

Expert Perspectives



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How to successfully leave the microscope behind

Impact on lab processes, diagnostic workflows, and the mindset of the pathologist

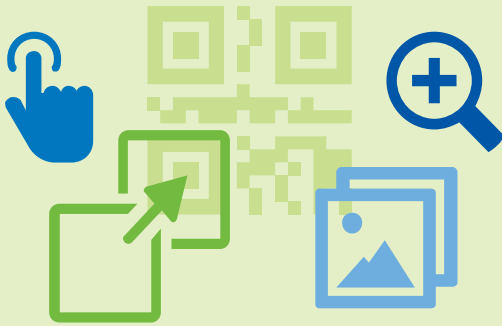
Implementation of digital pathology as a first-hand tool for clinical diagnostics has been slower than initially expected when the technical solutions first became available. Unilabs Pathology Sweden has successfully implemented digital pathology for histopathology cases, in part by using the Philips digital pathology solution for image management and scanning. Dr. Charlotte Orndal shares how obstacles and limitations have been resolved, and discusses challenges and benefits of adopting a digital pathology solution.

Dr. Orndal notes that Unilabs Pathology Sweden is a large organization that previously depended on the physical transfer of slides across locations. "Someone would pack it, unpack it, register it, unregister it, and we would spend an enormous amount of time doing that," she says. "I think no one misses the packing, carrying, sending and mailing. Another thing that could happen before [adoption of digital pathology] was that if I had a lot of unreported cases, they would be in physical stacks. And if the case was then rushed, it would take some time to look for it. Now, that time is always zero."

The journey to digital pathology

Unilabs Pathology Sweden started the small-scale implementation of digital pathology in a single laboratory approximately 10 years ago. In 2016, the Unipath/Digipath project included implementation of a common laboratory information system (LIS) at all laboratory sites. Digital pathology for histopathology started with both an LIS solution and a Philips digital pathology solution, which included the Ultra Fast Scanner and image management system. As of 2020, most of the organization's 150,000 histopathology cases are digital.

Digital pathology requirements for hardware, software and infrastructure



- LIS to support a lean, item-by-item workflow traceable by bar code or QR code
- Reliable slide scanners with scanning capacity to accommodate slide volume in a timely manner
- Image viewer with user-friendly interface
- Interface between slide scanners, LIS and image viewers
- High-performance network and adequate slide storage

Item-by-item support from the LIS means that the traditional sorting of blocks and slides at every step to keep the cases together can now be omitted. After drying, when the slides are stained, they are first visually inspected to assess quality, then logged in the LIS and loaded in the scanner racks. The slides can be immediately archived upon scanning. The only time that digital slides are not immediately archived is if they're used to train residents through simultaneous comparison of digital slides with physical slides.

Communication between the LIS and the Philips digital pathology solution provides information regarding when each case is completed from the lab and ready for diagnostics. Cases that already have an assigned pathologist are automatically displayed on the pathologist's worklist, while other cases are scheduled for dispatch. Dr. Orndal values this, saying, "It makes it immediately possible to do triage on your worklist if an urgent case pops up."

“ Nowadays, everyone has faster internet at home than you could imagine having in any research laboratory at that time. ”

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Keys to success

- **Shorten** the scanning time through consistent slide alignment and section size
- **Recognize** that variation in section thickness affects quality of digital slides
- **Keep** slides uncontaminated (as necessary as with physical slides)
- **Understand** that coverslipping is important, and that generally commercially available cover-slip material for histopathology is sufficient
- **Optimize** the amount of mounting medium (glue) and allow for additional drying time if necessary



Expectations from the early days of digital pathology

Healthcare in Sweden is primarily publicly funded. The journey to digitize clinical pathology in Sweden started approximately 20 years ago when a national board of cooperation was established. Dr. Orndal recalls that initial progress was slow due to lack of incentive, reluctance to change inherent in large organizations, shortage of investment, and a focus on details that did not ultimately move the digitization project forward. Dr. Orndal notes, “You actually need to have some major investments to change your entire workflow.”

Early expectations

Current reality

Slow internet speeds would hinder the reading of cases; familiarity with the microscope would mean reading digital slides would not be as fast

Internet speeds and efficient workflow allow cases to be read as fast – or even faster – as with a microscope, and on workstations in pathologists’ homes as well as in the lab, providing greater working flexibility

Would have the ability to consult about a particular case with colleagues all over the world

Consultation with colleagues in the network is quick and easy, but lack of standards for storage format makes it challenging to consult with colleagues outside of the viewing environment; patient privacy safeguards complicate the sharing of cases external to the organization

Concerns over the workload required to neatly prepare the slides and load the scanner

Loading time is easily made up by the time that is no longer required to sort, pack and unpack physical slides

Need to assess if quality matched traditional reading using a microscope

Digital support makes it easy to implement systems for double-reading and revisions for quality assurance

Access to all of a patient’s previous slides regarded as essential to a current case

For the bulk of routine cases, slides from previous cases lack relevance and so do not need to be accessed

Storage costs for digital slides

Storage costs can be lessened through secondary storage which allows older cases to be retrieved with a small amount of extra delivery time

“ We thought it would be so easy to consult colleagues everywhere in the world with difficult cases. No one had ever heard the term ‘GDPR’ at those times. ”

Charlotte Orndal, MD, PhD



Dr. Charlotte Orndal is Senior Consultant in Pathology, she received her PhD in Medical Genetics from the Lund University Hospital Department of Clinical Genetics, Lund, Sweden. In 2016, Doctor Orndal started working for Unilabs, first as Responsible Pathologist for the UniPath project and later as Medical Lead of Unilabs Pathology Sweden. Dr. Orndal has special interests in workflows, quality, and how technology can help patients and customers. Her primary field of study has been in gynecological pathology, including the cervical cancer prevention program, neuropathology and perinatal pathology.

Leaving the dust cover on the microscope

Dr. Orndal's microscope now usually has its dust cover on, waiting for the occasional frozen sections or cytology. She remembers the transition period well. "It's important to have no mixed worlds: not half physical slides and half digital, because that confuses your muscle memory and your way of working with your cases. The period when you're doing half-and-half is cumbersome for the pathologists, and it's cumbersome for the laboratory," she says. With the move to digital pathology, it's now possible for all senior pathologists to have a complete workstation at their home or at an office close to their home. Pathologists can now have a more flexible rotational schedule, with weeks at home and weeks at the lab.

"I think you shouldn't ignore the fact that part of reading slides is a physical work. It was slower in the beginning because my muscle memory was trained to do the microscope. It took some time before my muscle memory trained to do the same thing with the mouse. You also need to train your focus. The microscope provides a secluded area of interest to look at. If you have concentration problems, the microscope naturally concentrates your view for you," she says. "When you look at digital pathology, you have your lovely slide on one of the screens, but you also have constant messages from the mail program."

She's found other things helpful, as well. "An ordinary mouse will work as long as it has a reasonable sensitivity to movement. You need a chair and desk with good ergonomics," she adds. "It's necessary to have a workstation that includes adequate processing power and a high-resolution screen of adequate size. It's preferable to have two screens, with the LIS displayed on a separate screen with lower resolution. It's important that the screen shows the colors in the right temperature. I think it's popular to use some sort of self-calibrating screen."

She summarizes, saying, "In the end, I think you can read cases as fast as – or even faster – than you did before."

// If you're good at pathology with a microscope, you will be good at pathology on the screen. //

Charlotte Orndal, MD, PhD

Unilabs Pathology Sweden

5 laboratories
across **4** Swedish
regions

50 pathologists
Representing approximately
15% of all pathologists
in Sweden

150,000
histopathology
cases handled per year

Digital pathology enables high-quality remote reading.

For more information about digital pathology visit www.philips.com/digitalpathology

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

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