INSIDE PATHOLOGY

MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

2025

CONTENTS

INSIDE PATHOLOGY

ON THE COVER

Rendering of the D. Dan and Betty Kahn Health Care Pavilion. Credit: HOK

SECTIONS

Department Chair
Charles A. Parkos, MD, PhD

Editorial
Lynn McCain
Anastazia Hartman

Layout Design
Brent Temple

Find Us Online / Give Online
www.pathology.med.umich.edu
If you have questions about philanthropy or establishing a gift to support the work of the Department of Pathology:
path-development@med.umich.edu

Stay in Touch
To update your contact information, please e-mail Pathology Communications:
path-communications@med.umich.edu

Executive Officers of Michigan Medicine: Marschall S. Runge, M.D., Ph.D., executive vice president for medical affairs, dean, University of Michigan Medical School, CEO, Michigan Medicine; David C. Miller, M.D., M.P.H., president, UMHS, and executive vice dean for clinical affairs, University of Michigan Medical School; Patricia D. Hurn, Ph.D., dean, School of Nursing.

Regents of the University of Michigan: Jordan B. Acker, Michael J. Behm, Mark J. Bernstein, Paul W. Brown, Sarah Hubbard, Denise Ilitch, Carl J. Meyers, Katherine E. White, Domenico Grasso, *ex officio*.

Pathology is more than a diagnostic discipline; it is a powerful connector, driving precision medicine, bringing clarity to disease, and bridging the gap between science and healing. At Michigan Medicine, we take pride in being that pivotal connection: between diagnosis and care, research and real-world impact, and local communities and global partners. This issue of *Inside Pathology* highlights the many ways we are building those connections across teams, disciplines, and borders.

Our pathology laboratories are embracing the future with cutting-edge technologies, implementing advanced molecular and genomic testing, digital imaging and diagnostics, and innovative care practices. We have introduced a breast oncology clinic to educate breast cancer patients and address questions about their diagnoses. Through our expanding cutting-edge digital pathology arm, we are extending the reach of our expertise beyond institutional walls, contributing to diagnostic excellence on a global scale.

Our strong educational enterprise remains the backbone of our mission, with our trainees serving as key connectors with underserved communities both locally and internationally, including outreach to remote regions such as the Amazon rainforest in Peru. At the same time, our faculty are building strong global partnerships by providing education, mentorship, and clinical support to pathologists in countries such as Lebanon, Kenya, and more. Together, this work is building bridges of knowledge and compassion as we work to fulfill our mission of delivering exceptional patient care in Michigan and across the world.

Building a strong and connected community within our department is essential to fulfilling our mission. Two years ago, we introduced the FiSH!® Philosophy as a foundation for positive culture change. In this issue, one of our staff members shares how this approach has influenced her team and contributed to a more collaborative and uplifting work environment.

Meanwhile, our research enterprise continues to make ground-breaking discoveries that will shape the future of patient care. In this issue, you'll read about key research in inflammatory diseases such as artherosclerosis, diabetes, gouty arthritis, and Alzheimer's disease, and strategies to control them, the causes of squamoid eccrine ductal carcinoma, how pneumonia-causing bacteria spread from the lungs, leading to sepsis, and progress in understanding diffuse large B-cell lymphoma, among other topics.

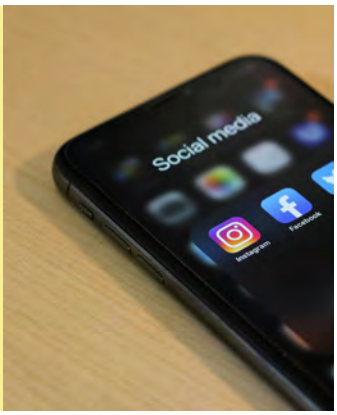
I hope you enjoy this issue of *Inside Pathology* and come away with a renewed appreciation for the extraordinary work being done across our department, as we continue to strengthen connections that advance patient care, scientific discovery, and community at every level.

Charles A. Parkos, MD, PhD
Carl V. Weller Professor and Chair
Department of Pathology
Michigan Medicine

STAY CONNECTED

Find out what's new on our social media channels! Stay updated about our news and events.

@umichpath



OUR WEBSITE

CAP Today Features U-M Pathology's Digital Pathology Service
Jan 29, 2025

New Uses for Common Drug May Help Patients with Inflammatory Diseases
Sep 11, 2024

FEATURED STORY

Rendering credit: HOK

Bridging Gaps, Building Community: Enhancing Healthcare Connections Through Pathology

by Lynn A. McCain, MHSA

"To serve Michigan and the World" is Michigan Medicine's mission, with "an ultimate goal of bringing knowledge and wellness to the people of Michigan and the world." As an integral part of the health system, the Department of Pathology echoes this mission, looking to the future, anticipating advances, and mitigating risks as it reaches out to communities across Michigan. The department's singular focus is to provide patients with the best possible care today and in the future.

Healthcare has been undergoing rapid changes, and Michigan Medicine is poised to meet the challenges and take advantage of the opportunities these changes present. As Michigan Medicine developed a 2016 clinical growth strategy, "we saw that healthcare in the state of Michigan would continue to consolidate with hospitals joining larger health systems. We predicted this consolidation would continue until 3 or 4 hospital systems were dominant, having super-regional reach in the state. As one of the leaders in healthcare in Michigan, we feel that Michigan Medicine should be one of the conveners of a statewide system of care," stated Keith Dickey, PhD, chief strategy officer for Michigan Medicine.

Across the United States, 68% of community hospitals are now part of larger health systems. "Originally, individual hospitals became part of multi-hospital systems. Now, we are seeing multi-hospital systems come together. One example in Michigan is Spectrum and Beaumont merging to form Corewell Health, a large, geographically diverse multi-hospital healthcare system. Many of these systems have health plans or health-plan-like capabilities," explained Scott Flanders, MD, chief clinical strategy officer for Michigan Medicine. Michigan Medicine is also moving forward with mergers and partnerships, in order to remain competitive in a rapidly consolidating market and to better serve patients across the state. "It is about fulfilling our mission, which speaks to all aspects of our tripartite mission. We feel a sense of ownership and responsibility to support the health of the communities that we touch," Flanders continued.

"For us to live into our mission, we need to build our base and grow strategically," Flanders went on. Michigan Medicine has formed partnerships with MyMichigan, University of Michigan West (formerly Metro Health), Holland Hospital, and University of Michigan Health – Sparrow, providing coverage across much of the southern peninsula of Michigan. In addition, Michigan Medicine has added ambulatory care centers in East and West Ann Arbor, Brighton, and Northville, expanded services in Ypsilanti, and will soon move into Troy. The new Pavillion hospital in Ann Arbor will open in November, expanding capacity to care for an increasing patient population.

In the meantime, Michigan Medicine has a partnership with Trinity and is a minority owner of Trinity's Chelsea Hospital to provide care for lower-complexity patient cases due to insufficient capacity at the University Hospital. "Each of these geographies and each different segment has a growth priority in terms of how and where we are going to grow," said Flanders. However, Michigan Medicine does not plan to expand outside the state. "Michigan is our priority. When large health systems begin to move into different geographies, they risk losing part of their mission focus and face challenges in operating as one integrated, coordinated system. We don't see a strong mission-based value proposition by becoming a multi-state system."

"We are the leading tertiary and quaternary

system in Michigan and beyond and train a lot of specialists and subspecialists," said Dickey. A large patient population is needed to ensure these very specialized programs can prepare residents and fellows to be well-trained healthcare providers. The Department of Pathology has up to 26 fellows and 28 residents in our training programs annually. "As Michigan Medicine expands, our pathology labs are seeing increasing volumes of complex and rare diseases. This unparalleled exposure to complex cases and mentorship and teaching from our world-class faculty ensures that our trainees graduate with exceptional diagnostic expertise, positioning them among the world's most skilled pathologists," stated Dr. Kamran Mirza, Pathology's assistant chair of education. These trainees then disperse worldwide, bringing world-class pathology skills with them.

Pathology has always been engaged in discussions regarding system expansion once formally approved to move forward, whether organically building new facilities or through partnerships with other healthcare providers. "Early communication and having a seat at the table are essential when planning for future expansions. We form a departmental committee of key faculty and staff to help drive success," commented Dr. Charles Parkos, chair of pathology. "I have been a part of every new facility project since 2000," said Chris Rigney, director of operations for Anatomic Pathology. "We have been involved in the design planning, determining what the footprint will look like. Where do the frozen section labs need to be located? What pathology services will be needed at the site? How will the courier services be structured?" She is currently working with the team planning for the new Frances and Kenneth Eisenberg Troy Center for Specialty Care facility. Due to the distance from Ann Arbor, Troy has some unique needs. "It will be more efficient for them to order and have their own material services, chemical storage, and things like that. Also, special requirements dictate transporting certain volumes with on-site storage needs, which require space planning." Digital pathology will be a significant part of the services at the Troy location. Specimens will be processed and slides stained and scanned on-site. Thus, pathologists at any of our sites can read those slides for diagnoses. "Digital pathology opens up the whole world to real-time consults, whether intraoperative frozen sections or consultation on different cases. It is super exciting," she added.

Pathology also supports point-of-care testing and phlebotomy needs at our remote locations. "When planning for a new location, we need to consider the types of equipment and supplies needed for point-of-care testing," stated Andrew Szczembara, manager for point-of-care testing. Personnel need to be trained on how to perform these tests as well. "We also need to plan for phlebotomy services. We need to determine the number of phlebotomists, blood draw bays needed, and space for the phlebotomists," added Kristina Martin, operations director for Clinical Pathology. These specimens need to be processed and transported to the Ann Arbor lab. She continued, "One of the challenges we face is staffing. As

we expand, we are drawing from the same regional talent pool; the market is very tight for phlebotomists and other laboratory professionals."

When Michigan Medicine enters into partnerships with other healthcare organizations, either as affiliates or mergers, our department quickly begins talks with Pathology leadership at the other institutions to determine how they might take advantage of economies of scale, driving down costs while improving patient care. The Pathology Informatics team, led by Dr. Ulysses Balis, director of Pathology Informatics, plays an essential role in programming interfaces between the two organizations to allow for easy test ordering and results sharing. The digital pathology platform also enables experts at Michigan Medicine to provide case reviews to support their colleagues at remote sites. "We do not have to move faculty to Sparrow and some of our other off-site locations," remarked Parkos. "With the advent of digital pathology, we can manage such cases remotely. This is especially true for surgical pathology consultations and will be the way of the future."

Michigan Medicine's expansion benefits patients across the state of Michigan, but it also benefits future patients worldwide. A larger patient population brings increased diversity both demographically and in disease. Characteristics of rare diseases can be better understood by analyzing traditional test results with larger genetic and genomic datasets. These data contribute to our understanding of the mechanisms of such diseases, which can help researchers develop new tests and therapeutics. Pathology has a robust research enterprise, with more than $30 million in annual research funding, and an excellent PhD program in Molecular and Cellular Biology. These students have access to the rich resources of the University of Michigan and Michigan Medicine, preparing them to advance healthcare for future generations. Graduates of this program can be found worldwide in industry and academia.

Expansion does not come without risk, however. Building new facilities, entering partnerships, and acquiring health systems are costly. These require funding to enable expansion, but the healthcare economic landscape continues to tighten. In Pathology in 2015, 28.3% of zeroed invoices were collectible. In 2024, this was down to 24.8%. Reimbursement rates from insurers continue to be cut, yet expenses have risen dramatically over the past several years. "We believe there is a lot of risk around Medicaid reimbursement right now. There have been threats and concerns around the 340B discount drug program. Thus, there is significant concern about future reimbursements for healthcare services. We have to figure out how to manage our expenses with a reduced topline revenue number. How can we work smarter, maximize our space utilization, and take advantage of technology to be more efficient?" reflected Dickey.

Pathology addresses these concerns by examining test menus for our laboratories and at our affiliate sites to identify which send-out tests could be more affordably brought in-house and if economies of scale could be brought into play. Test utilization is also reviewed to determine if tests are being ordered inappropriately, increasing costs but not improving patient outcomes. In addition, the department has added automation lines to the core laboratory to efficiently process increased test volumes without adding additional staff. Digital pathology enables our faculty to support multiple locations simultaneously, reducing the number of pathologists necessary to support frozen sections and other surgical cases. The department also invested heavily in genetic and genomic pathology, a rapidly growing market segment. Our MLabs program brings in test volume from unaffiliated healthcare providers to improve our efficiencies of scale, further driving down costs per test. The health system is also investigating using drones to help reduce specimen transport expenses and batch sizes for more efficient processing, shortening turnaround times for results, and leveling workloads.

As the health system advances across the state and the world, Pathology is an integral part of these efforts to ensure every patient in Michigan who wants to access our expert care can do so. The technological advances implemented within the department enable Pathology to provide high-quality patient care with fewer resources and as the health system continues to expand, Pathology will be an active partner, serving the patients of Michigan and the world.

Above:
Melina Adler hosting a FiSH! event on site.

Building Bridges Through FiSH! Philosophy

by Melina Adler, MHSA

A thriving workplace nurtures communication, understanding, and innovation, building bridges between ideas and people. In April 2023, I embarked on a journey using the FiSH!® Philosophy to enhance collaboration within the Michigan Medicine Pathology Department. This approach aims to boost creativity and productivity through four practices: choosing one's attitude, being present, making someone's day, and playing. By embracing these habits, teams engage more with each other, find joy in daily tasks, and cultivate a vibrant workplace culture. Through these shared values, we build bridges that empower our teams to explore new possibilities, enhancing both personal growth and collective success.

Together, we are laying the groundwork—one person, one step at a time—moving toward our shared goal of more purposeful and meaningful lives. The enthusiasm experienced through FiSH! has been contagious, leading to the formation of committees and individual efforts focused on infusing more excitement into our daily routines. Recently established clubs and celebrations have created fresh avenues for us to find joy in each other's company. Rafael Baran observed, "Since we started using the FiSH! philosophy in MLabs, there's been a huge boost in team spirit. We were inspired to create the Engaging MLabs Committee (EMC2) for greater participation in team-building events. Many people seem more engaged, making events, like the painting party last July, even more fun and memorable." Whether laughing over trivia at daily huddles or decorating cards for hospitalized children and nursing home residents, we are finding new ways to connect and make people's days.

Our department's partnerships—such as improving patient safety and care coordination through the patient registration project, refining consult submissions, and developing laboratory data visualization with HC1—underscore our commitment to high-quality healthcare and provide opportunities to cultivate a more playful state of mind. The environment promoted by FiSH! sets the tone, encouraging open communication and teamwork. Ashley Fratzke emphasized, "The FiSH! Philosophy was a fun training format that changes our mindset and reminds us of core values. If everyone incorporates

this into their day-to-day, we would all do a better job, and our patients would receive even better care than they already do!"

By engaging in cross-functional projects and shared activities, we address barriers and nurture a cooperative spirit. One example of breaking down silos came from the consults project. AlyNic McKenzie noted, "I've learned a lot about consults I didn't know before that has been helping me with my day-to-day work. I am hoping that the outcomes can help me and my team function better as a whole." Integrating teams allows for dynamic idea-sharing and problem-solving, leading to a more cohesive work environment and improved results.

Developing common ground is complex. For the FiSH! Philosophy to truly change the culture in our department, most of us must embody these values to create a cooperative and joyful environment. The journey begins within each of us. It's not enough to imagine choosing a more productive attitude or to wish to be more present for others. If I am not regularly seeking connections and learning the unique details of people's lives, I am not realizing my full potential.

In my FiSH! journey, I began by focusing on mastering the training materials and quickly learned the importance of actively practicing the behaviors in my life. I realized that to facilitate FiSH! effectively, I needed to model its values intentionally and visibly. Understanding the benefits of setting, writing, and sharing goals, I challenged myself to enhance thirty people's days over eight weeks. Using a discarded envelope, I created slips of paper to track each intentional act, whether a unique message or a comforting gesture towards someone unwell. These blank pieces on my desk reminded me of the countless opportunities to uplift others.

Although my perfectionism sometimes held me back out of fear of not doing things "right," I learned to take action, even imperfectly, rather than not at all. For instance, when unsure of how best to recognize someone, I sent them a personal note of thanks or appreciation. This practice pushed me beyond my comfort zone and toward growth, helping me become more present and attentive. I remind myself to give my full attention during conversations and make a point to note key details on my phone, genuinely getting to know my associates. Having achieved my initial target, I have now set new realistic aspirations that keep me energized and aligned with the FiSH! practices.

Living with greater purpose positively affects those around me. My partner appreciates finding notes on his nightstand, and my colleagues enjoy receiving handwritten words of gratitude. Simple gestures, like sending a message to a neighbor with a chronic condition, lifts her spirits. I focus on practicing FiSH! regularly by reflecting on my values and aiming to live intentionally through my actions. A simple message can make a meaningful difference.

Some days, my energy is spent, and staying positive feels more challenging. The key is remembering I have a choice, and adopting a more productive attitude helps others be their best selves, too. When we consciously strive to understand those around us, we build a bridge to a more positive and enjoyable environment for everyone. Every time we choose to be optimistic, attentive, and kind, we build a stronger foundation and promote a culture of connection, teamwork, and empathy.

Above:
Faculty and staff participate in a FiSH! session at NCRC.

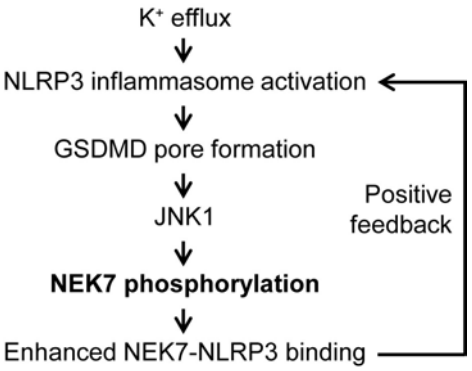
I invite you to join me in incorporating the FiSH! Philosophy into your life. Let's actively overcome the obstacles that separate us by choosing productivity and engagement in our interactions. Whether through a note of appreciation, active participation in cross-departmental projects, or being present for a colleague, each small act contributes to a larger, more connected whole. Together, let's bridge gaps, build relationships, and create a culture where collaboration and kindness blossom.

RESEARCH HIGHLIGHTS

NEK7 phosphorylation amplifies NLRP3 inflammasome activation downstream of potassium efflux and gasdermin

D. Xu J, Zhang L, Duan Y, Sun F, Odeh N, He Y, Núñez G. *Sci Immunol.* 2025 Jan 3;10(103):eadl2993. doi: 10.1126/sciimmunol.adl2993. Epub 2025 Jan 3.PMID: 39752537

Inflammasomes are protein complexes that are activated in the presence of microbial or sterile stimuli to induce inflammatory responses by activating the protease caspase-1. The best-characterized inflammasome is induced through the sensor NLRP3. Inherited activating mutations in NLRP3 cause several autoinflammatory syndromes, whereas chronic activation of the NLRP3 inflammasome can contribute to the pathogenesis of acquired inflammatory disorders, including atherosclerosis, diabetes, gouty arthritis, and Alzheimer's disease. In the new work, it was found that the kinase NEK7 is phosphorylated to regulate the activation of the NLRP3 inflammasome.

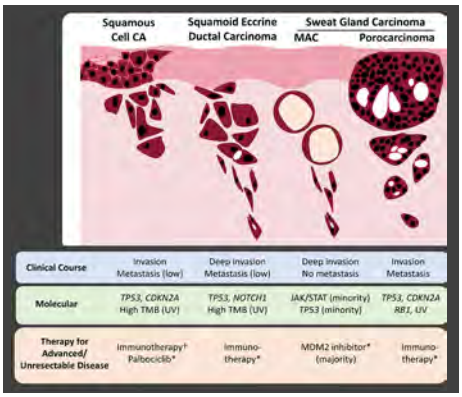


Impact:
The new studies suggest that targeting NEK7 can provide a mechanism to control inflammation in diseases associated with abnormal activation of the NLRP3 inflammasome.

Squamoid Eccrine Ductal Carcinoma Displays Ultraviolet Mutations and Intermediate Gene Expression Relative to Squamous Cell Carcinoma, Microcystic Adnexal Carcinoma, and Porocarcinoma

Harms PW, Runge M, Chan MP, Liu CJ, Qin Z, Worden F, Robinson DR, Chinnaiyan AM, Mclean SA, Harms KL, Fullen DR, Patel RM, Andea AA, Udager AM. *Mod Pathol.* 2024 Nov; 37(11):100592

Squamoid eccrine ductal carcinoma is a rare but often deeply invasive skin tumor. The biology and potential systemic treatments for this tumor have been a mystery. Even basic classification has been debated: some propose that these tumors arise from sweat glands, while others hypothesize these are simply a variant of a more common tumor, squamous cell carcinoma. Drs. Paul Harms and Aaron Udager led a team that investigated molecular changes in a set of squamoid eccrine ductal carcinoma tumors. They discovered evidence that these tumors arise due to sun damage, with a mutation burden suggesting potential use for immunotherapy. They next evaluated gene expression patterns, and found that these tumors demonstrated a unique profile combining



features of sweat gland tumors with squamous cell carcinoma.
—
Impact:
These observations identify the etiology of squamoid eccrine ductal carcinoma as ultraviolet photodamage, and might help direct investigations of systemic therapies for patients with advanced disease.

Patterns of Klebsiella pneumoniae bacteremic dissemination from the lung

Holmes CL, Dailey KG, Hullahalli K, Wilcox AE, Mason S, Moricz BS, Unverdorben LV, Balazs GI, Waldor MK, Bachman MA. *Nat Commun*. 2025 Jan 17;16(1):785. doi: 10.1038/s41467-025-56095-3.PMID: 39824859

Pneumonia can be deadly because the infection can cause the lungs to stop working, but also because the bacteria can escape from the lung and infect the blood, causing bacteremia and sepsis. It is generally assumed that bacteria grow to high numbers in the lung and then break through barriers to reach the bloodstream.

To test this assumption, Drs. Holmes, Bachman, and colleagues used a recently developed method where bacteria can be given a genetic barcode, analogous to those used in a grocery store, to uniquely identify each bacterial cell in a population. Using Klebsiella pneumoniae, a common cause of pneumonia in hospitals, mice were infected with many barcoded bacteria and tracked from the lungs to the bloodstream. In about half of the mice, the bacteria had the expected pattern of replication in the lung and then spread to the blood. They termed this "metastatic" dissemination, similar to how a tumor first grows at one spot in the body and then spreads. In the other half of mice, the bacteria invaded into the bloodstream without first growing in the lungs. They termed this "direct" dissemination. By disrupting components of both the bacteria and mouse immune cells, they have begun to identify the factors that determine which route of escape occurs during pneumonia.

—

Impact:
This work has uncovered two distinct mechanisms by which pneumonia can lead to life-threatening bacteremia. This insight may be able to guide more effective approaches to prevent and treat both types of bacteremia.

Selective Enhancer Dependencies in MYC-Intact and MYC-Rearranged Germinal Center B-cell Diffuse Large B-cell Lymphoma

Iyer AR, Gurumurthy A, Chu SA, Kodgule R, Aguilar AR, Saari T, Ramzan A, Rosa J, Gupta J, Emmanuel A, Hall CN, Runge JS, Owczarczyk AB, Cho JW, Weiss MB, Anyoha R, Sikkink K, Gemus S, Fulco CP, Perry AM, Schmitt AD, Engreitz JM, Brown NA, Cieslik MP, Ryan RJH. *Blood Cancer Discov* (2025) OF1–OF21. *https://doi.org/10.1158/2643-3230.BCD-24-0126*

High expression of MYC and its target genes identify germinal center B-cell diffuse large B-cell lymphomas (GCB-DLBCL) associated with poor outcomes. We used CRISPR-interference profiling of human lymphoma cell lines to define essential enhancers in the MYC locus and non-immunoglobulin rearrangement partner loci, including a recurrent rearrangement between MYC and the BCL6 locus control region. GCB-DLBCL cell lines without MYC rearrangement were dependent on an evolutionarily conserved enhancer we name "GC B-cell MYC enhancer 1," which was found to be activated by the transcription factor complex of OCT2, OCA-B, and MEF2B, showed an active chromatin state in normal human and mouse GC B cells, and demonstrated selective acetylation and MYC promoter topological interactions in MYC-intact GCB-DLBCL biopsies. Whole-genome sequencing identified tandem copy gains of GC MYC enhancer 1 as a rare but recurrent event in DLBCL. Our findings shed new light on mechanisms that dysregulate MYC, a key driver of B-cell malignancy.

—

Significance:
Aberrant MYC activity defines the most aggressive GCB-DLBCLs. We characterized a mechanism of MYC transcriptional activation via a native enhancer that is active in MYC-intact GCB-DLBCL, establishing fitness-sustaining cis- and trans-regulatory circuitry in GCB-DLBCL models that lack MYC enhancer-hijacking rearrangement.

RESEARCH IMPACT

Our faculty have published several hundred impactful manuscripts this year. We have selected some key publications that highlight different areas of our department's research.

Iris: A Next Generation Digital Pathology Rendering

Landvater RE, Balis U.: Engine. *J Pathol Inform.* 2024 Dec 5;16:100414. doi: 10.1016/j.jpi.2024.100414. PMID: 39830734; PMCID: PMC11742306.

Digital pathology is a tool of rapidly evolving importance within the discipline of pathology. Whole slide imaging promises numerous advantages; however, adoption is limited by challenges in ease of use and speed of high-quality image rendering relative to the simplicity and visual quality of glass slides. Herein, we introduce Iris, a new high-performance digital pathology rendering system. The system shows no slowing with high use loads, but rather increases performance due to graphical processing unit cache control mechanisms and is "future-proof" due to near unlimited parallel scalability.

Mutant induced neurons and humanized mice enable identification of Niemann-Pick type C1 proteostatic therapies

Azaria RD, Correia AB, Schache KJ, Zapata M, Pathmasiri KC, Mohanty V, Nannapaneni DT, Ashfeld BL, Helquist P, Wiest O, Ohgane K, Li Q, Fredenburg RA, Blagg BS, Cologna SM, Schultz ML, Lieberman AP. *JCI Insight.* 2024 Aug 29;9(20):e179525. doi: 10.1172/jci.insight.179525.PMID: 39207850

Therapeutics that rescue folding, trafficking, and function of disease-causing missense mutants are sought for a host of human diseases, but efforts to leverage model systems to test emerging strategies have met with limited success. Such is the case for Niemann-Pick type C1 disease, a lysosomal disorder characterized by impaired intracellular cholesterol trafficking, progressive neurodegeneration, and early death. We report the development of experimental tools, both human induced neurons and gene targeted mice, that establish a paradigm for testing and validation of proteostatic therapeutics as an important step toward the development of disease-modifying therapies.

STARD7 maintains intestinal epithelial mitochondria architecture, barrier integrity, and protection from colitis

Uddin J, Sharma A, Wu D, Tomar S, Ganesan V, Reichel PE, Thota LNR, Cabrera-Silva RI,

Marella S, Idelman G, Tay HL, Raya-Sandino A, Reynolds MB, Elesela S, Haberman Y, Denson LA, Parkos CA, O'Riordan MX, Lukacs NW, O'Dwyer DN, Divanovic S, Nusrat A, Weaver TE, Hogan SP. *JCI Insight.* 2024 Nov 22;9(22):e172978. doi: 10.1172/jci.insight.172978.PMID: 39576011

Susceptibility to inflammatory bowel diseases (IBDs), Crohn's disease (CD), and ulcerative colitis (UC) is linked with loss of intestinal epithelial barrier integrity and mitochondria dysfunction. STARD7 is critical for intestinal epithelial mitochondrial function and barrier integrity, and loss of STARD7 function increases susceptibility to IBD. STARD7 may be a target for therapeutic approaches to treat IBD, CD and UC.

CCN6 Suppresses Metaplastic Breast Carcinoma by Antagonizing Wnt/β-Catenin Signaling to Inhibit EZH2-Driven EMT

Gonzalez ME, Brophy B, Eido A, Leonetti AE, Djomehri SI, Augimeri G, Carruthers NJ, Cavalcante RG, Giordano F, Andò S, Nesvizhskii AI, Fearon ER, Kleer CG. *Cancer Res.* 2024 Oct 1;84(19):3235-3249. doi: 10.1158/0008-5472.CAN-23-4054. PMID: 39024552

Cancer development and progression occurs in concert with alterations in the surrounding stroma. Cancer cells can functionally sculpt their microenvironment through the secretion of various cytokines, chemokines, and other factors, remodeling surrounding cells. Cross-talk between cancer cells and the proximal immune cells ultimately results in an environment that fosters tumor growth and metastasis. Understanding the nature of this dialog will allow for improved therapeutics that simultaneously target multiple components of the TME, increasing the likelihood of favorable patient outcomes.

Mutant induced neurons and humanized mice enable identification of Niemann-Pick type C1 proteostatic therapies

Azaria RD, Correia AB, Schache KJ, Zapata M, Pathmasiri KC, Mohanty V, Nannapaneni DT, Ashfeld BL, Helquist P, Wiest O, Ohgane K, Li Q, Fredenburg RA, Blagg BS, Cologna SM, Schultz ML, Lieberman AP. *JCI Insight.* 2024 Aug 29;9(20):e179525. doi: 10.1172/jci.insight.179525.

Therapeutics that rescue folding, trafficking, and function of disease-causing missense mutants are sought for a host of human diseases, but efforts to leverage model systems to test emerging strategies have met with limited success. We leveraged a panel of isogenic human induced neurons expressing distinct NPC1 missense mutations. We used this panel to rescreen compounds that were reported previously to correct NPC1 folding and trafficking. These tools established a paradigm for testing and validating proteostatic therapeutics as an important step toward developing disease-modifying therapies.

HLA-C Peptide Repertoires as Predictors of Clinical Response during Early SARS-CoV-2 Infection

Olp MD, Laufer VA, Valesano AL, Zimmerman A, Woodside KJ, Lu Y, Lauring AS, Cusick MF. *Life* (Basel). 2024 Sep 19;14(9):1181. doi: 10.3390/life14091181

Our findings show that severely symptomatic infection in this cohort is associated with disproportionately abundant binding of SARS-CoV-2 structural and non-structural protein epitopes by patient HLA-C molecules. In addition, the extent of overlap between a given patient's predicted HLA-C and HLA-A peptide binding repertoires correlates with worse prognoses in this cohort. The findings highlight immunologic mechanisms linking HLA-C molecules with the human response to viral pathogens that warrant further investigation.

Longitudinal outcomes of chronically transfused adults with sickle cell disease and a history of childhood stroke

Jones JM, Wool J, Crowe EP, Bloch EM, Pecker LH, Lanzkron S. *Transfusion.* 2024 Dec;64(12):2260-2269. doi: 10.1111/trf.18041. Epub 2024 Nov 5.

For adults with Sickle Cell Disease who had a childhood stroke, our results suggest Chronic Transfusion Therapy returns the risk of stroke to that of age-matched stroke naïve patients with Sickle Cell Disease.

A Generalizable Decision-Making Framework for Selecting Onsite versus Send-out Clinical Laboratory Testing

Schroeder LF, Rebman P, Kasaie P, Kenu E, Zelner J, Dowdy DW. *Med Decis Making.* 2024 Apr;44(3):307-319. doi: 10.1177/0272989X241232666. Epub 2024 Mar 6.

Decision makers can select onsite versus send-out testing in an evidence-based fashion using estimates of the percentage of clinical utility lost due to send-out delays and the relative accuracy of onsite versus send-out testing. This model is designed to be generalizable to a wide variety of use cases.

Bloodstream infections: mechanisms of pathogenesis and opportunities for intervention

Holmes CL, Albin OR, Mobley HLT, Bachman MA.Nat Rev Microbiol. 2025 Apr;23(4):210-224. doi: 10.1038/s41579-024-01105-2. Epub 2024 Oct 17. *Nat Rev Microbiol.* 2025 Apr;23(4):210-224. doi: 10.1038/s41579-024-01105-2. Epub 2024 Oct 17.

As many pathogens become increasingly resistant to antimicrobials, new approaches to diagnose and treat BSIs at all stages of infection are urgently needed. In this Review, we explore the prevalence of major BSI pathogens, prominent mechanisms of BSI pathogenesis, opportunities for prevention and diagnosis, and treatment options.

Pathology: Connecting Communities, Advancing Patient Care, and Inspiring the Future

by Anastazia Hartman, MBA, MS

Sometimes overlooked, pathology plays a far more significant role in healthcare than it's typically credited for. The field is crucial not only to patient care but serves as a bridge between education, community engagement, and the future of medicine. From hands-on learning experiences for students exploring careers in medical laboratories to groundbreaking patient-centered reporting, pathology is evolving to promote community involvement, professional development, and improved healthcare outcomes.

Education: The Pathway to the Next Generation

For more than three years, Karen Barron, Allied Health education manager within the Department of Pathology, has been cultivating strong relationships with schools, teachers, and students to raise awareness of careers in medical laboratory professions.

One of Barron's key initiatives involves a network of schools and educators she has fostered. She visits classrooms, career fairs, community events, and teacher conferences to engage students and teachers in hands-on activities that link their natural scientific curiosity to roles in the medical laboratory. These initiatives, especially those targeting students from underrepresented backgrounds, are opening new pathways into pathology and laboratory science. "When I speak with high school students, they're excited to learn there are entry-level jobs in pathology where they can begin their journey in healthcare."

"At the recent Michigan Science Teachers Association (MSTA) conference, I learned that teachers are hungry for ways to connect what they teach in class to real-world applications," Barron explained. "At my exhibit, they could try DNA extraction from a banana. I also provided lesson plans and discussion prompts that tie into the DNA analysis we do in our Diagnostic Genetics and Genomics labs. I explain how we're on the front lines of fighting cancer by providing "precision", or "personalized", medicine.

Barron's outreach also extends to schools with student populations historically underrepresented in science and healthcare, an essential and impactful aspect of her work. At the MSTA conference, she connected with Dr. Terrance Burgess from Michigan State University, who offered an inspiring perspective on combining science with social justice and amplifying the voices of youth of color.

"The medical laboratory field is well-positioned to support this approach," said Barron. "One example is the Youth Summit at the Big House, which creates meaningful opportunities to spark students' interest in medical science. While outreach has previously focused on high schoolers, new connections with educators of younger age groups highlight exciting opportunities to engage upper elementary and middle school students with foundational concepts in medical laboratory science."

Expanding internship opportunities has also

Above:
Karen Barron, Allied Health Education Manager.

been a major focus. Phlebotomy and medical laboratory science training programs have seen substantial growth, ensuring a strong pipeline of skilled professionals.

"It's been incredibly rewarding to build on the foundation laid by others in the department and expand internships in allied health," Barron said. "Thanks to Theo Jones and his team in Satellite Support Phlebotomy, we've precepted 23 phlebotomy externs over the last 18 months—some are now permanent staff or student temps."

Above:
Dr. Rouba Ali-Fehmi, Professor, Medical Director of Breast Pathology and Breast Pathology Fellowship.

Our Medical Laboratory Science Internship program is also thriving, with 12 to 14 interns each year guided by more than 100 dedicated preceptors. "The universities we partner with are producing outstanding medical laboratory scientists, and it's a joy to watch these new professionals grow into impactful team members."

Continuing education resources further support current staff in advancing their careers through specialized training and certification programs.

"Collaborating with employees, labs, and online university programs has allowed us to expand internship opportunities in Microbiology and Histotechnology," Barron added. "It's incredibly rewarding to support the growth of our colleagues. The University of Michigan's Allied Health Continuing Education webpage is a tremendous resource, offering free learning tools and links to tuition support, and scholarship opportunities."

"I'd like to thank everyone in the labs for taking the time to support learners and collaborate with me. I also want to thank Dr. Kamran Mirza and Dr. David Gordon for their commitment and support of my work. I challenge everyone in Pathology to share their stories and passion for the work we do with others in their communities."

Bridging the Gap Between Diagnosis and Patient Care

While education fuels the future, patient engagement is transforming the present. Often perceived as a non-patient-facing specialty, pathology is breaking that mold, thanks to the work of Dr. Roubal Ali-Fehmi. Through a multidisciplinary clinic focused on breast pathology, she is redefining how pathologists engage with patients. Rather than working solely behind the scenes, they now help patients understand their diagnoses directly.

Through digital pathology, patients can view their own tumors, gaining a clearer understanding of their condition and treatment options. This innovative approach makes patients active participants in their care, often leading to better adherence to treatment plans.

"It's a team effort," said Dr. Ali-Fehmi. "When patients come here, they see everyone—surgeons, oncologists, radiologists, and pathologists—so they get the full picture in one visit. Patients are grateful to learn about their disease directly from the experts making the diagnosis. We break down each part of the pathology report—from tumor grade to hormone receptors—in a way that's easy to understand."

However, she notes that more institutional support is needed. Currently, these patient consultations are conducted on a volunteer basis.

"Pathologists need protected time to spend with patients. Right now, we do this voluntarily, squeezed into already packed schedules. This should be a formal part of our clinical responsibilities," she emphasized.

To enhance accessibility, the University of Michigan now offers virtual digital pathology consultations. "We offer digital visits every other Wednesday, so patients don't have to travel to the Cancer Center," said Ali-Fehmi. "This is especially helpful for patients with transportation challenges."

Digital pathology not only empowers patients but also fosters better collaboration among physicians. By digitizing slides, specialists can quickly share information, leading to faster and more accurate diagnoses.

Transforming Pathology Reports for Better Patient Understanding

Another major shift in patient-centered pathology is being led by Dr. Cathryn Lapedis, through her research on improving communication through patient-centered pathology reports.

Dr. Lapedis' group just published a study in *JAMA* (Lapedis, 2025) which showed that people struggle to get basic information— like whether they have cancer from standard pathology reports. The group's study showed that only 39% of people looking at a University pathology report and 56%

of people looking at a Veterans' Affairs Health System (VA) pathology report, could accurately determine if they had cancer. When people reviewed a patient-centered pathology report, 93% could accurately determine that the report showed cancer. Dr. Lapedis is now working to implement patient-centered pathology reports for patients undergoing prostate biopsy at Michigan Medicine.

Dr. Lapedis also runs a pathology explanation clinic similar to Dr. Ali-Fehmi's at VA Ann Arbor. Dr. Lapedis notes that in her pathology clinic improved communication with the urology and radiation oncology teams has prevented diagnostic miscommunications and significantly improved patient safety. She notes, "In one case, a veteran's pathology report was misinterpreted by the clinical team as negative for cancer, when in fact the pathology report indicated cancer was present. Through the pathology explanation clinic we were able to communicate that the patient had cancer, which led to appropriate management for that patient. This example highlighted the vital importance of communication and checking for understanding with our clinical colleagues. People make mistakes, and it is important to build in some redundancy to ensure patient safety."

Dr. Lapedis expands, "Our job as pathologists isn't just to generate a report and send it out to the abyss of the medical chart. Our job is to interpret images in the context of clinical factors, and then to communicate our interpretation in a way that guides behavior towards improved health outcomes," said Dr. Lapedis.

In addition to identifying and correcting important diagnostic miscommunications, virtual pathology explanation clinics at the VA have significantly improved veterans' knowledge about their prostate cancer diagnosis, and veterans have been highly satisfied with their visit. Dr. Lapedis notes, "I've been surprised by how popular virtual visits have become, even in remote areas," she said. "The VA's system makes that possible. There's a strong sense of community, even during virtual consultations. That shared bond among veterans is very real."

Dr. Lapedis also advocates for pathologists to be recognized as essential, visible members of the healthcare team.

"I want my patients to know—I'm a member of your care team. My job is to put together what I see in images of your tissue with your clinical history to determine a diagnosis. The diagnosis is typically the primary determinant of treatment and prognosis. You and your clinician should both have a clear understanding of that diagnosis, as it is essential for optimal management of your health. I include my phone number at the end of every report. Whether you're a clinician or a patient, I want you to reach out if something is unclear."

Pathology: A Link Between Communities and the Future of Medicine

Through student outreach, professional development, and patient-centered care, pathology serves as a vital connector—linking education with practice, science with humanity, and diagnosis with understanding. By inspiring the next generation, enhancing patient experiences, and fostering collaboration, the field continues to evolve in ways that benefit both communities and healthcare systems.

As curiosity is sparked in classrooms and lives are changed in clinics, one thing is clear: pathology is not just about disease—it's about people, education, and progress.

—

Above:
Dr. Cathryn Lapedis, Assistant Professor, Renal Pathology.

Reference:

Lapedis CJ, Kurnot SR, Bergholtz SE, Owens SR, Hawley ST, Morgan TM, Zikmund-Fisher BJ. Knowledge and Worry Following Review of Standard vs Patient-Centered Pathology Reports. *JAMA*. 2025 Feb 25;333(8):717-718.

Above *(Left to Right)*: Drs. Kamran Mirza, Robua Ali-Fehmi, Lee Schroeder, and Ul Balis.

Pathology Without Borders: How Michigan Medicine is Rewriting the Diagnostic Map

by Anastazia Hartman, MBA, MS

Across borders, bandwidths, and belief systems; a team of pathologists are partnering to make diagnostics and diagnostic education more accessible.

In many low- and middle-income countries (LMICs), access to basic diagnostic services remains severely limited or entirely out of reach. A breast biopsy might take weeks to months to process, if it's processed at all. The results? Treatable diseases like cancer become fatal, or far more difficult to treat, simply because the diagnosis comes too late.

"Diagnostics are the gateway to treatment," says Dr. Lee Schroeder, interim director of clinical pathology and global health advocate. "You can't treat what you haven't diagnosed. And right now, the global diagnostic gap is staggering."

In some countries, there's one pathologist for every million people. In others, key tests like immunohistochemistry or molecular diagnostics are virtually nonexistent. Even basic chemistry analyzers are absent in many hospitals. The lack of access can cost lives.

"A deeper understanding of the value of pathology and laboratory medicine has the potential to change this reality," says Dr. Schroeder. "Through international efforts like the World Health Organization (WHO) Essential Diagnostics List, there is a growing focus on diagnostics in LMICs. Diagnostic network optimization is becoming commonplace in countries that are managing public health systems that have tens of thousands of health facilities. These networks enable transfer of specimens and can also be an infrastructure within which to leverage the power of digital pathology for remote consultations and expert input from across the globe. There is a role for institutions like the University of Michigan to partner with our international colleagues to provide technical collaboration. This type of work must be done right, with a long-term vision through long-term partnerships."

From Ann Arbor to Accra: Building the Bridge

At the heart of this transformation is the Global Pathology and Laboratory Medicine (GPALM) initiative. Led by Drs. Rouba Ali-Fehmi, Kamran Mirza, Lee Schroeder, and Ulysses (Ul) Balis.

"The vision was never just to share knowledge," says Dr. Rouba Ali-Fehmi, director of breast pathology and director of Global Initiatives. "It was to co-develop, co-learn, and co-lead. We're not there to fix anything. We're there to listen."

That listening has led to deep partnerships across Ghana, Kenya, Rwanda, Egypt, Sudan, and Lebanon. Together, they're helping pathology departments to make greater use of digital

platforms, developing bilingual curricula, and are now helping pathologists and laboratorians in these locales to train the next generation of global pathology leaders.

"We're not just delivering lectures," Dr. Ali-Fehmi adds. "We're building trust, sharing space, and creating something sustainable."

For Dr. Kamran Mirza, director of educational programs, pathology education for health professionals is a fundamental right. And the barriers to it, he says, are unacceptable.

"Everyone, everywhere, deserves access to world-class education," he says. "We can't accept a world where geography determines whether you get to learn." Through digital platforms like PathElective.com and international mentorship programs, Dr. Mirza is making high-quality education available to trainees in the most remote corners of the world. "It's not about dumping content online," he adds. "It's about designing learning tools and resources for the realities people face—limited internet, shifting power grids, different languages. That's the challenge. That's the joy."

Director of Pathology Informatics, Dr. Ul Balis, believes the key to global diagnostics lies in appropriate leveraging of technology, not just use of cutting-edge tools, but selecting the right tool for the right context.

"In many places, treatable cancers become incurable simply because they're diagnosed too late," says Dr. Balis. "Digital pathology can change that, but only if we help our partners to build systems that are adaptable, scalable, and rooted in local realities." He emphasizes that Michigan's success has come not from exporting technology, but from co-developing it. "It's not about installing scanners," he says. "It's about building diagnostic ecosystems—ones that are maintained, understood, and owned by the communities who use them."

For Dr. Schroeder, the real power of diagnostics lies not in any individual device but in the systems that connect it to the people who need answers. "Point of care diagnostics, automated analyzers, and digital tools are incredible, but only if they are accessible," he explains. His research in Ghana, where he and his collaborators have developed models that can aid policy makers in the design of their national diagnostic networks, have taught him one essential truth: trust is the foundation. "You can't simply bring a new device or a brilliant idea and expect transformation," he says. "Partnership means forming trust and being in it for the long haul."

Lessons From the Frontlines

While GPALM is helping to build infrastructure and train faculty, the learning goes both ways. "Our colleagues in resource-limited settings are often the most innovative," says Dr. Balis. "They teach us how to do more with less, how to be flexible, how to rethink everything we take for granted."

Michigan's own residents and medical students are increasingly involved in global electives, curriculum co-development, and cross-cultural case conferences. "The impact on our trainees is enormous," says Dr. Mirza. "They come back more thoughtful, more adaptable, more collaborative. That's the future of medicine."

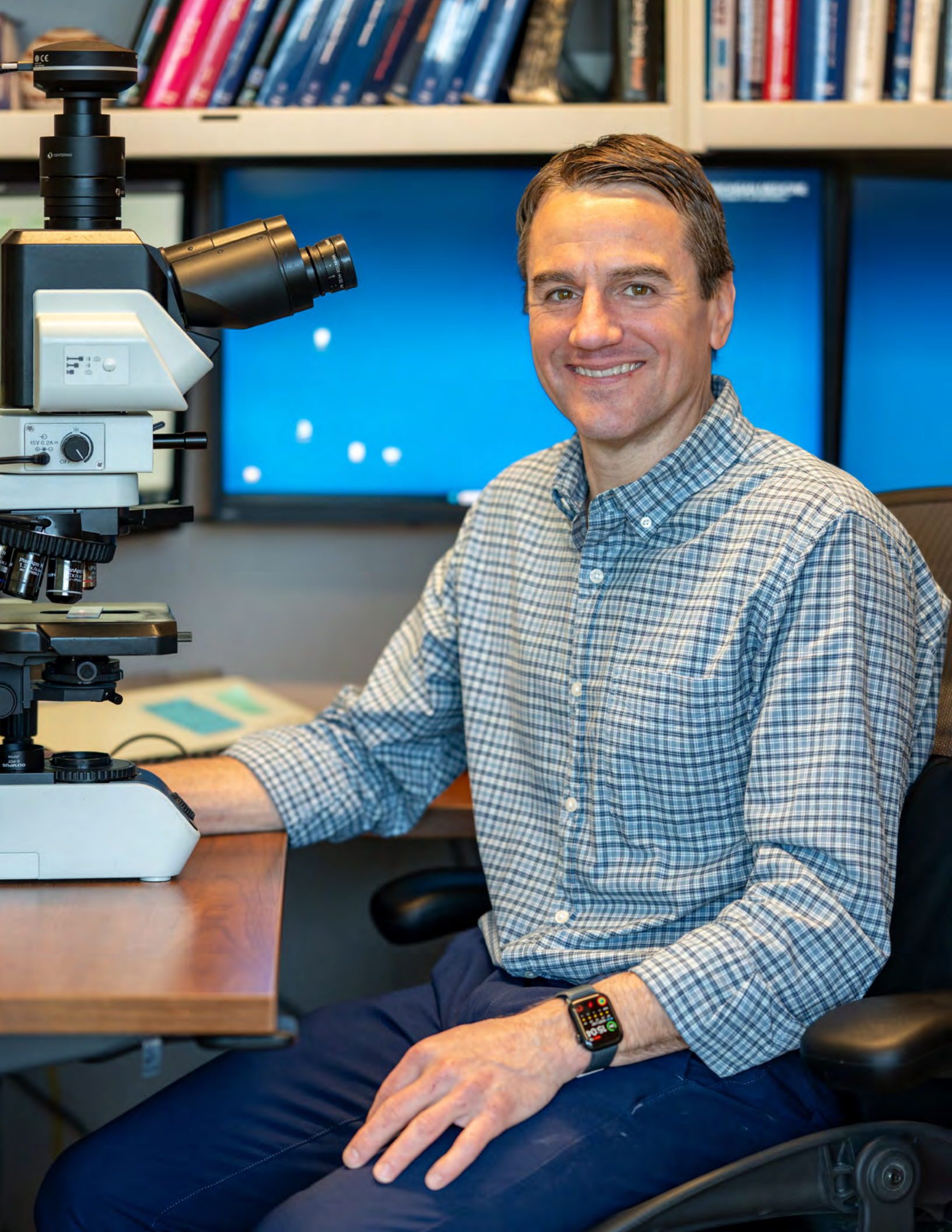
What GPALM is building is not just a network of labs and learning. It's a new way of thinking about medicine.

- Pathology as a tool for health justice
- Education as a bridge between continents
- Technology as a servant, not a savior
- Partnerships rooted in mutual respect

From Beirut to Nairobi, Accra to Ann Arbor, the work of Michigan Medicine's Department of Pathology is reshaping not just how disease is diagnosed, but how healthcare is delivered, how education is shared, and how futures are rewritten.

"There's enormous energy among young pathologists," says Dr. Ali-Fehmi. "They want to be part of something global. We just need to give them the space and the invitation." They see something exciting happening as we leverage the extraordinary technical expertise at our institution for impact at a global scale.

Below:
Participants from the first annual Global Pathology Summit.



A Passion for Patterns: Dr. Jonathan McHugh on the Art and Impact of Pathology

by Anastazia Hartman, MBA, MS

This story from inspiring veterinarian to pathologist was shaped by mentorship, passion for microscopy, and a love of teaching.

For Dr. Jonathan McHugh, the path to becoming a leading surgical pathologist wasn't linear. It started with an ambition to become a veterinarian when a college histology course and a well-timed conversation with his professor changed the trajectory of his career.

"I fell in love with the way he taught," McHugh recalled. "He recognized my skill at the microscope and one day asked me, 'Why do you want to be a veterinarian? Medical school pays better, is easier to get into, and is more rewarding assuming you think humans are more valuable than animals.'" McHugh laughed, "I thought about it and said, yeah, that sounds pretty good."

Now, as Director of Head and Neck Pathology within the department, Dr. McHugh's passion for microscopic diagnosis and medical education is unmistakable. "I love looking at things under the microscope," he said. "Teaching residents and fellows at the scope, that is by far my biggest passion. Some Friday nights, I sit back and think about all the awesome cases I saw during the week, and it still makes me so happy. Even after 17 or 18 years."

From Solo Specialist to Collaborative Mentor

When McHugh first joined the department of pathology, he found himself forging his path. "We didn't have any head and neck pathologists here during my residency," he explained. "I was flying solo for the most part." That isolation presented both a challenge and an opportunity. "Being the only person in head and neck pathology meant making a lot of high-stakes decisions as a young pathologist."

Despite the initial lack of in-house mentorship in his subspecialty, McHugh found deep professional fulfillment in the independence and grew into a cornerstone of the department. "Honestly, I think I've literally in my career sent one case out to the person who trained me. That's the only time I've ever sent out a head and neck pathology case."

His expertise quickly made him indispensable, especially to Michigan's elite ENT department. "They had this remarkable research program… they were craving head and neck pathology support. I've collaborated with just about everybody from pediatric specialists to high-volume surgeons and researchers," he said. "That collaboration has been remarkable for my career. I'm closing in on 250 publications, and if I'd been on my own, I might have had 25."

Passion, Patterns, and the Power of the Microscope

McHugh insists that pathology is more than just identifying disease; it's about recognizing patterns and having the experience and curiosity to put those patterns into clinical context.

"Physicians are pattern recognition experts, but pathologists are that to the extreme," he explained. "I believe in what I call 'optical mileage.' Just look at a lot of slides. That's how you build those neural networks in your brain." As a resident, McHugh rented a microscope from the med school and spent hours looking at slides in the evening. "I attribute a lot of my success to that, just looking at glass all the time."

This obsessive curiosity extends beyond the

lab. "I've always been a collector: baseball cards, music, birdwatching. I think that's why I love this job so much. You're constantly collecting visual experiences and rare diagnoses. It's the same impulse. You see something rare, and it's like, this is special."

His favorite bird? "Probably the Magnolia Warbler. Gorgeous little bird."

Looking Ahead: AI, Morphology, and a Legacy of Learning

While he acknowledges that molecular pathology and artificial intelligence are transforming the field, McHugh stays grounded in traditional morphologic techniques. "I'm a morphology-oriented pathologist. ENT pathology lags behind a little in molecular advances, which is

actually what I like; it lets me diagnose based on what I see, not just what the tests say."

Still, he sees innovation's value, especially in the form of new immunohistochemical tests that can act as quicker surrogates for molecular diagnostics. "An example is synovial sarcoma," he said. "It has a characteristic translocation, and now we have an antibody that recognizes the fusion protein. It confirms a diagnosis in 24 hours instead of three weeks, and it's much cheaper."

As he enters what he calls the "pedal off the gas" phase of his career, McHugh is focused on mentorship and building a strong future for his department. "I've got two former fellows, Aaron Udager and Will Perry, on staff now. It's great to have colleagues to show cases to. I want to leave a legacy: a strong ENT pathology division at the University of Michigan."

Inspiring the Next Generation

McHugh is also passionate about making pathology appealing to future physicians. "You don't hear many people say they want to be pathologists," he admitted. "But having a presence in the medical school curriculum, dynamic teachers, and showing students the exciting side of new technologies, rare diagnoses, even AI, that's how we bring them in."

And for those who do enter the field?

"Remember that our job is to look at altered human tissue, figure out what it is, and help clinicians manage it," he said. "It may not be a glamorous job, but it's an incredibly cool one."

A Life in Slides and Stories

Reflecting on the people who shaped him, McHugh speaks fondly of one mentor in particular. "Henry Appelman inspired me more than anyone. He just loved his job more than anybody I've ever seen. Watching him work and listening to him talk, it was infectious."

In the end, McHugh's story is one of passion for patterns, for teaching, and for the weird, wonderful world visible only under the microscope. His legacy may be quiet compared to more high-profile medical roles, but it's a vital one. "Pathologists are the so-called doctor's doctor," he said. "We may not always be seen, but we're always there, helping to guide every step of care."

Coming Full Circle: Working in Under-Resourced Settings in the United States and Abroad

by Kelsey Hummel, DO and Lynn A. McCain, MHSA

Dr. Kelsey Hummel shares her experiences providing patient care in under-resourced locations in the United States and Peru and the importance of viewing care from the patient's perspective.

Working as a medical technologist in automated chemistry at the University of Michigan Hospital, I saw that while my degree was more focused on understanding theory and knowledge, my actual work was focused on maintaining the analyzers that performed all of the testing. I was no stranger to the disparities within the US. My eyes had been opened to the differences in healthcare accessibility while I was an undergraduate student participating in an alternative spring break experience on a Native American reservation in South Dakota. Within one of the wealthiest nations on earth, where top-of-the-line medical technologies are available, the people in this part of South Dakota experienced third-world standards of care. This made me wonder: how is medicine practiced in low-resource settings around the globe?

I decided to pursue a Doctorate in Osteopathic Medicine at Michigan State University (MSU). I was fortunate in medical school that the MSU College of Osteopathic Medicine had a robust international presence. They offered several study-abroad opportunities to students in places such as Malawi, Cuba, and Mexico. During my last year, I had the opportunity to travel to Iquitos, Peru,

known as the gateway to the Peruvian Amazon. Our school established a free clinic there where I joined a team of physicians and medical students providing free health care.

Above:
Dr. Kelsey Hummell (front) with a team of physicians and medical students in Barretos, São Paulo Brazil, where they met with the incredible team at Hospital de Amor.

Right:
Dr. Hummel (2nd from the left) with staff at the Harena Institute and Hospital de Amor, Barretos, São Paulo, Brazil, where she deployed a 3D printed slide scanner to improve patient care.

As a medical technologist, I brought the necessary supplies for ova and parasite testing and set up a station at the clinic. There was no crisp chill of an air conditioner. The humidity was oppressive. I used some of our emergency ice packs and a refrigeration bag to keep the immunoassays close to refrigeration temperature. All the things I took for granted in the pristine laboratories in the US were absent.

During that time, I learned the importance of understanding patient needs. I had a table off to the side, with my microscope, test tubes, and glass slides. The clinicians sent patients my way when they complained of diarrhea and stomach pains. They waited patiently as I prepped the slides, performed the assays, and were relieved when I gave them the good news - negative for parasites. I loved being able to see patients. To have an impact in a place like this. So, I asked the visiting clinicians which laboratory tests they wished they had. Their responses included point-of-care analyzers for a basic metabolic panel, hemoglobin A1C, and a few others. Each of the tests they mentioned required specialized equipment, reagents, refrigeration, and electricity. None of which were readily available in the area. I asked the patients what concerned them the most, and it was parasitic worms. If they were diagnosed with worms, they could be treated. If the water source was contaminated, it could be addressed. Parasites were a more pressing issue to them than dehydration or diabetes. When I gave the patients a negative result, they were elated. They knew I was trying to help them with a problem that was very real for them. When providing healthcare, we must step back and think about what is important to the patients, not just what is important to the physicians. That is part of building bridges beyond pathology and understanding our end goal.

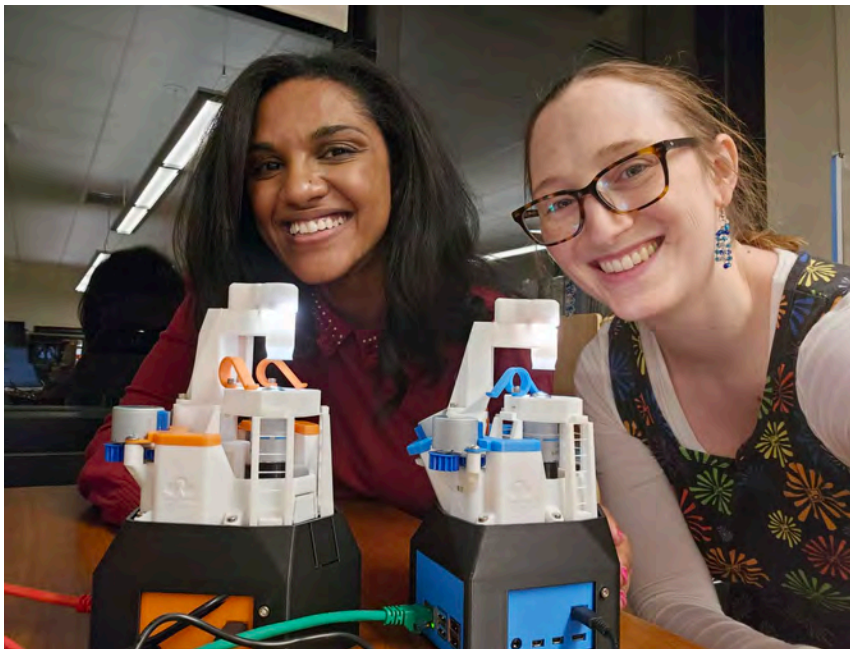
After medical school, I chose Baylor College of Medicine (BCM) for my residency training because I had heard it had connections with global health initiatives. I ended up with a great mentor there, Dr. Daniel Rosen, who is the Global Pathology Director at BCM. I applied for the American Society for Clinical Pathology's Trainee Global Health Fellowship, which connected me with Dr. Elisée Hategekimana, the head of anatomic pathology at the University Teaching Hospital of Butare (CHUB) in Rwanda. I was approved to participate in a rotation in Rwanda to learn about global pathology, but then COVID-19 hit, and I was unable to go. However, this initiative sparked a long-term partnership, enabling Dr. Elisée to secure funding to introduce immunohistochemistry to CHUB and another grant to establish mobile cytology clinics. In Rwanda, patients often require three doctor visits to undergo a fine needle aspiration (FNA) for those with superficial lumps and bumps. By having these clinics go out into the community, they needed only one. Since most patients need to walk several miles or travel for several days to reach a medical center, having a mobile clinic come to their community greatly facilitates care.

At Michigan Medicine, we have state-of-the-art facilities and world-class instruments and faculty. Most of the world does not have what we have. In many low and middle-income countries (LMICs), local pathology training is sparse, with maybe one hospital offering a residency training per country. In terms of global health, pathology is not a popular specialty because it is so technically dependent. Even just making a good slide is very

expensive and labor intensive. So many things have to go right. Aspects that seem small become crucial, like the transportation of specimens from surgery to a hospital that can gross large specimens. For example, an enormous fibroid uterus may be sitting in formalin, unopened, for three weeks before anyone touches it. All the tissue on the inside is decaying and becoming necrotic. When the pathologist attempts to evaluate it, they can't. There are numerous pre-analytical factors that we often take for granted, which become real problems when we try to work in other settings. We need to consider the bigger picture.

Dr. Rosen and I partnered with researchers at the University of Glasgow, who developed a 3D-printed tissue scanner, known as the OpenFlexure Microscope (OFM). At Michigan Medicine, we have highly complex whole-slide image scanners, which are excellent. However, if you don't even have reliable electricity, how can you consider doing this? If you don't have a ton of data storage space, how can you even contemplate capturing all these images and finding a safe place for them? The OFM measures only 8 inches in height and 5 inches in width. It is very small and weighs less than 2 pounds. The heaviest part is the objective lens, which is composed of glass and metal. Everything else, except the computer and electronic parts, are 3D printed. It costs less than $500 to produce one of these, and we have already demonstrated that they can be deployed in low-resource environments. The pathologists we have spoken to in Zambia and Brazil are excited about these scanners, as they want to use them to enhance their education and consult with other pathologists about cases in their own country and internationally. The OFM is building bridges between these isolated pathologists and experts worldwide. It enhances the expertise of remote pathologists, enabling them to provide better patient care.

I'm going to be finishing my gynecologic fellowship in June and then will begin working at the VA hospital in Ann Arbor, focusing on cytology and surgical pathology. I've already spoken with my director, Dr. Darius Amjadi, and we have some VAs in South Dakota that need a lab director. I will become their lab director and be able to visit the lab three times a year to check in. The VAs out there serve a large Native American veteran community, so this is coming full circle to where I began. I will also continue to be active in global pathology, continuing my work with the University of Michigan digital pathology team to develop an algorithm that can use images from the OFM to triage cervical biopsies for pathologist review. We hope this will be useful in LMICs where cervical biopsies are not only screening but diagnosing specimens. Where a timely diagnosis can be the difference between curative surgery or palliative care. I am looking forward to getting to know my colleagues at the VA in Ann Arbor and South Dakota, as well as at the Center for Health Equity at the University of Michigan and finding new ways to build bridges in pathology between faculty and staff, pathologists and clinicians, and with pathologists around the world.



Above:
Drs. Maisha Corrielus (University of Florida) and Kelsey Hummel (Michigan Medicine) display their 3D-printed tissue scanner, the OpenFlexure Microscope.

Supporting the Department of Pathology

Supporting key initiatives within the Department of Pathology plays a vital role in developing the next generation of trainees, researchers, and physicians. Your contributions enhance research and educational opportunities for emerging pathologists, foster collaboration, and help to fund the continuing education of faculty and staff members at all stages of their careers. Additionally, your generosity provides access to state-of-the-art diagnostic tools and helps to sustain ongoing research as we work to uncover the underlying causes of disease and identify ways to improve patient outcomes. Together, we can make a difference.

For more information email: *path-development@med.umich.edu*

Current Opportunities:

- **Pathology Annual Fund:** Provides the Department of Pathology with funds to be used where they are most immediately needed, or opportunities are greatest.
- **Appelman Family Junior Faculty Enhancement Fund:** This fund is designed to enhance the development of our junior faculty in the areas of teaching, clinical research, service, administration, and overall professional development.
- **Clinical Pathology Gift Fund:** Your contribution will help advance innovative research, education, and patient care inititatives in the Department of Pathology.
- **Clinical Pathology Staff Enhancement Fund:** This fund supports educational initiatives for clinical laboratory staff and clinical laboratory science/ phlebotomy interns in the Department of Pathology.
- **Pathology Faculty Research Fund:** Your gift will support faculty who are international leaders in diagnostic pathology, education, and research and aid in the continuation of their research efforts.
- **Pathology Residents Research Fund:** Gifts to this fund enable our residents to take on research projects during their training to help better understand diseases and disease progression, as well as uncover novel pathways that may lead to therapeutic solutions for patients.
- **Pathology Fellowship Fund:** Pathology Fellows are focused on becoming experts in a subspecialty area of Pathology. This fund will enhance their ability to undertake a scientific investigation, pursue educational leadership development, and expand their clinical expertise as they prepare to launch their careers.

Retirements — 2024-2025

Jyoti Athanikar
Technical Writer Lead, MCTP
Retired: Dec. 13, 2024

Greg Dressler, PhD
Professor
Emeritus: Jan. 1, 2025

Jeffrey Jentzen, MD
Director of Forensics
Retired: Jul. 2025

Eileen McMyler
IT Projects Senior Manager
Retired: Jan. 31, 2025

Kevin Newman
Human Resource Business Manager
Retired: Jun. 6, 2025

Jharna Saha
Research Lab Specialist Associate
Retired: Dec. 31, 2024

Stefan Stoll, PhD
Research Lab Specialist Lead
Retired: Mar. 7, 2025

Brian Wright
Medical Technologist
Retired: Jan. 3, 2025

Michele Centi
Medical Technologist
Retired: Apr. 16, 2025

David Harro
Allied Health Senior Supervisor
Retired: Apr. 5, 2024

Colleen McDermott
Clinical Technologist Senior
Retired: Nov. 15, 2024

Jeffrey Myers, MD
A. James French Professor
Emeritius: Jan. 1, 2025

Sunita Punjabi
Medical Technologist
Retired: Mar. 7, 2024

Carl Schmidt, MD
Clinical Professor
Emeritus: Nov. 26, 2024

Roscoe Warner, PhD
Research Lab Specialist Lead
Retired: Oct. 31, 2024

Those We've Lost — In Memoriam

Denise Flannery
Bacteriology Lab
Sep 2024

Elizabeth McCloud
Quality Assurance Coordinator
Jul 2024

Sem Phan, MD, PhD
Professor of Pathology
Nov 2024

Scan the QR Code
Read their Full Obituaries

Clinical Instructors

Mayyadah Al-Nuaimi, MBBCh
Breast Pathology
Pathologist

Alexander Gross, MD
Surgical Pathology
University of New Mexico, NM

Geoffrey Halling, MD
Head & Neck Pathology
Pathologist

Robert Humble, MD
Genitourinary Pathology
Clinical Assistant Professor
Michigan Medicine

Kelsey Hummel, DO
Gynecologic Pathology
Clinical Assistant Professor
VA Ann Arbor

Nathan McCammon, MD
Surgical Pathology
Pathologist
Private Practice, TX

Michael Mertz, DO
Surgical Pathology
Gynecologic Pathology Fellowship
Cleveland Clinic, OH

Fysal Shennib, MD
Surgical Pathology
Pathologist
Private Practice

Nicole Tomm, MD
Gastrointestinal & Hepatobiliary Pathology
Assistant Professor
University of Colorado, CO

ACGME Fellows

Haley Amoth, MD
Hematopathology
Associate Pathologist
Pathology Specialist of SE Michigan, MI

Nicole Becker, MD
Neuropathology
Assistant Professor
University of Iowa, IA

Daniel Cole, MD
Dermatopathology
Clinical Dermatology & Dermatopathology
Hamzavi Dermatology, MI

Juanita Ferreira, MD
Cytopathology
Hematopathology Fellowship
University of Pittsburgh Medical Center, PA

Thomas Herb, MD
Forensic Pathology
MD Provider
City of Philadelphia MEO, PA

Jesse Kinner, DO
Cytopathology
Head & Neck Fellowship
Michigan Medicine

Ryan Landvater, MD
Neuropathology
Pathology Informatics Fellowship
Michigan Medicine

Taylor Novice, MD
Dermatopathology
MD Provider
Novice Group Dermatology, MI

Corey Post, MD
Hematopathology
Molecular Genetic Pathology Fellowship
Michigan Medicine

Julianne Szczepanski, MD
Molecular Genetic Pathology
Assistant Professor
Michigan Medicine

Xiaoming (Mindy) Wang, PhD
Laboratory Genetics & Genomics
Assistant Professor
Michigan Medicine

Residents

Ashley Brent, MD
Bone & Soft Tissue Fellowship
Michigan Medicine

Ryan Cecchi, MD
Neuropathology Fellowship
Cleveland Clinic, OH

Elaina Daniels, MD
Gastrointestinal Pathology Fellowship
Michigan Medicine

Elizabeth Cline, MD, PhD
Forensic Pathology Fellowship
Michigan Medicine

Amber Holtz, MD
Surgical Pathology Fellowship
Michigan Medicine

Michael Olp, MD, PhD
Molecular Genetic & Path Informatics Fellowship
Michigan Medicine

Mark Rudolf, MD, PhD
Neuropathology Fellowship (PSTP AP)
Michigan Medicine

Katharina Wiedemeyer, MD
Dermatopathology Fellowship
Michigan Medicine

Molecular & Cellular Pathology - PhD

Shih-Chun (Alec) Chu, PhD
Defended / March 2025
Mentors / Drs. Arul Chinnaiyan & Marcin Cieslik
"Multimodal and Multiomic Integration in Precision Oncology"

Kristen Lozada Soto, MD, PhD
Defended / December 2024
Mentors / Drs. Asma Nusrat & Charles Parkos
"Claudin-23 Regulates Intestinal Epithelial Barrier Function and Mucosal Wound Repair"

Noah Puleo, PhD
Defended / April 2025
Mentor / Dr. Analisa DiFeo
"Identification of Novel Mechanisms and Drivers of Ovarian Cancer Carcinogenesis and Chemotherapy Resistance"

Alexander Monovich, PhD
Defended / April 2025
Mentor / Dr. Russell Ryan
"The Role of GGAA Microsatellite Enhancers in B-Cell Acute Lymphoblastic Leukemia"

Jessica Teitel, PhD
Defended / June 2025
Mentor / Dr. Analisa DiFeo
"Pan-Cancer Myc Modulator Induces Selective Cell Death Following Miotic Catastrophe"

MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

Department of Pathology and Clinical Laboratories
2800 Plymouth Rd, Bldg. 35
Ann Arbor, MI 48109-2800