INSIDE PATHOLOGY

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Photos: Camren Clouthier / *Digital Artwork:* Brent Temple
Patient specimens poised for COVID-19 PCR testing.

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Department Chair
Charles A. Parkos, MD, PhD

Editorial
Lynn McCain

Photography
Camren Clouthier

Layout Design/Digital Artwork
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, please contact:

Jason Keech
jkeech@umich.edu
or 734-763-0866

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

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Regents of the University of Michigan: Jordan B. Acker, Michael J. Behm, Mark J. Bernstein, Paul W. Brown, Sarah Hubbard, Denise Ilitch, Ron Weiser, Katherine E. White, Mark S. Schlissel, ex officio.

Photo by Dustin Johnston

When SARS-CoV-2 (COVID-19) first arrived in Michigan in March 2020, it was clear that this new virus had the potential to spread rapidly and cause serious illness. Over the next few months, the impact that COVID-19 had on our personal lives, the department, communities, country, and world was profound and unprecedented in modern history. Impacts from the virus were devastating – the loss of life, serious illnesses, isolation, job losses, fear, and despair were prevalent. However, during this extremely challenging time, there were abundant acts of kindness and compassion, new ways to provide and receive healthcare and increased awareness of disparities that would no longer be tolerated. There were many heroes amongst us, and a reprioritization of what we value most.

I am proud of our faculty, staff, and trainees in the Department of Pathology. Time and again, members of our department were faced with seemingly insurmountable obstacles only to pull together as a team and move forward. In the face of fear, our team exhibited courage. When overwhelmed, they conquered through collaboration, creativity, and perseverance. Every day, they served our patients with a commitment to excellence and did so without complaining.

The clinical laboratories not only rapidly developed and deployed new COVID-19 tests but provided top notch testing for the other diverse needs of our patients in the face of supply and staffing shortages. Our researchers continued to press forward in spite of shutdowns, writing manuscripts and submitting grant applications to sustain and grow our already robust research programs. Our educators developed novel content that could be delivered remotely, ensuring that trainees were able to continue learning and advancing in their respective programs. Our staff exhibited flexibility, creativity, and dedication to ensure tasks were completed and our department's missions of patient care, education, and research moved forward.

The intent of this magazine is to provide you with a glimpse into the challenges and the achievements we experienced together as a Department. As you read, I am sure you will be just as proud as I am of all we have accomplished as a team throughout the pandemic.

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

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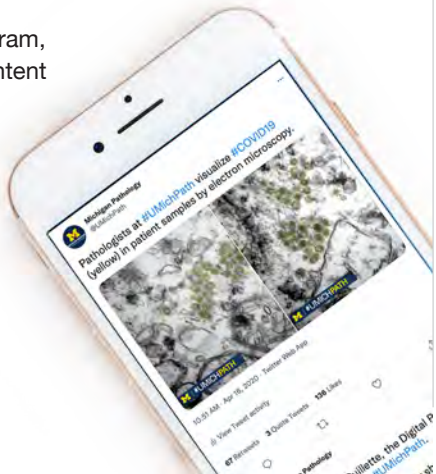


Featured On Our Website

Laura Lamps Begins Term as President of USCAP
April 15, 2021

Honoring Bill LeBar as He Retires from Clinical Microbiology
February 5, 2021

Inside the COVID Pandemic

A Laboratory Perspective

by Lynn A. McCain, MHSA

It was a chilly winter morning when the phone rang and Dr. Riccardo Valdez, Director of Clinical Pathology at Michigan Medicine, answered and heard the words, "Do we have a plan yet for this novel coronavirus, because I have a feeling it is going to really blow up." It was Pathology Chair Dr. Charles Parkos on the line. This phone call radically changed the course for the Department of Pathology and this novel virus, which caused COVID-19, became the chief focus of the entire department. Valdez immediately contacted Dr. Duane Newton, who was the head of the microbiology and virology lab, asking him about plans for testing and lab support, and the rest is history.

"It wasn't clear in the beginning what the impact would be," said Dr. Michael Bachman, Associate Director of Clinical Microbiology. "We were reading in the news about cases in China and the concern that cases would emerge in the United States." Previous health threats with Ebola and Zika Virus were handled by the CDC (Centers for Disease Control) and the state health labs assisted with identifying patients who had the virus. Initially, the plan was that COVID would be handled similarly. The FDA gave emergency use authorization to the CDC and state laboratories to do testing. "Initially, we felt that we would work closely with them so that samples would be sent to them for diagnostic testing," explained Bachman. As soon as the FDA provided guidance for other laboratories to perform the testing, Parkos charged the molecular team with developing a COVID test.

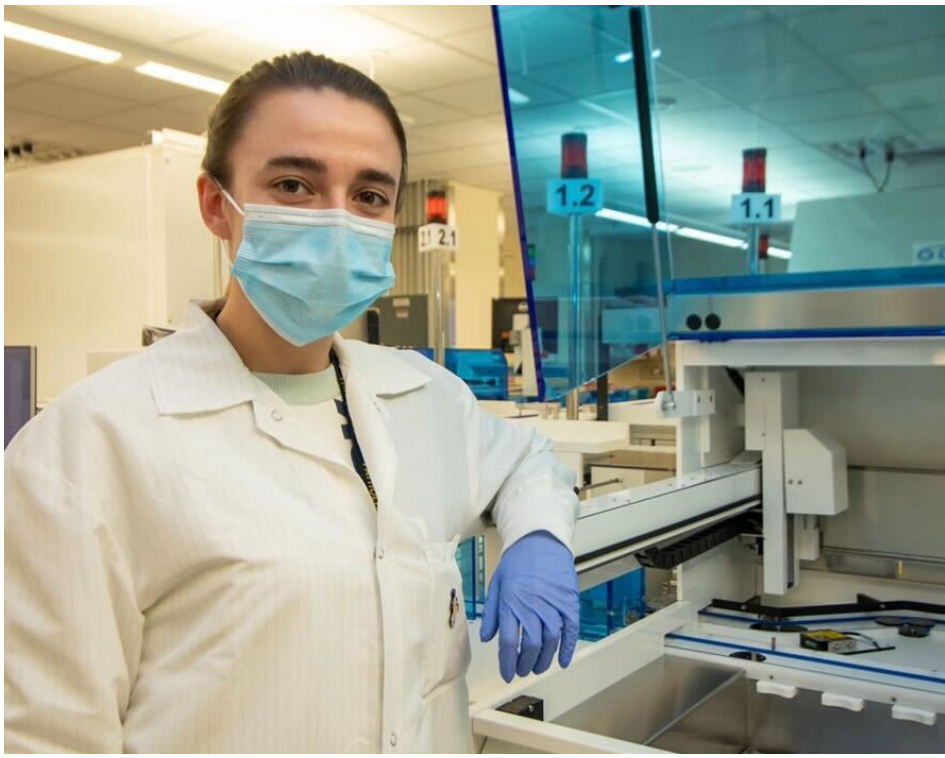
Developing tests to quickly and accurately identify a novel virus was not an off-the-shelf solution. There were no commercially-available samples that were known to have or not have the virus. "Typically, we have well-characterized samples that we can use to validate a test. That wasn't available. It was a struggle to even get materials that were known to have the virus in it, so we had to get viral RNA from a research laboratory in order to start validating the test," explained Bachman. "We worked for 17 days straight to get that implemented. That involved trying to find materials we could use as controls, trying to get CDC reagents quickly, trying to make sure it would work on our existing platforms. There were things we weren't sure about, like what kind of safety precautions we needed to take. It wasn't clear how the virus spread. We thought we would have to heat deactivate all of our samples and put out requests for heat blocks for us to be able to do that. Then it became clear that that was not only unnecessary, but it was actually hindering the test, so we had to change directions." The team successfully had the CDC test implemented within 10 days of the virus reaching Michigan.

It became clear pretty quickly that there were problems with the CDC assay, however. "The biggest stressor early in the pandemic was that the CDC test was the only test that was available and it was somewhat tedious and cumbersome," said Parkos. "They didn't get it right the first time." COVID was spreading rapidly and "we knew we were going to need higher throughput testing and rapid testing, and those likely were going to be two

different tests," said Bachman. By that point, some of the diagnostic companies had come out with assays that were higher throughput or faster, so the laboratory implemented a couple of those. "We spent 17 days validating the CDC test and ended up using it for only 10 days," recounted Bachman. "We moved through 3 different tests in less than a month."

While testing was being developed in the laboratory, departmental leadership were trying to determine how to handle volumes in excess of what our laboratory could handle. "We began talking to Viracor, and they had tests up and running pretty quickly and that is one of the first COVID tests that we did," said Valdez. "I remember being on a late-night call with Dr. Steve Kronick in the Emergency Department, Cybill Starr, our MiChart Liaison, Dr. Paul Lephart from our microbiology lab, and Beth Lawless from send-outs, to figure out how to organize tests for send out, how to name and code the test, how to determine when these would go out instead of be processed in our own laboratory, how to send them to Viracor, how many they could accept, and what the turnaround time would be." There were many unknowns in the process including what the actual number of tests would be. "We just kept building capacity," said Valdez.

One of the key drivers for decisions being made was diversity. Diversity of platforms, sample types, reagents – anything involved in the testing process. As a novel virus that was exploding across the world, there were severe supply shortages. Having a diversity of options enabled the department to continue testing. However, the nasopharyngeal swabs for obtaining the samples and the transport media for sending samples to the laboratories quickly became difficult to obtain. The supply shortage was due to multiple causes. "Manufacturing had their own challenges with staffing; there were raw materials issues," explained Kristina Martin, Clinical Pathology Operations Director. "We were trying to be resourceful and look at all possibilities. When we couldn't get the transport media, we outsourced to a compounding pharmacy and they made the collection tubes for us using a phosphate buffered solution." Calls went out to research laboratories and others who may have needed supplies in stock. "We tried to source them from China and tried to take advantage of opportunities of gifts that people were giving and something always happened," Valdez lamented. "The shipment didn't show up, or the shipment showed up and it was contaminated. We even tried 3D printing the swabs. A lot of effort in the department and the institution was just spent on trying to obtain the materials." In an effort to conserve supplies, the microbiology lab began pooling samples for testing. Samples from five patients would be combined and tested. If the results came back negative, all five could be reported out as negative. If the results came back positive, the five samples would be retested individually. This helped the lab keep up with the high volumes as well as conserve supplies, while getting test results back to patients more quickly.



Above: Medical Technologist Trisha Franklin poses with equipment used for COVID-19 testing in the Microbiology Lab.

The microbiology lab developed multiple tests to serve different purposes. After the CDC test was sunsetted, an assay called the M2000 was developed, but it was not sufficient to keep up with demand. "The ED (emergency department) patients needed a quicker turnaround, so we developed a test using the Diasorin Simplexa. We acquired more of those and validated those," explained Valdez. "That became our STAT test with a 3-4-hour turnaround time. That was supplemented with point-of-care testing. Initially, we tried the ID-Now test, which was a 15-minute test, but that didn't work because the swab that came with it wasn't high enough yield for the virus. So we abandoned that and went another route for point-of-care testing." The ED was being overwhelmed with patients. The 3-4-hour turnaround time wasn't fast enough. They needed the results quickly so they could determine if patients needed to go

Above: Researchers from the DiFeo Lab working with laboratory equipment.

to special isolation rooms or to standard rooms. "We eventually got them an accurate test that had results back in less than 1 hour and that was a game-changer for the ED," said Valdez.

As volume increased to several thousand tests per day, the microbiology laboratory staff simply could not keep up with the demand. To provide additional capacity, the molecular diagnostics lab was asked to assist. "Bringing an infectious disease into the molecular diagnostics laboratory is not the type of testing they normally do," stated Martin. "Jennifer Bergendahl (Administrative Lab Manager for the Molecular Diagnostics Laboratory) is to be commended for her can-do attitude in bringing on what normally doesn't fit there – it really helped to ease the volume in microbiology. Then later, when all the variant testing started coming in, her lab was able to help with determining which kind of variant was causing the outbreaks. She was very systematic and figured out how to get it done."

As the pandemic spread, University President Dr. Mark Schlissel asked the department to provide saliva-based testing for students. "We were already stretched pretty thin with testing for Michigan Medicine patients and employees," recalls Parkos. "Developing a saliva-based test and adding another 30,000 tests per week was not going to be possible with the constraints we faced in staffing and equipment." Parkos found the solution through Dr. Arul Chinnaiyan, who runs a very robust molecular platform in the department. Chinnaiyan was able to take the saliva-based testing protocol and onboard it at his UM start-up company, LinxDx, which was able to handle the high testing volumes.

Others stepped forward to help ease the burden as well. Laboratory staff and other departmental staff volunteered to help in any way they were able. Some unscrewed the specimen containers so others could aliquot the specimens for testing, while still others were busy labeling specimens. These volunteers would work their normal shifts and then, before or after their shifts, they would come to help. The MLabs call center team had phone calls for the laboratory routed to them so that the laboratory staff could do their work uninterrupted. Other staff ran specimens from the RICU (respiratory infection containment unit) to Specimen Processing. The Specimen Processing staff worked miracles in getting all of the thousands of additional specimens logged in each day. It was truly an all-hands-on-deck effort. "I want to give a shout-out to those working in the laboratories," said Parkos. "Med techs and the folks in the trenches who were having to work overtime, night and day, to cross-cover for each other through this enormously stressful time. We would have been in a much more difficult place if the micro lab, for instance, said, 'I quit, I'm not going to do this.' But they didn't. They came into work every day."

There were other laboratory challenges the department faced. The Blood Bank was running out of blood for patients. There were no people to donate blood – everyone was staying home. All of the normal blood donation activities simply stopped. Early in the pandemic, hydroxychloroquine was thought to be effective against COVID. The hematology lab was asked to suddenly ramp up on a test for patients who were to get this treatment. While this test is normally performed once a week, now there were hundreds of tests to rule out a particular enzyme deficiency. This was at a time when the department was working on a "Lombardy schedule" – half of the department worked in the office while the other half worked from home in rotation, to limit exposure. The Chemistry lab was also tasked with developing and performing serology testing to test for antibodies to the virus. This was a whole new field for the laboratory team to learn. Then there were the researchers who wanted to study COVID. "Researchers were coming from

everywhere wanting left-over swabs, left-over serum, left-over blood, and they wanted to come down to the lab to retrieve these samples," stated Valdez. "We had Dr. Robertson Davenport, who is an IRB (Institutional Review Board) co-chair and a biorepository expert in our lab, coming in on evenings and weekends to try to pull COVID-related samples for researchers who were requesting this. This task typically falls to some of our laboratory staff, but they were overwhelmed with testing. So a senior faculty member came in on his weekends during a pandemic to retrieve research samples to support the institutional need."

On the Anatomic Pathology side of the department, there were the autopsies and the management of the decedents that presented challenges. "One of the best tools we have in understanding a new disease is the autopsy itself," explained Dr. Liron Pantanowitz, Director of Anatomic Pathology. "Doing autopsies, you can understand why the people died, what the disease is doing, and how that correlates to clinical findings." Our morgue is equipped with negative pressure areas to help protect our staff when performing autopsies on those with infectious diseases. Dr. Allecia Wilson, Director of Autopsy and Forensic Services, really stepped up to perform autopsies on COVID-positive decedents. "She was quite brave," praised Pantanowitz. "I don't know how she plucked up the courage to say, 'OK, I will do the autopsies to figure out what is going on and to get tissue for the researchers to start figuring out how to treat that disease.' She didn't send other people in to do the autopsies. She did them herself." With the increase in the number of deaths due to COVID, storage of the decedents was another challenge. Early in the pandemic, before it actually became an issue, Christine Rigney, Director of Operations for the Division of Anatomic Pathology, had the foresight to prepare. "I was concerned about autopsy and forensic services," she explained. "We had to make sure we had enough storage for our decedents if it affected us in the way we had seen it happening in other areas of our country or even overseas. So we had to get additional storage." Rigney proceeded to locate and secure additional refrigeration units to be sure the department could properly care for our patients who died from COVID. "We had to be sure that we could care for these patients in a respectful manner. We needed to be able to assure their family members that their loved one was being handled with dignity."

During the first wave of the pandemic, many clinics were closed and non-urgent operations were suspended. This helped to reduce some of the burden on the laboratories, however, for the second and third waves, clinics were reopened and surgical centers were not just operational, but they had extended hours. The third wave of the pandemic was particularly challenging. "Following the first wave, the institution decided as part of the recovery to start operating on patients again, and the samples started to increase significantly," recalls Pantanowitz. "It was like a rebound. With the recovery, there are more patients and more surgeries. In the last two months, there were two occasions in which we broke the record for the number of blocks accessioned – and we are supposed to be in a pandemic." The operating rooms had expanded to include weekend hours and later hours during the week. In addition, the types of cases handled in the surgical outpatient clinics were expanded as well. "We had to deal with excess volumes with less staff due to COVID. People have various COVID issues to deal with, so we were short staffed, especially in histology," stated Pantanowitz.

The efforts of staff members were not overlooked. "I want to thank all the people in the laboratory, dealing with specimen processing and COVID testing. It really is a testament to their dedication to their work. They worked a lot of overtime, really long hours," praised Bachman. "This has left me with a new level of admiration for the staff and faculty in our clinical laboratories, who, in many respects, are unsung heroes of healthcare," said Dr. Jeffrey Myers, Vice Chair for Clinical Affairs. "One Saturday early in the pandemic," he recalled, "I went down to the lab to see how they were holding up. I learned that one of the senior technologists who was developing COVID testing was staying at a hotel down the road instead of going home, so he could be closer to work and not risk not being able to return. Who does that? Where do you see that kind of commitment? That is amazing to me." Myers continued, "There is a lot to grieve with the pandemic, but there are some things to celebrate and our people are number one."

Leading the Charge

by Lynn A. McCain, MHSA

"Leadership is not about titles, positions or flowcharts. It is about one life influencing another," John Maxwell.

In early 2020, the truth of this statement came to life in the Department of Pathology. Our country, our world, was faced with a pandemic caused by a novel virus for which no hard and fast answers were to be had. In the face of constantly changing "facts," leadership in Pathology was found at all levels. It began with the Chair, Dr. Charles Parkos.

"We were navigating circumstances that were unprecedented. We were going to have to do this together."

"As Chair, I feel privileged to lead a department where everybody pulled together as a team through a very physically and emotionally trying time. For me, I first became aware of SARS-CoV-2 over the winter of 2019-2020, right after the holidays. But the impact of this virus didn't start sinking in until I was at the United States and Canadian Academy of Pathology (USCAP) Annual Meeting at the end of February/early March. Travel became restricted and the first cases were diagnosed in Washington State." Parkos consulted with colleagues who were modeling the pandemic's spread and quickly reached out to Dr. Riccardo Valdez, Director of Clinical Pathology, to ensure the department would be prepared for COVID.

While Valdez initiated the test development process with the microbiology laboratory (see page 4), Kristina Martin, Clinical Pathology Operations Director, immediately began working with the phlebotomy teams to make plans for protecting our staff in the blood draw stations. They drew up plans for how to isolate patients and what types of personal protective equipment (PPE) would be needed if they had symptomatic patients. "We thought we would have more time," recalled Martin. "It escalated very quickly from there. I could never have imagined the impact it would have on our day-to-day lives."

"I was in Los Angeles for the USCAP Annual Meeting, along with 5000 other pathologists, when we heard about this. None of us knew that it would be as serious as it was. Then we all came back to work and were facing a global public health crisis," recounts Dr. Liron Pantanowitz, incoming Director of Anatomic Pathology. "I was just moving to Michigan at that time, so I had to move and assume a leadership position in a new institution during the pandemic."

Dr. Jeffrey Myers, Vice Chair for Clinical Affairs

and Director of Michigan Medicine Laboratories (MLabs), remembers hearing about Michigan's first COVID case on National Public Radio on March 10th, then being at an all-day retreat on March 12th when he heard the announcement related to the campus shutdown. "I never imagined it would last as long as it did. In fact, I originally labeled my folder COVID: March – June; and that is kind of true, just not the same year. It became clear very, very quickly," said Myers, "that there were a lot of questions. We were navigating circumstances that were unprecedented. We were going to have to do this together."

On March 13, the COVID Preparedness and Response Team (CPRT) was formed in the Department of Pathology. This team was made up of leaders at all levels and across all missions of the department, both faculty and staff. Almost immediately, this team was challenged with staffing issues. All those whose work could be done remotely and those without patient care responsibilities were required to work offsite per the governor's mandate. Those with patient care duties were put into two teams, Maize and Blue, in what was known as the Lombardy Schedule. This was to limit employee exposure to fewer individuals and to provide periods of respite through the pandemic. "The first communication from that group was on March 13," stated Myers. "It was our work-from-home policies, which was the first thing to hit our radar screens. That and the use of PPE in our environments." With faculty and staff working remotely and in shifts, communication was going to be key in weathering this pandemic. "There was a lot of anxiety and fear. This is completely understandable and valid," Myers continued. "Around those anxieties and fears were opportunities for incomplete information or gaps in information that were exacerbating workplace stress. One of the things the CPRT team did was to create a slide deck to share information and encouraged faculty and staff to liberally share that deck with their own areas." A regular email was also sent to all faculty and staff by Drs. Parkos, Myers, and Cho (Kathleen Cho, Vice Chair for Academic Affairs), to facilitate communications.

Nancy Fritzemeier, Anatomic Pathology Clerical Supervisor, was in the Lombardy region of Italy when the pandemic hit and came home just as things were ramping up. She recalled that the first thing she had to do was to split her administrative support staff into teams, ensuring that all work areas were covered and the workload was balanced, so that the clinical work could still get done. "My staff were great. There was never an issue and people just said OK. There was no pushback at all." This process was repeated across all areas of the department with similar results. With so many people working remotely, many faculty and staff volunteered to provide services in areas that needed assistance. "I was really amazed at how many of our faculty and staff stepped up to the plate to help with patient management," said Parkos.

"My first concern was the safety of the employees and how we were going to support the labs and what they would need through the pandemic," explained Regina Ferguson, Pathology Facilities Manager for Clinical and Research Pathology. The logistics required to implement the necessary measures were mind-boggling and included everything from telecommunications for those working remotely, to the demand for laboratory equipment, to the need for medical supplies, which far exceeded the actual supply.

"I was really amazed at how many of our faculty and staff stepped up to the plate to help with patient management."

The need for additional freezers to hold testing reagents is one example. Everyone was buying freezers, and they were becoming difficult to find. Even when purchased, it wasn't as simple as just plugging it in. There needed to be sufficient power, proper ventilation, adequate backup power, storage space, and connected monitoring. Building access modifications were another on-going challenge. Per the Governor's guidelines, building access was restricted, making it challenging for research personnel to obtain building access. Work sched-

Above: Collection of PPE at the North Campus Research Complex.

Left: Thank you messages and cards from PPE donors at Michigan Medicine.

ules had to be adjusted to maintain their critical research. Construction projects and scheduled installations were placed on temporary hold. Deliveries needed to be coordinated so access could be granted. It was a team effort with facilities, construction services, maintenance, procurement, and IT.

Within the department, there were multiple safety measures instituted to keep staff safe. Christine Rigney, Director of Operations for the Division of Anatomic Pathology, and Jennifer Bell, Safety and Preparedness Coordinator, were assigned responsibility for many of these measures. "There was a lot of information coming out quickly and changing quickly," said Rigney. "It was very confusing and upsetting to many. We strove to communicate in as many ways as possible and with sufficient frequency to be sure everyone knew what to do." Rigney, Bell, and Ferguson worked hand-in-hand with engineering to introduce on-site safety protocols including installation of plexiglass dividers between work stations, around multi-headed microscopes, patient waiting areas, and other areas where 6-foot social distancing was not feasible. Seating was removed in conference rooms to prevent over use. Posters on walls and elevators with stickers on floors reminded faculty and staff to maintain social distancing. Early in the pandemic, there was a severe mask shortage, which required staff to reuse single-use masks. Plus, hand sanitizer was difficult to obtain. "There were huge challenges to maintain our own safety and health. The way we overcame any of the challenges was as a team," said Rigney. "I think one of the things that left a super awesome impression on me was the way the entire medical system pulled together to work in lock-step, focusing on the one mission of taking care of the patients and taking care of our staff. When we all had the same major priority, I could see how powerful we really were and how great Michigan Medicine really is. While it was scary, it made me feel extra proud of who I work for."

The Pathology Informatics (PI) Team was instrumental in ensuring the department continued to function throughout the pandemic. When the work-at-home order was issued, the PI team was tasked with ensuring faculty, staff, and trainees possessed the hardware and software necessary to connect from home. Laptops, docking stations, monitors, printers, and other equipment needed to be procured, set up, and deployed virtually overnight. They were also responsible for ensuring proper connectivity of label printers and interfaces for test ordering in the new, temporary COVID locations for the Emergency Department, at Mott

Right: Faculty members participating in group sign-out using the "Big Rig" scope.

Children's Hospital and Von Voigtlander Women's Hospital, in the Respiratory Infection Containment Unit, at the testing tents, and for the planned field hospital, which was thankfully, not needed. Zoom became the communication method of choice and PI desktop support spent hours on the phone with new Zoom users helping them learn how to use this tool effectively. In addition, data were needed by the leadership team, so PI teamed up with the Division of Quality and Health Improvement to create a COVID dashboard. This dashboard enabled managers to monitor workloads, adjust staffing, and procure supplies in a timely manner. "Communication was the key to success," said Ferguson. "Each morning at 7 am, I meet with Peggy Otto (Administration), Oliver Bichakjian (PI), Steve Marshall (PI) and Eileen McMyler (PI) by Zoom to talk about upcoming projects and to make sure everyone is on the same page."

Pathology was committed to caring for its employees through the pandemic and beyond. Difficult family situations or COVID fatigue caused some to be unable to perform their standard work responsibilities for a time. "We redeployed staff to keep people working and to balance workloads. We kept staff employed who had childcare or other issues," said Rigney. "If they could work from home, we had them working on our Quality Assurance documentation, CAP checklists, or writing procedures that needed to get completed. We had to be really creative to keep people working whether they were at work or at home, to fit their circumstances. We didn't want them to feel like they didn't have any options."

"I truly appreciate the sacrifices made by our faculty and staff. We have all been changed by this pandemic and our workplace will be forever changed. I am optimistic that it will be a better place because we have found ways that we can do things better and keep people happier," said Parkos. Fritzemeier added, "We had strong leadership that made people feel safe. We had clear direction on how we were going to deal with the pandemic at the departmental level. The sense of community really stepped up and people were helping each other without any fussing or judgments. We were a team." People learned to be gracious and kind to one another. Pantanowitz concluded, "We have to be kind. This was not the time to be harsh. We need to really understand and listen to people. To have kind policies, to let people work from home. With that recipe, we will be successful – and we have been successful."

The Yin and the Yang of Research in the COVID Era

by Zander Tolyn

Above: Research lab technician Sean Watson hard at work during the pandemic.

Flashback to January 4, 2020. The World Health Organization (WHO) just reported on a cluster of pneumonia cases diagnosed in Wuhan, Hubei province, China. On January 12, China released the genetic sequence of a novel coronavirus, SARS-CoV-2. By January 21, the first case arrived in the United States and on January 30, the WHO declared COVID-19, the disease caused by the SARS-CoV-2 virus, a Public Health Emergency of International Concern with 7818 cases worldwide, 82 cases in 18 countries outside China. Two days later, air travel is restricted and by March 10, COVID-19 has arrived in Michigan.

As the initial reports of pneumonia came out from the WHO, Dr. Asma Nusrat, Director of Experimental Pathology at Michigan Medicine recalls, "I love reading international news, so I thought, 'Oh my goodness, what is this?' But I never realized how serious this was. As we progressed through January, the CDC [Centers for Disease Control] confirmed the first US coronavirus case and our lives changed rapidly. Marching forward into February, global air travel became restricted and our research laboratories were abruptly shut down in March." COVID-19 was here and scientific research on everything non-COVID came to a screeching halt.

"This was a very difficult time for researchers," explained Nusrat. "Many of us had long-term experiments that had to be halted. We had mouse colonies and time-sensitive projects that were stopped. We were allowed very limited personnel who could periodically check up on the laboratory equipment and do minimal maintenance and that was it." The mouse colonies were another difficult issues to address. Only the bare minimum number of mice were kept, so researchers froze embryos, sperm, and ova from mouse lines in an effort to be able to restart their research programs at a later date. Once research could be safely restarted, it would take several months for the mouse colonies to reproduce and projects resume. "ULAM (Unit for Laboratory Animal Medicine) did a fantastic job, my hat's off to them," praised Nusrat. "To my knowledge, everybody had some level of loss. Although, ULAM worked with people who were doing long-term experiments in cancer or in aging and made exceptions for them."

Eventually, the Medical School allowed research labs to reopen at 25% occupancy. "That

was a skeleton crew," explained Nusrat. "There are many specialties in the lab surrounding cultures and animals. 25% of the people can do an absolute minimal amount of the work, yet this crew did a fantastic job in maintaining and restarting research." Very slowly, research reopened to 50%, then 75% capacity. Research staff began working in shifts, 6 am – 1 pm and 2 pm – 9 pm. Those who were "morning people" came in for the 6 am shift while those who were the "night owls" took the afternoon shifts. Research progressed slowly and it was difficult to generate the preliminary data necessary for grant funding. This slowdown also significantly impacted the graduate students and new trainees, whose graduations were delayed. "The positive thing was, everybody was home, so they were writing a lot of grants for the data they did have," said Nusrat. "There were negatives and positives. The positives were that people were able to work on papers they were supposed to write and grants they were supposed to submit, but couldn't because they were too busy with other things. There was something of a yin and yang effect." Dr. Charles Parkos, Chair of the Department of Pathology, also leads a research lab. He concurs with Nusrat's observations; "Despite the limitations in ongoing research, the pandemic-related shutdown afforded opportunities to write more grants and more papers. Journals stepped up and asked reviewers on manuscripts to temper requirements for additional experimentation if the scientific premise of the manuscript was sound. As a result, we had a good response in grant writing and a lot of papers were published that may not have been due to researchers often being too busy conducting research to focus on writing."

While much of the research efforts of the department were halted, there were also new projects started trying to better understand COVID-19. The department was instrumental in developing COVID tests. Within a week of COVID-19 arriving in Michigan, they had a PCR test available, and subsequently developed several more tests using various methods and mediums. Subsequently, the clinical pathology laboratories developed antibody testing to ensure immunity following vaccination or infection. The Clinical Pathology laboratories made very important contributions to the institution as a whole. "Basic and clinical researchers also developed projects to study SARS-CoV-2 pathogenesis," stated Nusrat. Research has been published on the comparative sensitivity and specificity of the various testing platforms, how the SARS-CoV-2 virus impacts coagulation, the lung, kidneys, skin, and other organs. The forensics team performed autopsies, which they studied to determine means of community spread and how the virus impacts the body, while others looked at potential treatments, transcriptional regulatory targets, and infection rates with hospital-acquired infections among the COVID-19 patients. Some of this research is highlighted on page 14. "Members of Digestive Disease Center at U-M successfully used stem-cell derived gut and lung epithelial cells to study pathogenesis of SARS-CoV-2 infection. All in all, we did our best," stated Nusrat.

The pandemic initiated changes that revolutionized the way many teams work. "We have embraced hybrid modes of communication with all our collaborators, conducted grant reviews, and held scientific and clinical meetings by Zoom. Such communication is clearly efficient. In Pathology, consensus conferences and tumor boards now have better options for telecommunication" explained Nusrat. "This has allowed people to attend remotely. We never thought we could do it to this extent."

Above: Dr. Asma Nusrat.

"I also think this pandemic has taught us a sense of community and teamwork. We are a community, a group and we have to function together. We learned to be much more accommodating than pre-pandemic. Everybody had circumstances. We learned to have more empathy with people who have difficulties and overall, the pandemic has made us stronger." Nusrat credits the leadership team who led Pathology through the pandemic as exemplars. "Leadership was under enormous pressure and people like Chuck Parkos [Chair of Pathology], Ric Valdez [Director of Clinical Pathology], Jeffrey Myers [Vice Chair for Clinical Affairs and Quality], and Kathy Cho [Vice Chair for Academic Affairs] – they functioned as a fantastic leadership team through these tough times." While we have lost a lot of time, we have a renewed vision, and believe that research at Michigan Medicine will continue to thrive and grow in the future.

Our Mission

The Department of Pathology is advancing the future of health care through education, patient care, and research missions. We are committed to achieving the highest standard of service excellence to ensure an ideal experience for our patients and their families.

Support Leaders & Best

In the pursuit of continued excellence in our educational training, clinical care, and scientific discovery, the Department of Pathology has always been grateful for private support. Gifts from individuals, foundations, corporations, and associations play a key role in medicine at Michigan.

Available Funds

Pathology Faculty Research Fund - 324557
victors.us/pathologyfaculty

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victors.us/pathologyresident

Pathology Fellowship Fund - 324556
victors.us/pathologyfellowship

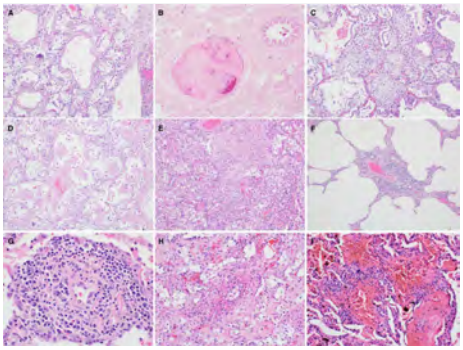
Research Highlights

www.pathology.med.umich.edu

Our faculty were very productive this year, publishing over 450 manuscripts in peer-reviewed journals! These publications represent successful research efforts undertaken. Some of the key highlights of particularly impactful research of late have included the following studies:

Examining COVID-19 Lung Damage

Dr. Kristine Konopka and colleagues conducted a study, published in *Histopathology*, to determine how COVID-19 impacted the lungs of patients. In this study, they examined



autopsy findings in lungs of decedents who died with COVID-19, either in the hospital or in the community, and compared them to patients who died from acute respiratory failure of other causes. There were questions at the time about the extent to which autopsy findings in COVID-19 patients were different from those seen in patients with acute respiratory distress syndrome (ARDS) from other causes, and whether some of the findings might be a consequence of hospital-associated treatments like mechanical ventilation. This study, like other studies, showed that diffuse alveolar damage (DAD), a common finding in ARDS of any cause, was present in autopsy lungs of COVID-19 patients, and were the same in hospitalized and non-hospitalized patients. It also found that there are no morphological changes that reliably distinguish COVID-related DAD from DAD of other causes. As such, histopathology alone is not a reliable method for accurately diagnosing COVID-19 respiratory failure.

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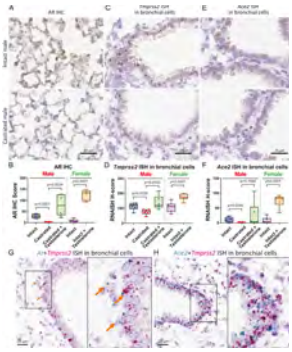
Histopathology 2020 Oct; 77(4): 570-578

Androgen Receptors may be a target for COVID-19 treatment or prevention

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus responsible for COVID-19, employs two key host proteins to gain entry and replicate within cells, angiotensin-converting enzyme 2 (ACE2) and the cell surface transmembrane protease serine 2 (TMPRSS2). TMPRSS2 was first characterized as an androgen-regulated gene in the prostate. Supporting a role for sex hormones, males relative to females are disproportionately affected by COVID-19 in terms of mortality and morbidity. Several studies, including one employing a large epidemiological cohort, suggested that blocking androgen signaling is protective against COVID-19. In this study, Dr. Yuanyuan Qiao and colleagues demonstrate that androgens regulate the expression of ACE2, TMPRSS2, and androgen receptor (AR) in some types of lung epithelial cells. AR levels were markedly elevated in males relative to females greater than 70 years of age. In males greater than 70 years old, smoking was associated with elevated levels of AR and ACE2 in lung epithelial cells. They found that SARS-CoV-2 infection of cells could be prevented, or significantly reduced, when drugs inhibiting the activity of AR or another protein called BET (bromodomain and extraterminal domain) were used, as these agents decrease expression of ACE2 and TMPRSS2. These studies, published in *Proceedings of the National Academy of Sciences of the United States of America*, support further investigations into therapies that inhibit AR or BET activity



for the possible treatment or prevention of COVID-19.

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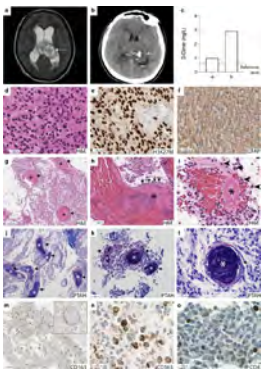
PNAS 2020 Dec 11;118(1):e2021450118

COVID-19 Cases Reveal Blood Clots Which May Impact Long-Term Tumor Outcomes

Matthew Pun and colleagues reported in *Acta Neuropathology* on a side-effect of SARS-CoV-2 infections that can impact patients with tumors. Generally, patients with H3K27M-mutant gliomas (a type of brain tumor) tend to exhibit a lower frequency of brain microthrombi (small blood clots), with most patients having fewer than 3. Yet, in this case report, a young adult female patient with SARS-CoV-2 infection and an H3K27M-mutant diffuse midline glioma exhibited more than 40 of these microthrombi.



COVID-19 infections often result in cytokine storms which predisposes patients to blood clotting issues. Patients with gliomas with microthrombi within the tumors tend to have worse outcomes. This raises concern that there may be a long-term impact of COVID-19 on tumor behavior and disease progression for cancer patients and these patients should be closely followed.

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Acta Neuropathol. 2020 Aug;140(2):227-229

ACE2 and PTEC pathway associated with COVID-19 exacerbated diabetic kidney disease (DKD)

With the pandemic spread of SARS-CoV-2 and the increased morbidity and mortality of COVID-19–associated disease in patients with diabetes and kidney disease, it is imperative to define the underlying mechanisms that would promote rapid development of risk reduction strategies. Autopsy studies of patients with COVID-19 as well as susceptibility and infection of *ex vivo* kidney cultures are consistent with a direct SARS-CoV-2 infection of the kidney tissue. Rajasree Menon, PhD, and colleagues described their research findings in *Kidney Int* of the interaction between ACE2 and kidney involvement in COVID-19. Their goal was to better understand the overwhelming burden of kidney disease in COVID-19 patients. ACE2, the primary SARS-CoV-2 receptor, governs pathways critical to kidney function. ACE2 expression was localized, in kidneys predominately to proximal tubular epithelial cells (PTECs) in healthy, living donors and patients with diabetic kidney disease. PTECs appear to be the main cell type for SARS-CoV-2 infection in the kidney. The ACE2-associated pathways could interact in 2 ways with SARS-CoV-2 infections: (i) The upregulation of viral infection pathways in DKD could explain the higher susceptibility of this patient population; and (ii) if viral infection of ACE2+ PTECs further activates pathways already increased in diabetes, this cumulative and exacerbating activation might lead to kidney damage.

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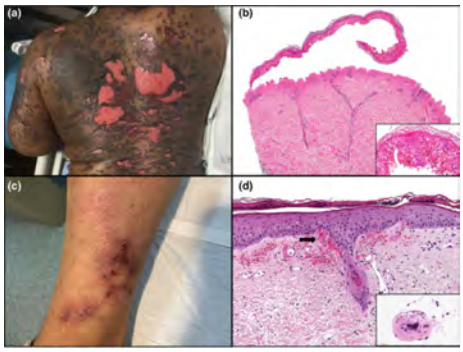
Kidney Int. 2020 Oct 8;98(6):1502–18

COVID-19 often causes serious skin issues

COVID-19 has been reported to cause cutaneous manifestations (skin rashes) in approximately 20% of COVID-19 patients. In the *Journal of the European Academy of Dermatology and Venereology*, Dr. Carole Bitar et al describe three novel COVID-19-associated cutaneous manifestations in hospitalized patients including 1) COVID-19-associated exfoliative shock syndrome, 2) COVID-19-induced rash and mucositis with an eruption that mimics Stevens-Johnson Syndrome (SJS) and 3) COVID-19-associated calciphylaxis with thrombotic vasculopathy. All of these patients presented with fever and upper respiratory infections, and it took a median of 9 days for the rashes to appear. In each of these cases, SARS-CoV-2 viral mRNA was not detected in skin biopsies, suggesting that these cutaneous manifestations associated with COVID-19 are secondary to dysregulation of the immune and coagulation pathways rather than direct viral skin toxicity. In other words, the virus causes the immune system to generate "cytokine storms", which can lead to a hyperinflammatory shock syndrome and induce keratinocytes' necrosis. The dysregulation of the coagulation pathway can cause an increase in blood clotting. This, in turn, can lead to these severe skin conditions in COVID-19 patients.



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J Eur Acad Dermatol Venereol. 2020 Jun 13:Epub ahead of print. PMID: 32534469;

Flexibility is the Key to Activation

by Christine Baker

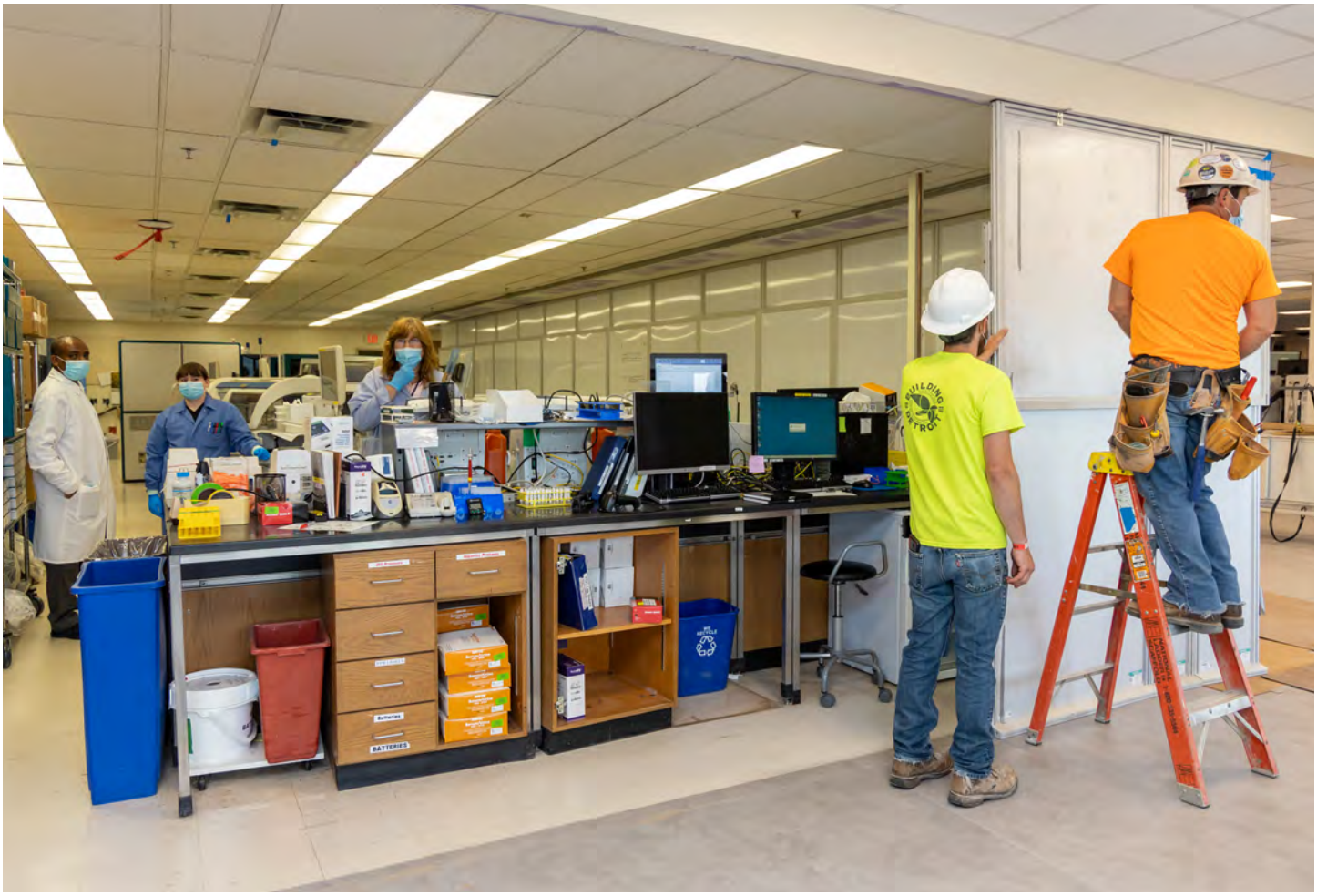
"Flexibility is the key to Activation" is the slogan the PRR Team and area Move Captains adopted as their mantra in 2017 in preparation for the move to NCRC. This, for me, echoed back to my time in the military when "Flexibility is the key to Air Power" was a frequent refrain during my training. Both mantras serve to remind all who are involved that a degree of adaptability and willingness to change to external forces are keys to a successful "mission." The slogan was meaningful for the NCRC relocation due to the sheer magnitude of change that was involved for such an endeavor. Not only new labs, new workspaces, and new ways of working, but changes all the way down to where to park and how to find the cafeteria. Over the summer of 2018, the more than 500 personnel who moved into NCRC showed that willingness to change and to adapt to a new environment.

Above: Jessica Bradshaw from the Specimen Processing lab works to deliver specimens at the University Hospital.

Now, more than 18 months into the renovation effort at University Hospital (UH) and University Hospital South (UHS), the flexibility displayed by staff has taken on a different angle. The new mantra could be "Flexibility is the key to Activation and Construction," as the staff, faculty, and learners adapt and change to a complex and ever-changing environment. They have exhibited a distinctive energy, both during construction and in the move into the renovated spaces. While their parking location may not shift and the cafeteria location hasn't changed, keeping laboratories operational while co-existing with construction has called for even greater degrees of flexibility.

For instance, in March of this year, we needed to shut down a key UH hallway. This hallway will become part of the new Specimen Processing (SP) area, so it had to close in order for the construction activities to continue. The SP team—currently split into two locations—had to adapt to a new route to deliver critical specimens to Chemistry, Microbiology, and Anatomic Pathology. The new travel route for the Stat Chemistry specimens from SP was at least seven times longer in distance. A few days after the hallway closed, the Chemistry team sent a "Thank you" email to SP—the turnaround time had not changed despite the significantly longer walk path!

The Chemistry Team, as well, has become adept at dealing with and anticipating changes in the construction zone adjacent to their space. The temporary walls that surround construction have frequent-



ly had to expand and contract as we move through the construction process. Recently, the entire Stat processing area had to move into a temporary space in the hallway to allow for us to construct the final walls around the future SP and cold rooms. To keep the teams' spirits up, and to create excitement about the changes ahead, Chemistry Chief Technologist Eric Vasbinder has been publishing daily trivia revolving around the number of days left until the new space opens up. On May 19th, 2021, for example, there were 49 days left, and the trivia was:

- 49 days is how long a group of Soviet soldiers were adrift on a barge in the ocean without food or water until the USS Kearsarge rescued them on March 7th, 1960. They survived by eating their boots, belts, walkie talkie straps and soap and what rainwater they could collect.

On May 27th, there were 41 days left and the trivia was:

- Mozarts last work was his Symphony No. 41 in C major. It's nicknamed the Jupiter symphony and it's also his longest. It's considered one of the greatest symphonies in classical music.
- Sloths travel, on average, 41 yards per day (Just keep in mind someone spent a lot of time, maybe a lifetime, to figure out that valuable piece of information).

These trivia facts are helping the team countdown to July 8th, 2021, when the new space will open up and we start to install the new Chemistry autoline. Additionally, the Coagulation area of Hematology will have new instrumentation connected to the automation lines and integrated with the new Sysmex line. This summer, we will also fully activate the new SP space, as well as the stat Microbiology lab and the accessioning and packaging area for Anatomic Pathology. Throughout the renovation journey at UH, Pathology staff are proving ingenuity and flexibility really do make the difference.

Above: The PRR construction team dismantles the wall connecting the Chemistry and Hematology labs.

A Journey Through Chemistry and Medicine

by Camren Clouthier

When Dr. Carmen Gherasim first arrived in the United States from Romania to pursue a graduate degree in biochemistry, she always thought that her career would be in research. Her research was focused on developing tools to better understand the impact of genetic mutations within diseased patients, and it was only years later that she discovered the field of Chemical Pathology (clinical chemistry). "I knew then that I wanted to pursue a fellowship in clinical chemistry," explains Gherasim. "The reality is that if I had known more about Pathology, I would have joined the field much earlier."

After experiencing the loss of her father early on in her research career, Gherasim realized that she wanted her work to have a more immediate impact on the field. "I enjoyed doing basic research, however, I saw that there was a real application within research findings to direct patient care."

Dr. Gherasim first arrived at Michigan Medicine in 2007 as a visiting graduate student when her PhD adviser moved her lab to the University of Michigan. In 2008, after completing her PhD, she continued to work at Michigan Medicine as a postdoctoral fellow, later being promoted to a research investigator. Once she settled upon pursuing a clinical chemistry fellowship, Gherasim left U-M for the University of Utah. Upon completion of the two-year fellowship, Dr. Gherasim returned to Michigan as an Assistant Professor of chemical pathology.

"I really enjoyed living in Ann Arbor and the possibility of continuing to collaborate with the researchers and physicians here was exciting," she explains. "It was such a coincidence that the position opened up."

"One of my responsibilities in the laboratory is the investigation of the performance characteristics of different FDA-approved assays," says Gherasim. She frequently interacts with physicians and raises awareness of the challenges that typically arise while interpreting these assays. The development of new methods, particularly using mass-spectrometry, for the measurement of biomarkers in biological fluids for toxicology and endocrine testing, is of particular interest to her. "Laboratory-developed tests are a unique opportunity for scientists to contribute to the development of new tools for diagnosis and management of different clinical conditions."

"The reality is that if I had known more about Pathology, I would have joined the field much earlier."

Today, Gherasim serves as the Director of Toxicology and is the Associate Director of Clinical Chemistry at Michigan Medicine. "The most exciting part of my job is investigating unexpected laboratory results," she explains. "I enjoy solving puzzles and mysteries. As a clinical chemist, I get to work with physicians and laboratory staff to figure out why some patients have unexpected laboratory results. There are no perfect tests, so understanding the limitations of these tests is paramount to the clinical care that our physicians provide.

"Don't let anyone change your passion. Don't think that you are too young to contribute. The opportunities are there. It's what we make out of these opportunities that truly make a difference."

Ultimately, this helps the patients which is very rewarding."

When the COVID-19 pandemic struck in early 2020, under the leadership of Dr. Riccardo Valdez, the faculty and medical staff stepped up to face the challenge head-on. "Early on, we were trying to develop and validate assays for SARS-CoV-2 antibody testing." Gherasim and her colleagues were tasked with working unconventional hours, around laboratory renovations, and were confronted with a number of limited resources. She recalls working many late nights in an effort to save residual specimens from COVID-19 patients and investigate the ever-growing list of possible assays. "There were a lot of learning opportunities that one may never otherwise experience in their entire career. Charles Darwin once said, 'it is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change.' This experience demonstrated the team spirit and communication that was needed to go through the pandemic and be as successful as we could be, given the circumstances," she praised.

Ultimately, Dr. Gherasim hopes to inspire future generations of clinical laboratory professionals to follow in her footsteps. "Don't let anyone change your passion. Don't think that you are too young to contribute," she expresses. "The opportunities are there. It's what we make out of these opportunities that truly make a difference." Second-year resident Batoul Aoun, DO, candidly remarked of Dr. Gherasim, "She embodies a standard of professionalism and constantly makes a commitment to resident education."

As the chemistry laboratory prepares for the installation of the state-of-the-art automated clinical chemistry line within the Pathology Renovation and Relocation project (PRR), Dr. Gherasim expressed her excitement to be working in an ever-changing world-class institution. "I plan to stay here for a long time. We are the leaders and the best. We are always striving to provide the best in laboratory medicine."

Celebrating Those Who Have Retired / 2020-2021

Ronald Allen
Research Lab Specialist Senior
Dec. 31, 2020

Cathy Marie Angelocci
Registered Nurse / Level C
Jan. 9, 2021

Donna M. Bush
Medical Technologist Specialist
Jan, 25, 2020

Stephen W. Chensue
Professor
Apr. 4, 2021

Kathryn E. Daavettila
Allied Health Senior Supervisor
Dec. 1, 2020

Gerald M. Davis
Clinical Technologist Senior
May 30, 2020

Kathy M. Davis
IT Acad/Admin Div Inter Dir
May 30, 2020

Mary T. Deis
Allied Health Associate Sup.
Dec. 1, 2020

Randy K. Dishman
Word Processing Operator
Aug. 1, 2020

Kathryn E. Gardner
Phlebotomist Specialist
Jun. 27, 2020

Donald A. Giacherio
Clinical Associate Professor
Aug. 1, 2020

Jeanette M. Gohl
Admin Asst. Sr. Healthcare
May 23, 2020

Sharon K. Henderson
Histotechnologist
Jun. 4, 2021

Binh H. Ho
Medical Technologist
Aug. 29, 2020

Pamela Howard
GME Program Admin Inter
May 1, 2021

Chuck Jasman
Laboratory Technician
Dec. 24, 2020

Jeffrey M. Jentzen
Clinical Professor
Jul. 1, 2020

Robert C. Jones
Medical Technologist Spec
Jun. 18, 2021

Usha Rani Kota
Admin Manager Inter
Oct. 31, 2020

Pamela Lincoln
Research Lab Specialist Inter
Aug. 8, 2020

Paul E. McKeever
Professor
Sep. 26, 2020

Ruth A. Miller
Medical Technologist
Apr. 1, 2020

Elizabeth Minors
Executive Assistant Assoc
Dec. 19, 2020

Iulian Mioc
Laboratory Technician
Feb. 29, 2020

Weslier M. Moorhouse
Training Specialist Lead
Dec. 24, 2020

Thomas Morrow
Admin Manager Sr.
Feb. 29, 2020

Linda J. O'Brien
Admin Asst Sr
Feb. 29, 2021

Christine B. Offord
Medical Technologist
Jan. 11, 2020

Becky J. Ott
Medical technologist Senior
Sep. 19, 2020

Karen A. Schairer
Patient Care Tech Associate
Dec. 31, 2020

Shannon St. Andrews
Clinical Technologist Senior
May 30, 2020

Tsehay Teklegzi
Medical Technologist
Jun. 6, 2020

James Varani
Professor
Mar. 2, 2020

Peter A. Ward
Professor
Jan. 2, 2020

Timothy Williams
Allied Health Sr. Supervisor
Feb. 25, 2020

Gui-Ying Yin
Clinical Technologist Sr
Aug. 1, 2020

Facing Down COVID One Patient at a Time

By Anne Van Veen

When someone mentions Pathology, images of laboratory testing or autopsies or microscopy may spring to mind. But there is another piece of Pathology that is often not considered by most people – that of phlebotomy. Phlebotomists are the healthcare workers who draw your blood so that tests can be run. These healthcare workers have daily patient exposure and were significantly impacted by the COVID pandemic.

Chris Distelrath is an in-patient phlebotomist who has worked in Pathology for the past six years and provides phlebotomy services for Michigan Medicine hospital, as well as patients who have been discharged to nursing homes and rehabilitation centers. "When COVID hit, we didn't know how it spread. So we had to gown up in almost a biohazard suit before going into patient rooms. We had the gown, goggles, gloves, N-95 mask, and for a time, a double mask, sometimes a face shield, shoe coverings and hairnets. We would gown up, go into patient rooms, draw the blood, then have to take it all off and put on a new set before going to the next patient's room. It was very difficult to see what we were doing with the goggles and especially when we had to use the face shield. I don't know how surgeons do it!" Distelrath stated. Before the pandemic, phlebotomists routinely wore gloves and sometimes a mask, but the full personal protection equipment (PPE) was new. Working with patients in the COVID ICU units, the phlebotomists knew what this virus could do. "We were scared to touch our face – we could catch this! I could be one of these people," said Distelrath. "The floors were segregated. You just knew that if you were going to this floor or this area, you were going into COVID-land. You didn't know what you were facing. It was scary. It was definitely scary. I didn't think I had signed on for something like this. You say, yeah, I'll do whatever I have to do. Then reality hits and it smacks you in the face and you are like, 'Oh my goodness! What did I just sign myself on for?'" After coming to terms with the initial fear, Distelrath and the rest of the phlebotomy team simply trusted that the leadership knew what it was doing and moved forward with a positive attitude. "One of the benefits we saw from this pandemic is that it really brought the team together. We supported each other and encouraged each other," she recalls. In addition, physicians were more cognizant of the number of times phlebotomists were called to patient rooms for blood draws. They began to combine orders so that phlebotomists would not have to enter patient rooms so frequently. "I hope this is a change that will continue post-pandemic," stated Distelrath.

Above: Chris Distelrath working on a portable work station.

Providing phlebotomy services in the nursing homes was heartbreaking, according to Distelrath. "The nursing homes were not necessarily the most wonderful places to be and I felt so bad for those folks. They were cut off from their families. They saw only their caretakers." For some of them, dementia and confusion just added to their isolation and loneliness because they couldn't gather to do any of the activities that they had done in the past. Those that had dining room privileges now had their meals brought to them in their rooms. "They were healthy, but were stuck in their rooms. I felt it important to take my

time, most especially there. To talk to the patient and to let them know that I cared. You were the only outside person they saw – to get their blood draws done. It is kind of sad," empathized Distelrath. "Phlebotomists care about patients, care about outcomes, care about their job. We have compassion. We have a heart. We do the best we can to represent the department, truly, truly, and we are doing our best to take care of the doctors, too."

Shanna Cook is the Associate Supervisor for three outpatient clinic phlebotomy units located in Dexter, Saline, and West Ann Arbor. Cook found that the ability to adjust quickly was essential in the pandemic. "Adjustments and patience," she exclaimed. "To adjust to wearing masks, communicating with patients so they are aware of what they need to do and what we need to do to keep safe, learning about COVID, the timeline and time frame when the exposures are happening, educating staff, and following protocols and policies established all required a lot of adjustments by the staff." Early in the pandemic, the outpatient facilities in Dexter and Saline were closed and all patients were funneled to the West Ann Arbor clinic for phlebotomy services. Patient volumes increased from 150 per day to 350 per day. "At one point, we had 12 phlebotomists working here, a combined staff from the other two clinics," stated Cook. "We have had to make adjustments with schedules and staff. All of us, including myself, have worked various shifts, from opening to closing, to weekend shifts, so I can honestly say that all of us have adapted to the change and made the best of it. Not once has anyone complained. Everyone had a lot of grace and was without complaints, to the best of their ability." Another adjustment was serving patients at the testing tents. While the nursing staff did most of the testing, Cook's team had to go to the tents to do any needed blood draws. "Our staff at West Ann Arbor, Dexter, and Saline provided excellent customer service," praised Cook.

Working through the pandemic was certainly stressful for many. "In the midst of all the stress that I endured and that the staff endured, we remained positive. We remained positive and we remained prayerful through it all and uplifting of one another when we could," explained Cook. "It was stressful for me, because I was pregnant and I lost my child in November. But going through that and all the other stressors just gave me more faith to keep going. And that is what we had to do. We had to keep going. And now I am pregnant again. Right now I am 4 months, almost 5, so I am excited!" Having a strong support structure was important when dealing with stress in the workplace. Cook found support from colleagues, but most importantly, from her family. "I can honestly say, the greatest impact has been my family. I have to give them all of the grace because they honestly kept me going."

Theo Jones, Administrative Manager over the out-patient phlebotomy area, told Cook, "You set the tone for the staff, the mood, everything." This was something that Cook knew to be true, but as a new leader over her area, it was a lesson the pandemic really drove home. She worked hard to keep her staff positive and encouraged, frequently providing special treats for her staff, laughing with them, and encouraging them. "The leader dictates the flow of the staff, the leader dictates the tone," concluded Cook. Kristina Martin, Clinical Pathology Operations Director, praised the phlebotomy teams serving across the health system, "The phlebotomists had to deal with all the patient interactions, all the PPE, and everything they had to undergo, potentially being exposed to positive patients – all of that is really commendable." Jennifer Slater, Administrative Manager over the in-patient phlebotomy area summed it all up, "I am immensely proud of our phlebotomy teams, especially over this last year. They have been asked to do more with even less, shifted to various work locations and shifts, and provided direct patient care, understanding there was an increased risk to exposure, (especially in the early days as PPE recommendations were ever changing). We also had several who adjusted home life to ensure the safety of their own families. Not an easy task." Dr. Charles Parkos, Chair of Pathology, expressed his appreciation for the sacrifices made, "Our phlebotomists were asked to be on the front lines, putting themselves at risk. It was enormously stressful for them and they served without complaint. We are truly grateful for their sacrifice and service."

Above: Shanna Cook continues to serve while eagerly awaiting the birth of her baby.

Schnitzer Lectureship and Resident Wellness Funds

by Jason Keech

For more than five decades Bertram Schnitzer, MD, served the Department of Pathology at the University of Michigan and was an international leader in the fields of hematology and hematopathology. As a result of his longstanding service, the Department of Pathology has made important contributions to research, education, and patient care that are recognized around the world.

Everyone who has known Dr. Schnitzer has been grateful for his dedication to our field. He loved teaching and mentored countless residents and fellows, taking great pride in helping to launch the careers of his trainees at the University, many of whom have had leadership roles throughout the country.

To honor Dr. Schnitzer's impact, we have initiated a $100,000 fundraising campaign to establish the Bertram Schnitzer, M.D., Lectureship Fund. Donations to this fund will be used to host an annual lecture focused on hematopathology topics, and will become a permanent endowment at the University of Michigan. Once established, this lectureship will continue Dr. Schnitzer's legacy of education and mentorship, all with the goal of improving the lives of our patients at Michigan Medicine and beyond.

Please consider supporting the Schnitzer Lectureship Fund and honoring Dr. Schnitzer's legacy.

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[1] COVID-19 vaccines were given at many locations around Ann Arbor, MI, including the "Big House", the University's of Michigan stadium.

[2] As part of the 2021 Equality Walk, participants from the department also knelt for 8 minutes and 46 seconds in memory of George Floyd.

[3] The resident class of 2024: *(top row)* Corey Post, Thomas Herb, Vincent Laufer; *(middle)* Fysal Shennib, Maxwell Wang; *(bottom row)* Nathan McCammon, Haley Amoth, Nicole Tomm.

[4] Former residency program Admin, Pam Howard (*fourth from the left)* with current residents while attending her retirement party at the North Campus Research Complex (NCRC).

[5] The Department of Pathology has processed nearly half a million COVID-19 tests throughout the pandemic.

[6] Michigan Medicine employees participate in COVID-19 rapid testing by performing saliva tests in Towsley Center.

[7] Plexiglass dividers, social distancing, and masks were among some of the ways Pathology kept their faculty, staff, and trainees safe.

Residents

Krista Chain, MD
Not currently in practice

Amanda Kitson, MD
Pathology
United States Airforce

Emily McMullen, MD
Breast & Gynecologic Fellowship
Michigan Medicine

Chelsea Styles, MD
Surgical Pathology Fellowship
Michigan Medicine

Steven Van Norman, MD
Hematopathology Fellowship
Michigan Medicine

Nicholas Zoumberos, MD
Dermatopathology Fellowship
Michigan Medicine

Abubaker Elshaikh, MD
Assistant Professor
Baylor College of Medicine

Sara Hall (Hawes), MD
Pathologist
St. Luke's Medical Center
Milwaukee, WI

Shula Schechter, MD
GI Fellowship
Michigan Medicine

Libby Simon, MD
Peds Fellowship
Michigan Medicine

Michella Whisman, MD
Breast & Soft Tissue Fellowship
Michigan Medicine

Helen Worrell, DO
Pathologist
Beaumont Health System
Troy, MI

Clinical Lecturers

Eman Abdulfatah, MD
Assistant Professor
Michigan Medicine

Jacob Abel, MD
MGP Fellowship
Michigan Medicine

Aaron Belknap, MD
GU Fellowship
Michigan Medicine

Lawrence Briski, MD
Pathology
University of Miami
Miller School of Medicine

ACGME Fellows

Laura Baugh, DO, PhD
MGP Fellowship
University of Colorado

Carole Bitar, MD
Pathologist

Kyle Conway, MD
Assistant Professor
University of Iowa
Iowa City, IA

Craig Cousineau, DO, MPH
Pathologist
Michigan Diagnostic Pathologists
Southfield, MI

David Manthei, MD, PhD
Assistant Professor
Michigan Medicine

Zeinab Moussa, MD
Medical Director
CSL Plasma Center
Jackson, MI

Jonathan Mowers, MD, PhD
Pathologist
Michigan Diagnostic Pathologists
Southfield, MI

Teresa Nguyen, MD
Assistant Professor
Michigan Medicine / Wayne County Medical Examiners Office

Libby Simon, MD
Assistant Professor
Michigan Medicine

Brian Soles, MD
Pathologist
PSA Banner Baywood Hospital
Mesa, AZ

Lauren Stanoszek, MD, PhD
Assistant Professor
University of Toledo Physicians

Molecular & Cellular Pathology - PhD

Samantha Kemp, PhD
Defended / February 10, 2021
Mentors / Drs. Marina Pasca di Magliano, Howard Crawford, and Celina Kleer
Position / Postdoctoral Fellow
University of Pennsylvania

Abhijit Parolia, PhD
Defended / February 17, 2021
Mentor / Dr. Arul Chinnaiyan
Position / Research Investigator
University of Michigan

FLASH FROM THE PAST

Can you guess who these individuals are? Two are currently emeritus, and one is still very active as a faculty member in the Department of Pathology here at Michigan Medicine.

A. Barbara McKenna; **B.** Thomas Annesley; **C.** Henry Appelman

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