Surprise Hit with Other Participating Physicians

Scripps' Tumor Board Finds Value in Digital Imaging of Slides

➤➤ **CEO Summary:** ***When the Pathology Department at Scripps Memorial Hospital in La Jolla, California, was considering the purchase of a digital imaging system, it gained unlikely allies. Non-pathologist physicians participating in the department's tumor boards advocated for the purchase after seeing a demonstration. Pathologists at Scripps are preparing for a future in which digital imaging systems will encourage more interaction with referring physicians. These systems also could foster a move away from batch processing in pathology and toward real-time continuous flow.***

DIGITAL PATHOLOGY IMAGES ARE PROVING to be a game changer in surprising ways. That's certainly been the case at **Scripps Memorial Hospital** in La Jolla, California, where physicians participating in tumor boards advocated that the hospital spend substantial money to purchase a state-of-the-art digital slide scanner and digital pathology system because of how the clarity of the images contributed to more diagnostic precision during tumor board sessions.

"It's a rare occurrence in any major hospital for proposed spending by the pathology department to have the support of physicians in other clinical areas," observed John Spinosa, M.D., Ph.D., Chief of Staff of the Pathology Department at 293-bed **Scripps Memorial Hospital**. "In addition, since Scripps is a nonprofit health system, the purchase was to be funded with charitable grants. Typically, hospital departments argue vociferously over charitable funds. Thus, it was both unusual and significant to have plenty of backers among the other physicians at the hospital who were not pathologists."

There were the usual hurdles of convincing the health system's information technology department about the value of acquiring digital pathology scanners and a digital pathology system. But the Pathology Department found willing allies among physicians participating in the regular tumor boards. After seeing a digital slide scanner demonstration, these non-pathologists appreciated the clarity of the images and ease of use so much that they recommended the hospital spend about $225,000 to purchase the digital pathology system and fund the informatics integration.

The **Scripps Health System** in San Diego has five facilities, including four hospitals, and 26 pathologists in three pathology groups who process six million billable tests annually, almost all of them for Scripps Health patients. Spinosa's pathology group, the **Laboratory Diagnostics Medical Group** (LabDx), consists of six partners and covers two hospitals about 10 miles apart.

To evaluate how physician members of the tumor boards appreciated the new scanned images over the previous system, LabDx partners conducted a before and after survey of physician satisfaction. In the "before" evaluation, tumor board images were produced using a digital camera attached to a microscope.

The "after" survey evaluated the physicians' opinion of the images produced by the demonstration with the digital scanner manufactured by **Aperio Technologies, Inc.**, in Vista, California. Physician members of the tumor boards greatly appreciated the quality and value of scanned whole slide images over those produced with the digital camera.

According to Spinosa, acquisition of this digital slide scanner and digital pathology system is helping the pathologists deliver more value to referring physicians. It also marks another forward step in greater use of digital pathology systems by the pathologists and their colleagues at Scripps Health.

"When it comes to digital pathology images, we're using them in three applications," noted Spinosa. "The most prominent use of these enhanced digital pathology images is during meetings of the tumor boards here at Scripps Memorial Hospital.

"Second, we are now archiving selected digital images of certain cases," he continued. "Third, we plan to send out digital images of specific slides for second opinions or in response to patient requests.

"It's important to understand that, at this time, our digital slide scanning system is not used to doing sign outs," added Spinosa. "That's because the FDA has not approved these digital pathology systems for primary diagnosis."

Use of digital pathology images at Scripps Health started earlier this decade. "Using a service provided by **US LABS**, a commercial lab company, we did some remote imaging with ER/PR and HER2," stated Spinosa. "That was our initial experience with a digital imaging system.

"Although the quality of the images was not particularly good, they were fine for doing computerized morphometric measurements in immunohistochemistry," he stated. "These images had been produced by the original **ChromaVision** ACIS system. What caught our attention, however, was when US Labs began to use digital scanners manufactured by Aperio. What struck us was the immediate improvement in image quality.

Improved Image Quality

"More importantly, we recognized that pathology images of this quality would make it possible for us to make diagnoses directly from the digital image and we would no longer need microscopes," he recounted. "That was a significant revelation for us. It motivated us to evaluate the benefits of acquiring our own Aperio digital pathology system with an eye to using it for primary diagnosis at some later point.

"While using it as a primary diagnostic tool was off the table, we thought it would be a great fit for tumor boards," related Spinosa. "That might help us justify acquiring such a system. At one time, we used a video camera and a microscope to project the images for tumor boards.

"But this system had a number of disadvantages," he noted. "Next, we evolved to taking photographs, which has another set of disadvantages. We thought a digital pathology imaging system would actually offer the advantages of both systems while minimizing the disadvantages of using video and photographs."

What happened next was a pleasant surprise for the pathologists at Scripps Health. "Acquisition of our digital pathology system turned out to be a most important management lesson about the value of having support from physicians in other clinical services in the hospital," declared Spinosa.

In fact, the Scripps' pathologists followed a step-by-step process to demonstrate the value of a high-quality digital pathology image and gain institutional support for acquiring digital scanners and a digital pathology system. This successful experience offers other pathology groups with a useful road map they can follow.

"It is very important to get your physician clients involved in the decision to purchase these systems because they can be your strongest advocates," said Spinosa. "In our case, physicians outside of pathology became advocates because they recognized that these digital pathology systems help to improve patient care. The fact that our proposed new acquisition improves the care that physicians deliver to patients carries a lot more weight than anything else we as pathologists could do on our own."

However, Spinosa and his colleagues took several steps to highlight this value proposition, including before and after satisfaction surveys of physicians involved in tumor board activities. This generated objective data that reinforced the value proposition of the proposed purchase of a digital pathology system.

"To gauge interest among members of the tumor board, we asked the vendor to conduct a demonstration of the system on site," noted Spinosa. "We also conducted a questionnaire before and after each tumor board meeting. The physicians were asked 'What did you think of the slides? What did you think of the discussion?' And 'What did you think about how the Pathology Department performed during the discussion? Were you satisfied with the results?'

Pre- and Post-Assessment

"At the vendor's suggestion, we did a pre-assessment of the tumor board process using our former system, which was a digital camera attached to a microscope," Spinosa said. "That gave us a baseline of physician satisfaction with our digital photographs of pathology slides.

"Then we installed the demonstration Aperio system. The shift was remarkable and physicians at the tumor boards noticed immediately," he continued. "When we

Would Use of Digital Imaging Systems Encourage Pathology Labs to Abandon Batch Processing?

IN COMING YEARS, use of scanned digital images by pathology groups could reinforce the trend in laboratory medicine to move away from batch processing and toward continuous flow.

"The future of digital imaging systems holds significant potential," said John Spinosa, Chief of Staff of the Pathology Department at Scripps Memorial Hospital. "When you virtualize the slides, you can remove the transport.

New Opportunities

"In fact, digital images create the possibility of evaluating pathology cases in new ways that are not possible with glass slides," he continued. "You can overlay different images. Assume that, on the same slide, you had a fluorescent image and a separate H&E image. Now these two images can be overlaid.

"This is an example of how digital pathology images create new possibilities," observed Spinosa. "I think the big leap for digital pathology imaging will happen—not as a replacement for the microscope—but for doing things that can't be done with a traditional microscope.

"Use of digital pathology images will also unlock a host of changes to the entire process management of anatomic pathology," he added. "For example, most anatomic pathology is currently done with larger batch processes.

"Yet, in histology, some labs are adopting Lean techniques which involve small batch or single-piece workflow," he commented. "Another change agent is rapid processing. These approaches enable the histology lab to achieve continuous flow, often in real time.

"When your lab goes from a batch process to a continuous process, efficiency goes way up. We've seen that in the clinical laboratory.

"The natural complement to continuous processing is digital imaging of slides because it removes the need to transport the slides," explained Spinosa. "Digital imaging of slides supports a continuous flow process, and one of the last bastions of batch processing is anatomic pathology.

"There's a natural synergy there with continuous flow," Spinosa explained. "We could see that there is an expectation that biopsies and specimens would be processed continuously and come out four or five hours later—especially in an integrated network.

"If a biopsy is received at 9:00 a.m. in the pathology laboratory and is processed by 2:00 p.m., why doesn't a pathologist read it that day?" he asked. "This makes it possible to change longstanding work schedules. Now we come in the morning and leave late at night. But pathologists have to become much more like radiologists—where service hours are expanded, but the number of people on staff at any one time is smaller and there is a continuous read-out of specimens arriving in pathology.

Continuous Flow

"In this model, cases would flow continuously to the pathologists as the tissue is processed and the slides are imaged," he noted. "There is time pressure to keep patients in the hospital only as long as necessary. To the extent that knowing the pathologic condition of the patient is an important time critical factor and dropping that time is pertinent, then it becomes clear how digital imaging could bring significant improvements in patient care."

started using the digital images as opposed to the digital photographs, physician satisfaction numbers went way up!

"Clinicians immediately saw the advantages of using the digital pathology system," stated Spinosa. "These high quality images play to the strengths of pathology, because much of what pathologists do is educational. We explain our results to non-pathologists.

"That's the essence of a tumor board," added Spinosa. "And, since physicians found the educational experience so much better when we used the digital scanned image instead of pictures, it was quite easy for them to advocate strongly for using the hospital's limited grant money to purchase a digital imaging system instead of using those funds for something else.

"After the digital pathology system demonstration, it was interesting to see non-pathologist physicians advocating to get the funds for this system," he said. "As a nonprofit institution, Scripps raises money through charitable gifts. Physicians attending the tumor board said, 'We would rather use the money to purchase the digital imaging system than anything else.'

"Having these physicians advocate for this system was significant," stated Spinosa. "When it comes to use of limited charitable gifts at the hospital, it is often a bit like a food fight as every department lobbies for its interests.

"Once we decided to purchase the system, it took about a year to get all the approvals and information technology sign offs," Sinosa added. "We bought the ScanScope XT, which is a relatively high capacity system that allows us to load 106 to 120 slides at a time. Because the system went live in the fall of 2008, it's too early to determine the precise return on investment (ROI).

"But use of these digitally-scanned pathology images has definitely been worth it in one important way," observed Spinosa. "It has elevated the position of pathology in tumor boards and as a collaborator in multidisciplinary reviews. I don't know how you put a number on something that important.

"In addition, the digital pathology system gives us a window today into how pathologists will interact with their physician colleagues in future years," he continued. "After a pathologist shows the physician a digital image, the first thing a physician asks is, 'How can I see this in my office?' and 'How can I show this to a patient?'

"This is an important insight," he continued. "We all know that physicians go over radiology images with their patients. High quality digital pathology images would allow them to do similar reviews with their patients—and thereby boost the value of pathology to their practice.

"That's one advantage of digital imaging," Spinosa commented. "It improves patient care and fosters communication between pathologists and referring physicians in a way that has not been seen previously. However, for this future to become reality, we pathologists must become accessible to referring physicians and their patients in ways that we traditionally have not been.

Looking Ahead

"For now, our primary and regular use of the digital imaging system is in tumor boards," related Spinosa. "We are making preparations to expand its use for other functions.

"For example, we plan to use it to archive slides," he noted. "For second opinions and patient requests, digital images have an advantage. When glass slides are sent out, there is often no record of which specific glass slides for the case were shipped. Using digital images in these circumstances is actually a very functional utility for us.

"One hurdle to this application is that health systems currently don't want to give non-credentialed providers access to images because they don't want to violate

security regulations or federal privacy rules.

"We believe the digital pathology system has the potential for use in virtual immunohistochemistry (IHC)," postulated Spinosa. "This works because IHC is not a primary diagnosis. "Virtualizing IHC would significantly shorten turnaround because there would no transport time. We would like to do that in our next budget year, meaning possibly in 2011.

"In the meantime, our existing digital pathology system will evolve into a quality assurance (QA) resource for us," he continued. "It will allow our pathologists to look at those important or interesting cases, as well as cases we want co-reviewed.

"The pathology images can be transmitted directly to our pathologists, allowing them to accommodate the evaluations according to their workflow. A digital image can also be easily reviewed by two or more pathologists together. That is a big benefit in terms of staff efficiency," commented Spinosa.

For Spinosa, the biggest advantage will result when the FDA grants approval to use these digital pathology systems for primary diagnosis. "At Scripps, we are already using our digital pathology system in productive ways," he concluded. "Until that approval happens, we are getting a lot of utility from digital imaging. What's more, all pathologists need to get up to speed with the culture of using digital imaging systems, and we're already doing that."

THE DARK REPORT observes that Spinosa's group is getting experience with a tool that is likely to change how pathologists deliver services to referring physicians and their patients. That means, Scripps and other health systems installing digital imaging systems today will be well ahead of the curve, particularly if the FDA approved these systems for primary diagnosis. TDR

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Non-Pathologists See Benefits of Digital Images

"LOOKING BACK, IT'S EASY TO SEE why non-pathologists at Scripps Health would advocate for this system," observed John Spinosa, M.D., Chief of Staff.

"When using photographs, maintaining perspective is difficult for clinicians who are not pathologists," he noted. "That's because, as the slide is moved, it blurs up and generally the field of view is much less than a digitally scanned slide. Having the physicians maintain their context is very difficult as the pathologist moves the field of view.

"Often when the magnification is switched from 2x to 4x or from 4x to 10x, it can be disorienting for non-pathologists," Spinosa said. "Changing the view will blank the screen momentarily. Then when the image returns, the non-pathologists don't quite know where they are looking compared with where they were looking previously.

"We didn't appreciate this aspect of viewing slides until we tested a fully digital system," Spinosa commented. "That context of going to a higher power where all is maintained during the dive down is really very comfortable for non-pathologists. In turn, this is a big help for physicians at tumor boards.

"Viewing digital images was not entirely new to non-pathologists, of course, because they were familiar with the ease of use with radiology images and the picture archiving and communication (PAC) system," he add. "During the demo of digital pathology images, they had an 'aha' moment when they realized pathology could have a PAC system equivalent to what radiology has. That was a strong draw for them."