. "If you produce a coin or a candy and then you make it disappear, then the kid starts examining you," says the hobby magician. And voilà: license to move a hip or check a brace. "You would see the look on their face. They get delighted, all of a sudden. And then you know you've won the battle."

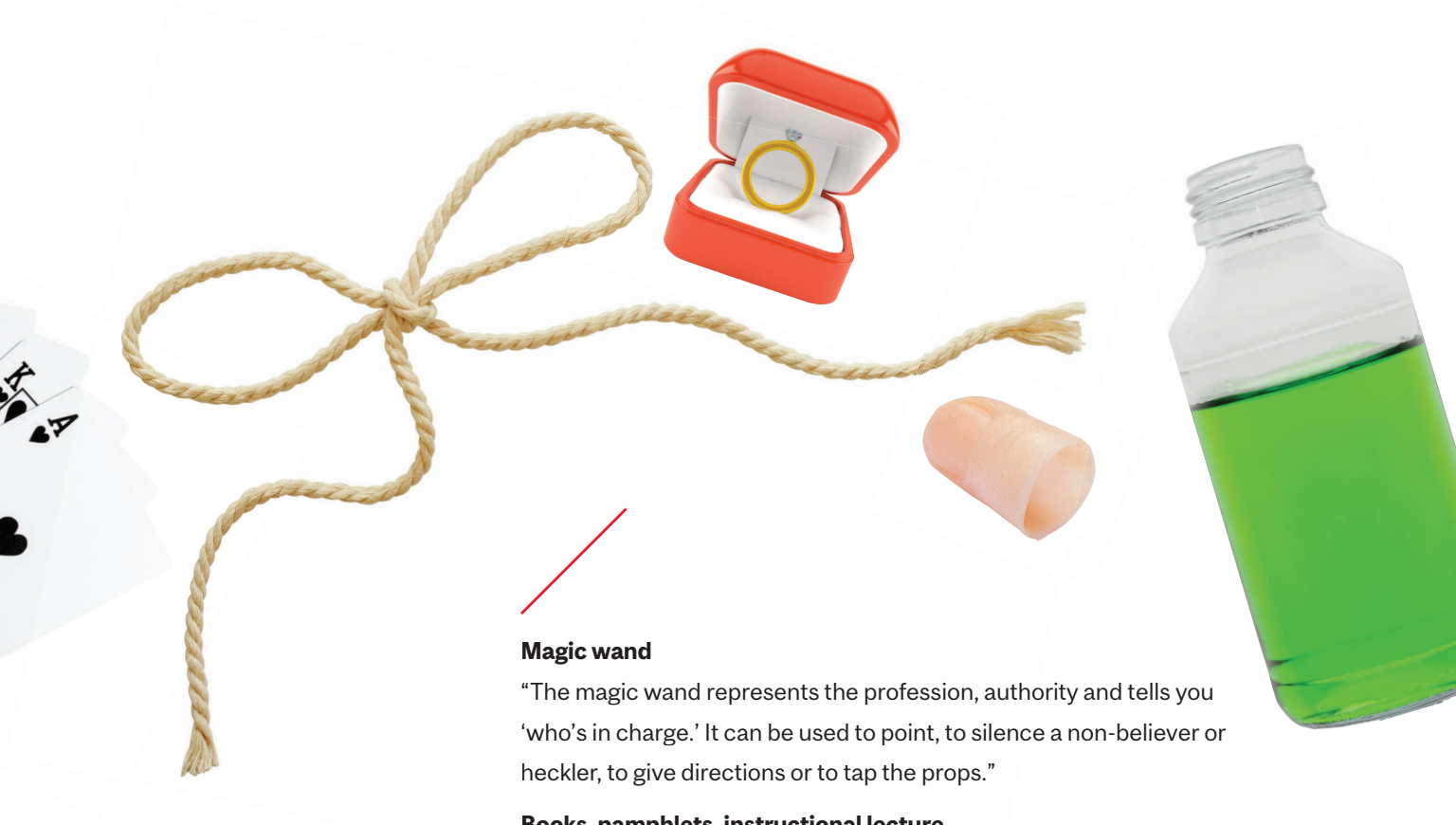
Hsu spent many years practising what's known as table-top magic, employing items such as cards, coins or sponge balls. As a McGill student, magic would sometimes be just the trick to get him and a friend out of a social obligation. They'd perform their routine, leave the crowd speechless, and make a swift exit.

Hsu, who is now retired, worked for most of his career at Rancho Los Amigos National Rehabilitation Center in Los Angeles, where he became Chair of Surgery. He would often take his staff to shows at Magic Castle, a renowned private nightclub in Hollywood for magicians and magic enthusiasts to which he belongs.

Hsu's stories of Montreal in the 1950s sound, dare we say, magical. In the winter, he would head to Mount Royal with pals from Nursing, who would bring metal bed pans to use as sleds to careen down the slopes. He travelled by street car around the city, the inexpensive tours allowing him to visit magic shops on Jean Talon St. or explore a new part of town.

A proud alumnus, he regularly comes back to the city to see his wife's relatives. He cherishes the memories that, unlike the coins and candy found behind a child's ear, will never disappear.





Magic wand

“The magic wand represents the profession, authority and tells you ‘who’s in charge.’ It can be used to point, to silence a non-believer or heckler, to give directions or to tap the props.”

Books, pamphlets, instructional lecture

“Magicians who invent tricks or give lectures usually summarize them in lecture notes and pictures, DVDs or illustrations. Most of my magic knowledge comes from reading books.”

Coins

“Changing the colour of silver or gold coins is a favourite magic trick. Also, pulling a coin out of a child’s ear usually fascinates them. I use it frequently when I examine children to get them to cooperate.”

Playing cards

“Magicians always carry a deck of cards. The most frequent trick is to be able to find a single selected card.”

Rope

“One of the classical items for the close-up magician, rope is used to demonstrate their skill in giving the audience a sense of mystery.”

Ring box

“Magicians like to borrow rings from people and have them reappear in a box.”

Thumb tip

“The thumb tip was invented about 40 years ago and can help make fairly large objects ‘vanish.’”

Bottle of chemicals

“Chemicals are frequently used to effect colour changes.”

(As told to Philip Fine by John Hsu.)

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Editor

Anne Chudobiak

Copy editors

Philip Fine
Gillian Woodford

Cover art by

Sébastien Thibault

Design

Lisa Kisiel
Mario Marandola
*Communications and
External Relations*

Contributors

Gail Yenta Beck, MDCM'78
Brenda Branswell
Matthew Brett
Chris Chipello
Jason Clement
Daylen Conserve
Jacqueline Di Bartolomeo
Joni Dufour

Lisa Dutton
Owen Egan
Philip Fine
Dr. Céline Giordano
Luca Martial
Frédérique Mazerolle
Neale McDevitt
Michelle Pucci
Jon Rou
Joy Tseng, BSc'17
Mark Witten
Gillian Woodford

Facebook: McGill Faculty of Medicine

Instagram: McGillMed

Twitter: @McGillMed @McGillMedAlumni

Alumni: www.mcgill.ca/facmed-alumni/

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Whether to react to a story, to share
a story of your own, or to change your
address, please contact the editor at
anne.chudobiak@mcgill.ca or
514-398-1314.



Healthier societies, Made by McGill



Canada's first faculty of medicine began with the core belief that knowledge and compassion can eradicate suffering and disease. Nearing 200 years later, our belief remains the same, while so much around us has dramatically changed.

An explosion of scientific advances—from genomics and epigenetics to big data, high-resolution imaging and nanotechnologies—now illuminates the mechanisms of countless diseases. What was formerly the stuff of science fiction has become routine.

Today, the promise of better health for millions is greater than at any time in human history. And yet, the challenges are manifold.

Cancer strikes one in two individuals. Pandemics loom—as does the spectre of a post-antibiotic world. Meanwhile, social and economic disparities remain entrenched. Access to care and health outcomes are woefully—indeed *shamefully*—unequal, even in the richest countries.

As we approach our third century, we're unveiling our vision to reshape teaching, research and, ultimately, health care. Together, we can turn the major health challenges of the 21st century into great opportunities.

At the heart of our vision: unite our strengths in a renewed Faculty—of Medicine *and* Health Sciences—one that recognizes our distinguished past and all we have become. We have world-class expertise in Medicine, yes, but also in Nursing, Physical and Occupational Therapy, and Communication Sciences and Disorders. There is our history of leadership in the Biomedical Sciences, and the strides we are making in genomics and computational medicine. We promote excellence in education with the recently launched Institute of Health Sciences Education and our soon-to-come Centre for Interprofessional Education. Our name and structure should reflect this breadth.

As the University launches Made by McGill: the Campaign for Our Third Century, we commit to:

Train future-ready health professionals and scientists.

We will innovate in teaching and learning, and create spaces equal to our ambitions, revitalizing the McIntyre Medical Sciences Building as a crucial first step. Thank you to all of you who have made this cause your own already!

Break down walls to discover and innovate. We are pioneering a new era of discovery focused on humanity's biggest health challenges. This means tackling the hardest to treat cancers at the Rosalind and Morris Goodman Cancer Research Centre; overcoming antibiotic resistance, and defeating infectious and immune-mediated diseases with the McGill Interdisciplinary Initiative in Infection and Immunity (MI4); creating a powerhouse in genomic medicine to target disease with personalized treatments; pioneering regenerative medicine to cure "from within"; applying big-data research at the Ludmer Centre for Neuroinformatics & Mental Health; driving clinical innovation across the McGill health network; and championing "open science" at The Neuro.

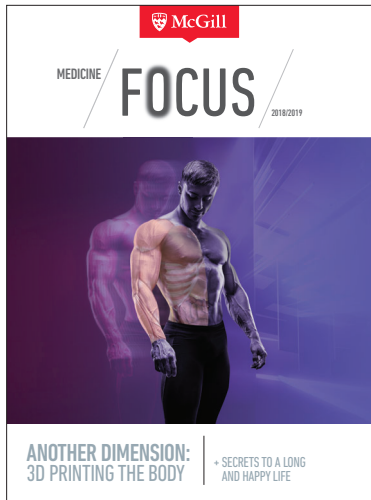
Help heal communities locally and globally. We will continue to build strong partnerships here and around the world through our new McGill School of Population and Global Health, to better understand and identify the major drivers of disease and to target health inequities. We will continue collaborating with Canada's Indigenous communities, and we will take on the mental health crisis afflicting youth.

Since our inception, we've had the great fortune to attract brilliant educators, researchers and students to the Faculty. This, too, has not changed. We have amazing potential—in this city, with our alumni and partners worldwide—to continue improving health for societies. We have the science and expertise. And we have the vision, together with the compassion and *determination* to do it. All we need is you.

Thank you in advance for joining with us to help realize this vision.

David Eidelman, MDCM'79
Vice-Principal (Health Affairs)
Dean, Faculty of Medicine

You tell us



Something's gotta give

(*"Simulation for caregivers" and "Closing the gender gap," Medicine Focus 2018–2019*)

Appreciated @McGillMedAlumni's Medicine Focus publication including #caregiving and caregiver support needs in two of their articles. Supporting caregivers supports everyone, including patients.

It also helps caregivers lead in other areas, like teaching (1st article) and research (2nd), too!

— Aimee Castro, BSc'13, MSc(A)'18, and PhD student at the Ingram School of Nursing, via Twitter

Lives well lived

(*"Secrets to a long and happy life," Medicine Focus 2018–2019*)

I thought this was so beautifully done. What a great way to honour someone. In fact, years ago, my husband and I occasionally played golf with Edith Levy [MDCM'42]. She was a lovely woman and I must admit, I never knew her story.

— Kappy Flanders, LLD

The B-Side

(*"Dr. Alice Benjamin: Grateful patients give birth to new fund," Medicine Focus 2018–2019*)

Everyone's angel <3 <3 <3

— Roula Vrentzos via Instagram

Dr. Benjamin is a wonderful person and a thoughtful and caring OB/GYN. She delivered my second child in 2002, a C-section, and I am greatly thankful to have had such a caring, skilled physician in my life. Thank you, Dr. Benjamin!

— Dr. Suzan Al-Khodair, PGME'03, via Twitter

Naming names

(*"On watch," Medicine Focus 2018–2019*)



Doulia Hamad MD @Doulia_Hamad · Jul 12, 2018

Not to forget Mame Daro Faye, also @McGillAlumni & classmate featured here. As well, without numerous other contributing students, supportive faculty and collaborators (importantly Suicide Action Montreal) this training would not have been possible!



McGill Medicine @McGillMed · Jul 12, 2018

Medicine Class of 2018 supports expanded Sentinel suicide prevention training publications.mcgill.ca/medinfocus/201...
@Doulia_Hamad @mjkoziol @McGillAlumni





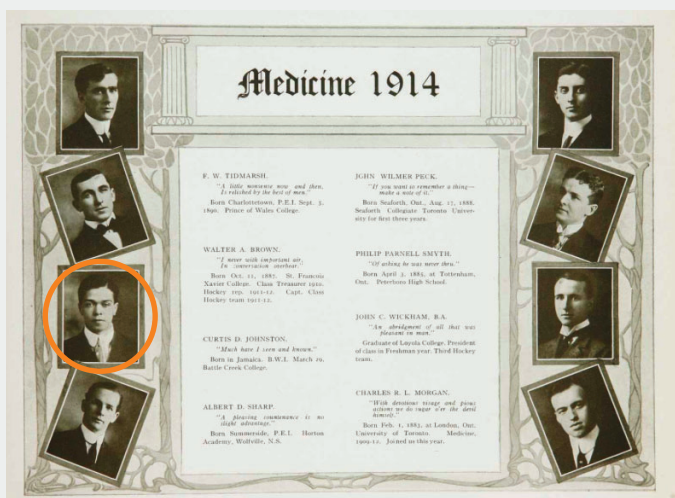
OLD MCGILL

Setting the record straight

I hope all is well. I actually had come across the article, "Canada 150: No Prescription for Prejudiced Patients," by Rachel Décoste, which stated that McGill did not admit any black students until the 1920s. From researching family history, I discovered that Dr. Curtis D. Johnston (my great-great-grandmother's first cousin) graduated from McGill Medicine in 1914. I was able to find his class photos in the online yearbook and have included them here. As well, I was able to find additional information about him through a published paper by Dr. Jacalyn Duffin (2000) entitled, "Poisoning the Spindle: Serendipity and Discovery of the Anti-Tumor Properties of the Vinca Alkaloids." Dr. Johnston is mentioned on pages 160, 162, 163.

— Hailey Lawson

Editor's note: As mentioned in our last issue, the first black medical student at McGill was likely William Wright, MDCM 1848, who went on to chair the Department of Pharmacology & Therapeutics for almost thirty years.



OLD MCGILL

Got your magazine in the mail today. There were a number of stories on science advances from faculty that interested me, e.g., autism, breast cancer, but I was really frustrated that there were no references/citations given. The readership for this magazine has got to be a sophisticated one ... if the stories are going to be so short, with big fonts and colour, and photos dominating over actual content, so be it, but in that context it would be particularly helpful to provide citations to the new research being described. This can quickly give an idea about the currency and prominence of the information, and make it much easier for the readership to chase down the details if the blurb you put in generates interest.

— Torsten O. Nielsen, PhD'96, MDCM'97

Send your comments to anne.chudobiak@mcgill.ca

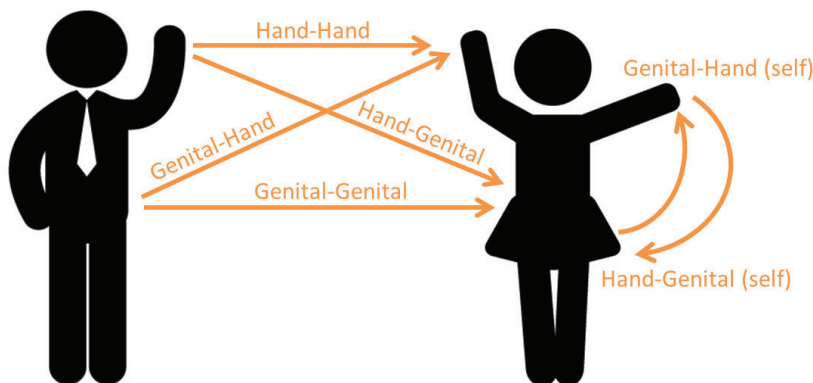
The music of neurodiversity

COURTESY OF ALISON USHER-JONES



Engaging in musical activities such as singing and playing instruments in one-on-one therapy can improve autistic children's social communication skills, improve their family's quality of life, and increase brain connectivity in key networks, according to researchers at the Université de Montréal and the McGill School of Communication Sciences and Disorders (SCSD). A recent joint clinical trial is the first to show that music intervention for school-age children with autism can lead to improvements in both communication and brain connectivity, and provides a possible neuroscientific explanation for improvements in communication. "The universal appeal of music makes it globally applicable, and it can be implemented with relatively few resources on a large scale in multiple settings, such as home and school," says Dr. Aparna Nadig, Associate Professor at SCSD and co-senior author of the study. — (McGill Newsroom)

"Hand"-ling HPV



Commonly known as HPV, human papillomavirus is a virus that infects the skin and genital area, in many cases leading to a variety of genital, anal and oropharyngeal cancers in men and women. Strong evidence exists showing that penetrative genital sex and oral sex can transmit HPV. While HPV is often detected in the hands, the question of whether hand-to-genital contact can transmit HPV has long been a source of debate among researchers. A new study, led by researchers at McGill's Faculty of Medicine and published in *The Lancet Infectious Diseases*, aims to solve that debate. Their conclusion: Unlike being genital

HPV-positive, having HPV in the hand does not increase the risk of transmitting it to a sexual partner. Dr. Talía Malagón, a postdoctoral researcher in the Gerald Bronfman Department of Oncology and the paper's first author, notes that the results do not necessarily mean that it is impossible to transmit HPV through hand-genital sex. "It just means that if hand-to-genital HPV transmission does happen, we have not observed it, and it is therefore rare and unlikely to explain how most HPV gets transmitted."

— (Jason Clement, Med e-News)

Fountain of youth?

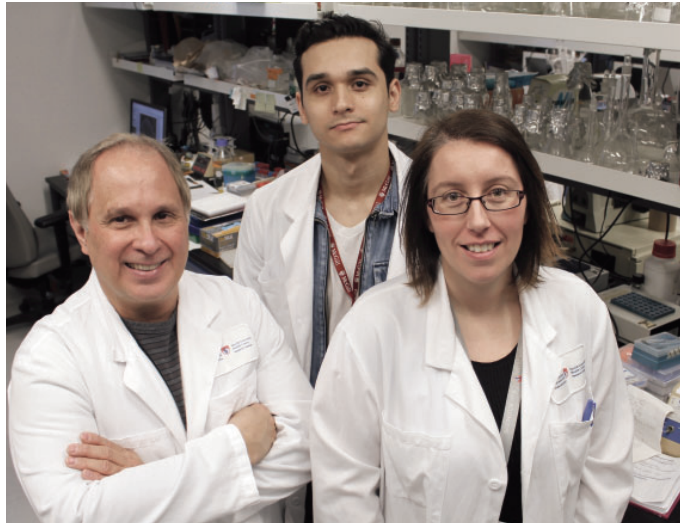
You are what you eat. Or so the saying goes. Science now tells us that we are what the bacteria living in our intestinal tract eat, and this could have an influence on how well we age. Building on this, McGill scientists fed fruit flies a combination of probiotics and an herbal supplement called Triphala that was able to prolong the flies' longevity by 60 percent and protect them against chronic diseases associated with aging. "Probiotics dramatically change the architecture of the gut microbiota, not only in its composition but also with respect to how the foods that we eat are metabolized," says Satya Prakash, PhD'96, a professor in the departments of Biomedical Engineering and Physiology, and senior author of the study.

— (McGill Newsroom)



Hide and seek

COURTESY OF MCGILL NEWSROOM



New McGill research shows that a virus infecting the *Leishmania* parasite spreads by exploiting a mechanism used for cell-to-cell communication, a discovery that could pave the way to new vaccines against infections that can cause severe disfigurement and death.

Much like animals, viruses evolve to improve their chances of survival. Every year, the influenza virus spreads by changing key proteins on its surface to trick our immune system into thinking that it never encountered the pathogen. The herpes simplex virus, on the other hand, lies hidden in the brain—an area that is off limits to our body's defences—until the next time it is ready to attack.

Martin Olivier, PhD'88, Professor, Microbiology and Immunology, and a senior scientist from the Infectious Diseases and Immunity in Global Health Program at the Research Institute of the McGill University Health Centre (RI-MUHC), has recently shown that a virus that infects a primitive type of cell—the *Leishmania* parasite—employs a ruse to avoid detection.

"This is the first time that a non-enveloped double-stranded RNA virus is shown to be capable of exploiting lower eukaryotic exosomes to gain an envelope," says Olivier, adding that this provides us with a new model to study virus biology and could lead to the development of a vaccine to protect against one strain of *Leishmania*.

The *Leishmania* parasite, mostly found in tropical areas, is transmitted by the female sandfly and leads to about one million cases of leishmaniasis yearly, killing thousands and leaving many others disfigured. — (McGill Newsroom)



EMMANUEL BARRAUD

Back on their feet

Three men who had been partially or completely paralyzed from the waist down for years are able to walk again, thanks to a novel combination of precise electrical stimulation of their spinal cords and intensive, robot-assisted overground body weight support training.

A team of Swiss scientists, led by neuroscientist Dr. Gregoire Courtine from the École Polytechnique Fédérale de Lausanne and neurosurgeon Dr. Jocelyne Bloch of the Lausanne University Hospital, earned international attention recently when they reported the breakthrough results from the STIMO (STimulation Movement Overground) study in the journal *Nature*.

McGill nursing graduate Molywan Vat, BSc'10, MSc'13, was hired by Bloch as clinical trial coordinator in 2016 and has played a pivotal role in helping steer the team toward a successful outcome.

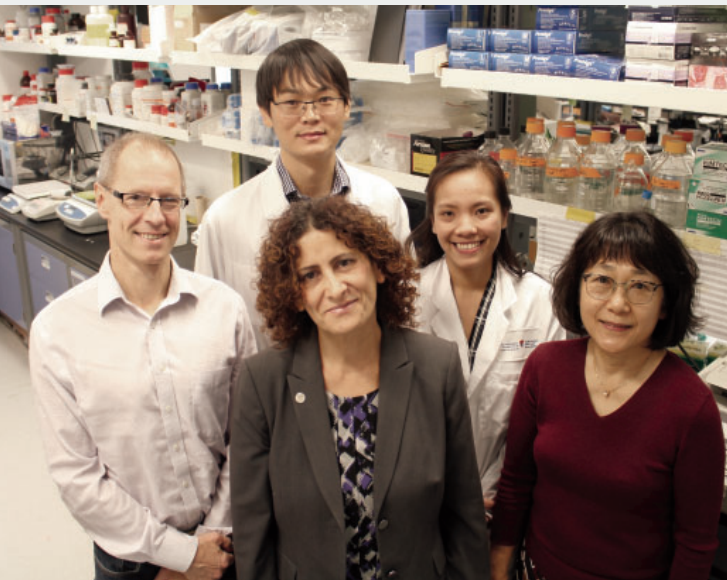
"I work with the engineering team who develop our technology devices, and the clinicians and physical therapists. I'm the eyes of the clinical PI, Dr. Bloch, and assist her in the operating room, implanting the electrodes and neurostimulator. I'm also the hotline for patients for their health and medical issues," says Vat, who took elective neuroscience courses at McGill and worked as a clinical trial coordinator at the Institut de Cardiologie de Montréal after graduating.

The patients had to learn how to use the targeted stimulation to coordinate their intention to walk. Within a week of starting treatment, they progressed from stepping on a treadmill to walking on the ground with support. After months of training, the patients were able to walk hands-free for more than a kilometre on a treadmill using stimulation, without showing signs of muscle fatigue or a deterioration in stepping quality.

Preventing injuries was another challenge. "Due to their spinal cord injuries, patients are at risk of bone fracture, ankle sprain, scoliosis, falls and muscle inflammation during the training phase. We were able to optimize rehabilitation to minimize injury risk. Physical therapists were supervising each training session and I was there to get the necessary medical follow-up for adverse events," explains Vat.

McGill physical therapy graduate Valentin Radevich, BSc'16, MSc'17, who did a master's neurology rehabilitation internship at Lausanne University Hospital, joined the STIMO team last August to work with patients in the training sessions. "The engineers have come up with new techniques for rehabilitation, which can be customized for each patient's walking pattern, so their walking becomes more natural and fluid. It's exciting to be part of a breakthrough that's changing their lives," says Radevich.

— (Mark Witten, McGill News)

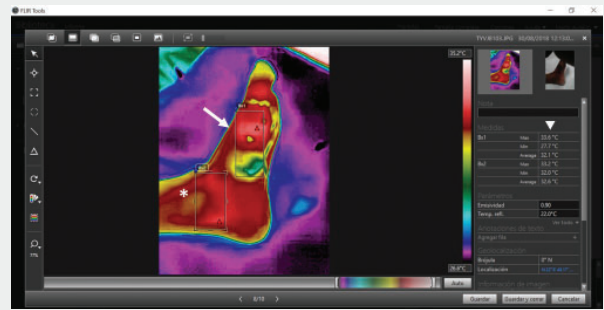


COURTESY OF MUHC NEWSROOM

Genetic breakthrough

A team of scientists at the Research Institute of the McGill University Health Centre (RI-MUHC) and McGill have identified three genes responsible for recurrent molar pregnancies, a rare complication that occurs when a non-viable fertilized egg implants in the uterus. The results of this study, published in the *American Journal of Human Genetics*, could have important implications, since little is known about the genetic causes of fetal loss. “Our findings add three new genes to the list of mutations leading to fetal loss,” says lead study author Dr. Rima Slim, who is a researcher in the Child Health and Human Development Program at the RI-MUHC and Associate Professor of Human Genetics, and Obstetrics and Gynecology at McGill. “This will allow for more DNA testing for patients in order to prevent the recurrence of molar pregnancies and provide better genetic counselling and management for couples.”

— (MUHC Newsroom)



Better decision-making: burns

According to the World Health Organization, approximately 180,000 deaths every year are caused by burns, with the majority occurring in low- and middle-income countries. Upon arriving at the emergency room with a burn, a patient typically undergoes a clinical inspection to assess both the severity of the lesion in relation to the affected area of the body and the depth of the injury (1st-, 2nd- or 3rd-degree burns). Based on this assessment and other considerations, the surgical team makes a decision regarding management of the patient's care.

However, because a wound can change its clinical characteristics in the days following the initial injury, determining the best course of treatment with only clinical inspection has shown to be inaccurate in 30 to 50 percent of cases.

To address this, researchers at McGill's Faculty of Medicine, working in collaboration with Universidad Autonoma de San Luis Potosi in Mexico, have proposed using non-invasive digital infrared thermography within the first three days of a patient suffering a burn in order to better predict the best mode of treatment. Their method is described in a paper published in *PLOS ONE*. Akin to taking a picture with a special camera, the method is painless and requires minimal training.

“Digital infrared thermography allows us to visualize the heat emitted by objects,” explains Dr. José Luis Ramírez García Luna, PhD candidate in the Department of Experimental Surgery and the paper's corresponding author.

The researchers discovered that the temperature difference between the healthy skin and the wound alone is enough to predict how well the lesion will heal. Their algorithm proved accurate 90 percent of the time, both in the development cohort of patients as well as in an independent validation cohort.

— (Jason Clement, Med e-News)

Let's Go 'Jooay'

A group of occupational therapists based at McGill have launched a brand new version of Jooay, a Canada-wide mobile application aimed at connecting families of children with disabilities to leisure activities in their area.

The interactive app, which made its debut in 2015, uses geo-location on users' mobile devices to showcase nearby activities such as arts and recreation programs, sports and day camps, respite homes and support groups.

Jooay is the brainchild of Dr. Keiko Shikako-Thomas, Assistant Professor at McGill's School of Physical & Occupational Therapy (SPOT), and Annette Majnemer, BSc(OT)'80, MSc'85, PhD'90, Vice-Dean, Education, McGill Faculty of Medicine. Working with a team of researchers, rehabilitation professionals, educators, community organizations and parents, their goal is to increase access to information in order to boost participation in leisure activities for children with disabilities.

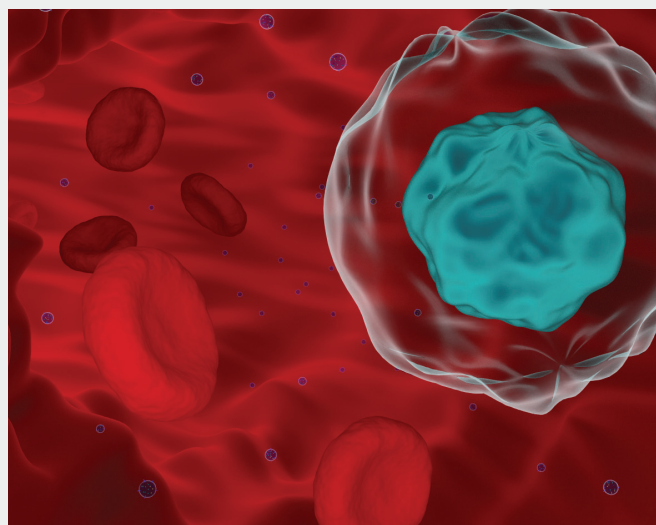
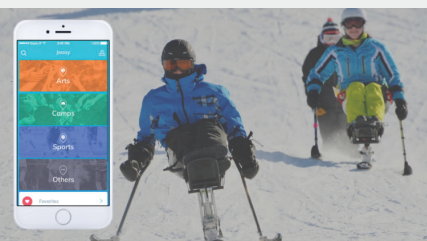
"We wanted it to be an app to help families connect and find solutions," says Shikako-Thomas.

The new and improved version of the app now includes a chat function, as well as increased accessibility features. All are key to creating an online community for sharing information and creating a support network for families and their children.

"We are always so busy trying to find activities that are right for our children. This is really what we needed to make at least this task easier. It also helps to talk to other parents and see what they are doing, what works for them that could work for us, too!" says Dr. Mehrnoosh Movahed, a research associate at SPOT and parent who uses the app.
— (Luca Martial and Jacqueline Di Bartolomeo)



SPOT



Promising new target for immunotherapy

The 2018 Nobel Prize in Physiology or Medicine brought immunotherapy in oncology to global attention. Now, an international team's work has singled out a protein as the next potential target for immunotherapy treatments in patients with cancer and other diseases. Scientists and physicians from the Research Institute of the McGill University Health Centre (RI-MUHC), the Montreal Children's Hospital (MCH-MUHC) and McGill, in collaboration with French teams from AP-HP, Inserm, Université Paris-Descartes, Université Paris-Diderot, and the Imagine Institute at the Necker-Enfants Malades hospital hope that the molecule, TIM-3, might play a key role in the regulation of the immune response.

"This study places the TIM-3 protein at the heart of immune system regulation. We could use it as a target in immunotherapies to trigger enhanced immune responses in patients with cancer and better treat them," says co-lead author of this study, Dr. Nada Jabado, Professor, departments of Pediatrics and Human Genetics, who is a researcher from the Child Health and Human Development Program at the RI-MUHC and a hemato-oncologist at MCH-MUHC.
— (MUHC Newsroom)

Researchers *unlock* mysteries of complex microRNA oncogenes

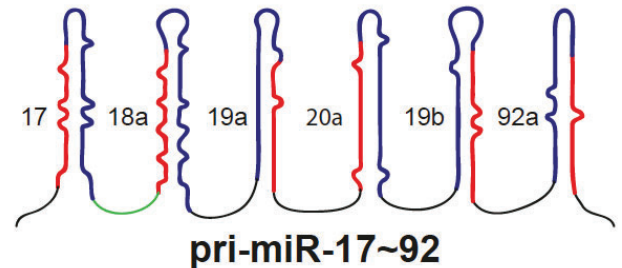
New research led by McGill's Goodman Cancer Research Centre improves our understanding of microRNAs

MicroRNAs are tiny molecules of nucleic acid that control gene expression, acting like a dimmer switch to tone down gene output at key positions in the network of information that governs a cell's function. MicroRNAs are important for the day-to-day inner working of cells and especially important during development. They also become profoundly defective in diseases such as cancer. Unlike most other human or animal genes, microRNAs are often encoded in genomes and expressed as beads-on-a-string groupings known as polycistrons. The purpose for this organization has, until now, been a mystery.

A new collaborative study, led by researchers at the Rosalind and Morris Goodman Cancer Research Centre (GCRC), and published in the journal *Molecular Cell*, set out to solve this mystery, uncovering novel functions for polycistronic microRNAs and showing how cancers such as lymphoma twist these functions to reorganize the information networks that control gene expression.

The researchers made their discovery by examining how strongly the oncogenic microRNA polycistron miR-17-92 was over-expressed in several types of cancer. Surprisingly, this led to only small increases in the mature microRNA expression in the same types of cells. This meant a lot was happening during their biogenesis, especially in cancer, and that there may be more to the purpose of microRNA polycistrons than previously thought.

"Why some microRNAs are expressed as polycistrons, and how cancers such as lymphoma change microRNA biogenesis were not known," explains Dr. Thomas Duchaine, Professor in the Department of Biochemistry, member of the GCRC, and one of the study's authors, with Ariel Donayo, PhD'18. "We were able to identify some mysterious steps in microRNA biogenesis that occur in cell nuclei, which had been completely missed for the nearly 20 years since the discovery of the conservation of microRNAs."



Understanding microRNAs' role in cancer

While researchers knew that microRNAs are important in a broad variety of cancers, the how and why were not fully understood. "We discovered an entirely new function for microRNA polycistrons and showed how deep an impact it has in certain types of cancer," notes Duchaine. The findings will help make sense of many of the genomic reorganizations that occur in microRNA loci in those cancers. "We also think this may be happening in physiological conditions, early in development, in embryonic stem cells for example, in placenta, and in other types of tumours."

Knowing what drives specific types of cancer is critical in stratifying cancer sub-types, in developing new therapeutic strategies, or anticipating treatment outcomes in precision medicine.

"The breadth of the impact of the amplification of a single microRNA locus on the gene networks is pretty amazing, in my opinion," says Duchaine. "Especially considering that this occurs through a mechanism entirely outside of the traditional targeting function of microRNAs. We are not done understanding microRNA mechanistics. I am always amazed at how complex their functional relationships are within our genomes."

While it is not always easy to anticipate the practical implications of basic research findings, Dr. Duchaine believes that they will be diverse. "Besides forcing a reinterpretation of the function of the miR-17-92 proto-oncogene, it will prompt new potential therapeutic strategies. For example, the depth of the impact on the gene network in cells wherein miR-17-92 is amplified indicates a completely different gene network state. To me, this is a screaming opportunity for the testing of genotype-specific treatments in a precision medicine perspective." — (Jason Clement, Med e-News)



PICTURED: DONAYO AND DUCHAINE.
(COURTESY OF THE RESEARCHERS)

McMed reMade

by Medicine Focus

On a Friday the 13th, in July 2018, a four-alarm fire broke out on the 5th floor terrace of the McIntyre Medical Building. The suspected cause: a smouldering cigarette on the wood slats of the terrace.

Fortunately, the response was swift. McGill teams and Montreal authorities quickly brought the fire under control. There were no injuries, but water infiltrated the lower floors, and smoke and moisture spread throughout the building, sparking fears for the building's research labs, as well as the priceless collection of rare books and other artifacts housed in the Osler Library of the History of Medicine on the 3rd floor.

Christopher Lyons, Head Librarian, Rare Books and Special Collections, and former Osler Librarian at the Osler Library, recalls the scene the night of the fire. When he arrived, firefighters had already placed tarps over piles of rare books. "A fireman told me, 'We got every tarp out of every truck we could because we know this is a special library.'" That action alone saved thousands of irreplaceable books.

"One of our first priorities after the fire was to have the upper floors of the building available for the researchers," says Danielle Dubois, Director, Building Services, Faculty of Medicine. Initially, researchers and lab assistants were able to visit their projects for one hour a day. Floors 7 to 13 opened within two weeks. The remaining floors, except for the 5th and 6th, were back in working order by October. Some administrative offices have been permanently relocated.

As for the Osler Library, damage was limited. The rarest books were in a room far from the leaking ceilings, and with its own ventilation system. Out of the 110,000 books in the library's collection, 600 contemporary titles were damaged beyond repair, while 800 required deodorizing. The recovery efforts were helped by the McGill University Library and Archives staff, a good half of whom volunteered to assess damage, and pack and unpack books.

The Osler collection is back in circulation and temporarily housed within the McLennan Library's Rare Books and Special Collections. Meanwhile, the hallowed library, which houses the ashes of Sir William Osler, MDCM 1872, is being rebuilt to its former self, but will also see two new active learning classrooms and two new seminar rooms, with expanded study and exam space. It's expected to reopen next summer.



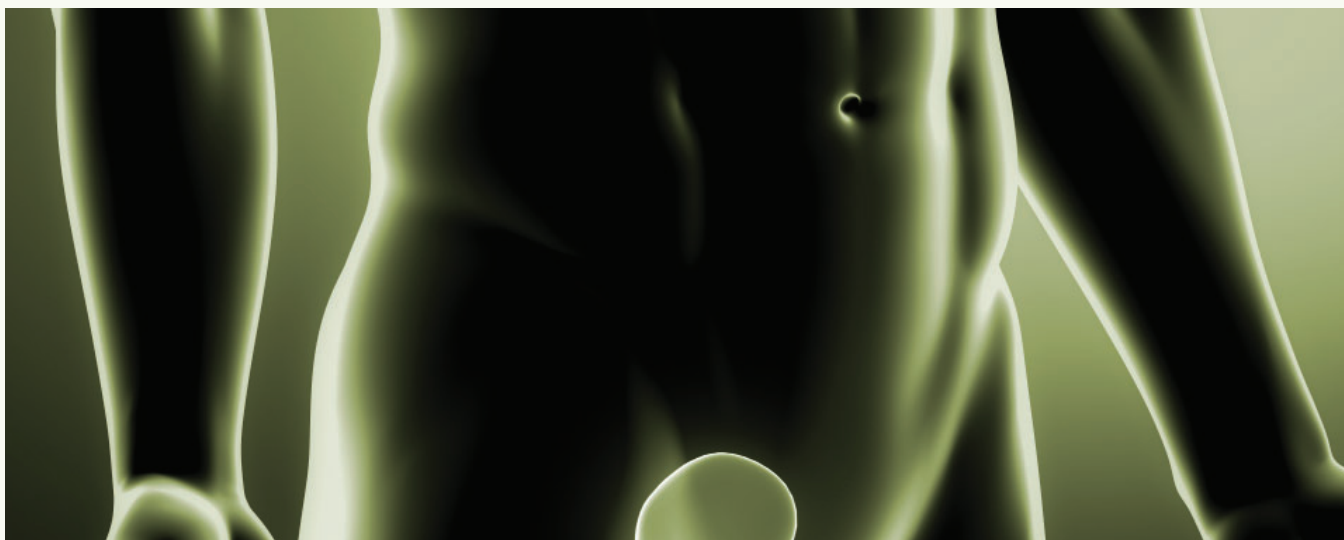
As David Eidelman, MDCM'79, Vice-Principal (Health Affairs) and Dean, Faculty of Medicine, explains: "Insurance will cover the basics and would restore the McIntyre to what it was before. Our goal, though, in the aftermath of the fire, is to bring the building into the 21st century."

When the iconic circular building, a defining presence on the Montreal skyline, first went up in 1965, it was at the height of contemporary design. At Expo 67, it was touted as an example of Montreal's forward-thinking nature. Alumni of a certain vintage remember being attracted to McGill because of the McIntyre, and the first classes, from the late '60s, to experience the building still speak of it fondly.

"But, even before the fire, the McIntyre was in need of an upgrade to meet the needs of today's students and researchers," says Eidelman. "A complete overhaul is overdue, and since we must embark on repairs because of the fire, now is an excellent time to undertake the first step towards building the health sciences campus of the future. As it was, we had already started the planning process."

A multimillion-dollar renovation plan is currently underway for the building. The 5th floor is in the design phase for an expanded cafeteria, which will have a contemporary warm design (complete with a faux fireplace) and will be divided into three zones to encourage discussion and collaboration. The three main amphitheatres will be modernized. The 6th floor atrium will be repurposed into an attractive student space that can double as a venue for receptions.

"It is our hope that the McIntyre will become the physical embodiment of a health sciences enterprise for McGill's third century," says Eidelman, adding that he is grateful for the donations that the McIntyre upgrade has already received, notably from the McGill Medicine Parents Committee and the Medicine classes of '74, '79 and '99.



Relax, it may be **muscular**

Claudia Brown, BSc'80, MSc'13, regularly puts men's medical fears to rest by helping them identify a set of muscles called the pelvic floor. The physiotherapist treats many male patients experiencing pain and presenting urinary and sexual dysfunction.

By the time they see her, "they've done every test in the book and they're at their wits' end," says Brown, a lecturer in the School of Physical & Occupational Therapy.

But after meeting them, she often finds their problems are muscular in nature, and relatively simple to address.

She says many urologists are now recognizing the physiotherapist's role in finding a solution to undiagnosed pelvic pain. "I'm on a bit of a crusade to let the medical community know that there is evidence out there that we can treat these problems," says Brown.

She says many men's pelvic floor muscles shorten and seize up, often after a combination of events such as urinary tract

infection and overexertion on a bicycle. Stress then exacerbates the problem, which can often lead to sexual or urinary dysfunction.

The muscles in question are the same ones used to suppress flatulence or temporarily halt urination. Brown identifies the muscles for her patients through on-screen biofeedback, showing them when the muscles relax or tense, and offering techniques on how to recognize them and/or how to relax them.

She says men experiencing pain in the lower pelvis should first see a urologist. But for patients whose pelvic pain remains unresolved, the next stop should be the physiotherapist.

— (Philip Fine)



OWEN EGAN/JONI DUFOUR

Pan-Canadian cancer research network builds on Goodman Centre initiatives

by Chris Chipello, McGill News

It's been a whirlwind 12 months for McGill University's Rosalind and Morris Goodman Cancer Research Centre. The GCRC spearheaded the launch of two consortiums that promise to improve patient care in Montreal and across Quebec. And those initiatives helped lay the groundwork for a recent announcement by the Government of Canada that it will invest \$150 million over five years to create the nationwide Marathon of Hope Cancer Centres network.

The Marathon of Hope network, led by the Terry Fox Research Institute, will unite cancer centres across the country, accelerating implementation of precision medicine so that patients can access the right treatment at the right time for their particular cancer.

Precision medicine is a promising framework for cancer research and care that factors in the genetic characteristics of each patient and their cancers to personalize treatments, making them more effective and reducing negative side effects associated with current therapies.

Because the \$150 million of federal funding will be matched by the network's partners, the project

represents a \$300 million boost for cancer research across the country.

"It's a game-changer," says GCRC Director Dr. Morag Park. "This initiative creates a tremendous opportunity to position Canada as a world leader in patient-centric cancer research. We are proud to play an important part in this venture that will ultimately lead to better outcomes for patients."

The pan-Canadian network will bring together top centres and their researchers to share data and apply new technologies such as genomics, advanced imaging, big data and artificial intelligence for the benefit of patients.

"I think the most important thing here is we're building a cohort of patients across Canada," Park says. That will help researchers puzzle out which subsets of patients respond to which treatments, for any given type of cancer. Because Canadian patients are treated through public health care systems with common standards across the country, she adds, this provides a powerful basis for developing precision medicine.

The Marathon of Hope builds on a series of initiatives in which the GCRC has played a key role, and which are also fostering unprecedented collaboration among leading Montreal institutions:

- In June 2018, the newly formed Montreal Cancer Consortium was awarded \$6.5 million by the Terry Fox Research Institute. This funding supports four major projects—three of them led by GCRC researchers—aimed at understanding why some patients respond to a new cancer treatment strategy known as immunotherapy. In addition to McGill and the GCRC, the consortium includes the Centre de recherche du Centre hospitalier de l'Université de Montréal, Centre de Recherche Hôpital Maisonneuve-Rosemont, Institute for Research in Immunology and Cancer, Jewish General Hospital, the McGill University and Génome Québec Innovation Centre, and the Research Institute of the McGill University Health Centre.
- In May 2019, an initiative led by Montreal artificial intelligence (AI) company Imagia and the Terry Fox Research Institute—and including the GCRC—was awarded \$49 million from the federal government's Strategic Innovation Fund. The funding will support efforts to combine Canadian expertise in AI and precision medicine to improve health care for Canadians.
- The Québec Cancer Consortium for Novel Therapeutics and Biomarkers, a collaboration among six leading hospital and cancer research centre sites led by the GCRC, was awarded \$10 million this June from the Ministère de l'Économie et de l'Innovation du Québec (MEI) through its Fonds d'accélération des collaborations en santé program. This award, together with contributions totalling \$17.9 million from 12 private, public and non-profit partners, will be invested to double patient recruitment into oncology clinical trials and support development of personalized medicine and immunotherapies in Quebec.
- In August, the Government of Canada announced funding of up to \$6 million over four years for a team of scientists led by Dr. Nahum Sonenberg of the GCRC and Michael Pollak, MDCM'77, at the Lady Davis Institute (LDI) to develop a new way to treat metastatic breast cancer. The new approach, which targets messenger RNA (mRNA), strikes at the process that allows breast cancer to go from a localized problem to a potentially fatal disease. Dr. Josie Ursini-Siegel, also at the LDI, and an associate professor in the Gerald Bronfman Department of Oncology, played a leading role in securing this new Stand Up to Cancer (SU2C) Canada Metastatic Breast Cancer Dream Team, which involves researchers from the GCRC as well as from leading institutions across the country, including the University of Alberta, the University of British Columbia and Princess Margaret Hospital at the University of Toronto.

On top of all those developments, GCRC researchers recently received support from the CQDM biopharma research consortium, the Canadian Cancer Society and other funders for two ambitious projects:

- Park and her GCRC team are collaborating with Aspect Biosystems to reproduce tumours from living cells of breast cancer patients using Aspect's microfluidic 3D bioprinting technology. This \$2.2 million project will assess the efficacy of anti-cancer drugs and predict a patient's response to treatment.
- Dr. Alain Nepveu from the GCRC and Michael Witcher, PhD'04, of the LDI are leading a \$6.1 million collaborative project to develop novel drugs for the treatment of hard-to-treat breast cancers.

The Goodman Cancer Research Gala has also underpinned the GCRC's recent achievements, Park notes. The biennial fundraising event, which has raised more than \$10 million since its inception a decade ago, helps the Centre purchase sophisticated laboratory equipment and recruit leading scientists. Without that extra funding, she says, "there's no way you can support this level of innovation and technology." The next Gala is set for June 4, 2020.

New Institute

On June 11, 2019, more than 100 guests celebrated the launch of McGill University's new Institute of Health Sciences Education. The Institute, which replaces the former Centre for Medical Education, is now an academic hiring and teaching unit, which can provide graduate programs in health sciences education.

— (Matthew Brett)

Silo breaking

A new Interfaculty Studies PhD program, Quantitative Life Sciences, is bridging the gap between the quantitative and biological domains. "We need researchers who can develop and apply powerful mathematical and computational methods to life sciences research," says inaugural Director Dr. Celia Greenwood, BSc'85, Professor in the departments of Oncology, Human Genetics, and Epidemiology, Biostatistics and Occupational Health.

— (Gillian Woodford)

Coming soon



In 2020, the McGill Faculty of Medicine will open Campus Outaouais, which will allow students to complete McGill's four-year undergraduate medical education program, as well as their residency, in French, in the Outaouais region of western Quebec. Pictured: Graduation day for a group of McGill medical students who did their clerkships in Outaouais.

— (Lisa Dutton)



Next-gen

In summer 2019, Dr. Vincent Mooser joined McGill. A pioneer in using genomics-based tools and datasets to develop new target-based therapies, Mooser holds the new Canada Excellence Research Chair in Genomic Medicine: Genes to Drug Targets for Next-Generation Therapies. — (McGill Newsroom)

Spacewalker

On April 8, 2019, David Saint-Jacques, PGME'07, an adjunct professor in the Department of Family Medicine, became the fourth Canadian astronaut—and the second McGillian—to take part in a spacewalk. The Faculty of Medicine has also “launched” two other Canadian astronauts, Robert Thirsk, MDCM'82, and Dave Williams, BSc'76, MDCM'83, MSc'83, DSc'07.

— (With files from Neale McDevitt, McGill Reporter)



NASA/AUBREY GEMIGNANI

Win for Family Medicine

More than 40 years ago, the Department of Family Medicine started out as a small teaching program with units based in Montreal-area hospitals. From these humble beginnings, the Department has grown to become a leading voice and champion of primary care in Canada and around the world. This year, the Department is celebrating a new milestone, the official accreditation of its PhD program in Family Medicine and Primary Care. — (Frédérique Mazerolle)



OWEN EGAN/JONI DUFOUR

Dynamic duo

Two champions of medical professionalism, former Dean of Medicine Dr. Richard Cruess and his wife Dr. Sylvia Cruess—or “the Cruesses” as the two are often referred to in McGill Faculty of Medicine circles—were recently recognized by the Association of American Medical Colleges (AAMC) with the Abraham Flexner Award for Distinguished Service to Medical Education. The Association noted that the couple had “singlehandedly changed medicine’s understanding of professionalism and the role of the physician in the 21st century.” — (Brenda Branswell, McGill News)

Global health pioneer



SPGH

This fall, Dr. Timothy Evans takes the helm as the inaugural Director and Associate Dean of McGill’s new School of Population and Global Health (SPGH) and Associate Vice-Principal (Global Policy and Innovation). The SPGH, established in 2016, brings together the Department of Epidemiology, Biostatistics and Occupational Health, the Institute for Health and Social Policy, the Biomedical Ethics Unit, and the McGill Global Health Programs. — (Med e-News)

Quiz: Who turned what?

Match the units, groups or events to their most recent milestone anniversaries.

- | | | |
|----------|---|---|
| 20 years | ? | Défi Canderel, an annual superhero run founded by Montreal businessman Jonathan Wener in support of cancer research at the Rosalind and Morris Goodman Cancer Research Centre, as well as the Montreal Cancer Institute |
| 10 years | ? | MD-PhD program |
| 75 years | ? | Life Sciences Complex |
| 30 years | ? | I Medici di McGill Orchestra |
| 30 years | ? | Department of Psychiatry |



Answer:
20 years, MD-PhD program
10 years, Life Sciences Complex
75 years, Department of Psychiatry
20 years, I Medici di McGill Orchestra
30 years, Défi Canderel

Indigenous perspectives: Decolonizing the approach to health research in primary care

Recently, over a five-week span, a group of graduate students and researchers from McGill University's Department of Family Medicine had the opportunity to learn and better understand Indigenous viewpoints on health and wellness, leading to discussions on finding ways to develop significant partnerships with Indigenous peoples through patient-centred research.

Now concluding its second edition, the course, Indigenous Perspectives: Approaches to Health, focused on exploring the nature of Indigenous peoples' ways of understanding health and wellness, particularly with regards to the divergences between the Western and Indigenous knowledge and practices and the impact of the processes of assimilation and resulting ethnostress on Indigenous communities.

"This course was designed to showcase the experience of health and wellness from Indigenous peoples prior to the contact with European settlers, from which we transition to the period of arrival that led to colonization and oppression of Indigenous communities," explains Alex McComber, Assistant Professor in Family Medicine and lead instructor of the course. "This gives us the opportunity to assess the immediate and long-term effects on Indigenous peoples' and communities' health and wellness, but it also leads us to contemporary times when Indigenous peoples and scholars are collaborating with Western scholars and health professionals in more respectful ways to understand the impact of the experience, but also using traditional knowledge and practices to improve people's health." — (Frédérique Mazerolle)



ASSISTANT PROFESSOR AND MEMBER OF THE KANEN'KEHÁ:KA COMMUNITY OF KAHNAWAKE ALEX MCCOMBER (SECOND FROM LEFT) INVITED GERALDINE STANDUP (CENTRE, IN WHITE SHAWL), AN ELDER AND TRADITIONAL HEALER FROM KAHNAWAKE, TO MEET WITH STUDENTS ENROLLED IN THE DEPARTMENT OF FAMILY MEDICINE'S INDIGENOUS PERSPECTIVES: APPROACHES TO HEALTH COURSE.



Nurse on the front lines

The man bringing the female patient to the clinic seems unnervingly charming and keeps the woman's Medicare card. A nurse examines the woman, noting a dollar sign tattooed near her groin, bruises on her neck, and a mention of a recent abortion.

These are all possible signs of forced sex trafficking, according to Ingram School of Nursing Assistant Professor Françoise Filion, who for years has invited police officers into her classroom to talk to students about how to identify trafficking victims. "A nurse will have a short period of time and that might be the time where, if they know what question

to ask, they can help," says Filion. She has since brought the issue into the interactive classroom, working closely with the Steinberg Centre for Simulation and Interactive Learning to co-write a training scenario for students to run through with actors. This work has sprouted an offshoot in the form of the creation of a free webinar for health care professionals on how to recognize the signs of sex trafficking in patients, produced in partnership with the Montreal police department's *Survivantes* project.

— (Philip Fine)


Responsible data sharing

The Chan Zuckerberg Initiative, the Leona M. and Harry B. Helmsley Charitable Trust, and the Klarman Family Foundation recently announced \$647,895 in collaborative funding to support ethical biomedical research and responsible data sharing for the Human Cell Atlas (HCA), an international effort to map all cells in the human body. The McGill-based Centre of Genomics and Policy (CGP) will help guide and inform the approach and governance of data sharing to assist participating investigators to collect and share data. "The human right to benefit from scientific advances means that HCA governance and policies must be principled, pragmatic and practical, to enable the scientific community to interact with patients," says Bartha Maria Knoppers, Professor in the Department of Human Genetics and Director of the CGP. — (McGill Newsroom)



COURTESY OF MCGILL NEWSROOM

A nod to nursing research



Kelley Kilpatrick, BScN'89, MSc(A)'05, PhD'10, loves the feeling of walking past a hospital nursing station and exchanging nods with a staff nurse. It reminds her that nurse clinicians and nurse scientists are on the same team.

Kilpatrick holds the Susan E. French Chair in Nursing Research and Innovative Practice at the Ingram School of Nursing (ISoN). She studies the roles of both the nurse practitioner, who are nurses with the additional authority to, depending on the jurisdiction, diagnose, treat or prescribe, and nursing specialists, who are highly trained in areas such as oncology or critical care.

She has transformed practice in Quebec by helping to implement nurse practitioners in long-term care teams, where, her research suggests, their presence can translate into many benefits, notably fewer falls, fewer transfers, reduced costs and less reliance on medications.

Kilpatrick took nursing in CEGEP before continuing her studies at McGill. She admired the clinical nurse specialists she encountered in her

early training. "They had in-depth knowledge of clinical areas, acting as support for other nurses." But they were, she noticed, an underutilized resource.

It was the professor of one of her master's courses—Dr. Susan French, BN'65, herself, former director of what is now the ISoN—who 15 years ago convinced the then-mother of three young children, that she could, as a PhD, study issues like these. "I was so immersed in clinical practice. I didn't see myself as a researcher."

Today, Kilpatrick devotes 100 percent of her time to research but still enjoys connecting with her clinical roots through forays into the field. "If there's data collection, I like to try to do some of it myself." She appreciates the opportunity to speak firsthand with her peers in clinical practice, whose consumption of research, she says, is increasing. That change, and her appointment as a Chair this past January, are two more nods in her direction.

— (Philip Fine)





The post-antibiotic world How ready are we, really?

by Michelle Pucci

Dr. Makeda Semret, BSc'88, PGME'01, tells a cautionary tale about the perils of antibiotic resistance.

In 2009, Semret, an assistant professor in the Department of Medicine at McGill University, joined colleagues from the McGill Division of Infectious Diseases to provide infectious disease training to newly graduated physicians in Addis Ababa, the capital of Ethiopia and her hometown.

Fast forward to 2015. Ceftriaxone, an antibiotic considered to be a “magic bullet,” and used to treat a wide range of infections, had become readily accessible—seemingly good news for a country where infectious disease is a leading cause of death. Within a few months, it was being prescribed on a regular basis.

Then it hit the streets.

“This drug became extremely widespread,” says Semret, who is also an infectious disease expert at the McGill University Health Centre (MUHC). And, as people started to use it more and more, with or without a prescription, a new phenomenon emerged: drug resistance. “To the point where now, if I look at what is growing in the lab at a hospital there, virtually 90 percent of bacteria from patients are resistant to this antibiotic, which, less than 10 years ago, was rarely available in the country,” Semret explains.

She decided to do something about it. With Michael Libman, MDCM'85, PGME'91, Professor, Department of Medicine, Division of Infectious Diseases, and Director, J.D. MacLean Centre for Tropical Diseases, and Cédric Yansouni, BSc'98, MDCM'02, PGME'09, Assistant Professor, Department of Medicine, Division of Infectious

Diseases, and a scientist at the MUHC Research Institute (RI-MUHC), she set out to improve laboratory diagnostics at the 800-bed Tikur Anbessa Specialized Hospital, a teaching hospital at Addis Ababa University. This meant upgrading equipment, training technologists and microbiologists, and encouraging physicians to use the lab more consistently.

The trio also launched stewardship programs with pharmacists, nurses and clinicians, as well as models for response to infectious diseases. They partnered with the antimicrobial stewardship app Sanford Guide, which now provides the hospital's physicians customized guidance for treating infections and resistant strains. The project has already collected data from more than 2000 individual infections.

“We're still at a stage where we're trying to come up with characterizations of what's happening in Ethiopia,” Semret says, “which is probably typical of what goes on in a lot of sub-Saharan countries.” Semret estimates that when the project began, 8 out of 10 patients at the hospital were receiving antibiotics, and almost all of them with no documented infection. She compares that rate to that of the Royal Victoria Hospital of the MUHC, where only 30 percent of patients, mostly in intensive care, receive antibiotics. The numbers in Addis Ababa are changing, though. In the first two years of the project, the number of prescriptions at the hospital for “last-resort” antibiotics—those called upon when all others have failed—was halved.



A worldwide crisis

Over the past century, antimicrobials—an umbrella term that includes antibiotic, antifungal and antiviral drugs—have revolutionized medicine. They are used against infections caused by germs, with each type acting on a specific pathogen: antibiotics on bacteria, antifungals on fungi, antivirals on viruses, and so on. Everyday procedures, from caesarean births to dental surgeries, depend on antimicrobials, as do organ transplants and cancer treatments. But over time, use—and, especially, overuse—of these “wonder drugs” has fuelled resistance to them in the very pathogens they are intended to target.

“We didn’t create antibiotics, we discovered them, and we now know that microorganisms resistant to these antibiotics already exist in nature and can easily replace sensitive organisms if antibiotics are overused,” says Dr. Don Sheppard, PGME’99, Professor and Chair of the Department of Microbiology and Immunology. He is the director and founder of the McGill Interdisciplinary Initiative in Infection and Immunity (MI4), the largest grouping of experts focused on infectious and immune-mediated diseases in the world. MI4 brings together over 250 researchers from McGill, the MUHC and the Jewish General Hospital, as well as from their affiliated research centres.

It is estimated that up to half of all antibiotics are prescribed unnecessarily. Overuse leads to resistant strains, which are associated with hundreds of thousands of deaths each year. And, if things continue as they are, antibiotics will fail us entirely within 30 years, Sheppard warns.

The World Health Organization (WHO) declared antimicrobial resistance a global threat in 2014. Since then, many countries have adopted strategies to address the problem. Canada is among those seeking to reduce antibiotic use in agriculture, on crops and in livestock, as well as in humans. The challenges are significant. Whereas infections are the second most common cause of death in the world after heart disease, the dangers of antimicrobial resistance are more difficult to quantify.

Gut-inspired

In addition to killing bacteria that cause disease, antibiotics can wipe out healthy bacteria that live in our gut and enable resistant bacteria like *C. difficile* to grow and cause disease. To reduce the risk of infection and restore non-resistant microbes, researchers Libman, whose work in Addis Ababa was mentioned earlier, Emily McDonald, MDCM’09, MSc’16, Assistant Professor, Department of Medicine, Division of General Internal Medicine, and Director, Clinical Practice Assessment Unit MUHC, and Dr. Todd Lee, Associate Professor of Medicine, Department of Medicine, divisions of Infectious Diseases and General Internal Medicine, and Director, MI4 Clinical Trials Platform, are working with an unlikely ally: feces.

Through fecal transplantation, which is the introduction of donor feces or fecal components directly into the colon of a recipient, these McGill and MUHC researchers believe we can control infections, by having “healthy” bacteria educate the immune system. Fecal transplants have been used to restore normal bugs that have been wiped out by antibiotics and to attack infections caused by *C. difficile* colitis. The next goal is to see if they can be used to remove antibiotic-resistant organisms from the gut.

Resistance rates are low in Canada, but Canadians who travel, eat new foods and drink water with unfamiliar microbes sometimes get sick. That leads many to take antibiotics, which can then change the composition of their gut bacteria, called the microbiome. These travellers can acquire multidrug-resistant bacteria while visiting other countries, particularly in Asia. “Often what happens is that you take an antibiotic in India for diarrhea, which wipes out your normal bacteria,” says Sheppard. “And what repopulates your gut microbiome are the bugs floating around in the water in New Delhi, which are much more resistant than the ones here.” Libman, McDonald and Lee’s proposal is to screen travellers heading to places with higher rates of resistance and freeze their stool so that it can be used to repopulate their old flora when they return. Such investigations could in turn inform treatment for patients with hospital-acquired antibiotic-resistant infections.

From the ground up

With the help of the students in her undergraduate lab course, Samantha Gruenheid, PhD'00, Principal Investigator and Associate Professor, Department of Microbiology and Immunology, is looking at soil samples from the Canadian Arctic in search of new bacterial strains that can be cultured and used to potentially develop new antibiotics. "We are facing a crisis of increasing antibiotic resistance. As more and more pharmaceutical companies are bowing out of antibiotic development, the role of academics and scientists to bring these things into the pipeline becomes more important," Gruenheid says.

Universities around the world, including McGill, are partnering with Tiny Earth, a network that studies soil samples in search of the next antibiotic. Gruenheid launched the first Canadian chapter, at McGill, for a first-year microbiology class, where students would culture and test soil bacteria for their ability to kill or inhibit other bacteria. "One of the goals of the Tiny Earth network is to give students a feel for research early on in their degree," Gruenheid says. For students, the initiative is a direct way to contribute to something bigger.

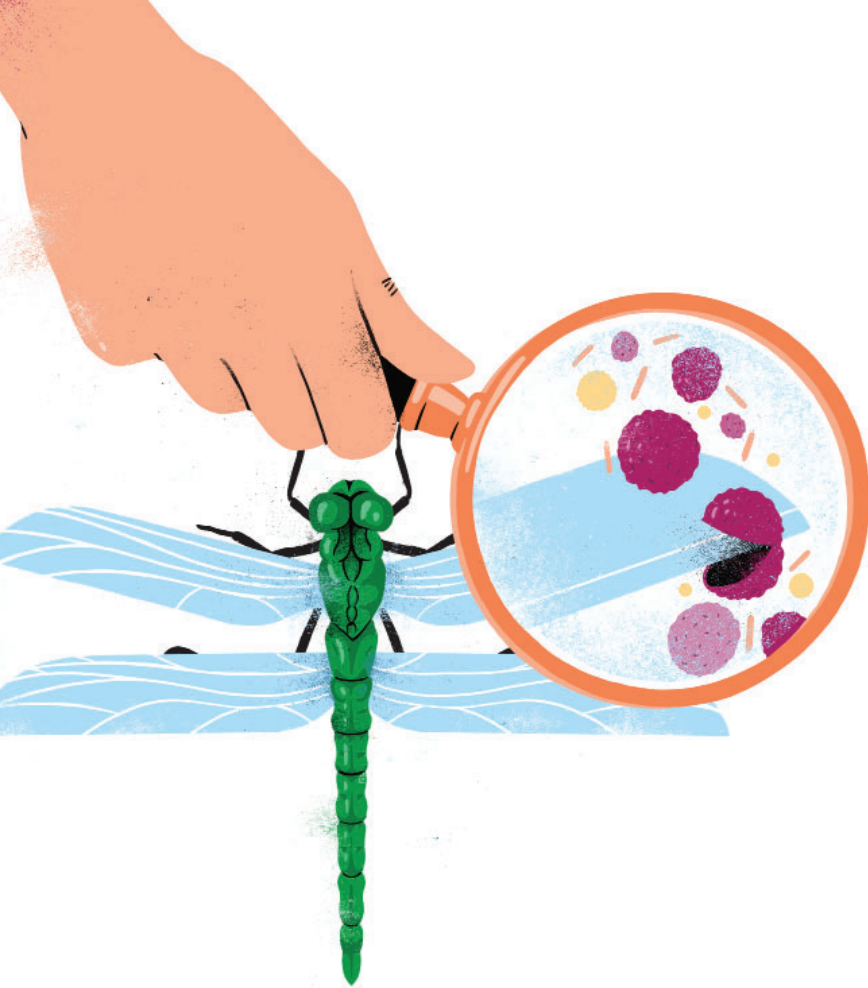
Initially, students were crowdsourcing the discovery of antibiotics by collecting samples across Montreal. Gruenheid wanted to take the microbial bioprospecting by students to a new level by partnering with Professor Lyle Whyte of the Department of Natural Resource Sciences at McGill's Macdonald Campus, whose lab collects samples in saline springs, permafrost, ground ice and ice shelves near Axel Heiberg Island at the McGill Arctic Research Station. These samples, which contain many bacteria that were believed to be unculturable in the past, are now transported to Montreal where some are handed over to Gruenheid's students to isolate novel microbes that have the potential to make new antibiotics.

"Every year the class finds over a hundred microorganisms that are antibiotic producers," Gruenheid says. "Now we're trying to go through them and find which ones might be unique or have an interesting activity." Gruenheid is building a bank with these hundreds of strains. The plan is to fully sequence the genomes and try to identify the active molecules produced by those that are the most promising.

Gruenheid and her students also got crafty, making colourful googly-eyed knitted plushies, embroidered keychains and buttons in the form of such pathogens as *Borrelia burgdorferi* (Lyme disease) or *Pseudomonas aeruginosa* (a multi-drug resistant pathogen). Their goal was to raise money for under-resourced schools to join the program and to start conversations about antimicrobial resistance. "I found these microbial crafts really adorable, but they were also educational and resonated with the cause. A wide range of audience, from the McGill community to preschool children in Montreal, could relate to these crafts," says MSc Epidemiology student Joy Tseng, BSc'17 and past coordinator of the student-led fundraising activity. "Students and professors were really enthusiastic because this project combined our interests in craftmaking with our knowledge of microbiology, coupled with our desire to act on the problem of antibiotic resistance." — (Michelle Pucci)

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Every year the class finds over a hundred microorganisms that are antibiotic producers.”



Nature-inspired

Looking inward can tell us a lot about reducing antimicrobial use and resistance in humans, but other researchers are turning to small creatures in our environment for ideas. One example of a novel MI4 project recreates the nano-scale properties of a dragonfly's wings. Dragonfly wings have nanoscopic spikes like a bed of nails, which rip up and destroy bacteria that land on them, according to research by Dao Nguyen, MDCM'97, PGME'02, MSc'04, Associate Professor, Department of Medicine, Division of Experimental Medicine, and Department of Microbiology and Immunology, as well as a scientist at the RI-MUHC, and Dr. Nathalie Tufenkji, BEng'00, Professor and Tier 1 Canada Research Chair, Chemical Engineering. Nguyen is looking for molecules that could enhance the effect of antibiotics or make antibiotics active against drug-resistant bacteria. Dr. Chris Moraes, Assistant Professor and Tier 2 Canada Research Chair, Chemical Engineering, and Tufenkji are copying the nanospikes to create medical devices, like catheters, that mimic the wings, so organisms can't survive on the surfaces of devices. These materials would then have antibacterial properties, preventing the spread

of infections and drug-resistant pathogens while reducing the use of antibiotics.

Dragonflies may be models for destroying unwanted bacteria, but other creatures, notably ticks, are spreading disease. Vermont and MI4-supported researchers are looking at both the big and small picture of Lyme disease by analyzing the genomics and environment of ticks. The project, run out of the MUHC and jointly led by Dr. Michael Reed, Associate Professor, Department of Medicine, and Dr. Ioannis Ragoussis, Head of Genome Sciences at the McGill University and Génome Québec Innovation Centre and Associate Professor, Department of Human Genetics, is applying sophisticated genomic tools to understand the spread of Lyme disease by studying the ticks that transmit this illness. Ticks are migrating north and there is still little consensus on how to best manage Lyme disease. Genomic science may lead to answers about how the disease is transferred by understanding the environment where ticks are found and the blood meals they eat.

Inside the brain

The deadliest and most difficult-to-treat form of malaria is a condition known as cerebral malaria. Repurposing a molecule with significant activity against a new target can treat cerebral malaria, according to research by Philippe Gros, PhD'83, Deputy Vice-Principal (Research and Innovation) and Professor, Department of Biochemistry, Dr. David Langlais, Assistant Professor, Department of Human Genetics, and Jerry Pelletier, BSc'81, PhD'88, Professor, Department of Biochemistry. Québec Science magazine named it one of the top 10 discoveries of 2018. The work began with finding the genes involved and the molecules that could be active against those genes. To address the problem, the scientists repurposed a molecule, plant-

“

If you have bacteria that are tolerant and unkillable, they provide a pool of cells with genes that can become drug-resistant.”

derived rocaglate, which was developed to treat cancer but demonstrated a remarkable dual activity in improving outcomes in cerebral malaria, where it targets the malaria parasite and reduces brain inflammation.

Immunotherapy is used to “boost” the immune system. This approach is being used to treat some cancers. It can also be used to treat infections that do not respond to traditional antimicrobial therapy. Don Vinh, BSc’97, MDCM’01, PGME’07, Associate Professor, Department of Medicine, Division of Infectious Diseases, and a clinician-scientist from the Infectious Diseases and Immunity in Global Health Program of the RI-MUHC, has successfully treated patients who have genetic diseases of the immune system. One patient had a strain of candida, a yeast infection, growing in his brain because of a defective gene that made him unable to produce an immune molecule. This patient failed to improve with every antifungal drug on the market but was cured by injections of the molecule missing from his immune system. Vinh was also able to treat another patient who was wheelchair-bound and placed in a palliative care ward because the yeast infection in his brain was thought to be “incurable.” Six years later, the patient is alive, able to walk and lives semi-independently.

Know thy enemy

McGill has one of the few labs in Canada that detects the enzymes that make bacteria resistant. Antibiotics attack critical molecular machines in bacteria, acting like a tailor-made monkey wrench to disable them. When bacteria are resistant, they often have specific enzymes that chemically modify antibiotics so that the monkey-wrench function no longer works. Dr. Albert Berghuis, a Distinguished James McGill Professor and Chair of the Department of Biochemistry, studies these enzymes by taking 3D images of them.

Berghuis, who, with Semret, is an Antimicrobial Resistance Theme Leader at M14, frames the question as follows: “What can we do to prevent these enzymes from destroying the antibiotic monkey wrenches? For example, can we make a next-generation monkey wrench that these resistance enzymes cannot destroy?”

Berghuis’ lab isolates resistance-causing enzymes from harmful bacteria and, through collaborations with the Canadian Light Source in Saskatoon, uses synchrotron radiation to generate 3D images, which show the individual atoms that together make up the enzymes. The images on Berghuis’s computer, a tangle of colourful branches depicting oxygen, carbon and nitrogen atoms as well as benzene rings, take time to create. In 1995, when Berghuis began looking for these details, a 3D image required two to three years of work to generate and even more time to interpret. It now takes 6 to 12 months to produce such an image, still a long time, but the technology is improving.

“Without imaging you’re working in the dark,” Berghuis says, explaining that the images allow drug makers to be better informed about why treatment fails. He uses clinical samples to identify widespread resistance-causing enzymes that chemically destroy aminoglycosides and macrolides. These antibiotics would normally interfere with a crucial molecular machine called the ribosome, resulting in bacteria dying or not being able to grow and multiply. Aminoglycoside antibiotics, in particular, are used for severe infections, such as bacteremia, which, if untreated, can lead to sepsis and septic shock, while macrolides are important alternatives for patients allergic to penicillin. The detailed images from Berghuis’ lab are helping to develop more effective antibiotics that are less susceptible to resistance.

Drug-resistant bacteria are also joined by bacteria with tolerance for drugs meant to destroy them. One such bacteria, *P. aeruginosa*, affects people who are already sick, either in the ICU, immunosuppressed, or with chronic lung disease like cystic fibrosis. Drug-tolerant bacteria are believed to be “indifferent” to antibiotics that are supposed to kill them, and until last September, unkillable. Resistance is coded into DNA, but tolerance may come and go, says Nguyen, whose work looking into the antibiotic properties of dragonfly wings was mentioned earlier. “Both resistance and tolerance are reasons why anti-bacterial treatment might fail and lead to infections that are life-threatening,” she says. “If you have bacteria that are tolerant and unkillable, they provide a pool of cells with genes that can become drug-resistant.”

To find drugs that work on the slow-growing bacteria, a team of researchers from McGill and Concordia University

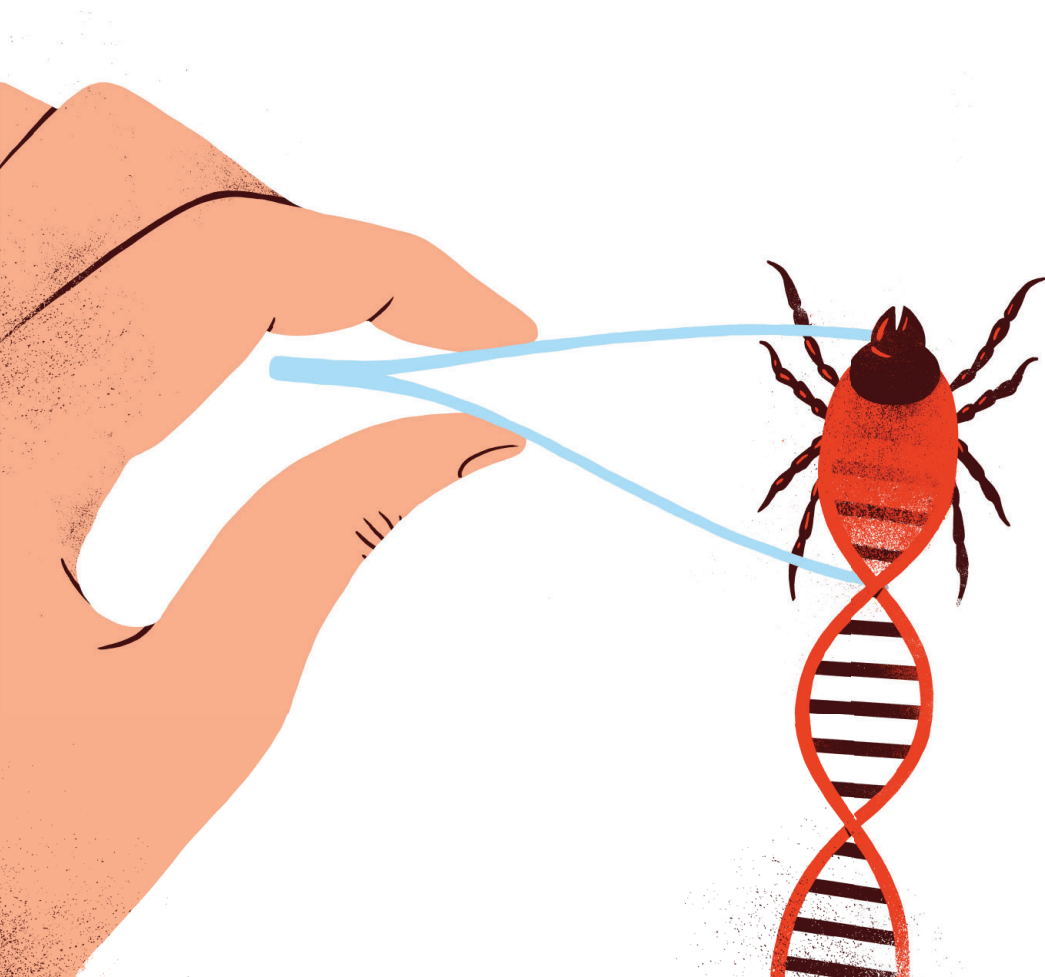
had to figure out what made them indifferent. “We’re trying to find ways where you can fool bacteria, make them more sensitive, more vulnerable to antibiotics,” says Nguyen. Bacteria use an enzyme as a signalling system when they detect stress and then remodel the cell membrane to become impermeable.

At MI4, Sheppard and Nguyen are tackling another source of antibiotic resistance: biofilms. Biofilms are created when microorganisms attach to surfaces and embed themselves in a self-produced slime layer that protects them from our immune system and antibiotics—much the way a medieval wall served to keep villages safe from hostile invaders. Biofilm production has been found to be associated with most bacterial infections that are acquired in hospitals, often leading to failure of antibiotic therapy. Sheppard is using repurposed synthetic enzymes that are isolated from the superbugs themselves to mechanically break down these biofilm walls, while Nguyen is trying to reprogram signalling pathways to trick microorganisms into destroying biofilms rather than building them.

Getting drugs to where they need to be

Antimicrobial resistance poses a major problem for the treatment of tuberculosis. One of the worst bugs—killing 1.6 million people in 2017—tuberculosis is increasingly resistant to all drugs. BCG is the only vaccine for tuberculosis on the market, but unfortunately it doesn’t work very well. Dr. Marcel Behr, MSc’95, PGME’95, Co-Director, Infectious Disease, MI4, and Professor of Medicine, and Maziar Divangahi, PhD’05, Associate Professor of Medicine and Strauss Chair in Respiratory Diseases, both of the McGill International Tuberculosis Centre, have an idea as to why not.

BCG was likely effective when it was first invented, says Sheppard, but the vaccine was passed from plate to tube for many years without freezing and preserving the original strain. Behr has shown how the vaccine has lost chunks of its original DNA over the years as it was passed through people’s labs, making it ineffective. Divangahi posits that new strains need access to the bone marrow where they can reprogram and generate protective immunity. “It’s all





Physicians who see the most patients per day were more likely to prescribe antibiotics inappropriately.”

about getting the vaccine to the right place at the right time and not just about using the right vaccine,” says Sheppard.

Drug discovery is important, but the perfect drug is no good if it sits on the shelf and doesn't reach the communities that need it. With funding from M14, Marina Klein, MDCM'91, PGME'96, MSc'01, Dr. Nadine Kronfli, BSc'04, and Dr. Christina Greenaway, PGME'96, MSc'04, are launching a flagship program positioning Montreal as a test case for best practices to eliminate hepatitis C in vulnerable communities. As Klein explains, hepatitis C disproportionately affects marginalized groups such as people who inject drugs, Indigenous people, migrants, prisoners and men who have sex with men. Each of these groups experience unique challenges and barriers to treatments. Lack of knowledge and mistrust in medical services further contribute to health disparities. “Approaches that are specifically tailored to each community are needed to increase diagnosis and access to treatment,” says Klein, who is a senior scientist at the RI-MUHC and Professor, Department of Medicine. “We are bringing together medical specialists, front-line health care providers, public health and epidemiologic researchers, and, most importantly, members of the affected communities to tackle hepatitis C in Montreal.”

Even when drugs are available for treatment, the treatment only works if it's appropriate to the infection. In Canada, doctors are pressed for time with patients, and aren't always able to determine whether an infection is viral or bacterial, according to a 2007 study on inappropriate prescribing led by Geneviève Cadieux, MSc'04, PhD'11, MDCM'13, Associate Medical Officer at Ottawa Public Health. The study looked at physicians' prescribing habits, using billing data from 1990 to 1998, and compared them to factors, including where they'd studied, their licensing exam scores and how long they'd been practising.

Cadieux found overprescribing was associated with physicians who have high-volume practices and have been working for more years. “Physicians who see the most patients per day were more likely to prescribe antibiotics inappropriately,” Cadieux says, adding that a quarter of doctors in the study saw 34 to 77 patients in a day. “There's less time to explain why it's not appropriate to prescribe

antibiotics.” Social dynamics come into play between doctors who hesitate to prescribe antibiotics, but only have 15 minutes to give a diagnosis, and patients who ask for an antibiotic. One hypothesis is that a fee-for-service payment model, which pays physicians more for seeing a higher number of patients, may be one of the factors contributing to overprescribing. Doctors also may be less likely to stay up to date on prescribing guidelines if they've been practising for longer. Cadieux says 50 percent of prescriptions for respiratory infections are unnecessary.

In her current role at Ottawa Public Health, part of Cadieux's job is preventing resistance by ensuring patients get appropriate antibiotic treatment. For example, gonorrhea resistant to antibiotics, the so-called superbug gonorrhea, has become an issue in Quebec and Ontario. “There are actually a lot of errors in how it is treated,” she says. “We'll follow up with physicians and do some education about what the guidelines are, and ensure the patient gets the correct antibiotic so they don't pass it on to anybody else.”

One Health, one world

Microorganisms aren't choosy: resistant and non-resistant strains can move between animals, soil and humans. Canada is among the countries that responded to the WHO's call for a “One Health” approach to antimicrobial resistance. One Health targets antibiotic use in animal husbandry, plant agriculture and humans. The connection is clear when widespread contaminations occur. In 2000, the farming community of Walkerton, Ontario, saw an E. coli outbreak kill six and infect thousands after storms and cattle manure runoff contaminated the town's water supply. Antibiotic use in animals, which is more widespread than in humans, has gone down, according to Sheppard. But despite some gains, many problem pathogens remain.

Increased travel and global trade make the cross-border approach of One Health even more important, since infections can't be contained by national boundaries. The SARS outbreak in 2003 is a good example of a transboundary epidemic. It first hit southern China, where a doctor from the country then travelled to Hong Kong and

“

If you can prevent the disease from happening in the first place, you don't have to use an antibiotic.”

exposed a Canadian woman. The disease killed hundreds of people in more than three dozen countries. In Canada, it tested our epidemic response.

Not all viruses travel as far as SARS did, or, as in the case of Ebola, have mortality rates as high as 80 percent. While these diseases capture media attention, the real threat to global health is influenza, according to Brian Ward, MDCM'80, PGME'92, Professor, Department of Medicine. “The scariest virus out there has been and always will be influenza,” says Ward, pointing out the recent centenary of the 1918 influenza pandemic, which infected an estimated 500 million people. “None of these other infectious diseases come close.”

Ward works in countries like Peru, Brazil and Zimbabwe, as well as in northern Quebec. Instead of chasing the latest epidemic, he says governments should prioritize prevention of diseases that antimicrobial resistance may make impossible to treat. “If you can prevent the disease from happening in the first place, you don't have to use an antibiotic,” he says.

Ward is the Medical Officer for Medicago, a Ste. Foy-based company that develops vaccines with technology, growing viruses in plants. Typically, vaccines are grown in eggs or tissue culture, which takes months. Because of the lead time, vaccines can be hit (this year's flu vaccine) or miss (last year's vaccine). With plants, like tobacco, sugar proteins grow the vaccines in two weeks. This novel platform will hopefully lead to new and more effective vaccines on a shorter timeline.

Even though vaccines exist to prevent a number of viral infections, countries that need them most don't always have access to them, or the vaccines fail due to factors like poor nutrition and aggressive microbial environments. Twenty years is the average delay it takes for a vaccine that is readily accessible in richer countries to become available for use globally and in the lower-resource areas where they are needed most, Ward says, adding, “That's just not right.”

Resistance is a wider problem in bacteria than it is in viruses, according to Ward. In poorer communities, families can't always afford to buy antibiotics that are appropriate, or can only afford a few pills at a time. The quality of drugs that are available are sometimes questionable: drugs sold as antibiotics on the street are often expired, fake or

have low potency. “I've personally seen people get sick or die because they've used antibiotics, or non-antibiotics, because that was all they could afford,” says Ward.

“I've certainly seen people dying from diseases that are preventable by vaccines.”

To solve problems on a global scale, we must first break silos, says Sheppard. His vision, through MI4, is to bring together experts from different disciplines to work together on novel ideas. “There is a new culture of collaboration,” Sheppard says. “This culture is being applied to a space where, traditionally, we have had fragmented excellence.”

Reducing antimicrobial resistance is a colossal task, especially for lower-resource countries, but that doesn't mean standards should be lower. “It's not going to have one solution,” says Semret, whose team is rebuilding a framework for infectious disease in Ethiopia. “I'm looking at it as a global problem.”

Without big-picture thinking, actions can have unforeseen consequences, just as the availability of stronger antibiotics to treat ill patients led to overuse and resistance. “It shows you that when you rush to resolve one problem, you may not know what else you've created,” says Semret. “By resolving the access-to-drugs problem, it's fed into this massive problem of antimicrobial resistance.”

She says this is not unlike public health decisions in countries with high rates of poverty that focus on single diseases, like HIV, malaria or tuberculosis, and underfund the treatment and research of other diseases. “The approach of, ‘Let's deal with this one thing now,’ is very costly,” Semret says. “Whereas we really have to take a step back and say ‘Let's try to deal with everything.’”

Sheppard agrees: “If you tackle only one piece of the puzzle, it's not going to work.”



COURTESY OF THE DOGGONE FOUNDATION

Elspeth McConnell was an art lover, a journalist and the philanthropist behind the Doggone Foundation, which provided the \$15 million that launched MI4 in 2018 and funded the first 12 MI4 interdisciplinary research projects in 2019.


A respected collector of Canadian Indigenous art, and a supporter of the arts and health research in Montreal, Elspeth died in 2017. She was the daughter of two school teachers and grew up in N.D.G. during the Depression. She began her career at the newspapers of the Montreal Star group where she met John Griffith McConnell, the publisher at the time and the son of John Wilson McConnell, a financier and generous donor to major institutions, including McGill.

Elspeth shared her husband's passion for art and her father-in-law's dedication to philanthropy. She collected the works of First Nations artists from the Northwest Coast, and began consulting with artists as well as the curator of Northwest Coast Art at the Museum of Anthropology (MOA) at UBC. She brought back artifacts that had left Canada a century or more earlier, and also helped new artists in their production. In 2017, the Elspeth McConnell Gallery of Northwest Coast Masterworks opened at the MOA as the new home of her collection, thanks to her donation of \$3 million to create the dedicated gallery.

Elspeth also supported social welfare initiatives and community involvement. In 2012, when her health started to decline, she founded the Doggone Foundation to support health care, research and education in Montreal. She donated more than \$10 million to the MUHC's Best Care for Life Campaign and made generous contributions to cardiology, ovarian cancer, vascular surgery, ophthalmology, and complex care. She preferred to remain anonymous in many of her donations, but after her death the MUHC recognized her support by naming the atrium of its Research Institute in her honour. — (Michelle Pucci)

The *Finer* Things

by Philip Fine



Fred Einesman, BSc'75, MDCM'79, turns skeptical scientists into collaborative storytellers. A writer for Grey's Anatomy, he regularly calls up medical researchers to run over possible story lines for rare conditions. Conversations usually begin with him being told that these conditions are one in a million. But he eventually arrives at that satisfying moment when the researcher begins seeing the disease's dramatic possibilities. Then there's a back and forth of ideas. "I get off the phone and feel so elated. They've become co-conspirators and storytellers," says the

Montreal-born Einesman, who successfully merged his own storytelling and medical talents. He had been an emergency care doctor in Los Angeles and took a needed break. He enrolled in filmmaking and, halfway through his master's, was recommended as medical advisor for the TV show ER, a job that would last 12 years. From 1996 to 2004, he straddled both worlds, coming up with story ideas in between shifts. He went on to write for Private Practice and has been with Grey's Anatomy since 2012.

His 2-year-old daughter makes for a whole other storyline. We asked him to share with readers the places he likes to take her in Los Angeles.

Disneyland

Growing up in Montreal, Einesman dreamed of going to Disneyland. Now, it's just 45 minutes from his home and he has season's passes for his family. Seeing it through his daughter's eyes, he has rediscovered its magic.

Underwood Farms

Einesman's daughter Mia had her second birthday at this working farm just outside of LA, with its hay rides, petting zoos and pick-your-own produce. "It's nice for city kids to go to a farm and see where their food comes from."

Griffith Park

At 4300 acres, it's one of the largest US urban parks. Its carousel is believed to have inspired a young Walt Disney and its big open spaces, playground and pony rides inspire Einesman's daughter.

Descanso Gardens

Botanical collections and horticultural displays abound. "They light up the gardens at night and it feels like you're wandering through an enchanted forest."

Natural History Museum of Los Angeles

Towering dinosaurs stand tall in its permanent collection, while, once a year, butterflies flutter on to your shoulder in another exhibit. Mia's red hair seems to make her even more attractive to the colourful creatures.





“Fichman! Take off your glasses. He’s going to put this device on your eye.”



The first person in North America to try on the soft contact lens

It was 1965 and Stephen Fichman, BSc'59, MDCM'63, was an ophthalmology resident at the Baylor University College of Medicine in Houston, Texas. His department was at the forefront of contact lens research and had organized an international conference on the subject. Attending was a Czechoslovakian researcher named Dr. Otto Wichterle.

Contact lenses had been around for decades but were still uncomfortable. The researchers at Baylor were excited about Wichterle's significant contribution to the field, a hydrophilic hydrogel soft contact lens that he and chemist Drahoslav Lim had developed six years earlier. The Baylor team was thrilled to be part of its North American debut and to see the lenses privately before they were unveiled at the conference. But who would model them? Ah, let's see: Fichman.

Fortunately for Fichman, he found the lenses to be very comfortable. Wichterle and Lim's discovery took off that year. Six years later, the FDA approved the soft contact lens for sale in the United States.

As for Fichman, he went on to become a successful ophthalmologist—and one of the first Montrealers to perform refractive (laser) eye surgery. He recently inaugurated the Dr. Stephen Fichman Annual Lecture in Clinical Ophthalmology with a \$100,000 donation—also a first of its kind, for McGill's recently renamed Department of Ophthalmology and Visual Sciences. THANK YOU, DR. FICHMAN!

Do you have a claim to fame to share with us?

Please get in touch at medicinefocus.med@mcgill.ca



TO MARKET, TO MARKET

by Mark Witten
with files from McGill News

Ben Cadieux, BSc'96, PhD'04, was sitting at home after finishing his third and final year of undergrad studies in physiology. He was ready to go back to work on a ferry boat for the summer when he got a phone call from Dr. Hugh Bennett, Professor, Department of Medicine, Division of Experimental Medicine.

"I thought I'd flunked his class. But Hugh asked, 'Hey, are you looking for a job?' I jumped on it and was ecstatic," says Cadieux, who started doing research with Bennett in his endocrinology lab that summer and was recruited to do a PhD in experimental medicine.

Cadieux is now Head-VP of medical affairs at ChemoCentryx, a California-based biopharmaceutical company, which discovers, develops and commercializes drugs to treat autoimmune and inflammatory diseases, and cancers. He's enjoyed a highly successful career, helping to develop and launch drugs in senior medical affairs positions at more than half a dozen startup and established biotech companies.

His experience is an example of how seizing the moment and jumping into unexpected research collaborations can be a springboard for health sciences students and graduates to gain entry to dynamic career opportunities in the medical and biopharmaceutical industries.

EDUCATING INNOVATORS AND EMBRACING INNOVATION

Today, the McGill Faculty of Medicine, like many other medicine and health sciences faculties, is embracing a cultural shift towards teaching, promoting and supporting concepts such as innovation, commercialization and business management. This is being accomplished through a wide variety of initiatives including the Clinical Innovation Program (CIP), based at the Steinberg Centre for Simulation and Interactive Learning (SCSIL), and the McGill Clinical Innovation Competition (CLIC), which was inspired by Raymond Hakim, MDCM'76, who created the Hakim Family Innovation Prize.

"Supporting innovation in medical technology is part of our responsibility," says Dr. Jake Barralet, Director of Innovation, SCSIL, and Vice-Chair (Research), Department of Surgery.

"A lot of our clinicians and students want to start companies to develop, translate and commercialize their ideas into marketable products. As a Faculty, we've realized that a little bit of help goes a long way in helping to translate those ideas into clinical solutions."

Here are the stories of some health sciences graduates who've launched and built successful businesses, and established rewarding careers in industry. These alumni and faculty innovators also share their advice on translating a health sciences degree into a career in business and industry.

JUMPING FROM A SLOW BOAT ONTO A FAST-PACED PHARMA CAREER

That phone call from Cadieux's mentor-to-be changed the course of his life. He had been raised by a single mom on welfare in Outaouais, the Quebec region across the Ottawa River from the nation's capital. Without the education, training, research opportunities and mentoring he received at McGill, Cadieux says he might have missed his calling.

"McGill took a chance on me and that gave me the ability to integrate and persevere in a new environment," says Cadieux, who did postdoctoral research on the epigenetics of brain tumours at the University of San Francisco, where colleagues suggested he pursue opportunities as a medical science liaison and in medical affairs in the hot California biotech sector.

His adaptability and strong foundation in clinical research have proven to be key assets for working in medical affairs with biopharmaceutical and biotech companies that include Berlex (now Bayer), Pharmion (now Celgene), Genzyme, Raptor Pharmaceuticals, Rigel Pharmaceuticals and, now, ChemoCentryx.

In a fast-paced global environment where biotech companies are routinely acquired for billions of dollars, Cadieux advises grads to broaden their outlook: "Students tend to be laser focused in one area when doing their PhD. For a successful career in industry, you need to be flexible and open. Learn to let go, and adapt to change and new environments," he says.

Cadieux's PhD research in experimental medicine with McGill mentors Bennett and Dr. Andrew Bateman, Professor, Department of Medicine, spanned nearly 10 years and focused on better characterizing the multiple roles of progranulin growth factor, a protein that instructs cells to divide and move. Progranulin keeps nerve cells alive and helps repair wounds, but also makes cancer cells more aggressive.

He was keenly influenced by the doctors' approaches to doing and presenting science to different audiences. "Hugh Bennett and Andrew Bateman taught me about patience and hard work. There's a high level of sophistication when you're doing research and you don't want to get bogged down by challenges," says Cadieux. "They also taught me a lot about public speaking, which is integral to my role in medical affairs these days. You need to be respectful of other people's opinions, and never talk and think in absolutes. These are the business soft skills, which are so important in industry."

Cadieux is enthusiastic about the opening of the Faculty's Campus Outaouais in 2020, where students will be able to complete their four-year undergraduate medical education in French. "I'm excited to see a mini-campus in the region," he says.

He welcomes the trend in the Faculty of Medicine towards more collaborations with industry and business faculties to innovate and commercialize discoveries. "We need to foster more partnerships between universities and industry. There is a wealth of technology and new development in universities, and we need to find better ways to partner with clinical biotech that can contribute to and benefit the community," says Cadieux.

THE BIOTECH ROUTE

Carmen Bozic, MDCM'86, chose to pursue a career in the biotechnology industry with Biogen in Cambridge, Massachusetts, for the opportunity to help many more patients than she could have as a clinician.

"What we do in biotechnology is translate scientific discoveries and develop the discoveries into medicines for patients. If I'd stayed as a clinician, I might have helped a few thousand patients over the course of a long career. Being at a biotech company and leading the development and approval of nine different drugs, I've been able to help hundreds of thousands of patients," says Bozic, Senior Vice President, Global Development, who oversees about 500 people within R&D and global clinical drug development programs in all phases, from development through launches, in the areas of neurodegenerative and rare diseases.

Biogen is one of the first and most successful global biotech companies, founded in 1978 by prominent scientists including Nobel Prize winners Walter Gilbert and Phillip Sharp. Through her 20-year biotech career in increasingly senior positions, Bozic has overseen the development, regulatory approval and successful launch of new therapies for conditions such as multiple sclerosis, hemophilia and spinal muscular atrophy, a motor neuron disease and the leading genetic cause of death for infants.

Bozic regards the combination of superb research experience and clinical training she received at McGill as instrumental in preparing her for a successful career in biotech. "I'm incredibly grateful to McGill. I had a broad exposure to amazing mentors in clinical medicine and while doing research at the Meakins-Christie labs, a pre-eminent pulmonary research centre," she says.

Bozic also benefited from her early leadership experience as chief resident in internal medicine at the Royal Victoria Hospital. "My fellowship in internal medicine was a phenomenal opportunity. As chief resident, I got to see the workings of the hospital at the leadership level, and coach and mentor residents. That clinician-in-training model translates well into biotechnology, where you work in cross-functional teams with people from many disciplines," she explains.

As a result of her stellar achievements at McGill, Bozic won fellowships to do post-doctoral clinical training and research in combined pulmonary and critical care at Harvard Medical School, Brigham and Women's Hospital and Beth Israel Hospital. "Some researchers I met while teaching at Harvard suggested I look at the biotech industry. They told me lots of great research was happening from bench to bedside and that you could apply research very rapidly to transform the lives of patients," she says.

Bozic offers this advice to medical graduates interested in a career in industry: "Always pursue both research and clinical training. Rather than joining industry right after medical school, it's better to have a few years of clinical and research training. That's an attractive combination for biotech companies," she says. — (Mark Witten)

SCALING UP SPORTS MEDICINE SKILLS AND SERVICE

After graduating as a physiotherapist, Joel Cyr, BSc(PT)'88, didn't plan to launch a business, but that's what happened. Kinatex Sports Physio has grown to include 38 private sports medicine and physiotherapy clinics in Quebec, and two recently opened facilities in Toronto and Florida.

Cyr had developed an interest in sports medicine as a student physiotherapist for the football team when McGill won its first national championship, the Vanier Cup, in 1987. But his first job as a physiotherapist working in a hospital was a disappointment. "I wasn't happy with the work I did. I got frustrated that I couldn't spend enough time to give patients the quality of care they needed. I was working hard, with many hours of overtime, but didn't feel I was making a difference," he explains. As a young person, he wanted badly to make a positive impact on patients' health and lives.

The catalyst for his business emerged from a painful episode. His father was suffering from cancer and dying at home. "I was having trouble dealing with the loss of my father, and my mom's emotional pain," recalls Cyr, "and I started to get off track."

His family had been left with insurance proceeds of \$50,000. "Mom said, 'Joel, take the money and do something with this.' My mother did the right thing. It got me focused and I bought a 50 percent share in a sports medicine clinic that had just opened," he says.

Cyr jumped into the venture with no business knowledge or experience, and he didn't realize the clinic was struggling financially. But he brought a strong philosophy of providing high-quality care, and the skills and knowledge to deliver it to patients. "I was 22. I worked 85 to 90 hours a week for the first seven or eight years, and I loved it. It's a service-oriented business. I felt that I had to invest the time and the money, and financial success would come later," says Cyr, who bought out the original owner's share a few years later.

Cyr's professional, patient-centred approach to care was grounded in his physiotherapy education and training. "The professional clinical care training from McGill was excellent. The practical experience I got working at McGill's sports medicine clinic was important in opening and operating my own clinics," he says.

To increase Kinatex's public visibility, Cyr also ran a mobile clinic in a converted ambulance that would travel to sporting events and bring physiotherapy services to clients. Kinatex is the official clinic for Tennis Canada, the Montreal Impact, Défi sportif Altergo and Les Grands Ballets Canadiens de Montréal, and has partnered with the Canadian men's alpine ski team, the Canadian track and field team, and many other sports groups to provide support for their athletes.

After turning around his first clinic, Cyr opened three others with operating partners, in each case, two employees with strong physiotherapy skills. Then, two therapists approached him about opening a fifth one, and Cyr turned them down because he thought five clinics would be too many to manage. They left and opened their own practice.

"That was a real turning point. I was spending a lot of time training good people and said to myself, 'I'll never lose a good, strong employee again by denying them an opportunity to grow.'"

Their departure prompted him to develop a hybrid, franchise-cooperative model, under which two staff open a new clinic as majority shareholders, with Cyr as a minority shareholder. "I bring in strong employees as operating partners and shareholders to have a piece of the pie, which has made our successful expansion and growth possible," he says.

Kinatex now has 40 clinics and about 80 shareholders. Eight to 10 new ones will open in Quebec this year, with McGill grads helping to fuel and support the expansion. "At least 30 shareholders, and 200 of our 600 employees, are McGill graduates," says Cyr. "Our model gives graduates a chance to be entrepreneurs. That's important because the new generation is more demanding and wants to have a stimulating work environment with opportunities and challenges."

Cyr advises health sciences students who are considering a career in business or industry to learn from his experience. "I learned everything about starting, managing and growing a business by trial and error, which is not the most efficient way to do it," he admits. His advice? "Find a field you're passionate about and if you're interested in going into private practice, take some business courses as part of your education."

“
MOM SAID, 'JOEL, TAKE
THE MONEY AND DO
SOMETHING WITH THIS.'”

ENCOURAGING AN INNOVATIVE MINDSET & ENTREPRENEURIAL SPIRIT

When Dr. David Y. Thomas was recruited to McGill from the National Research Council of Canada (NRC) in 2001, he brought an innovation mindset to his research and teaching. “I was at the NRC for 18 years, doing my own research and heading a division, helping translational research. Although I was a basic scientist, it was ingrained in my psyche that it’s no good doing great science and just publishing papers. Your research should have an impact on the world. We’re here to save lives and make lives better,” says Thomas, Professor in the Department of Biochemistry and Canada Research Chair in Molecular Genetics.

As a professor and former chair of Biochemistry, Thomas encourages students and graduates to take advantage of research collaborations and pursue career opportunities in industry. He also teaches them about the challenges and opportunities for innovation and commercialization, based on his own experiences working with industry as scientific advisor, research collaborator and CEO of Traffick Therapeutics Inc. The company specializes in the development of therapies for protein trafficking diseases, such as cystic fibrosis.

One example has been a collaboration with GlaxoSmithKline plc (GSK), where Thomas and colleagues were able to identify small molecules that correct the basic trafficking defect in the CFTR protein, known to be defective in people with cystic fibrosis. Thomas and Dr. John Hanrahan, a professor in the Department of Physiology, later licensed and sold two of the compounds to Quebec venture capital fund AmorChem, and Vertex Pharmaceuticals, a global leader in cystic fibrosis therapies.

“The students are very interested when I share insights and practical lessons learned from my experience serving on boards and being active in biotech and biochemical companies. I encourage trainees to network with graduates who’ve been successful in industry,” he says. “It’s important for the Faculty of Medicine to nurture an entrepreneurial spirit in students and graduates, and give them contacts in industry and venture capital.”

“
IT’S IMPORTANT FOR THE FACULTY OF MEDICINE TO NURTURE AN ENTREPRENEURIAL SPIRIT IN STUDENTS AND GRADUATES.”

AN EYE-TRACKING APP FOR PERSONALIZED COMMUNICATION

Etienne de Villers-Sidani, MDCM’00, has developed an eye-tracking software technology that enables patients who can’t talk due to paralysis, or intubation in intensive care, to communicate using simple eye movements.

“Communication is so important to quality of care and quality of life for these patients, and it’s very frustrating for these patients when they can’t communicate what they need and want. Patients may want to talk about their discomfort, pain or positioning, or talk to loved ones about their feelings,” says de Villers-Sidani, an associate professor of neurology and neurosurgery at the Montreal Neurological Institute and Hospital (The Neuro).

De Villers-Sidani came up with the idea for a fast, user-friendly device after seeing patients at The Neuro’s Amyotrophic Lateral Sclerosis (ALS) clinic struggle to communicate with the printed letter boards they’re given. These are slow, limited and impractical for patients and health care professionals.

His company, Innodem Neurosciences, is pilot-testing this novel app, called Pigio™, which uses smartphone or tablet cameras to track and analyze gaze patterns of patients who suffer from neurological conditions such as stroke or ALS and who can no longer communicate. Patients can control a cursor on their devices using only their eye movements; this allows them to communicate rapidly with health care staff or family members using pre-defined sentences or words on the screen.

The Pigio™ software will also be cheaper than the sophisticated eye-tracking systems (using infra-red cameras) now on the market. “Most patients and clinics can’t afford and don’t have access to devices that cost \$8000,” says de Villers-Sidani.

Innodem got initial backing from CENTECH, a Montreal-based technology incubator, and recently received \$1 million in financing from angel investors, as well as banking and government entities, to help commercialize the technology. It will first market and deploy the mobile app within a consortium of local Montreal hospitals, outpatient clinics and rehabilitation centres, and health care facilities in Boston and California.

But de Villers-Sidani aims to enhance the technology and make the affordable mobile communication device the global standard of care. “We’ll create different modules for different types of patients and health care professionals, such as neurologists, nurses and speech therapists. It will be easy to create updates, based on patterns of usage and requests, so we can make this very personalized, with entertainment options as well,” he says.

“
MOST PATIENTS AND CLINICS CAN’T AFFORD AND DON’T HAVE ACCESS TO DEVICES THAT COST \$8000.”

BRINGING INNOVATION TO THE INNOVATORS

Dr. Jake Barralet, Director of the Faculty of Medicine's Clinical Innovation Program (CIP), has his finger on the pulse of the most exciting and promising discoveries being made by McGill medical researchers. He's also a leader in launching and implementing cross-disciplinary programs, tools and facilities to help health sciences researchers become innovators. That gives them the means to apply their inventions and ideas to help solve clinical problems and improve the lives of patients.

"What's been apparent is that the Faculty of Medicine generates many excellent ideas, which are all potentially valuable to patients. But why is it so difficult and why does it take so long for patients to see a beneficial outcome if at all from these ideas and all that hard work? It's because the process by which a need is identified and solved, and solutions are delivered, is extremely complicated and involves many groups of people from different disciplines," says Barralet, who is also the Alan Thompson Chair in Surgical Research and Vice-Chair (Research) Department of Surgery. "Individually, each step is relatively simple and often 80 percent successful or more, but combine eight of them and success starts to slip away, especially if it was never planned for."

The CIP, housed in the Steinberg Centre for Simulation and Interactive Learning (SCSIL), accelerates that cross-disciplinary translation process by bringing together multi-disciplinary teams of surgeons, clinicians, computer scientists, engineers and business students from McGill, École de technologie supérieure, Concordia University and Polytechnique Montréal to define, screen and solve unmet clinical needs, with the goal of improving patient outcomes. It expands and builds on the success of the Faculty's Surgical Innovation Program, launched in 2015 and funded by NSERC's CREATE initiative.

"Innovation is not just about developing a new medical product, device or treatment; it's a way of thinking and a way of doing things as a team. We're educating the next generation of clinicians about innovating. If they have great ideas, they'll know the steps and teams they need to assemble, to move their ideas forward."

Barralet views the McGill Clinical Innovation Competition (CLIC) and its prizes as a powerful catalyst in advancing and commercializing the best ideas and innovations. "The range and quality of ideas being presented are very impressive. A great outcome of the competition is that it had put all these innovators and innovations from multiple hospitals, research institutes, clinics and departments in one place. Our alumni network of judges is international, and the innovators get exposure to many potential investors, mentors and partners," he says.

The SCSIL facility and services offer special advantages for testing and accelerating medical technology product development. "If you're going to develop an innovation and don't have access to a hospital, a simulated hospital can provide a fantastic way for innovators to collect information about how usable their product is, and to measure performance and thereby understand better the value proposition," says Barralet. "There are a lot of incubators and accelerators that help with business approaches. But having a simulated environment for validating med tech concepts and devices is unique." — (Mark Witten)

FROM BENCH TO... BAKERY!

Dr. Nguyen-Vi Mohamed, a post-doctoral fellow at McGill and The Neuro, loves working with mini-brains, which are miniature balls of human brain cells no bigger than a pea. She takes cells from the blood of patients, re-programs them into stem cells and then into specific types of brain cells to build mini-brains. These help researchers to better understand neurological conditions such as Parkinson's disease, and accelerate drug development.

"These 3D mini models of human brains are made up of different cell types—neurons, glial cells and astrocytes—and mimic the interconnections of the real brain. The other beauty of this model is that the cells come from patients, so it's very personalized," explains Mohamed. "The ultimate goal is to develop personalized drug screening, where we can generate a mini-brain for a specific patient and test the drug on that mini-brain before giving it to the patient."

To do that, Mohamed is developing and aging mini-brains for a familial form of Parkinson's disease, which will be used as a tool to test the effectiveness of promising compounds. The Neuro's iPSC/CRISPR platform team, directed by McGill researchers Dr. Edward Fon, PGME'95, and Dr. Thomas Durcan, is working with pharmaceutical companies, which possess large banks of compounds on which to test innovative therapeutic strategies. "If the team can find some hits with specific compounds using 2D systems, then I'll test those compounds to see if they will stop progression of Parkinson's disease in 3D systems in the mini-brains," she explains.

Mohamed is also the co-owner of a Montreal bakery, Boulangerie Chez Fred, where she has worked since arriving from Paris in 2011. She thrives on juggling science and entrepreneurship, and sees the two as complementary. "A bakery and a lab have a lot in common," she says. "In each environment, you need to control temperature and humidity, either to successfully have cells growing or croissants baking."

Managing change is another critical ingredient for success in both science and business.

The bakery is known for the high quality of its artisanal products and has a loyal clientele, but Mohamed aims to boost sales by enabling customers to order their croissants and baguettes for delivery by smartphone. "As an entrepreneur, you need to manage the business and adapt if something doesn't work; and, in science, you need to show your ability to manage projects and new concepts to be successful."

Mohamed is an avid rugby player, too: "You have to push yourself in rugby and never give up. Both qualities are very important in business, in science and in your life."

— (Mark Witten, with files courtesy of The Neuro)

BIOTECH FOR THE BOLD

Hicham Alaoui, PhD'99, came to Montreal from his native Morocco after completing an MSc in biochemistry at Université Pierre et Marie Curie in Paris. As a French-speaking science graduate, he set his sights on pursuing further education and research in Montreal and was accepted at the Université du Québec à Montréal (UQAM).

"North America was the ideal destination for me because it was about tolerance, diversity and opportunity. You earn rewards for hard work and anything is possible," says Alaoui, Vice President, Biotherapeutics & Development Inc., at Codexis Inc., a biotech company in the San Francisco Bay Area, which develops drugs for the treatment of rare genetic diseases.

Alaoui soon discovered that amazing, unexpected things were possible in Montreal. A professor recommended he contact Dr. Chris Richardson, then a leading molecular virologist at the National Research Council of Canada Biotechnology Research Institute (NRC-BRI) and an assistant professor at McGill. "I was so impressed with his research, and the corridors were lined with posters his lab had presented at conferences. We talked about various possibilities and it was fascinating to me. I would have worked for free in this guy's lab," he recalls.

Alaoui was surprised and delighted when Richardson offered him a paid, short-term contract position. He learned the hands-on skills and techniques for working with an insect virus Richardson had developed—a baculovirus—to genetically engineer and produce proteins in large volumes and quantities for therapeutic purposes.

"Dr. Richardson was looking for potential graduate students to do research, but he wanted to check me out first. I gave 150 percent, working days, nights and weekends, and it was a steep learning curve. After a few months, I got some very interesting results with another insect virus he asked me to work on. I discovered a new protein the virus system was making at very high levels and turned that into a PhD project," says Alaoui.

He also saw firsthand how a baculovirus technology Richardson had developed was commercialized: "It was a big success. He transferred the technology to a company and the system is now widely used around the world."

While doing his McGill PhD in microbiology and immunology, Alaoui gained valuable, marketable experience doing cutting-edge research with Richardson and other top scientists at the NRC-BRI and the Amgen Research Institute in Toronto. "I learned in my PhD how to think critically about problems and solve them in an efficient way. The people I worked with had laser vision on their projects," he says.

This was a game changer in launching a successful biotech career. "I can never forget Dr. Richardson's mentorship, which gave me the opportunity of a lifetime. It opened my eyes, and gave me a clear vision of the path I needed to take. I wanted to go into industry, work in genetic engineering, and apply the skills I learned to develop new drugs."

Montreal's BioChem Pharma, which had a global impact with its 3TC Epirvir anti-HIV drug (identified in collaboration with the late faculty member Dr. Mark Wainberg, BSc'66),

snapped him up, and Alaoui used insect virus vectors to make proteins and test their activity against the hepatitis C virus. "We screened hundreds of thousands of molecules. We discovered a molecule that showed promising activity against hepatitis C viral infection," says Alaoui, who managed a group of scientists that discovered three lead molecules, one of which advanced to a Phase II clinical trial. He downplays the coup: "It was beginner's luck."

After BioChem Pharma was acquired by Shire Pharmaceuticals Group, Alaoui's career progressed through various drug discovery leadership positions at NeoGenesis Pharmaceuticals and Stryker Biotech in the Boston area. He moved to Genentech in California and, for five years, was Associate Director and then Director of Biochemical & Cellular Pharmacology. "It was a dream job, doing top-notch science at one of the best biotech companies in the world. I had a large team of 35 people internally and managed another large team for the company through contract research organizations (CROs). At Genentech, my focus was on learning how to lead effectively and sharpening my leadership skills," he says.

Alaoui also served as Senior Vice President, Discovery Biology, at Symic Bio, and was recruited in mid-2018 to the newly created position of Vice President, Biotherapeutics Research & Development, for Codexis. He reports directly to the CEO and is responsible for directing the company's biotherapeutics discovery pipeline within R&D and accelerating drug candidates toward the clinic. "It's been a really interesting career. This is a new challenge and I'm looking forward to being successful in leading an entire business," he says.

His advice to health sciences students wanting to break into industry is to take an active role in charting their path, build strong relationships and persevere through graduate studies. "During the graduate program, be on the lookout for the areas where the science you're doing could be applied to industry. Be proactive, go to conferences, don't hesitate to reach out, and never give up."

As he did with Richardson at the outset of his career, Alaoui counsels reaching out and building trust through mentors and colleagues. "People trust when they know you give it your all and when your integrity is at the maximum. They appreciate the work ethic and commitment, and you develop long-lasting relationships that can be extremely beneficial for your career," he says.

Word to the Wise

by Philip Fine

... Featuring alumni wisdom

In our first edition, we ask Susanna Furfaro, MDCM'86, for advice on making schools and programs more diverse and attracting young people to non-traditional programs.

One day last year on a trip to her native Montreal, Susanna Furfaro, MDCM'86, returned to her alma mater to discover Eagle Spirit Science Futures Camp.

The annual one-week health and science camp, now run out of the Faculty of Medicine's Indigenous Health Professions Program (IHPP), introduces Indigenous youth to the health professions as a potential career path.

Furfaro, who has been accepted to pursue a master's of science in public health at McGill, was so impressed with what she saw that she and husband Diego Giurleo became financial supporters of the IHPP. The program, officially launched in 2018, aims to train more Indigenous health professionals as well as to teach McGill's future health professionals about the health needs of Indigenous peoples.

Exposing youth from under-represented populations to greater academic opportunities is a passion of Furfaro's.

She previously co-chaired the board of a nursery-to-Grade-12 independent school in New York City's Brooklyn borough, which takes considerable efforts to ensure the diversity of its student body and staff.

Furfaro also volunteered with Women in Science and Engineering (WISE), a free symposium that inspires girls to pursue science, technology, engineering and mathematics. Every year, 350 students, from grades 5 through 12, participate in a day-long event of hands-on activities and meet-ups with women working in science and engineering.

Tip #1 / Diversity attracts more diversity.

"Word was out that our school is diverse. That diversity attracts more diversity," Furfaro says. The school attracts a variety of ethnic and socio-economic groups thanks also, she says, to a robust program of financial aid. Aside from offering financial support, how can an educational institution ensure its student population mirrors the wider community? She offers a simple answer: "By prioritizing it."

"For us, it was important that our school reflects our community and our community is New York City, one of the most diverse cities in the world."

Tip #2 / Sometimes it takes a friend's enthusiasm to attract a young person into a new program.

"Statistics show that as you get to the more sophisticated science classes, the number of girls who participate in those classes decreases," says Furfaro. She picked up on something interesting from the first iteration of WISE: "A lot of the kids came with their friends." She believes that having friends see other friends in programs can help non-traditional fields catch fire with girls. "You get the friends involved and show that it's actually very cool for girls to go to these advanced classes."

Tip #3 / Harness the power of role models.

"A young woman, who, at 18, was already doing research at Columbia University, was asked to speak at WISE. She was almost the same age as the participants. And so she showed them that 'Look, if I can do it, you can do it too.'"

Tip #4 / Give young people permission to dream big.

"It's about allowing young people to see themselves in a role that they would not have not known that they could aim for."

"I was thrilled to attend one day of the Eagle Spirit Science Futures Camp at McGill. It's so important for these children to be exposed to McGill and to the health sciences. It's also so important for them to be able to say 'Maybe I could be a health professional one day.'"



A tale of two doctors

by Philip Fine



OWEN EGAN/JONI DUFLOUR

Isadore Rosenfeld, BSc'47, MDCM'51, DIP INT MED'56, DSc, (1926–2018) and Dr. Leon Glass offer a study in contrasts. One left Montreal for New York City, the other, New York City for Montreal, where their lives would become interlinked, thanks to a generous gift from Rosenfeld to McGill.

Rosenfeld cut a very public figure as a physician. He wrote popular health books and appeared regularly on American TV to dispense medical advice. He loved pulling pranks and telling jokes. His patients were his passion and he maintained a full-time cardiology practice into his 80s.

According to his son, Stephen, the Montreal native found in New York City an international metropolis where his larger-than-life personality could thrive. He counted Danny Kaye, Walter Matthau and Aristotle Onassis as friends and patients, took part in several Cold War exchanges with Soviet physicians, and earned TV and book contracts, addressing health issues in everyday language for a large audience.

Rosenfeld's rise—from the son of Jewish refugees to a cardiologist on Manhattan's Upper East Side, faculty member at Cornell University and bestselling author—gave him the ability to give back. In 2001, the 50th anniversary of his Medicine class' graduation from McGill, he endowed a chair in cardiology.

Enter Glass, the inaugural holder of the Isadore Rosenfeld Chair in Cardiology. Glass, who retired this year from his role as Professor of Physiology, applies mathematics to the study of the cardiovascular system. Some of his early research, on dynamic genetic networks, laid the foundation for major developments in systems biology. With Dr. Michael C. Mackey, Joseph Morley Drake Emeritus Chair in Physiology, he established that chaotic dynamics naturally arise in physiological control systems. The two lend their names to the resulting model, the Mackey-Glass equation.

Glass, a native New Yorker who came to McGill in 1975, downplays his many accomplishments. He is grateful, he says, for having found a good home in Montreal, for his research as well as for his family.

He sings the praises of his adopted neighbourhood of N.D.G., with its shops and residential streets that remind him of his childhood home of Brooklyn. It was a delight for him to watch his children grow up speaking French and English. He also appreciates the research environment in Canada, which he says allowed him better access to principal investigators and funding.

As for the Chair, he is thankful for the institutional recognition that came with it and says it may have helped his standing among the granting agencies. His work, which could be described as chaos theory meets cardiology, has resulted in more than 250 papers. He has had a patent licensed by medical technology giant Medtronic for a device that identifies atrial fibrillation based on the intervals between subsequent heartbeats.

At McGill, Glass also found a place for his French horn playing. "I stopped for many years, but then when I came to Montreal, I started again." For years, he's been a member of the I Medici di McGill, an orchestra made up of musicians from the Faculty of Medicine community.

One of Rosenfeld's extracurricular activities was more cheeky: He would pull off prank phone calls. "I have recordings of him calling another unit pretending to be a patient who has been prescribed an enema," recalls his son.

Two McGillians, two very different people: One would catch up on his cardiology research by reading his medical journals in the backseat of a chauffeured car on the way to a full day caring for patients, or, on the weekend, to his TV segment, Sunday Housecall with Dr. Rosenfeld; the other could be found at work simulating experiments on stimulated chicken hearts, or discovering the mathematical possibilities of a heartbeat and, on his way home, happy to stop in at his local bakery.

The contrasts may be apparent, but the two are tied together by their New York-Montreal connection and a special Chair that brought important fundamental research to McGill and joy to an alumnus who never forgot where he came from.

"My father loved McGill. And endowing a chair was something he could do for an institution that he found so formative in his life, and that he always identified with," says Stephen.

Coda: With his former colleague Mackey, Glass is once again lending his name, this time to a bursary, the Mackey-Glass Research Bursary in Physiology, with an \$80,000 goal. The tradition of giving continues!

Reflections from Rwanda

A medical resident's experience abroad

by Dr. Céline Giordano



DR. CÉLINE GIORDANO (WITH DR. ALICE BENJAMIN, RIGHT, ABOVE) IS THE FIRST RECIPIENT OF THE DR. ALICE BENJAMIN GLOBAL MATERNAL AND CHILD HEALTH AWARD, AWARDED IN SEPTEMBER 2018. SHE GRADUATED WITH HER MD FROM THE UNIVERSITY OF OTTAWA IN 2015 AND IS CURRENTLY COMPLETING HER RESIDENCY IN OBSTETRICS AND GYNECOLOGY AT MCGILL UNIVERSITY AND, AS PART OF THE AWARD, IS IN KIGALI, RWANDA, LEARNING FROM PEERS THERE.

After two weeks in the capital, Kigali, I think I've grasped the main features of the Rwandan medical system. The Centre Hospitalier Universitaire de Kigali (CHUK) is the university-affiliated referral centre for all of Rwanda. There are five established referral hospitals throughout the country (CHUK, CHU Butare, King Faisal, Rwanda Military Hospital and Ndera Hospital) and three newly added (in Kibuye, Ruhengeri and Kibungo). The CHUK serves the entire population, whereas the King Faisal and the Rwanda Military Hospital are reserved for patients with private insurance. In theory, every patient has access to basic subsidized health insurance known as *mutuelles de santé*, but many don't have it, which complicates their care.

In Rwanda, specialists work in referral hospitals and provincial hospitals, generalists in district hospitals, nurses in health centres and health posts, and community health workers at the level of the community, where 80 percent of the burden of disease is managed.

Training Rwanda's doctors

There is one medical school in Rwanda and basic training is six years after high school. Every graduating doctor has to serve for a minimum of two years in a district hospital after completing one year of internship. After these three years, they can either specialize (usually four years) or remain a generalist. In district hospitals, generalists are expected to perform caesarean sections and manage the labour ward. They also cover the emergency room, pediatric and internal medicine wards, etc.

What has struck me the most is the high number of postpartum peritonitis (infection of the entire abdominal cavity) cases transferred to the CHUK. Whether surgical technique or lack of proper sterilization is the cause of these cases, the burden of disease is huge. The treatment consists of a supra-umbilical midline laparotomy (opening the abdomen from the pubic bone to the chest), debridement of the infected/necrosed areas (removal of infected and unhealthy tissue), abundant washing and partial closure. Sometimes, if the skin is infected, it is also debrided and the abdomen is left open to close by secondary intention (from the inside). The wound is packed with gauze and daily dressings are done. Patients can stay over a month in the hospital until it heals.

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Measuring up

By Gail Yenta Beck, MDCM'78



THE AUTHOR, LEFT, WITH KAREN POIRIER-BRODE, BSC'71, MDCM'73, AT HOMECOMING.

OWEN EGAN/JONI DUFOUR

It's been 41 years since I graduated from McGill Medicine in 1978 and 45 since I first walked into the Pine Avenue entrance of the McIntyre Medical Sciences Building.

It was a bright, warm September morning. I remember that the auditorium was already dark when I entered, and steep-pitched. I took a seat on a side aisle toward the back of the room. There were many people in front of me and some behind me. I hoped I had picked a spot where I was invisible enough not to be asked any questions. I felt slightly sick to my stomach and I worried that I might faint or trip.

As the first days of the first week wore on, my panic grew. I learned about my classmates and my thoughts reflected my awe:

"A PhD? He has a PhD!! What am I doing here with people who have PhDs?"

"I wonder if I can ask to be in a group without former science majors?"

"I wonder if there's anyone here who wasn't a science major?"

"Another guy with a PhD!"

"Oligo-what?"

I did want to know about my classmates. I did want to have friends in my class. But when anyone asked me any questions about myself, I was painfully aware of how young I was and how little science I had studied. I remember being asked what I did for fun. I wondered what people really thought when I said that I was a Brownie and Cub leader at a church in the Milton Park

neighbourhood. My older friends, like my high school English and Biology teachers and the priests and wardens at the church, seemed surprised and grateful that I loved that work so much, but I thought being a Brownie and Cub leader for poor kids must have sounded pathetic to my sophisticated classmates. I also thought being an English and Theatre major would demonstrate that I was not clever enough to be a doctor. I really was very young and all the time I was thinking: "Do I measure up?"

Forty members of my class returned to Montreal and McGill for our 40th reunion in October 2018. Once again, I was awed by them.

My classmates are professors of medicine and world-renowned researchers. Some have served their country in the military and others at the highest levels of the civil service. Many are also now contemplating retirement and focusing on their grandchildren and their legacies. I am friendly with most of my classmates and some are good friends.

But... but...

The accomplishments of these 160 determined, intelligent people still inspire awe. I am still enthralled by accounts of their clinical, research and social achievements, and I still cannot help but wonder: "Do I measure up?"

Republished from DrGailBeck.com, where it first appeared in October 2018.

Blood unknown: Patient initiatives bring rare blood cancers to the forefront

by Michelle Pucci

Ed Pascal was at a routine check-up when he learned something was not right with his blood. His last blood test showed an above average platelet count: “It wasn’t crazy high, but given my age, my general practitioner was concerned,” Pascal says.

Pascal, 60 at the time, was eventually diagnosed with polycythemia vera, a disease he had never heard of, which he learned was part of a group of rare blood diseases. The news came from Dr. Jaroslav Prchal, a hematologist who had made blood diseases like Pascal’s his life’s work. Pascal laughs as he remembers meeting the doctor: “He told me, ‘You’ll die from something else, if this treatment works, before you’ll die from this.’ I said, okay, that’s encouraging.”

Today, Ed and his wife Phyllis Pascal sponsor a Continuing Professional Development (CPD) course on diseases such as his, Myeloproliferative Neoplasms (MPN) and Myelodysplastic Syndromes (MDS). It’s an online course targeted at family physicians, nurses, specialists, students and other health care providers. Prchal, an associate professor of Oncology at McGill and the former Chief of the Department of Oncology at St. Mary’s Hospital Center (SMHC), helped create some of the content for the course, which is currently undergoing an update and will be available again in 2020. “Mr. Pascal wanted to spread the knowledge of this disease,” Prchal says. “It’s well known among hematologists, but it needs to be better known by general practitioners so they can recognize the disease and refer patients for treatment. Then they can continue to see patients under a plan with hematologists.”

MPNs are rare conditions once considered to be disorders and now listed as blood cancers. Prchal has been

researching these blood cancers since the 1960s when he was a medical student at Charles University in Prague. In the past, conditions like Pascal’s were thought to be innocent. Patients had no “serious” diagnosis to point to, no support groups. “You thought being fatigued was because of old age,” Prchal says, “and because it’s not common, you don’t know anyone else who shares your misery.”

Prchal’s expertise in these chronic diseases has continued since those early days as a young doctor, now with a focus on clinical care. Fatigue, headaches, nose bleeds, itchy skin are some symptoms of MPN. “No one thought they could be part of a disease that could be helped by proper treatment,” Prchal says. Without treatment, patients are likely to suffer strokes and hemorrhages.

Pascal’s treatment consists of chemotherapy in a pill, and a checkup every three months. That wasn’t always the case for patients with this condition. Treatment in the past was limited to bloodletting. Today, treating MPNs sometimes requires blood transfusions or bone marrow stem cell transplants—a difficult and often impossible procedure for people over the age of 60. “The problem is there is an immune reaction, because they are not your stem cells, and high mortality, as many as 20 percent of people die because of transplantation,” Prchal says.

Fourteen years after his diagnosis, Pascal is living a full and healthy life with polycythemia vera, but he has fears about it being genetic. He found out he had a genetic mutation, Jak2, that is common among over half of MPN patients. “If your children and grandchildren are aware that their father had this, they may want to get blood tests and check their blood cell counts.”



Pascal was CEO and President of KOMBI, a family-owned winter accessories company known for its gloves originally developed by McGill ski racer Danny Gold, BCom'59, in 1961. The prototype padded gloves were designed to protect the knuckles of skiers flying down mountains between wooden posts. Pascal doesn't ski anymore, but with Prchal's treatment plan, he's still able to be active and spends whatever time he can in Florida.

Since meeting Prchal, he's become a benefactor for MPN research and patient care, including sponsoring the online course. He's also become a spokesperson for the cause. "I felt that I was fortunate to be diagnosed because there is treatment," Pascal says. "I made some inquiries and felt there wasn't enough awareness among general practitioners and health care givers about this particular cancer."

With Pascal's support, Prchal opened a specialized clinic at the Jewish General Hospital. The MPN Clinic has received referrals from across Quebec for patients with abnormal blood tests, which made it possible to improve research and diagnosis. No one hematologist in Quebec had had experience treating a large number of patients with MPNs. "The incidence is not very high, but it is frequent enough to cause a cost to the medical system and individual patients," says Prchal. The clinic brought together enough patients for a successful clinical trial, which led to the approval of a new medication used for treatment.

The lack of information about people with MPNs made it difficult to understand their traits. Prchal began working part-time at the clinic with Shireen Sirhan, BSc'99,

MDCM'03, PGME'09, an assistant professor of Oncology at McGill, collecting a large number of patients and developing treatment plans. "If you have rare diseases, you have to see large numbers," Prchal says. "Otherwise, if a doctor only sees one or two patients, you can't treat them properly." There is a trend in large centres, Prchal adds, of science developing around rare diseases, because of the need for specialization and better information about patients as a group.

The patient-doctor duo has worked on a number of awareness-raising projects, including conferences, talks and patient advocacy, and that may be why the number of MPN diagnoses is growing. The clinic has been operating for more than five years and has 140 registered patients. It expanded to a second clinic at SMHC with up to another 90 patients. Nationally, the Canadian MPN Group brings together oncologists and hematologists across the country. The Canadian MPN Network was founded in 2014 as a patient advocacy group pushing for support to MPN patients as well as to caregivers, family members, coworkers and employers. The next stage, according to Pascal, is raising funds for a charitable research foundation on MPNs. He is a founding board member of the Canadian MPN Research Foundation, a charitable foundation established in 2018. "Rare cancers such as these don't receive the same attention as mainstream cancers," he says, adding that "without awareness of a cancer that is not widely understood, it's possible that strokes and deaths may have been preventable."

What are MPNs?

Myeloproliferative neoplasms are a group of blood cancers in which bone marrow makes too many red blood cells, white blood cells or platelets. They are rare, slow-growing and chronic diseases that were categorized as cancers by the World Health Organization in 2008.

Types of MPNs

The most common MPNs are:

1. Polycythemia vera, a disease in which the body produces too many red blood cells.
2. Primary myelofibrosis, which is characterized by overproduction of white blood cells.
3. Essential thrombocytosis, a disease in which the body produces too many platelets.

Other MPNs include chronic myelogenous leukemia, where cells produced in the bone marrow don't mature and crowd out normal cells. The leukemia cells may spill into the bloodstream and cause white blood cells to increase.

There is also a subgroup of rare MPNs.

What are the signs and symptoms?

Prchal believes MPNs were hard to diagnose because the symptoms of the disease were associated with getting older: fatigue, rosy cheeks, itchy skin after hot showers. Patients have a higher risk of blood clots or hemorrhages. The median age of patients is about 60 years old, and many of them live with symptoms such as headaches, bleeding and clots.

How do you diagnose an MPN?

The majority of MPN patients are found to have the Jak2 mutation. Polycythemia vera can be found in routine blood tests that show elevated hemoglobin and blood cell counts. A bone marrow biopsy can confirm the diagnosis and type of neoplasm. A diagnosis of MPN should be considered for patients with abnormal blood counts—the WHO sets out blood count thresholds for identifying these blood cancers. “It is not always easy to make a diagnosis of the condition,” Prchal says. Diagnosis may require a combination of elevated hemoglobin, platelets or white cells, and an enlarged spleen.

How do you treat it?

With proper treatment, patients can improve their quality of life and likely prolong life.

Many patients with polycythemia vera or essential thrombocytosis can take medication, such as low-dose chemo, to treat the disease. MPN patients may need a stem cell transplant, which is often impossible for patients over the age of 60. With an MPN diagnosis, especially of polycythemia vera or essential thrombocytosis, a person can reach the average life expectancy.



“

We likely all know someone who has a rare disease. There are more than 7000 identified rare diseases worldwide, each of which affect fewer than 1 in 2000 people. Added up, though, rare diseases affect tens of millions of people, including 1 in 12 Canadians.

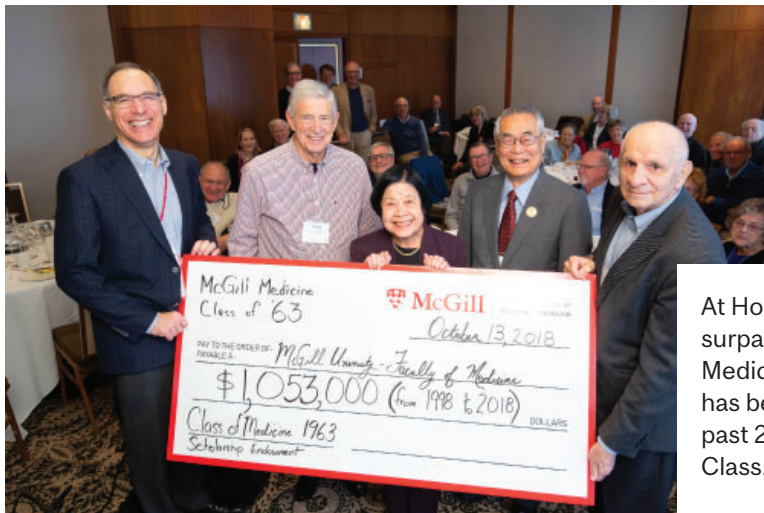
People with rare diseases face inequities in health care, including prohibitive medication costs and difficulty accessing experts in their condition. A lack of awareness about these diseases in the healthcare community means that patients often embark on what is called a diagnostic odyssey, where late diagnosis leads to delayed intervention and prolonged suffering.

In fall 2017, a group of McGill medical students started the Rare Disease Interest Group (rareDIG), the first student-run, rare disease advocacy group in Canada. We aim to encourage students across the health professions to adopt attitudes that will benefit patients with rare diseases, as well as raise awareness of rare diseases in general. Developing insight into the challenges patients with rare diseases face will inform the advocacy efforts of our colleagues and encourage the creation of public policy that can reduce inequities in care.”

— (rareDIGmcgill.com)

Did you know?

The Medicine Class of 1963 has set a new bar for Medicine reunion class giving.



At Homecoming 2018, they celebrated reaching and surpassing \$1 million in book value for the Class of Medicine 1963 Scholarship Endowment Fund, which has benefited more than 120 students so far over the past 20 years. Congratulations and thank you to the Class. What a show of team spirit!

The accidental basketball stars by Philip Fine

It was 1959 and David Boyd, MDCM'63, was playing pickup basketball in the Currie Gym with two fellow American med students. Watching them was McGill's athletic director, who had recently become the basketball coach and was feeling pressure to improve the weak varsity team he had inherited. On the spot, he asked the three first-years if they would join the team. No tryouts, no questions about their experience: "I think he saw three guys that could throw the ball through the hoop," says Boyd.

He and fellow scrimmagers Don Bishop, MDCM'63, and John Newsom, MDCM'63, were surprised. Making the team back home—Seattle for Boyd—required much more than shooting hoops during a break in classes. The coach persisted and offered to accommodate their course load. "He said, 'I just need you to show up for the games. We can organize some practices around your times.'"

The three joined the basketball team, as did classmate, Alan Murdock, BSc'59, MDCM'63. They played against teams all over the US and Canada. And they were regularly trounced.

But the style of play that the three Americans brought to the team would pay off. The full court press had not yet been adopted in Canada. On the last game of the season it really worked. A McGill player stuck to any opposing player who had the ball and teammates swarmed in to create a trap. The University of Toronto team was befuddled.

Because there were so few spectators, the McGill team had a wide open gym, knocking the Toronto team off their game and frequently out of bounds. McGill won. Toronto was devastated. "They left. They didn't even shake our hands."

After the season, the three were replaced by more experienced players. The coach was finally building a team based on skill rather than on basic knowledge of the game.

But before benching them for good, he repaid at least one of them for their help getting the team on its feet. Boyd didn't have much money during his time at McGill and was known to sleep on an army cot in the gym. Seeing this, the athletic director offered him a loan from a sports scholarship fund. That loan got Boyd through his next three years at McGill.

"I told my pals in Seattle that I went to medical school on a basketball scholarship. They couldn't believe it!"





OWEN EGAN/JONIDUFOR

Ode To Our Class

**McGill Medicine
Graduates,
1963...
Octogenarians,
2018**

To the Extraordinary McGill University Medicine Class of 1963

We Women and Men of McGill Medicine Sixty-Three,
Fifty-five years(!) after getting our MD, CM Degree,
Have Returned to Montreal with Vim, Vigor and Esprit
To Celebrate and Revel in Warmth and Camaraderie ...

Our Class Communality has been Nurtured and Buoyed
Thanks to our Czars, Drs. David Chui and David Boyd,
Who Have Kept Us Together via Internet Sharing,
Creating a Virtual Family with Remarkable Caring ...

Whatever Curveballs to Us Karma and Life May Have Tossed,
We've Still Won Most Games, Although There were Some We Lost:
We've Discussed Our Experiences, Both Superficial and Vital,
But When We're Together Now, It's Like An "Organ Recital"!

We've All Loved, Laughed and Exulted, and Yes, We Have Cried,
We've Cherished our Loved Ones, and Mourned Those Who Died ...
You May Well Have Noticed, Since We're Somewhat Old,
That Our Lives Have Changed in Ways Not Foretold ...
Worries that Once Exasperated, Were Oppressive and Weighty,
May Have Lessened or Evaporated Now That We're Eighty ...

Our McGill Med '63 Class Produced Remarkable Physicians,
Pillars of Society with Civic and Professional Positions ...
Achievements Recognized, Awarded, Garnered, Steered,
Our Octogenarian Classmates Have All Had Illustrious Careers!

BUT: The Core of Our Lives Has Always Been Those We Have Loved,
Close Family and Friends, Here and Afar, Below and Above ...
We Have Enriched Each Other With Relationships Fundamental,
We Have Enhanced Our Lives With Meanings Transcendental ...

While We Know Not How Many Years We Each May Have Left,
What We Do Know is That Not One of Us Shall Be Bereft
Of Profound Gratitude to McGill for the Education and Experience Provided:
We were Nurtured and Challenged, The Fullness of Our Lives Deeply Prided.

To quote Stephen Sondheim's touching song,
"Old Friends, Here's to Us, Who's Like Us?!"

Saul Levine, BSc'59, MDCM'63
Professor Emeritus in Psychiatry
University of California at San Diego

Planned Gifts & Bequests



A son thanks his father by giving to others

Hans Josef and Klaus Jochem Bursary

The work of avant-garde playwright Samuel Beckett helped convince Klaus Jochem, MDCM'85, to enrol in medical school. Fresh off his master's thesis, Jochem developed a curiosity for the human mind and, in turn, medicine, thanks to the ravings of Beckett's downcast characters.

Jochem's curiosity was boundless. He picked up cooking skills during a summer at an Austrian hotel, pursued piano for years, took in modern dance shows, spoke several languages, and found joy in his walk to work through Montreal's Parc Lafontaine. "My brother was a Renaissance man," says his sister, Karin Macpherson.

Jochem died Nov. 29, 2017, in Montreal, at the age of 65 after living for five years with multiple myeloma.

His curiosity was coupled with an appreciation for the opportunity he was given to pursue his education, passions and career choice. He felt particular gratitude to his father, who had come to Canada from Germany with very little and become a success, thanks in no small part to his education.

After his master's, Jochem took prerequisite science courses at Dalhousie University, which allowed him to pursue his MDCM at McGill. He went to University

of London to complete a subspecialty in tropical medicine and to Harvard University for a master's in public health.

He pursued field work in tuberculosis in Nepal and, after his degree at Harvard, managed public health projects in the country. He spent most of his youth in suburban Toronto, but it was Montreal, where he had lived for six years after arriving from Germany as a baby, that felt like home. He eventually settled in the city, pursuing a career in public health at both the municipal and provincial levels.

Appreciation lies at the heart of Jochem's decision to bequeath a donation to McGill for a merit- and need-based scholarship. The Hans Josef and Klaus Jochem Bursary will provide generous funding, in perpetuity, to one international student each year.

"Our father was grateful to those who helped him along the way," says Macpherson. "And Klaus made that a very important part of his life: helping people."

Whether it was implementing immunization programs in Nepal or tackling TB in Quebec, Klaus Jochem gave to others. With this gift, he found a way to help young people in low-resource parts of the world realize their full potential for years to come.



Faculty of
Medicine

Chantal Thomas
Managing Director, Development
chantal.thomas3@mcgill.ca
514-398-6558

University Advancement, Faculty of Medicine
McGill University
1010 Sherbrooke St. West, Suite 1210
Montreal, QC H3A 2R7



McGill

Faculty of
Medicine

University Advancement
Faculty of Medicine
McGill University
1010 Sherbrooke St. West, Suite 1210
Montreal, Quebec, Canada H3A 2R7

BACKCHAT@McGillMedAlumni

SOCIAL MEDIA ROUNDUP



karellelamoureuxbacon "It's not just about girls going to school and becoming smart women, it's knowing that those smart girls become influential women and that ends up changing the world for the better."—Meghan Markle. Happy International Women's Day #internationalwomensday #women #womenempowerment #girlboss #girlssupport-girls #womensday #boss #bossbabe #nurse #friends #mcgilluniversity



pixmatt1 McGill Medicine mini-reunion in the Adirondack Mountains. #mcgill #medicine #adirondacks #1990 #montreal #mcgilluniversity #mcgillmed



cy_mtl #First day of a big adventure. My two greatest supporters in the reflection ... #medicine #mcgill #mcgillmed #backtoschool #parentsoftheyear #LiterallyAlwaysHaveMyBack