

PHILIPS



Digital pathology supports fast, accurate diagnoses at ASAN Medical Center

Digital Pathology

Customer story



The transformation to digital pathology at ASAN Medical Center

Who

Heounjeong Go, MD, PhD

Where

Department of Pathology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Challenge

Meeting the rise in cancer cases with fast, accurate pathology diagnoses while staffing levels remain constant in the pathology department

Solution

Since 2022, ASAN has been diagnosing cases using digital pathology for all surgical cases and consultation on cases from other hospitals, resulting in high accuracy and faster time to diagnosis

ASAN Medical Center in Seoul is the largest private hospital in Korea, with 2,400 beds, serving more than 1 M inpatients and 3.2 M outpatients yearly. It is a luminary institution, focused on cancer treatment and organ transplants. Dr. Heounjeong Go heads a pathology department of 27 professors and approximately 15 residents and fellows.

Since 2022, ASAN has been diagnosing cases using digital pathology for all surgical cases and consultation on cases from other hospitals. The journey to digital pathology started years ago for ASAN, and Dr. Go feels it was well worth it for the benefits the institution gained, in terms of reduced time to diagnosis, increased diagnostic confidence and a better experience for pathologists and consulting physicians.

Results are specific to the institution where they were obtained and may not reflect the results achievable at other institutions.

At a glance

- ASAN produces ~900,000 pathology slides each year and diagnoses ~130,000 surgical pathology cases
- The number of cases continues to increase, but staffing remains constant, requiring improved workforce efficiency for timely diagnosis and smooth consultation
- In 2022 ASAN decided to digitize all newly produced slides, as well as slides from the past 10 years, with on-premise data storage
- Electronic Medical Record (EMR) and image management systems are tightly integrated for greater diagnostic efficiency
- The introduction of digital pathology at ASAN has decreased average time to diagnosis by almost 20 hours for pathology cases and by more than an hour for immunopathology cases



Digital pathology for fast, efficient diagnosis at this busy medical center

ASAN produces a high volume of slides (~900,000 pathology slides yearly) and diagnoses ~130,000 surgical pathology cases. While the number of cases continues to increase, staffing in the pathology department remains constant, requiring improved workforce efficiency for timely diagnosis and smooth consultation. This increased volume also creates challenges for data management.

The introduction of digital pathology at ASAN has resulted in decreased time to diagnosis. For histopathology cases, even though the number of diagnoses increased and the number of pathologists has remained unchanged, there was an average 27.6% improvement, with diagnosis time decreasing by 19 hours and 51 minutes on average with digital pathology. In immunopathology, the diagnosis time decreased by approximately 2.93%, which translates to a reduction of 1 hour and 28 minutes. In the case of molecular pathology, when the method of specifying ROI (region of interest) was performed using a digital pathology system, the test time per case was reduced by about 1 hour.

Digital pathology at ASAN

Histopathology

Average decrease in time to diagnosis



19 hours, 51 minutes

Immunopathology

Average decrease in time to diagnosis



1 hour, 28 minutes

Increased demand for cancer care creates additional challenges for pathology

Because people are living longer with cancer, it is becoming more common for those patients to undergo repeat biopsies or surgeries during follow-up care, which often requires review of pathology slides made years ago.

Before digital pathology, locating and retrieving those physical slides required extra time. In addition, staining quality may have faded on old slides, reducing image quality and diagnostic confidence. It's difficult to make precise annotations for diagnosis using physical slides. Physical slides can be damaged or lost. When slides are used for research, it can be difficult to locate and review those slides in a timely fashion. When preparing for conferences or writing papers, photos must be taken with a camera to present results, which can be very inconvenient. In addition, storing physical slides requires significant space in the facility.

Realizing greater efficiency, aided by Artificial Intelligence (AI)

To address challenges, ASAN decided to digitize all newly produced slides, as well as slides from the past 10 years, with on-premise data storage. EMR and image management systems are tightly integrated for greater diagnostic efficiency, and integrated systems send all pathological ancillary test results from the pathology department to the digital pathology server, allowing all test results to be managed by surgical pathology case. ASAN has implemented an interface for AI-based algorithms and is building a platform that can provide de-identified and pseudonymized diagnosis slides for research and external consultation. ASAN uses an AI-based program that takes less than one minute per case to evaluate the morphometric analysis (previously a resident would spend two hours every day to evaluate morphometry). In addition, reimbursement is greater for AI-assisted morphometry.

Convincing stakeholders about the value of digital pathology

When Dr. Go decided to adopt digital pathology, the field was still relatively new, with little available information. At the time, there were no similar reference models for an institution as large as ASAN, and most other institutions had only partially implemented digital pathology. ASAN developed its own plan, starting in 2017 and finalized by the end of 2019, reaching an agreement with hospital administration to proceed. In 2020, ASAN created a task force to begin the project, building the necessary interfaces for a year, followed by another year of trial operation. It took approximately five years to fully implement digital pathology at ASAN.

Dr. Go addressed concerns about digital implementation by identifying difficulties in the analog workflow for diagnosis and found that a major obstacle was in locating and reviewing previously made physical slides. Dr. Go was able to demonstrate these benefits:

- Slide access is easy using the digital system, including slide access by researchers
- Security of patient data is enhanced when using digital slides to consult with other hospitals because no physical slides are transported from one location to another
- Pathologists were concerned with the ability to use new technology, and so Dr. Go provided one-on-one training so that her team was comfortable with the technology
- Digital slides are easier to view versus the microscope (younger pathologists are very comfortable with computer use and older pathologists appreciate the enlarged view)
- The unified barcode system has eliminated the chance of misidentifying physical slides, and so that the risk is reduced to nearly 0%, creating an error-free system of identification*
- The hospital uses a 1G network, and the pathology department operates on a separate 10G network for uploading and downloading data
- File size is approximately 1.5 GB to 2 GB per slide

Preserving short turnaround times

ASAN prides itself in short turnaround times for pathology slides, delivering diagnosis in 1.5 days for biopsy specimens and 3.5 days for resection slides, and Dr. Go says that ASAN has highly efficient workforce utilization compared to other institutions. Initial concerns concerned productivity and efficiency--could they be maintained after adopting digital pathology because of the extra workflow step of scanning slides, potentially lengthening turnaround time?

To address this, Dr. Go decided to re-evaluate all processes from the perspective of digitalization and optimize them for digital pathology and made the bold decision to fully implement the digital pathology system at once rather than in stages to avoid the inefficiencies of managing workflow that was partially digital and partially analog. ASAN set up an interface that allows direct viewing of previous cases of whole slide images from the EMR case management screen, making it easier to review all the slides.

The institution also changed the entire physical environment of the pathology department--including equipment, lighting, workspaces and conference areas--to be conducive to digital workflow. Molecular work is now more efficient because of the ability to draw annotations for DNA extraction directly on the slide, which previously required 1-2 days for a glass slide.

Quality of digital compared to analog

Dr. Go says that pathologists prefer digital viewing to viewing with a microscope because of the ease of workflow and that the scanned

images are able to be viewed at greater than 40X magnification, which is helpful in identifying small particles or organisms. The ease of sharing and discussing digital images improves collaboration with other clinicians.

Increasing productivity and accuracy of diagnoses through efficient consultation

Dr. Go points out some of the past difficulties in diagnosing in the analog era.

"If multiple doctors needed advice, they would all gather together and have a separate meeting, or they would come to the office one by one with slides and ask for opinions. Because these cases take significant time and effort, diagnosis can be delayed, and sometimes the diagnosis is made without sufficient consultation. With a digital pathology system, you can easily consult multiple pathologists using a simple messenger app with screen sharing from directly from the Image Management System (IMS), and have those pathologists access and view your case at the same time, easily sharing opinions even if you are not in the same room. This is not limited to just an opinion about the diagnosis, but can also include additional tests that are needed, an interpretation of the tests, and the patient's clinical situation. This allows for a more specific diagnosis that can be much more helpful in the patient's treatment."



Heounjeong Go, MD, PhD, Department of Pathology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

In the future, Dr. Go imagines that the field of digital pathology can be expanded to include frozen sections and cytology specimens, a system that manages all ancillary test images and the creation of a prognostic cancer screening and grading system.

The future of AI in digital pathology

"I think AI will definitely benefit productivity and diagnostic efficiency if we can use more models for a variety of purposes in addition to the morphometry we currently use," says Dr. Go.

"For example, in the prostate screening model that is currently being used in multiple institutions, each of the 12 cores must be evaluated for diagnosis, Gleason score, Gleason pattern, tumor volume, total sample size and tumor portion size, number of tumor foci, and neural tissue infiltration. This is laborious, cumbersome and tedious. When describing a number of items, it's easy to make mistakes. If the AI model does the screening first, and in particular, writes a report on the results, I think the accuracy and productivity of the diagnosis will increase dramatically."



Heounjeong Go, MD, PhD, Department of Pathology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Keys to success

Dr. Go notes the importance of a user-centered approach to digital pathology transformation, saying

“When implementing a system, it is crucial to think about how things will change from the perspective of the pathologist who will actually use it. Implementers tend to focus on the technical aspect, but users care most about how much easier their work will become with the digital system.”

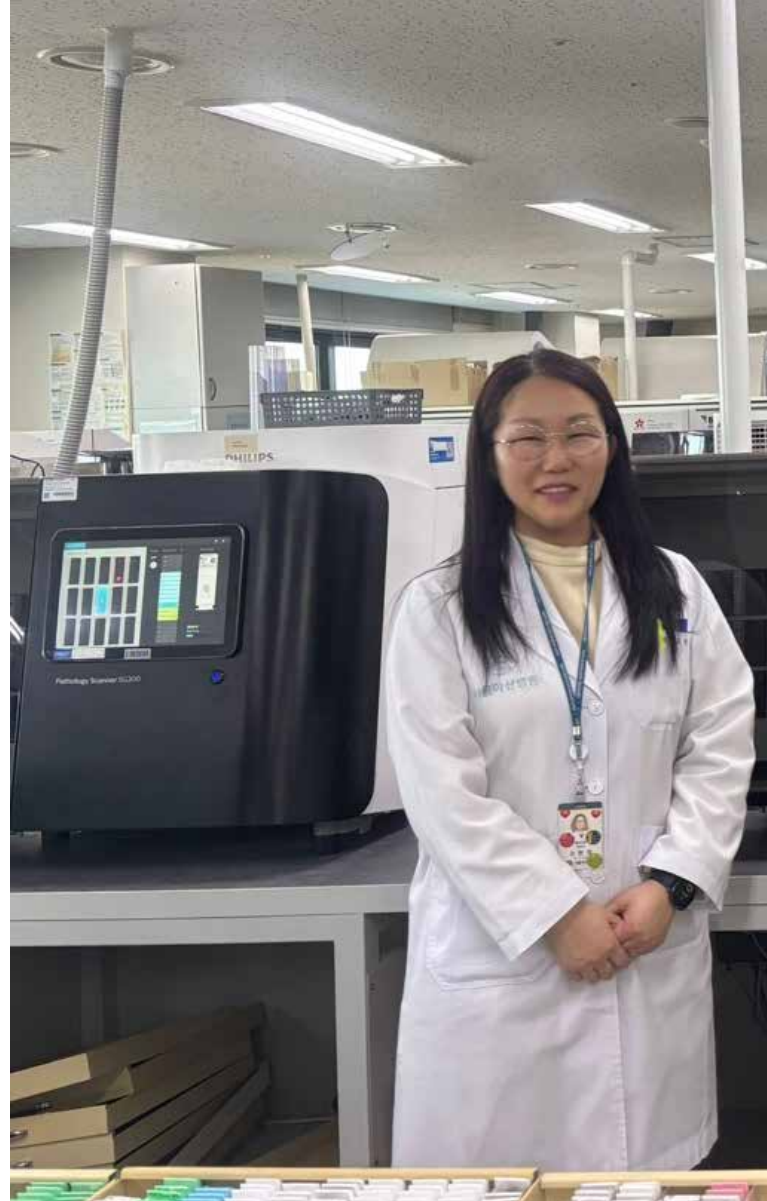


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Going 100% digital from the start made more sense for ASAN because both partial and fully digital approaches would require the same scope of infrastructure development and a partially digital solution would lead to duplicated workflow, resulting in increased time and more staff. Scan time is now shorter than before, and pathologists can start reading two hours earlier than before, which saves time.

She points out tight integration of the EMR and IMS is essential, and that the entire workflow needs to be transformed because traditional pathology processes are designed for the analog method.

Dr. Go says that throughout the process, Philips demonstrated that it is committed to quality, and the Philips team works to innovate in digital pathology by truly listening to the pathologists' feedback.



Conclusion

Digital pathology at ASAN has led to decreased time to diagnoses, supports increased clinical confidence for clinicians and is valued by the department for its positive effect on workflow and work-life balance for staff.

Talk with your Philips representative about the transformation to digital pathology today, or visit www.philips.com/digitalpathology

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