



Department of
PATHOLOGY



DALHOUSIE
UNIVERSITY

2023 Annual Report

Expanding our capacity and planning for the future

Message from the department head: Expanding our capacity and planning for the future



2023 WAS ANOTHER GREAT YEAR FOR THE DEPARTMENT OF PATHOLOGY. We are reaping the benefits of our efforts to expand our capacity over the past few years, while positioning ourselves to be even more efficient and effective in the future.

We held a strategic planning retreat last spring, our first in-person meeting since before the pandemic. On top of planning how we will advance in the key areas of education, research and clinical service, we set goals for improving in the areas of equity, diversity, inclusion and accessibility, and wellness.

We are more focused than ever on safeguarding the sustainability of our services. This is a serious challenge, given we face an ongoing shortage of human resources

in our laboratories, at the same time our population is growing larger and older, and diagnostic testing is becoming more complex.

As you will see in this year's report, we have embraced AI in our laboratory automation systems. This dramatically improves efficiency by removing as much as 80 per cent of the human labour required to conduct repetitive tasks. Automation will be key in the new laboratory facilities to be constructed over the next five years as the MacKenzie building is being decommissioned. Some of this work has already begun, with the expansion of the laboratory facilities at the Dartmouth General Hospital and Cobequid Community Health Centre.

We are working on developing a "liquid biopsy" testing protocol, an innovation which allows us to identify cancer in a blood sample, using very sensitive equipment. This eliminates a trip to hospital for a traditional biopsy, removing bottlenecks in the system and facilitating faster diagnoses as well as easier and more efficient disease-monitoring.

Of course, getting test results into doctors' hands quickly is crucial. We are working with colleagues across Nova Scotia to standardize testing and equipment in preparation for the launch of One Patient, One Record in 2025. This new system will facilitate the movement of patient samples around the province and feed all test results into one comprehensive system.

On the research front, we have increased grant capture substantially and several faculty members have received prestigious awards. Dr. Graham Dellaire received Dalhousie University Distinguished Research Professorship and Dr. Paola Marcato was named QEII Foundation-Canadian Breast Cancer Society Chair in Breast Cancer Research. We have also embarked on a collaboration with the Faculty of Computer Science to establish a Tier II Canada Research Chair in Precision Medicine and Bioinformatics.

Our education program is also growing. We have two new fellows in hematopathology, one in histocompatibility and three in medical microbiology, in addition to the already-established dermatopathology fellowship. At the same time, we are investigating a new fellowship in liver pathology, and launching a new graduate program in genetics. These are exciting developments that demonstrate the maturity and excellence of our department.

I am looking forward to our continued progress in 2024. It is a privilege to oversee such a dynamic department in these unprecedented times. I am proud of our faculty, staff and learners for their creativity, dedication and willingness to work so well together to turn challenges into opportunities as we prepare for the future.

Sincerely,

Dr. Irene Sadek
Head, Department of Pathology

CLINICAL WORKLOAD

16,402,851 TOTAL NUMBER OF TESTS PERFORMED

1,214,985 TOTAL BLOOD COLLECTIONS PERFORMED

PEOPLE

111 NUMBER OF PRIMARY FACULTY

750 NSHA TECHNICAL STAFF

14 CROSS APPOINTED FACULTY

110 IWK TECHNICAL STAFF

5 ADJUNCT FACULTY

216 NEW BRUNSWICK TECHNICAL STAFF

RESIDENTS

34 NUMBER OF RESIDENTS & FELLOWS

12 DIAGNOSTIC & MOLECULAR
9 DIAGNOSTIC & CLINICAL

7 HEMATO-PATHOLOGY
6 MEDICAL MICROBIOLOGY

GRADUATE STUDENTS

44 NUMBER OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

18 MSc
13 PhD
13 PDF

RESEARCH STATISTICS

272 NUMBER OF PUBLICATIONS

\$5,353,917 GRANT CAPTURE



Dr. David Conrad

COMMUNITY FEATURE: Dal pathologist launches “Cellfie Project” to demystify cancer for kids



Liam Emery

NEVER UNDERESTIMATE THE POWER OF A CHILD’S CURIOSITY — especially when paired with a caring adult with a passion for pathology. This is the powerful combination of forces that led to the Cellfie Project, a groundbreaking initiative that allows kids with leukemia to see their own healthy and cancerous cells under a microscope, with personal interpretation from a pathologist.

It all started with eight-year-old Liam Emery from Dieppe, N.B. Liam was diagnosed with acute lymphoblastic leukemia (ALL) in July 2021. During one of his visits to IWK Health for chemotherapy, Liam asked his hematologist-oncologist Dr. Victoria Price if he could see his own blood cells. He knew that he was being treated for blood cancer, but he couldn’t fully grasp what it all meant.

Dr. Price reached out to Dr. David Conrad, head of the Division of Hematopathology, to see if it would be possible to accommodate Liam’s request.

“Give me two days!” Dr. Conrad replied without hesitation. He set about his preparations, which included finding a child-sized lab coat, a stuffed toy “cell” that reverses from a healthy cell to a cancer cell and back, and some of Liam’s favourite snacks.

When Liam showed up in the IWK Hematopathology Lab in May 2022, he and his parents were thrilled with the obvious care Dr. Conrad had taken to make Liam feel special.

“We had lots of pictures of his cells for Liam to observe under the microscope,” Dr. Conrad recalls. “It was clearly very meaningful for Liam to be able to see older images of his cancerous cells, and new post-treatment images showing his healthy cells. This was the physical evidence, the visual proof, that he was cancer free.”

Dr. Conrad showed Liam the slides of his cells and took him on a tour of the hematopathology lab, where Liam got to meet and speak with the staff. When they were done, Dr. Conrad gave him a thumb drive with his cell pictures, calling it a “cellfie stick.”

Liam was so pleased, he took the images of his cells to school to show his teachers and classmates, and gave a presentation about his experience with leukemia.

“When Liam was told he was in remission, he didn’t quite understand what that meant,” explains Julie Bourgeois, Liam’s mother. “But when Dr. Conrad showed him his cells, it made it easy for him to understand. For us, that was a big deal, and Dr. Conrad made it kid-friendly.”

The experience was so empowering for Liam, it inspired Dr. Conrad to offer something similar to other children. “The Cellfie Project” idea popped into his mind, propelling him to take the next steps. Dr. Conrad spent \$5,000 of his own money to get the name and Cellfie logo trademarked, to source hundreds of custom Cellfie stickers and thumb drives, and to buy additional child-sized lab coats in preparation.

Word about the new initiative spread quickly and more than \$100,000 in spontaneous donations poured in, so the IWK Foundation got involved in managing the trust fund Dr. Conrad established. Meanwhile, the IWK Department of Pathology & Laboratory Medicine provided a giant screen television so kids and families would be able to view the cell images together and ask questions of the pathologists. In January 2023, the Division of Pediatric Hematology-Oncology came forward with additional funds to cover ongoing costs associated with Cellfie visits.

The Cellfie Project is growing now by leaps and bounds. Dr. Conrad is reaching out to other children’s hospitals to get them involved, and colleagues as far away as Dubai have asked how they can take part. And, he has put together an application to the IWK Foundation for funding.

“I want to take this to another level by developing collateral materials, so kids can go back and review what they learned, in engaging formats like coloring books and video games,” Dr. Conrad says. “It would be so helpful for them to be able to access animated videos about how normal

“When faced with the fear of the unknown, knowledge is the key that unlocks the ability to cope.”

blood cells look and function, what happens in leukemia, how chemo works, how to manage the side effects, and what the cells look like on the other side of treatment.”

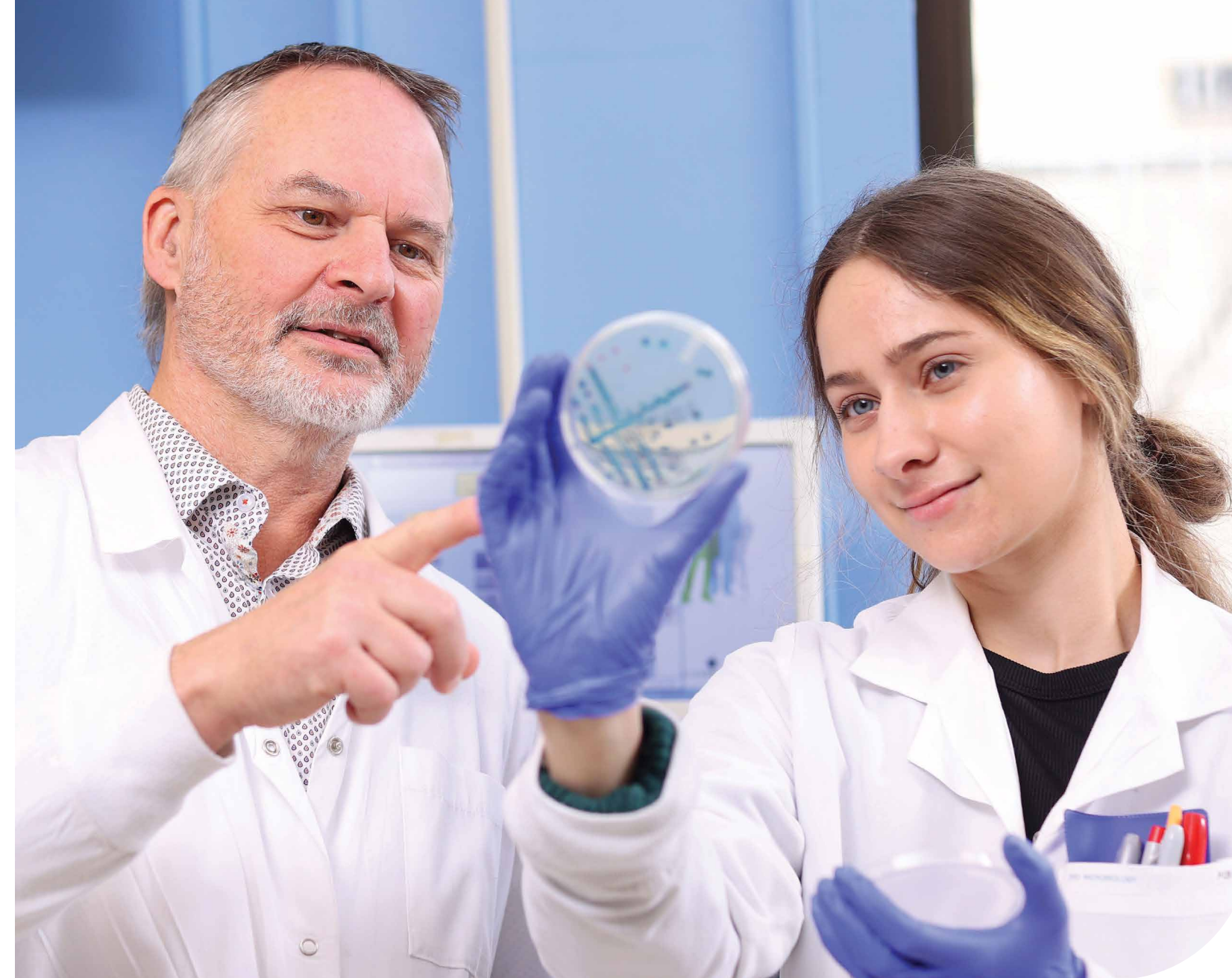
Dr. Conrad’s colleagues at IWK Health are equally enthusiastic. Dr. Bruce Crooks and Dr. Valerie Bourque-Riel in the Division of Hematology-Oncology want to explore the benefits of the project. They are planning to survey children and families before and after their visits to the IWK, to see how the Cellfie Project has influenced their knowledge, perception, feelings and overall experience of the cancer journey.

Nine children have participated in the Cellfie Project since Liam—eight with acute leukemia, one with a solid tumour. They and their families have all been enthusiastic about the opportunity to gain a deeper understanding of what’s happening with their cancer.

“Some kids were even inspired to want to become pathologists and wore their new lab coats as Hallowe’en costumes,” says Dr. Conrad, whose leadership of the Cellfie Project has earned him appearances on the Sickboy Podcast, CTV Your Morning, and the cover of the October 2022 issue of Doctors NS magazine—the first time a pathologist has graced the cover.

“It is such an amazing opportunity to help a child and a family with knowledge, just by sharing information,” Dr. Conrad says. “I was not changing the diagnosis or the treatment, just giving insight, but the impact was profound. When faced with the fear of the unknown, knowledge is the key that unlocks the ability to cope.”

(L-R) Scott Richard, MLT II IWK, Dr. David Conrad, Morgan Gallant, MLT II IWK



Dr. Ian Davis and Emilie Mombourquette, MLT Mackenzie

CLINICAL FEATURE: Microbiology Lab introduces AI to lab automation



Charles Heinstein and Dr. Todd Hatchette

SOMETIMES, POSITIVE DEVELOPMENTS CAN EMERGE FROM GREAT CHALLENGES. This is certainly the case with the large-scale lab automation process underway in the bacteriology section of the Microbiology Lab.

“During the pandemic, the federal government made funding available to help labs across the country deal with the massive volumes of COVID testing,” recounts Dr. Todd Hatchette, head of the Division of Microbiology. “We were already looking at instrumentation to help us automate certain processes, and this was the perfect opportunity to secure the funding for that.”

Provincial collaboration and federal funding allowed the Microbiology Lab to take delivery of a WASP (Walk Away Specimen Processor) total lab automation system in the summer of 2021. Under the guidance of lab operations manager, Charles Heinstein, the equipment was installed and up-and-running by November the same year.

Automating the processes required to culture and identify bacterial pathogens freed up limited staff resources to focus on processing COVID tests. But the benefits are far greater and longer-lasting than that. The WASP system is setting up the lab for optimal efficiency, far into the future.

“We’ve known for a long time we are going to be in a laboratory human resources crisis,” explains Dr. Hatchette. “We have not been training enough technologists to replace those who are retiring, let alone to meet the demands of the expanding and aging population. Automating simple, high-volume processes frees up medical lab assistants and medical lab technologists to focus on more complex analyses that require humans to be involved.”

The lab’s first priority has been to automate the highest-volume tests, starting with by far the most common, urinalysis.

“Our medical lab assistants no longer have to manually streak about 200 plates a day, which adds up to about 70,000 per year,” says Dr. Ross Davidson, who heads the bacteriology lab along with Dr. Glenn Patriquin. “They no longer have to manually move the plates to an incubator, check on them periodically, sort them into piles based on the results, or make a standardized suspension for susceptibility testing. The WASP does all of this now.”

Over the past year, the team in the Microbiology lab has been developing the machine-learning and artificial intelligence capabilities of the WASP. The manufacturer has been training senior laboratory technologist Conor Porter, the WASP’s “super user,” in how to set up the machine-learning process. This essentially “teaches” the equipment to recognize various bacteria with great speed, accuracy and precision.

With this system in place, the WASP is now able to rapidly sort out 80 per cent of urine samples as negative, dramatically reducing the labour required to process the samples. When the system identifies a positive sample, the machine delivers the sample to the technologist, who completes its workup.

Next up for automation will be swabs for MRSA (methicillin-resistant *Staphylococcus aureus*) and strep throat, as well as testing for VRE (vancomycin-resistant *Enterococci*) and CPE (carbapenamase-producing *Enterobacteriaceae*), which must be tested for whenever someone is admitted to hospital.

“There are not a lot of limits to what we can do with the WASP,” says Dr. Davidson. “It just takes time to set up and validate the machine-learning process.”

These efficiency gains are allowing medical lab technologists to focus on the growing volume of other kinds of testing that can’t readily be automated.

“A lot of testing got sidelined during COVID but now it is snapping back like an elastic, with much higher volumes than before the pandemic,” notes Heinstein. “We’ve had to repatriate tests we used to send out, because the volume is too high now and that would make the results too slow. The WASP has allowed us to redeploy staff to work on things like testing organs prior to transplant and testing for tuberculosis, which is on the rise with higher levels of immigration.”

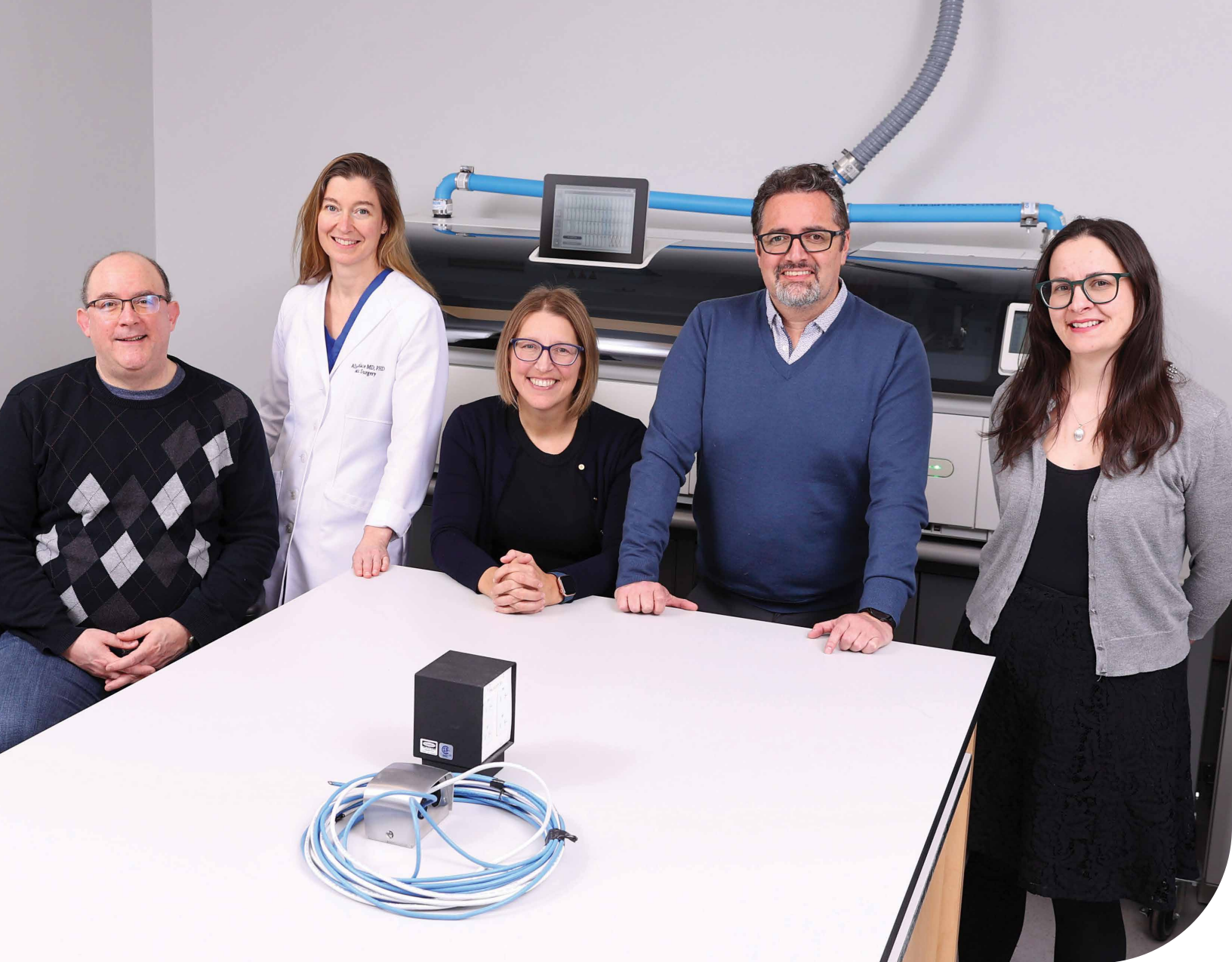


Dr. Ross Davidson and Dr. Glenn Patriquin

The benefits of the WASP system will accrue over time, as the AI and machine-learning components are programmed, trained and refined for more and more bacterial pathogens.

“It’s a lot of change and a lot of training that will ultimately transform our workflows,” Heinstein says. “It’s a team approach. Everyone plays a part and there’s a lot of trial and error. The end result will be a testing capacity that keeps pace with the demands of our growing population and provides our laboratory staff with a great deal of job satisfaction as they are constantly learning new things and focusing their efforts on more interesting tasks.”

“Automating simple, high-volume processes frees up medical lab assistants and medical lab technologists to focus on more complex analyses that require humans to be involved.”



(L-R) Dr. Graham Dellaire, Dr. Alison Wallace, Dr. Robin Urquhart, Dr. Victor Martinez, Dr. Jeanette Boudreau

RESEARCH FEATURE: Dalhousie researchers take the lead in tackling Canada's lung cancer crisis

AS RATES OF SMOKING HAVE PLUMMETED IN CANADA, IT STANDS TO REASON THAT RATES OF LUNG CANCER WOULD ALSO DECLINE, BUT THIS IS NOT THE CASE. Lung cancer continues to take its deadly toll, with ever-rising rates in relatively young people who have never smoked.

The cause of this paradoxical increase is to be found in our basements, wells and the very air we breathe, according to Dr. Graham Dellaire, professor and director of research in the Department of Pathology, and co-principal investigator of a massive cross-country lung cancer study that has received a \$5.2 million Canadian Cancer Society (CCS) Breakthrough Grant.

“Canadians are among the most radon-exposed people in the world,” explains Dr. Dellaire, noting that Nova Scotia is particularly affected by radon, a radioactive gas and known carcinogen that seeps out of rock and soil and accumulates in basements. “Nova Scotia also has a lot of arsenic in the soil that gets into the well water in affected areas, and most of the country is affected by smoke from increasingly severe and numerous wildfires.”

As Dr. Dellaire points out, the climate crisis is driving the lung cancer crisis: “Melting permafrost is releasing more radon, flooding is increasing arsenic in wells, and wildfires are sending more fine particulate matter and chemicals into the air. This situation demands that factors other than smoking be taken into account when assessing lung cancer risk and screening protocols.”

Lung cancer is the leading cause of cancer death in Canada. More people die in Canada due to lung cancer every year than die of colon, breast and prostate cancers combined. And Nova Scotia gets more than its fair share. Of 30,000 new diagnoses across Canada in 2022, 4,000 were in N.S., and mostly at stage four, by which stage five-year survival rates are less than 20 per cent. This abysmal statistic highlights the urgent need for screening to detect lung cancer early.

Currently, a person will only be screened for lung cancer if they are between 50 and 74 years old and have a history of smoking. But factors other than smoking now account for one-fifth to one-third of new lung cancer cases. The researchers running the new CCS Breakthrough study want these increasingly problematic environmental exposures to be included in decisions to screen for lung cancer—but this requires a quantification of risk.

“We need solid evidence as to what level of exposure predicts what level of risk,” says the study’s principal investigator, Dr. Robin Urquhart, an associate professor in the Department of Community Health & Epidemiology and CCS-NS Endowed Chair in Population Cancer Research. “This will enable us to provide policymakers with the data they need to set new eligibility criteria for lung cancer screening.”





Dr. Robin Urquhart & Dr. Victor Martinez

The researchers aim to establish a way to calculate personalized risk scores for individuals, based on lifetime exposure to radon, arsenic and fine particulate matter (known as PM2.5). Such risk scores would determine who should be screened for potential lung cancer.

It is a complex, multifaceted research effort involving many sub-projects. For example:

- » Dr. Wallace, Dr. Dellaire and collaborators are assessing radon- and arsenic-induced molecular damage in “organoids” derived from lung cancer patients’ tissue samples. These patients are selected based on arsenic and radon metabolites found in their toenails. The researchers also want to identify and validate molecular signature features of arsenic and radon damage that could serve as biomarkers of exposure.
- » The researchers are measuring radon metabolites (namely, lead) in toenail specimens submitted to the Atlantic PATH cohort study over the past 15 years, as well as by new lung cancer patients, and correlating this data to radon exposure and clinical data collected through other large cohort studies, including the national Evict Radon study. This will allow the researchers to integrate radon exposure, arsenic levels, and cellular damage information at the individual level, and use this information to assign personalized lung cancer risk scores based on long-term environmental exposures. This risk measure can then be employed within lung cancer screening programs to prioritize individuals, particularly non-smokers, for screening.
- » Dr. Maksym, Dr. Dellaire and collaborators are designing a particle collector to be mounted on a drone to collect wildfire smoke samples for laboratory

“We need solid evidence as to what level of exposure predicts what level of risk. This will enable us to provide policymakers with the data they need to set new eligibility criteria for lung cancer screening.”

Timely and appropriate screening leads to early detection, and early detection saves lives. When lung cancer is detected and treated at stage one, the five-year survival rate surpasses 80 per cent.

“Unfortunately, most patients are asymptomatic until it is too late,” says Dr. Alison Wallace, a thoracic surgeon at NS Health who is cross-appointed to the Department of Pathology and co-leads the QEII Lung Tumour Bank with Dr. Zhaolin Xu. “It is so sad to see patients presenting in emergency with symptoms, being admitted and dying without ever leaving the hospital. It’s such a shock, especially when they are non-smokers.”

Dr. Wallace is one of many Dalhousie-based collaborators on the CCS Breakthrough team, which also includes: Drs. Victor Martinez, Jeanette Boudreau and Zhaolin Xu in the Department of Pathology, Dr. Geoff Maksym in the School of Biomedical Engineering, Dr. Brent Johnston in the Department of Microbiology & Immunology, Dr. Daria Manos in the Department of Diagnostic Radiology, and Dr. Stephanie Snow in the Division of Medical Oncology, among others. Collaborators outside Dalhousie hail from the University of Calgary, University of British Columbia, University of Alberta, Queen’s University, UPEI and the University of Iowa.



Dr. Graham Dellaire

analysis. The researchers will identify and quantify metals and organic compounds attached to the PM2.5 smoke particles, as these rather than the carbon have toxic effects. Related studies will map the toxicity of wildfire smoke across the country, and examine the biological effects of the various toxins on the genomes of human cell lines and fruit fly models.

» Dr. Urquhart will oversee all aspects of the overall study, while leading an exploration of patient and community perspectives on what the researchers are learning.

“As these findings come out, we don’t want to scare people with them,” explains Dr. Urquhart. “We are connecting especially with people in communities with high exposures, to bring them into the conversation and provide them with knowledge and tools that will empower them to protect themselves—for example, by providing them with particle collectors they can wear to measure exposure to toxic particulates, or with information about how to minimize radon in their homes.”

Ultimately, the researchers will be sharing their findings with policymakers across Canada, to guide the development of expanded screening programs for lung cancer, as well as public education programs to inform people about non-smoking-related lung cancer risks.

“People who don’t smoke have a faulty perception of non-risk,” notes Dr. Wallace. “We need to get the message out that you don’t have to smoke to be at risk of lung cancer.”

In addition to the strong scientific track record of the investigators and the breadth of their interdisciplinary collaboration, there are several factors that uniquely positioned Dalhousie to lead this important and influential study.

“We have the largest lung tumour bank in Canada, we are the only region that has been collecting toenails for many years, and we have a brand new, state-of-the-art histology core facility,” explains Dr. Urquhart. “These resources and this infrastructure position Dalhousie as the natural leader in lung cancer research in Canada.”



(L-R) Dr. Allam Shawwa, Dr. Penny Barnes and Dr. Bassam Nassar

EDUCATION FEATURE: Pathology Department leads key education initiatives

THE DEPARTMENT OF PATHOLOGY HAS A STRONG TRACK RECORD FOR LEADING EDUCATIONAL INITIATIVES, across the learning continuum from introductory undergraduate courses to continuing professional development conferences.

2023 Atlantic Pathology Conference

The Atlantic Pathology Conference is one of the department's longest-standing initiatives. First held in the early 1990s, this conference brings together pathologists and scientists from across the region every second year to learn about new developments, landmark discoveries and interesting cases in the field.

The 2023 Atlantic Pathology Conference took place on November 17 and November 24, virtually via Microsoft Teams. While the conference was held as a full-day in-person event prior to the pandemic, participants have adapted to the new format, with attendance reaching all-time highs in 2021 and 2023.

"We decided to hold the conference across two consecutive Friday afternoons, to allow participation and minimize interference with productivity," notes Dr. Bassam Nassar, a senior department member who has served as chair of the Pathology department's Continuing Professional Development Committee for the past five years. Dr. Nassar completed his term in December 2023, with Dr. David Conrad stepping into the role for the next five years.

All divisions in the department are involved in planning and executing the conference, which is open to all faculty members, residents, pathologists and technical staff across the Maritimes.

"The subject matter is very broad and all-encompassing, covering all aspects of pathology," Dr. Nassar remarks. "It varies from conference to conference, depending on what topics people have up their sleeve to report on. Ultimately, we are looking to showcase talent, skills and accomplishments, and share knowledge, insights and new developments."

The 2023 keynote speaker was Dr. Kiril Trpkov, a professor in the Department of Pathology at the University of Calgary. Dr. Trpkov described his insights into diagnostic and immunohistochemical approaches to kidney biopsies performed for a renal mass.

In addition to his talk, the following presenters shared their perspectives:

Dr. Mahmoud Elsayw and Dr. Curtis Marcoux, assistant professors in Dalhousie's Division of Hematology, revealed early outcomes of Chimeric Antigen Receptor (CAR) T-cell therapy in Nova Scotia, as well as potential future applications of this promising new immunotherapy.

Dr. Amy Lou, Dr. Andrea Thoni and Dr. Manal Elnenaï presented their perspectives on using evidence to determine which "fancy" new tests to implement, under what circumstances.

Dr. Erica Schollenberg and Dr. Craig Midgen, both pathologists at IWK Health, presented several interesting cases in pediatric oncology.

Dr. Elizabeth Simms, a resident in Infectious Diseases and Medical Microbiology, reported on the increasing numbers and types of tick-borne infections in Nova Scotia

Dr. Mojgan Ebrahimi, a pathologist at the Saint John Regional Hospital, spoke on the need to reduce errors in pathology, along with potential approaches to doing so.

Halifax-based medical oncologist, **Dr. Stephanie Snow**, and pathologist, **Dr. Tom Arnason**, discussed the emergence and application of new biomarkers of upper gastrointestinal cancers, in particular esophageal cancer.

"Ultimately, we are looking to showcase talent, skills and accomplishments, and share knowledge, insights and new developments."

Dr. Michael Carter, medical director of the Molecular Diagnostics Laboratory in Halifax, updated participants on new developments in the use of biomarkers for testing solid tumours.

Dr. David Conrad, head of the IWK Division of Hematopathology, told attendees about the remarkable response to the Cellfie Project and its positive impact on the experience of children with leukemia.

Dr. Robert Boutilier, a pathologist at the Colchester Regional Hospital in Truro, shared his insights regarding pleomorphic dermal sarcoma (PDS) presenting on frozen section.

Dr. Jason Robinson, a clinical chemist with Health PEI, reviewed the findings of his evaluation of a single-step LCMSMS assay for urine metanephrines.

Dr. Paola Marcato, a professor in the departments of Pathology and Microbiology & Immunology, shared her discoveries about long noncoding RNAs as cancer biomarkers, mediators of tumour immunosuppression, and potential targets of therapy.

Canadian Association of Pathologists Residents' Review Course

Preparing for Royal College exams is daunting for residents, who get a helping hand from the annual Canadian Association of Pathologists Residents' Review Course. The course runs online every January, providing residents with a comprehensive review of their five years of training so they are fully prepared for exams.

"It's a fast-paced update and review of laboratory medicine topics that takes place online over five days," says Dr. Penny Barnes, a professor in the department who spoke at the course for many years and stepped into the role of co-director in 2015. "Each year, we have about 40 leading experts who present the latest developments in their specialties." The roster typically includes several speakers from Dalhousie.

Residents make up about 80 per cent of the annual participants but they are not the only ones who benefit from the review course.

"It's designed for senior residents but many practising pathologists take part," notes Dr. Barnes. "It's a great opportunity to update their knowledge and also earn CPD credits. Some pathologists who attended the course as residents return every year to refresh their knowledge."

Replays, quizzes, practice exercises and self-assessments anchor the learning, which covers diagnostic and molecular pathology, diagnostic and clinical pathology and hematopathology.

Atlantic Pathology Conference 2023 Committee

CHAIR

Bassam Nassar

ADMIN

Kimberlea Clarke, Amy Langdon (alternate)

MEMBERS

David Conrad, Hematopathology

Heleen Arts, IWK

Manal Elnenaei, Clinical Chemistry

Todd Hatchette, Microbiology

Lauren Westhaver, Graduate Student

Greg Fairn, Basic Science

Kelly Dakin Hache, Anatomical Pathology

Alexander Rudick, Resident

Ather Naseemuddin, New Brunswick

Dr. Allam Shawwa, a professor in the Division of Hematopathology, has been involved in creating the hematopathology portions of the curriculum since the course began in 2011. Dalhousie's Dr. Laurette Geldenhuys was also one of the original faculty members involved, serving as co-director for the first couple of years.

"Expertise is rapidly expanding, with an explosion of new molecular and cytogenetic testing," Dr. Shawwa says. "On top of this, there are new diagnostic criteria that residents and faculty need to know. Residents are grateful as the course helps them prepare for the exam; it is a vast topic... we do our best to review the topics that are most likely to be examined."

In 2023, faculty from the Dalhousie Department of Pathology included: Dr. Penny Barnes, Dr. Allam Shawwa, Dr. Zaiping Liu, Dr. Glenn Patriquin, Dr. Mathieu Castonguay, Dr. Kelly Dakin Hache, Dr. Heidi Sapp, Dr. Ashley Stueck, Dr. Mandy Rahmani, and Dr. Tish O'Reilly.



Department of Pathology DIVISIONAL REPORTS

CLINICAL WORKLOAD

10,323,307 NS HEALTH TESTS

888,090 NS HEALTH BLOOD COLLECTIONS

45,799 NS HEALTH TISSUE COLLECTION



Anatomical Pathology

The Clinical Focus this Year

The Division of Anatomical Pathology continues to focus on gaining efficiency through new technology.

Dr. Ashley Stueck has been leading the division's digital pathology initiative. This includes validating a new Leica high-throughput scanner for clinical use and working with IT to develop a platform for effective integration into clinical work.

The installation of four new immunostainers has improved turnaround times for immunohistochemistry (IHC) stains and surgical pathology in general.

Liquid-based gynecologic cytopathology (LBC) processing has completed validation. Efforts are underway to increase the use of LBC throughout the province, by distributing the collection vials to primary care providers.

On the Education Front

Anatomical Pathology is spearheading increased independence for transition-to-practice residents. This will allow them to verify some cases before review by a pathologist.

The autopsy section has re-introduced a program for early-year medical students to attend autopsies, thereby increasing their exposure to pathology.

The Dalhousie DMP and DCP programs are highly popular nationally, with a record 28 applicants for DMP this year.

In the Realm of Research

The NSH/Dalhousie Biobank has received \$750,000 for three years from the Terry Fox Research Institute.

Dr. Zhaolin Xu received funding for his studies on the molecular profiling of lung cancers and liquid biopsy. He is principal investigator on three grants awarded in 2023: \$432,700 from the Terry Fox Research Institute (TFRI) Marathon of Hope Atlantic Cancer Consortium to explore liquid biopsy for the detection of drug-targetable mutation in lung cancer patients; \$165,000 from the TFRI Marathon of Hope Atlantic Cancer Consortium to support the lung tumour bank project; and \$75,000 from AstraZeneca CyberGrants for liquid biopsy validation studies.

Dr. Michael Carter and Dr. Tom Arnason are co-investigators on a \$300,000 Canadian Cancer Society Atlantic Cancer Research Grant (ACR-21): Genetics, infiltration and immunity: are natural killer cells the missing link in pancreatic cancer immunotherapy?

Other Highlights of 2023

Dr. Mathieu Castonguay was a co-author of the Society for Cardiovascular Pathology consensus statement on the processing, interpretation and reporting of temporal artery biopsy for arteritis, published in *Cardiovascular Pathology*.

Dr. Xu co-authored the Canadian Multicentric Pan-TRK (CANTRK) Immunohistochemistry Harmonization Study, published in *Modern Pathology*.

The dermatopathology team published an update on Merkel cell carcinoma in *Human Pathology*.

Dr. Stueck was first author of an invited review for *Human Pathology* on hepatic graft-versus-host disease.

The international non-profit, My Green Lab, certified the cytopathology section with its gold status.

Awards

- » Dr. Tom Arnason won the 2023 Canadian Association of Medical Educators Certificate of Merit Award.
- » Dr. Penny Barnes received the 2023 William Boyd Award from CAP-ACP in recognition of her contributions to laboratory medicine as a senior member of CAP-ACP.
- » Dr. Martin Bullock was appointed a member of the American Joint Committee on Cancer, and sits on their Education and Promotions Committee.
- » Medical students ranked Dr. Mathieu Castonguay among the top 10 per cent of lecturers.
- » Dr. Ashley Stueck was appointed to the CAP-ACP Digital Imaging National Working Group.

Clinical Chemistry

The Clinical Focus this Year

In 2023, the Division of Clinical Chemistry focused on improving the quality and efficiency of clinical and analytical services. The division updated the reporting of estimated Glomerular Filtration Rate (e-GFR) and urine albumin and protein, and introduced more stringent review of certain test results. The division also replaced outdated instrumentation for testing toxic alcohols and glycated hemoglobin, and worked with stakeholders to ensure appropriate utilization of specialized refer-out testing.

New rules for utilizing relatively low-value tests, such as folate, reduced this testing by 85 per cent. A new remote sign-out system for serum and urine protein electrophoresis and immunofixation reduced turn-around time (TAT) of results by 50 per cent, while enhancing staff efficiencies and reducing paper waste. Educational initiatives showing that the TAT of in-lab lactates meets clinical requirements helped to reduce inappropriate requests for venous blood gases.

The division continues to facilitate harmonization of lab services across NS. This has led to the standardization of lipid panel reporting, dexamethasone suppression testing, ferritin reference ranges and coeliac testing using a single algorithm.

On the Education Front

Clinical Chemistry faculty provided didactic and clinical teaching as well as mentoring of residents in both clinical (Endocrinology) and lab medicine (Anatomical Pathology, Hematopathology and General Pathology). They ran Biochemical Investigations of Clinical Disease (BIOC4813), cross-listed graduate course (PATH 5013), in the fall of 2023 and tutored second-year medical students (Metabolism II).

The division hosted five medical students for their electives in pathology, as well as two observers. Division faculty are also mentoring a RIM student on an innovative project in myeloma proteomics.

In the Realm of Research

A sizable number of patient samples were subjected to whole genome and whole transcriptome sequencing through the division's myeloma projects, co-led by investigators in Halifax and Saint John, which received \$1,235,226 from the Terry Fox Foundation-Marathon of Hope. The Nova Scotia Health Research Fund awarded \$50,000 for proteomic analysis of the same samples. This will provide unrivaled data and promote further collaborations to enable biomarker discovery.

Division members produced several notable publications, including a health technology review with the Canadian Agency for Drugs and Technologies in Health (CADTH), Choosing Wisely recommendations for conserving laboratory resources, and an analytical result variation for high-sensitivity cardiac troponin, published in the *Canadian Journal of Cardiology*.

Other research included a multi-centre study assessing imprecision for cardiac troponin at the female 99th percentile concentration, a study with Emergency Medicine on early detection of septic shock, a collaboration with a hepatologist to examine the association between change in the FIB-4 biomarker index and rate of adverse outcomes in patients with non-alcoholic fatty-liver disease, and the analysis of 12 years of data on HFE genotyping and biochemical results for patients with suspected hemochromatosis.

Other Highlights of 2023

The division provided substantial manpower resources to the provincial One Patient One Record (OPOR) project, provincial stewardship collaborative, and the provincial accrument and harmonization of core-lab automated instrumentation.



Fundamental Research

On the Education Front

In 2023, there were 25 graduate students at various stages in the Department of Pathology’s graduate program. Nine of these students successfully completed their program’s required defenses for graduation. The high calibre of these students is reflected by the fact that 76 per cent of them held a stipend and award. Pathology graduate students have a track record of being highly competitive for awards, which also speaks to the quality of the graduate program itself.

In the Realm of Research

In 2023, total grant capture increased by 42 per cent over 2022, to \$3,668,497 awarded to principal applicants in the fundamental scientist group. These include recent successes of department members in their applications for funding to the Canadian Institutes of Health Research, Molly Appeal and Cancer Research Society.

In addition to this impressive grant capture by individual department members, several teams either led by or including Department of Pathology scientists also received substantial funding. These include a \$5.2 million Canadian Cancer Society Breakthrough Grant in lung cancer, and a historic \$23 million investment into an expansion of the Marathon of Hope–Atlantic Cancer Consortium.

Fundamental scientists in the department and their collaborators published 54 peer-reviewed journal articles in 2023. The current average H-index in the department has now reached 39 (range of 24-54).

Other Highlights of 2023

Highlights include construction of the HistoCORE immunohistology facility on the 13th floor of the Tupper Building, which opened in late 2023. Dr. Jeanette Boudreau was appointed to the role of Scientific Director of Beatrice Hunter Cancer Research Institute and master’s student Riley Arsenault won a prestigious award from the Terry Fox Research Institute.

Awards

Awards in 2023 for primary and joint fundamental research faculty included:

- » Dr. Paola Marcato was appointed the Canadian Breast Cancer Foundation Chair in Breast Cancer Research.
- » Dr. Graham Dellaire was awarded a prestigious Dalhousie University Distinguished Research Professorship.
- » Riley Arsenault won the Terry Fox Research Institute Marathon of Hope Health Informatics and Data Scientist Award.

Hematopathology

The Clinical Focus this Year

In 2023, the Division of Hematopathology focused on modernizing some of the tests and laboratory services. As an example, the blood transfusion service validated an automated assay for red-cell antibody identification and completed the clinical validation of a novel flow cytometry-based red blood cell phenotyping method. This will improve donor matching for patients in need of blood transfusion. Similarly, the flow cytometry laboratory validated cocktailing procedures for antibody panels used in the diagnosis of leukemias and lymphomas, which significantly improved the turnaround time while increasing throughput and greatly reducing the cost of testing.

On the Education Front

This was the inaugural year for the Hematopathology Fellowship Training Program, which was recently established in collaboration with the Dalhousie University Postgraduate Medical Education office. Two fellows, Dr. Richard Wood and Dr. Shatha Altahan, started the program in July of 2023, and will complete their training in June 2024. Dr. Manal Al-Aufi completed her training in the HLA Director Fellowship Training Program, which is approved by the American Society for Histocompatibility and Immunogenetics.

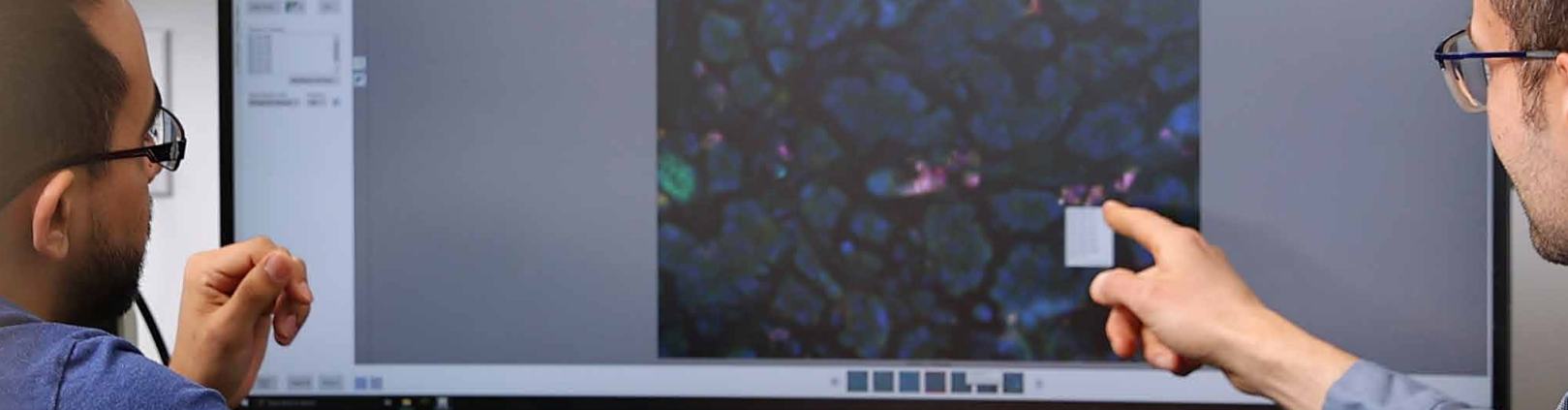
In the Realm of Research

In the area of research and quality improvement, the division successfully developed a novel flow cytometry-based multiplexed red cell antibody detection and identification assay. This method is more efficient and utilizes only a small fraction of the reagents required to perform conventional tests used for antibody identification in blood banks around the world. We are delighted to share that this work, published in *Vox Sanguinis* on behalf of International Society of Blood Transfusion, is one of their top 10 most-cited papers published. Division members completed another study using flow cytometry-based multiplex technology to further improve their novel method for red cell phenotyping, which allows up to 48 patient or donor samples to be phenotyped simultaneously.

Awards

Dr. Robert Liwski served his term as president of the American Society for Histocompatibility and Immunogenetics.

Medical students ranked Drs. Calvino Cheng and David Conrad among the top 10 per cent of lecturers.



Microbiology

The Clinical Focus this Year

The Division of Microbiology performed 732,135 tests in 2023. While the volume of SARS-CoV-2 testing has dropped significantly from its peak in 2021, it still represents an increase of 40,000 tests a year. Overall compared to pre-COVID years, laboratory volumes have increased by 10 per cent. This poses a challenge for Microbiology, which struggles with human resource shortages like other areas in the Department of Pathology. The division is mitigating this capacity problem in part by transitioning more labour-intensive tests—like testing for bacterial vaginosis—to high-throughput instruments. At the same time, division members have been working hard to implement machine learning in the total laboratory automation system to maximize the benefits of automation. Not only have these enhancements decreased the turnaround times for testing, they have allowed technologists to be redeployed to other areas of the lab to offset the ongoing human resource pressures.

The division has broadened the scope of serologic and molecular testing, used to support tissue bank and organ donor programs, to include support for New Brunswick. This is an important step that helps expand the donor pool throughout the Maritimes.

On the Education Front

Microbiology continues to play an important role in teaching at all levels, from undergraduate to graduate programs at Dalhousie University. The Microbiology mini course remains the mainstay method of providing fundamental training in microbiology to residents in medical microbiology, infectious diseases and general pathology. A quality review of its impact on the training of general pathology residents showed that the average performance on the microbiology section of the Resident Inhouse Examination increased from 50 to 95-99 percentiles after the Microbiology mini course was implemented.

Of course, it is crucially important to have enough technologists available to teach not only the mini course, but also the training programs for medical laboratory technologists. The division works hard to ensure there are enough teachers available to meet these education needs.

In the Realm of Research

In addition to ongoing translational research on SARS-CoV-2, members continue to collaborate with many different researchers and clinicians across the country on diverse topics, from emerging infections such as monkey pox and tick-borne infections, to antimicrobial resistance and stewardship. Division members have published 22 peer-reviewed manuscripts and 19 abstracts at local, national and international conferences. Dr. LeBlanc’s publication, “Generation of False-Positive SARS-CoV-2 Antigen Results with Testing Conditions Outside Manufacturer Recommendations: A Scientific Approach to Pandemic Misinformation,” published in *Microbiology Spectrum* in 2021, received the Department of Pathology Best Clinical Research Paper Award last year.

Awards

- » Dr. Ross Davidson was named recipient of the coveted Professor of the Year Award by the Dalhousie Medical Students Society.
- » Dr. Todd Hatchette received the Lea C. Steeves Award, a Dalhousie award given annually to an individual actively engaged in continuing professional development.
- » Dr. David Haldane received the Department of Pathology Lifetime Achievement Award.
- » Dr. Jason LeBlanc received the Department of Pathology Best Clinical Research Paper Award.

IWK Pathology & Laboratory Medicine

The Clinical Focus this Year

The IWK Division of Anatomical Pathology continued to provide diagnostic pediatric and perinatal pathology services for Nova Scotia and consultative services to the other Maritime provinces, as well as histology services for the IWK Division of Hematopathology, the Nova Scotia Medical Examiner Service, and Dalhousie University researchers. The division maintained excellent turnaround times for surgical pathology and autopsy reports, including a six-day median TAT for malignant diagnoses.

The IWK Division of Clinical Genomics acquired a new automated extractor for DNA isolation from blood and other specimens, which will allow it to accommodate larger testing volumes. Dr. Heleen Arts and Dr. Victor Martinez gave a presentation to the University Health Network in Toronto about the division’s experience implementing whole-exome sequencing.

The IWK Chemistry Division was certified as a successful Using Labs Wisely site for Choosing Wisely Canada. The team was able to deliver IWK-specific solutions to the overuse of various tests in maternal and pediatric medicine. The division also launched three new competency assessments for its teams and advanced new technology for hemoglobinopathy screening in newborns.

The IWK Division of Hematopathology installed and validated new hematology and coagulation analyzers, allowing for better quality control monitoring and

CLINICAL WORKLOAD

2,079,544
IWK TESTS

192,956
IWK BLOOD COLLECTIONS

aligning with other hospital laboratories in Nova Scotia. The division hired a new medical laboratory technologist (MLTII) in immunohematology, several new MLTs in hematology and transfusion, a new manager of transfusion, and a new transfusion nurse. With these additions, the lab can maintain a high quality of diagnostic care.

Hematopathology participated in a simulated massive transfusion in Labour & Delivery and helped implement the pediatric massive transfusion protocol for IWK Health. These activities highlighted areas for the lab and clinical teams to improve in life-threatening transfusion scenarios. The division also successfully participated in hospital accreditation in 2023.

The IWK Division of Clinical Microbiology did the key foundational work to prepare for the transition to One Patient One Record, and continued the ongoing work to maintain support for COVID/respiratory virus testing and to bring pediatric standards to molecular testing across Nova Scotia Health for central nervous system infections. To support changing population needs, the division conducted in-house validation for IGRA testing for tuberculosis and explored molecular malaria testing.

On the Education Front

Anatomical Pathology continued to host learners in the medical laboratory assistant (MLA) and medical laboratory technologist (MLT) programs, as well as

medical students, and residents in pathology, maternal-fetal medicine and pediatric hematology-oncology.

Dr. Lori Beach moved into the course coordinator role for Biochemistry of Clinical Disorders.

Teams took part in specialized mass spectrometry training, as small molecule assays are under development, and were pleased to see the post-COVID return of the Maritime Newborn Screening teaching rounds.

Because of the additional work being done by the new MLTII in immunohematology, there is now a more comprehensive competency assessment program for MLTs. Staff have successfully completed competency assessments in several areas of hematopathology and there are many more to come. Many MLTs from Transfusion Medicine attended the virtual Blood Matters education conference.

Hematopathology supported the training of numerous post-graduate residents in hematopathology and pediatric hematology/oncology, as well as an undergraduate science student and many MLT/MLA students from the community college programs. Dr. Conrad, Cathy McAuley (MLTII transfusion medicine) and Louise Seniuk (transfusion nurse) offered a transfusion workshop for new pediatric residents. Dr. Conrad also provided academic half-day teaching on transfusion medicine to the Neonatal-Perinatal Medicine fellowship training program.

Clinical Microbiology members continued to provide multidisciplinary training with NSCC, Michener, and Dalhousie (medical students and residents).

In the Realm of Research

Dr. Victor Martinez and Dr. Heleen Arts received an IWK Foundation Translating Research into Care level 3 grant, through the Healthcare Improvement Research Funding Program, for the project, “Implementation of next-generation sequencing technologies in the diagnosis of repeat expansion disorders.” This work aims to reduce the number of tests per person and is expected to increase the diagnostic yield of whole exome and genome data in the future.

Dr. Arts and her research team published molecular genetics findings on Bardet-Biedl Syndrome in *Clinical Genetics*. Her research informs genetic strategy for patients with suspected BBS in the Maritimes.

Dr. Martinez received funding for the development of the new IWK Centre for Clinical Bioinformatics (IWK CCBio). The CCBio’s mission is to enable patient data-driven insights that will inform precision medicine, while safeguarding privacy and data security. Initially, the CCBio will focus on facilitating the development of a collaborative data platform to enable advanced data analytics across different clinical data types. This platform will provide accessible tools for data analysis to IWK clinicians and researchers with varying computational skills.

Dr. Lori Beach worked with other national leaders in point-of-care testing to develop and publish the paper, “Establishing quality indicators for point of care glucose testing: recommendations from the Canadian Society for Clinical Chemists Point of Care Testing and Quality Indicators Special Interest Groups.” The paper appeared in the April 2023 issue of *Clinical Chemistry & Laboratory Medicine*.

In Hematopathology, Dr. Conrad collaborated with Dr. Horne (Cardiac Surgery) to study complement activation in the sanguineous prime preparation for children undergoing cardiac surgery.

Clinical Microbiology continued its congenital CMV (cytomegalovirus) discovery work. This is explorational work with Ontario and Saskatchewan newborn screening programs that have adopted CMV screening. The division continues to support IWK and Dalhousie researchers who require medical microbiology support.

Other Highlights of 2023

Dr. Beach moderated the Canadian Society of Clinical Chemists “The Lab Report” Podcast: Celebrating Women in Clinical Biochemistry.

Dr. Conrad and Ms. Amy Power provided clinical and technical expertise to support the development of a province-wide sickle cell screening program in Saskatchewan.

Awards

- » Dr. Tim Mailman received the Queen’s Platinum Jubilee Award for Healthcare and the Premier’s Award of Excellence.
- » Dr. David Conrad received the 2022-2023 Dr. Bruce Wright Teaching Award from the Department of Pathology.



New Brunswick

The Clinical Focus this Year

The pathology laboratory at the Saint John Regional Hospital (SJRH) functions as a service provider to patients in southwestern New Brunswick, performing more than four million tests a year. The lab is staffed by more than 125 lab technologists and lab assistants, 10 pathologists, two hematopathologists, a molecular pathologist, a clinical chemist and two medical microbiologists.

Building on the integration that helped centralize testing for COVID during the pandemic, this year the lab began to focus on developing systems that communicate better with lab information systems in other labs across New Brunswick. This marked the beginning of a multi-year project and will help uncover inefficiencies and reduce redundancies to make health-care dollars go further.

The lab at SJRH is also the site for many provincial programs, including testing for enteric pathogens, the tuberculosis lab, and the provincial toxicology lab. It also provides forensic autopsy coverage for the entire province of New Brunswick.

On the Education Front

SJRH serves as a training site for undergraduate medical students at Dalhousie Medicine New Brunswick, as well as a community-based training site for residents in anatomical pathology. This year, SJRH also started accepting hematopathology residents as trainees in a community-based rotation.

CLINICAL WORKLOAD

4,000,000
NB TESTS

133,939
NB BLOOD
COLLECTIONS

Other Highlights of 2023

This year saw an expansion of the molecular pathology service at the SJRH, with the introduction of a wider solid tumour testing tumour panel. The lab is now able to detect a far wider variety of genetic abnormalities, making targeted therapy available to a wider variety of patients.

In collaboration with Diagnostic Imaging and Thoracic Surgery, the SJRH pathology lab has also played a key role in becoming Canada’s first site to perform fluoroscopic navigational bronchoscopy procedures, using the Illumisite platform. This will increase the diagnostic yield of biopsies obtained from lung tumours, reducing the need for repeat biopsies and reducing complications associated with these invasive procedures.

OUR FACULTY

Dr. Mohamed Abouelhassan	Dr. Xiaofeng Ding	Dr. Amy Lou	Dr. Mahboubeh Rahmani
Dr. Behram Cenk Acar	Dr. Tsetan Dolkar	Dr. Thai Yen Ly	Dr. Tarek Rahmeh
Dr. Tom Arnason	Dr. Alexander Easton	Dr. John Alexander MacNeil	Dr. Lakshmi Rajappannair
Dr. Heleen Arts	Dr. Mojgan Ebrahimi	Dr. Erin MacQuarrie	Dr. Muhammad Rasul
Dr. Penelope Barnes	Dr. Allison Edgecombe	Dr. Emmanuel Maicas	Dr. Jason Robinson
Dr. Lori Beach	Dr. David Edwards	Dr. Timothy Mailman	Dr. Pouya Sadeghi Aval
Dr. Karen Bedard	Dr. Sameh El Bailey	Dr. Jonaki Manna	Dr. Irene Sadek
Dr. Gillian Bethune	Dr. Manal Elnenaei	Dr. Samina Mansoor	Dr. Heidi Sapp
Dr. Jeanette Boudreau	Dr. Somayyeh Fahiminiya	Dr. Paola Marcato	Dr. Erica Schollenberg
Dr. Robert Boutilier	Dr. Greg Fair	Dr. Victor Martinez	Dr. Sorin Selegean
Dr. Matthew Bowes	Dr. Robert Fraser	Dr. Kristen Mead	Dr. Sundip Shah
Dr. Jo-Ann Brock	Dr. Daniel Gaston	Dr. Kathryn McFadden	Dr. Ismatun Swati
Dr. Martin Bullock	Dr. Laurette Geldenhuys	Dr. Craig Midgen	Dr. Allam Shawwa
Dr. Hakan Buyukdere	Dr. Tanya Gillan	Dr. Derek Minney	Dr. Jennifer Shea
Dr. Michael Carter	Dr. Marek Godlewski	Dr. Erik Mont	Dr. Navaro Spartaco
Dr. Mathieu Castonguay	Dr. Anna Greenshields	Dr. Phillip Moss	Dr. Ashley Stueck
Dr. Yu Chen	Dr. Wenda Greer	Dr. Joanne Murphy	Dr. Andrea Thoni
Dr. Cal Cheng	Dr. Jennette Gruchy	Dr. Shawn Murray	Dr. Meghana Toal
Dr. David Conrad	Dr. Shashi Gujar	Dr. Ather Naseemuddin	Dr. Imran Umar
Dr. Sidney Croul	Dr. David Haldane	Dr. Bassam Nassar	Dr. Michael Volodarsky
Dr. Lisandra Cubero Herrera	Dr. Todd Hatchette	Dr. Jennifer Merrimen	Dr. David Waisman
Dr. Kelly Dakin Hache	Dr. David Hoskin	Dr. Tish O'Reilly	Dr. Noreen Walsh
Dr. Jeremy Daniels	Dr. Mohammad Hossain	Dr. Ken Obenson	Dr. Cheng Wang
Dr. Ross Davidson	Dr. Thomas Issekutz	Dr. Saul Offman	Dr. Dietrich Werner
Dr. Ian Davis	Dr. Doha Itani	Dr. Sylvia Pasternak	Dr. Marnie Wood
Dr. M. Fawaz Dawamneh	Dr. Patrick Lee	Dr. Glenn Patriquin	Dr. Richard Xiang
Dr. Ryan DeCoste	Dr. Zai ping Liu	Dr. Sergey Pozdnyakov	Dr. Zhaolin Xu
Dr. Graham Dellaire	Dr. Robert Liwski	Dr. Jason Quinn	Dr. Jake Yorke

OUR RESIDENTS AND FELLOWS

Diagnostic & Molecular Pathology	Dr. Rumana Rafiq	Dr. Alexander Rudiuk	Dr. Richard Wood
Dr. Carley Bekkers	Dr. Sean Rasmussen	Dr. Nafisa Mahmoud Shandi	
Dr. Angela Cheng	Dr. Priyanka Ravi	Dr. Lauren Wotton	Medical Microbiology
Dr. Alexandre Corriveau			Dr. Mohammed AlQahtani
Dr. Caroline Guinard	Diagnostic & Clinical Pathology		Dr. Thamir Al Saeed
Dr. Aleksandra Kajetanowicz	Dr. Ibrahim Elsharawi		Dr. Ziyad Allehebi
Dr. Archana Kakadeker	Dr. Simon Farquharson	Hematological Pathology	Dr. Farhan Khan
Dr. Christopher Liwski	Dr. Ashlyn Fong	Dr. Manal Al Aofi	Dr. Yahya Shabi
Dr. John Loggie	Dr. Yuanyuan Gu	Dr. Shatha Altahan	Dr. Elizabeth Simms
Dr. Allison Maybank	Dr. Eniko Hollo	Dr. Tessa Boyer	
Dr. Laura McDonell	Dr. Mahtab Khudadad	Dr. Amarillis Figueiredo	
		Dr. Maci-Arielle Ricketts	
		Dr. Ian Sarty	

OUR POST DOCTORAL FELLOWS

Dr. Raj Pranap Arun	Dr. Wasundara Fernando	Dr. Samir Mehndiratta	Dr. Vishnu Vijayan
Dr. Shima Borzouie	Dr. Mahlegha Ghavami	Dr. Michael Salsaa	Dr. Marie-Claire Wasson
Dr. Dharmapal Burne	Dr. Preethi Gopalakrishnan Nair	Dr. Jaganathan Venkatesh	
Dr. Charneal Dixon	Dr. Seketoulie Keretsu		

OUR ACADEMIC & RESEARCH STAFF

Dr. Dharini Bharadwaj	James Edgar	Victor Martins Madeira	Michelle Sampson
Janis Breeze	Dr. Wasundra Fernando	Erin Noftall	Dr. Rashmi Shah
Joyce Chew	Julie Griffith	Tomoko Ochi	Dr. Haggag Zein
Kimberlea Clarke	Nigel Griffiths	Dr. Gopal Pathak	
Patricia Colp	Dr. Barry Kennedy	Will Roderick	
Cheryl Dean	Kelly Leights	Dr. Jayme Salsman	

OUR GRADUATE STUDENTS

MSc	Bakhmala Khan	Kennedy Whelan	Leah MacLean
Arezoo Afshari	Maya MacLean		Teresa McMillen
Riley Arseneau	Noah Martin	PhD	Gillian Okura
Yara Azizieh	Meghan McLean	Hanan Aljamei	Morgan Pugh-Toole
Anurag Banerjee	Anna Nicolela	Hannah Cahill	Olivia Walker
Lara Crone	Mika Park	Mike Giacomantonio	Marie Claire Wasson
Zara Forbrigger	Jayatee Ray	Mark Hanes	Lauren Westhaver
Alex Gibson	David Sapp	Vishnupriyan Kumar	
Elias Habib	Frey Verth	Edwin Leong	

ANNUAL DEPARTMENT AWARD WINNERS

DR. WENDA GREER PRIZE FOR RESEARCH EXCELLENCE Dr. Namit Holay	BEST PAPER – FUNDAMENTAL Lauren Westhaver – CLINICAL Dr. Jason LeBlanc	FACULTY OF MEDICINE RESIDENT RESEARCH AWARD NOMINEES Dr. John Loggie and Dr. Ibrahim Elsharawi	2022-2023 LIFETIME ACHIEVEMENT AWARD Dr. Bassam Nassar and Dr. David Haldane
DAVID T JANIGAN TEACHING AWARD Dr. Tish O'Reilly and Dr. Karen Bedard	FOM DEPT. OF PATHOLOGY PATH FORWARD COLLABORATION AWARD Lauren Westhaver and Dr. Boris Gala-Lopez	2022-2023 AWARD FOR EXCELLENCE IN CLINICAL SERVICE Dr. David Conrad	GRADUATE STUDENT AWARD FOR TEACHING, OUTREACH & MENTORING Dr. Jagathan Venkatesh
POST-DOCTORAL FELLOW TRAVEL AWARD Dr. Wasundara Fernando			

RESEARCH DAY WINNERS

BEST TALK BY A PATHOLOGY GRADUATE STUDENT Marie Claire Wasson	BEST DIGITAL POSTER BY A PATHOLOGY GRADUATE STUDENT Lauren Westhaver	BEST DIGITAL POSTER BY AN EXTERNAL PARTICIPANT Dr. Sharon Oldford	GUPTA TRAVEL AWARD Dr. Aleksandra Kajetanowicz and Dr. Ibrahim Elsharawi
BEST TALK BY A PATHOLOGY RESIDENT Dr. John Loggie	BEST DIGITAL POSTER BY A PATHOLOGY RESIDENT Dr. Ashlyn Fong	BEST DIGITAL POSTER – JUDGES CHOICE Meghan McLean	RESIDENT TEACHING AWARD Dr. Ashlyn Fong
BEST TALK BY AN EXTERNAL PARTICIPANT Neal Callaghan			



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