

Digital Pathology Pilot Predicts Prosperity: Pondering Pathology's Pivot

By Mary C. Tierney

When it comes to digital medicine, digital pathology is very late to the game. But its time is coming. And the benefits could be many: Bolstering the capabilities, efficiency and reach of individual pathologists, cutting patient wait times, streamlining multidisciplinary team meetings (MDTs) and offering more data-rich decision-making. It could even obviate a shortage of pathologists. Where does it fit into your strategic plan?

University Hospitals Cleveland Medical Center (UH-CMC) is ready for digital pathology and working on ways to educate and prepare their pathology team. UH-CMC has been using a digital pathology slide scanner in research for about six years, and now wants to expand and enhance their ability to look at cases across the health system that spreads across Northeast Ohio. Digital pathology would bring that flexibility, and myriad other advantages. So the health system has begun to test the waters.

Last summer, UH-CMC ran a frozen section pilot study on the Sectra Digital Pathology Solution. The study had two goals: clinical validation and improving

clinical familiarity by introducing faculty to the technology, according to the leader of the study, Hannah Gilmore, MD, who is the division chief of anatomic pathology and director of the breast pathology service.

“We see digital slide scanning [which we’ve been using in research for 6 years] greatly enhancing our ability to do telepathology across our system,” Gilmore says. For example: “If there was a neurosurgeon operating in the community, our neuropathologist here can look at the intraoperative diagnosis. We need to validate the techniques in our own hands. But we also want to get our pathologists comfortable with digital pathology.”

UH-CMC chose to focus on frozen sections because they’re such a critical function of anatomic pathology. They require a pathologist be present to perform the microscopic evaluation to guide surgery. Digital pathology offers a path forward in expanding both access and reach by adding remote access. This would allow facilities like UH-CMC to utilize their concentrated subspecialty expertise in anatomic pathology across the larger system for intraoperative interpretations.

“We need greater efficiency so we can look at slides and make a diagnosis from anywhere,” Gilmore notes. “We really need to move away from being dependent on being in a specific location because this will allow us to spread our subspecialty pathology knowledge, literally. It also will allow us to bring better information to key meetings like MDTs and eventually take advantage of artificial intelligence and analytics.”

Inside the study

The frozen section pilot compared the pathologists’ diagnosis using digitized slide images vs. using



microscopy. Previous pathology cases were digitized using a slide scanner, and images were uploaded into the Sectra Digital Pathology Solution. Pathologists viewed the images, offering a diagnosis for each case. The cases were grouped by organ system, with 11 different organ systems offering diversity of tissue type. The pathologists' digital diagnoses were compared to the correct final diagnosis for each case. The number of correct digital diagnoses were determined per question and per organ system. The number of participants that made a correct digital diagnosis was compared to the total number of responses per organ system. Those numbers were used to determine the concordance rate per organ system. Concordance was based on the final diagnosis.

The results were outstanding—showing an average overall concordance rate of 95 percent across the 11 organ systems. High concordance rates stretched across a wide range of specimens including brain, lung, ENT, gastrointestinal, genitourinary, gynecological, breast and soft tissue.

The pilot sought to simulate the types of cases a busy hospital frozen section service sees. They also examined a diverse set of interoperative diagnoses from a lot of organ systems. “Some were bad slides, some were really good slides,” she says. “We also used easy and hard cases. Overall, we were very pleased with our high concordance rate. We considered that fabulous and definitely good clinical validation.”

And what about goal No. 2: what did the faculty think? “It was a big success as well,” Gilmore says. “We wanted to take questions out of their minds. Things like: Is it easy to use? Is the image quality good? Can we make our diagnoses? Is it accurate? And can I trust it? The answer was yes on all. The pathologists were impressed by how clear the images appeared on the screen and the attitude was very positive.”

Cue up the rad-path meeting

The awareness-building for faculty expanded further when UHCMC integrated digital pathology into their monthly breast radiology-pathology (Rad-Path) conference as part of another pilot.

The Rad-Path conference seeks to resolve issues of concordance between imaging findings and the microscopic findings to determine whether or not patients need additional surgical intervention or can be followed with imaging. It's essential for the team to examine both the radiologic images and the microscopic image clearly and comprehensively. The team had been frustrated by low resolution and suboptimal projections of the microscopic images. So in May 2018 the team piloted the use of one Sectra enterprise PACS for digital pathology along with radiology images.

Cases were presented as usual, along with a few digital pathology images that were scanned at 40X and uploaded into the enterprise PACS platform. The slide images were projected onto the screen side by side with radiology images. As Gilmore says, it was obvious to the team that the digital pathology images were both clearer and easier to see on the screen than the projected microscope glass images, especially at low power. The Rad-Path team agreed that integrated conferences like this could greatly enhance the clinical care and efficiency system-wide, especially for tumor boards.

“This was the right place to pilot it, because it's only once a month and the volume is small,” says Gilmore who works hand-in-hand with Donna Plecha, MD, co-chairman of Radiology and Division Chief, Breast Imaging, on the conferences. “We wanted to work through it. It was awesome and everybody really enjoys using it.”



Since the pilot, they've been uploading pathology and radiology images into the enterprise PACS and projecting images from both departments on one system for each monthly conference. Using one system to display the images has streamlined how the cases are viewed, annotated and presented and has greatly increased efficiency, Gilmore says. Moreover, with the Pathology PACS, the digital images of the pathology slides can now be saved alongside the radiology images for clinical documentation, education, and research use. "Most importantly, we can make sure that the patient is getting the most appropriate treatment. More access, better access and shorter wait times will help too. "This is our first step forward. Our idea is to move this to breast tumor board when it's available."

A move to digital pathology down the road, Gilmore believes, would reduce the prep work needed for multidisciplinary meetings. The time savings would be "significant" for her and especially support staff. "No more looking through the archives to find slides, some of which may not have been returned, or were misfiled and simply can't be located. We miss out because the team cannot compare priors to currents." And after the meeting, "all of the images would live together going forward so reaching back to priors would offer a more global view," she says.

Digital pathology also brings the promise of precision medicine and machine intelligence to potentially improve diagnosis and disease monitoring. "Machines are better at counting," she says. "My human eye is never going to be as good as the machine when it comes to quantifying large numbers of cells under the microscope. Precision medicine is coming but we need digital capabilities first."

Mapping out a plan

UHCMC has been bitten by the digital pathology bug and is putting together solutions to meet their needs in patient consults. For example, when challenged by distance and geography for a tumor board at a small community hospital, they'll scan their slides. "That way, our pathologist off-site can just take pictures of their images and put it in a PowerPoint [presentation].



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That means we don't actually have to physically drive the slides to the location," Gilmore says. "It works well but isn't the fully digital lab with digital signouts we are mapping out for the future."

The UHCMC team is getting more comfortable with digital pathology. Areas such as frozen sections and tumor boards are working well. "We'd like to be able to use digital because our specialty immunostain labs are here at our main campus. If we have a pathologist who's two hours away, we just scan the slides, and he or she doesn't have to wait for the courier to take them. You can see how much more efficient that is. It saves time and some costs too."

Frozen sections will be the first phase of implementation, thus the reason they were the focus on the pilot study.

The UHCMC team sees the potential for digital pathology in boosting efficiency throughout the patient management journey and improving ergonomics in looking at big screens vs. looking through microscopes. No more waiting or looking for slides and physically sending them to another specialist for an opinion. Digital viewing offers higher power settings and better visualization, for individual pathologists or in meetings.

Gilmore sees opportunities to improve quality of work and quality of care. "This is why radiologic and pathologic correlation with every image-guided biopsy is so important," she says. "The breast world is probably

ahead of lots of other areas, where after the radiologist does a biopsy, they have to put an addendum on saying whether or not the findings are concordant or discordant. We think about that more than probably other disease teams. And just in general, it helps us move toward a world where we really integrate radiologic, pathologic, genomic, and clinical data into kind of one unifying system. There is huge potential.”

The future is largely being modeled after the evolution of digital radiology where all images are viewed digitally, Gilmore says. She sees the pilots and awareness-building among faculty as step one of an evolutionary pivot toward digital pathology. While it’s estimated that only 5 percent of pathology sites across the globe have digitized their workflow, that will soon be changing with new U.S. FDA approvals of digital pathology systems on the horizon. “We want to be ready,” she says. “We’re really excited. There’s a lot of enthusiasm for embracing new technology.”