Newsbytes

Editors: Raymond D. Aller, MD, & Dennis Winsten

Need for speed only one factor in selecting a digital scanner

September 2023—The musician Frank Zappa said, "One size does not fit all," a declaration that counters the claims of many clothing manufacturers and holds true for a variety of products, including, one could argue, digital scanners.

Matthew Hanna, MD, director of digital pathology informatics at Memorial Sloan Kettering Cancer Center, agrees. "There isn't a one-size-fits-all scanner—at least that's what we felt," he says.

Digital scanners vary in features and functionality, and it's important to select the one that's right for your lab, Dr. Hanna says. For example, a pathology lab that scans glass slides before the pathologist reads them will have different speed and throughput needs than a lab that scans and archives slides that have already been read by a pathologist. Furthermore, different types of pathology slides may necessitate different imaging modes, Z-stacking capabilities, or other scanner features, he adds. Therefore, a laboratory should consider numerous factors when shopping for a digital scanner, says Dr. Hanna, who spoke on this topic at the 2023 annual meeting of the United States and Canadian Academy of Pathology. Following are some points he raised.

Imaging mode. Brightfield imaging is used for most clinical workflows, yet a digital scanner with fluorescence-based scanning modes serves multiple purposes. For example, some dermatopathologists employ fluorescence-based markers to confirm diagnoses, and clinical research often involves fluorescence imaging. Furthermore, it may be worthwhile to purchase a scanner with a darkfield fluorescence scanning mode because the fluorescence stain in glass slides tends to fade over time with exposure to light. So this type of functionality provides "an immortalized image of these darkfield slides or FISH slides, and you can pull the slides back up years later for research," Dr. Hanna says.
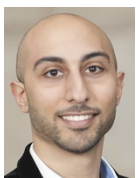
Dr. Hanna

Slide throughput and continuous load. Know the volume of slides your laboratory needs to scan in a set amount of time and whether or not one scanner can handle that workload, Dr. Hanna advises. "If your lab is outputting 120 slides an hour, and the scanner you looked at can scan 30 slides an hour, you need four scanners to keep up with workflow," he says. However, laboratories should take into account what Dr. Hanna calls "dwell time," the period of time when glass slides are being held for a courier or another step in the distribution process. If the lab produces 120 glass slides an hour during the day shift and its slides aren't distributed until the next morning, the lab could purchase a scanner with a lower throughput, which may be more cost-effective, and scan slides during overnight hours—and it would still be prepared for the morning pickup, he says.

Laboratories should also consider the benefits of newer continuous-load scanners, Dr. Hanna says. If 15 racks of slides were being processed on an old scanner, he explains, and racks one through three were finished, the scanner would have to be stopped or paused to remove the completed racks. The scanner would then restart the process from the beginning or pick up where it left off. The newer continuous-load scanners, on the other hand, can scan without interruption as racks are loaded and offloaded.

Slide size. For some pathology cases, such as prostate resections and select sarcoma cases, labs put specimens on 2- × 3-inch whole mount slides instead of the standard 1- × 3-inch slides. Laboratories that want to use whole mount slides must not only ensure that a digital scanner can accommodate larger slide sizes but factor the larger size into their estimations of throughput and storage costs, Dr. Hanna says. A 2- × 3-inch slide will take twice as long to scan and will require twice the storage space of a typical slide.

Scan speeds. The scan speeds quoted by many digital scanner vendors are based on scanning a 15- × 15-mm image, but that standard does not accurately represent the size of a typical image, according to Dr. Hanna. In fact, an evaluation of specimen size in scanned glass slides, conducted at Memorial Sloan Kettering, found that scanned images were typically 2.8 times that size. "This is why anytime one of the vendors tells me their scan speeds, I immediately triple them," Dr. Hanna says.

Magnification and resolution. The standard 40× magnification that pathologists are accustomed to using with microscopes equates to a resolution of 0.25 microns per pixel in a digital scanner, Dr. Hanna says. And some digital scanner vendors use 20× or 40× magnification measures in marketing material in an attempt to translate microns per pixel into terms pathologists understand—but these terms are used inconsistently across vendors, he notes. Some vendors describe a resolution of 0.25 microns per pixel as 20× magnification and others describe it as 40×. For that reason, it's better to focus solely on the micron-per-pixel resolution metric when evaluating digital scanners, Dr. Hanna says.

Scan area selection. Some digital scanners scan a rectangular area around a specimen, including the white space in the background. Others scan multiple areas of interest, but they only capture those areas that meet a certain level of contrast to the background. Scanning areas of interest can shorten scanning times, Dr. Hanna says, but the downside is that the scanner might be more likely to miss small pieces of tissue when there is low contrast between the specimen and background.

Multilayer support. Many digital scanners scan specimens in just one focal plane, or Z-plane, but for some specimens that tend to be thicker, pathologists prefer to scan in multiple focal planes to get a more three-dimensional view, Dr. Hanna says. Digital scanners with Z-stacking capabilities offer pathologists a multi-dimensional view that is comparable to that provided by a microscope. "For cytology slides and hematology smears, a lot of pathologists like the ability to scan in multiple Z-planes because that means they are able to have at least some of the fine focus that would otherwise be lost if you were scanning in just one focal plane," he explains.

Re-scan rates. It's important to consider re-scan rates when evaluating a scanner's throughput, Dr. Hanna says. If a lab needs to scan 100 slides, for example, and its scanner has a failure rate of one percent, the lab should calculate total slide throughput capacity as 101 slides. The amount of time that re-scans take can vary based on the type of scanner, he adds. Some scanners recognize when scans are not sufficiently focused and can automatically re-scan them quickly, while others require that humans intervene to diagnose problems. Laboratories should put processes in place for investigating the causes of scan failure, Dr. Hanna adds.

Whole slide image file formats. Some digital scanners have proprietary file formats, so a scanner from vendor A and a viewer from vendor B may not be compatible. While efforts are underway to develop a universal imaging standard, labs should carefully evaluate whether the file format a digital scanner uses allows that device to be used with other vendors' products, Dr. Hanna says.

Lab space and weight load. To streamline clinical workflows by minimizing the distance glass slides need to travel to be scanned, digital scanners should be placed in the lab or as close to it as possible, Dr. Hanna says. However, he cautions, it's important to consider the equipment's weight when choosing a location. A heavier digital scanner may need to sit on reinforced floors, he notes.

Rack interoperability. Putting coverslips on glass slides is often the last step before sending the slides to the digital scanner. And if the rack used in the coverslipping step is not compatible with the scanner, each slide will have to be manually transferred to another rack for scanning, Dr. Hanna explains. "Ensuring interoperability

between the slide racks that your lab's coverslipper uses and the whole slide scanner is key to avoiding inefficient workflows."

Barcode formats. Most digital scanners can read the major barcode formats, but labs affix barcodes to glass slides in numerous ways, including by printing them on stickers or etching them into the glass slides. Regardless of the format, laboratories need to ensure that barcodes are legible and located where the scanner can read them, Dr. Hanna says.

Laboratories that perform third-party consultation testing of slides may encounter glass slides with multiple barcodes—from different institutions as well as their own. Some scanners can be configured to only recognize barcodes from the institution in which the scanner is located, but if a scanner does not have that setting, the lab should ensure that its own barcode is visible and other institutions' barcodes are obscured, he adds.

Evaluation models. Most vendors have models of their digital scanners that they will loan to prospective clients for up to three months upon request, Dr. Hanna says. Laboratories can use an evaluation model to determine what digital scanning features they need, observe how the digital scanner manages lab workflow, and assess whether the scanner is user friendly.

"We never buy scanners without evaluating them first in our lab," Dr. Hanna says, "and I always recommend to others to ask for the evaluation unit."

—Renee Caruthers

Tips for creating glass slides for digital scanning

- Don't put too large of a piece of tissue on a slide. The tissue should not extend to the edge of the glass. If it does, cut it in half and make two slides.
- Place pieces of tissue close together on the slide to minimize the scan time and lower digital storage costs.
- Know the margins of the scanner's tissue-detection area. Center the tissue sample as much as possible so that it is fully within the scanner's view.
- Avoid wet or overhanging coverslips. Coverslips that hang over the edge of a slide can get caught, damaging the slide or even the scanner. Wet coverslips can shift inside the scanner.

—Matthew Hanna, MD

Upcoming DPA annual meeting

The Digital Pathology Association is hosting its annual meeting, Pathology Visions 2023, from Oct. 29–31, in Orlando, Fla.

Under the theme of "Igniting digital pathology transformation," the meeting will address real-world, practical applications of digital pathology and artificial intelligence today and into the future. It offers more than 50 expert presenters, over 70 poster presentations, and nearly 50 vendors showcasing the latest innovations.

For more information, visit https://digitalpathologyassociation.org/.

Hc1 joins forces with oncology network to enhance lab staffing

The performance-analytics and operations-management technology provider Hc1 is partnering with the American Oncology Network to develop solutions that connect laboratories to data-driven staffing recommendations in real time.

The collaboration is intended to enable AON's alliance of physicians and other health care professionals to optimize their laboratory staffing through artificial intelligence and machine-learning models using Hc1's Workforce Optimization solution, which is under development.

"This partnership enables us to develop better processes with real-time actionable insights into our data and imparts us with forward-thinking recommendations based on a detailed analysis to optimize staffing and expenses," said Curtiss McNair, vice president of laboratory services for AON, in a press statement.

The Workforce Optimization system is slated to be installed and tested this fall at AON's central laboratory in Ft. Myers, Fla.

AON provides protocols for managing administrative procedures and ancillary services, including pathology, for its affiliates across 18 states.

[Hc1](#), 317-219-4646

Duke Health and Microsoft collaborate to advance AI

Duke Health has entered a five-year-long partnership with Microsoft to responsibly and ethically harness the potential of generative artificial intelligence and cloud technology, in part by developing the Duke Health AI Innovation Lab and Center of Excellence.

Microsoft will provide Duke with state-of-the-art training to foster a cloud-savvy information technology workforce and construct a secure cloud environment to simplify and modernize IT operations. Duke will use the Microsoft Azure cloud to streamline clinical care, promote health equity, and expand research and education.

Duke Health and Microsoft will also develop AI-based solutions to fast-track innovation and use Microsoft's Azure OpenAI Service to augment health care experiences for providers and patients through such means as automating administrative tasks to reduce workloads and expanding personalized patient education.

QuidelOrtho partners with BYG4lab to strengthen portfolio

The in vitro diagnostics technology provider QuidelOrtho has entered a software-development partnership with BYG4lab, a provider of data-management solutions for the laboratory, to enhance QuidelOrtho's data-management offerings across its portfolio of diagnostic systems.

Through the agreement, the companies will jointly develop proprietary tools that allow autoverification to become more routine and available to labs of all sizes.

"Our partnership with BYG4lab reaches across the business, from clinical labs to transfusion medicine to point-of-care, and it allows QuidelOrtho to rapidly integrate affordable, cutting-edge and time-saving informatics solutions," said Douglas Bryant, president and chief executive officer of QuidelOrtho, in a company press release.

The collaboration expands on an earlier commercial partnership between the companies.

[QuidelOrtho](#), 800-874-1517

Sysmex extends long-standing alliance with Roche Diagnostics

Sysmex has expanded its 25-year-long global business partnership with Roche Diagnostics. The revised agreement

renews the companies' nonexclusive total laboratory solution collaboration that allows customers to purchase products for clinical chemistry, immunochemistry, and hematology testing from one vendor. The companies will also jointly explore ways to tackle social issues.

"Sysmex has agreed with Roche to expand the scope of their collaboration to include not only their products and sales and services but also the creation of a circular resource value chain in the in vitro diagnostics domain to deliver greater value to customers in laboratories from an eco-social perspective," according to a press release from Sysmex.

Under the agreement, Roche will continue to distribute Sysmex' hematology products and share management resources.

[Sysmex](#), 847-996-4500

HNL Lab Medicine contracts with Proscia and Leica

The clinical diagnostics laboratory HNL Lab Medicine recently announced that it will use Proscia's Concentriq Dx digital pathology software and Leica Biosystems' high-throughput scanner hardware to establish an advanced digital pathology practice.

Allentown, Pa.-based HNL Lab Medicine is a full-service medical laboratory that operates more than 50 patient service centers in Pennsylvania.

[Proscia](#), 215-608-5411

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