



ADVANCE FOR ADMINISTRATORS OF THE LABORATORY

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AP System Enhancements

Digital pathology is leading the way to more efficient, expedient diagnosis

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Clearly, the most significant value-added capability for anatomic pathology information systems is the ability to acquire, store, manage and display whole slide images via digital pathology (DP) applications. Prior to the advent of DP, pathologists were limited by the glass slides that held tissue samples. If a pathologist wanted to share a slide with a colleague, that person had to physically access the slide and slide review were inherent in the process. Imaging was limited, often lacking in diagnostic quality and used primarily for inclusion in the pathology reports.

Benefits of Digital Imaging

Whole slide digital imaging is a technology that converts glass slides into digital slides with excellent image quality that can be viewed, managed, stored and even streamed over the Internet. Personal computer screens can serve as virtual microscopes, allowing pathologists to quickly distribute the slide images to colleagues for consultation. Additionally, pathologists can share their digital slide images immediately, conveniently and easily with peers who have Internet access anywhere in the world.

Digital slides can be identified and retrieved by unique bar codes or other computer-generated identification. DP significantly reduces the turnaround time for consultation reviews and allows multiple pathologists, even at different locations, to review a digital whole slide image or multiple images side-by-side concurrently. Such accessibility is a boon to improved diagnoses and an aid to teaching programs.

Today's imaging technologies permit slide scanning acquisition in a matter of seconds. The digital imaging whole slide capture can be combined with other computer system data to allow presentation on a computer terminal of slide images with associated clinical information about the patient and/or case.

Today's Technologies

Many AP systems vendors have already ventured into DP and whole slide imaging via partnerships with specialist imaging companies.

Aperio's digital pathology solutions, for example, are designed to improve workflow processes and expand data access, integration and communication capabilities. Four key

AP applications include consultation and sharing services, LIS integration, digital IHC and frozen sections.

Specifically, digital slide sharing and consultation services allow pathologists to obtain consultations from experts anywhere in the world in a matter of hours. Secure transmissions of consultation slides can be made to a data center where they are accessed by authorized consultants.

Integrating a DP system with an anatomic pathology information system allows pathologists to archive, analyze and examine slides digitally while also accessing demographic, clinical history and other relevant information. The ability to access digital slide images directly from the information system without the need for a glass slide streamlines case evaluation.

An all-digital approach to immunohistochemistry (IHC) creates a highly efficient clinical workflow. Pathologists can read slides on a computer monitor and run associated image analysis programs. Professional reports are created automatically.

Digital frozen section applications allow pathology groups to provide coverage for remote hospitals that would otherwise require travel for a pathologist to be onsite to read a frozen section. A pathology assistant located at a remote site can digitize the glass frozen section slide and a pathologist located at the main hospital can read it within minutes.

BioImagene's DP solutions are designed to transform the practice of anatomic pathology from manual to digital. The iScan™ family of automated digital slide scanners coupled with Virtuoso™ software allows pathologists to digitize pathology slides, provide more reliable and consistent diagnoses, collaborate with one another and enrich the pathology education experience for future pathologists.

The iScan Coreo is a high-throughput, high-capacity scanning system. The system provides high-speed, walk-away scanning of slides with excellent image quality. The iScan Coreo incorporates a 160-slide capacity with advances in scanning technology. It is fully integrated with BioImagene's Virtuoso software application to provide an end-to-end management, viewing, image analysis and reporting system. (Virtuoso is a Web-based software application that has an extensive menu of Companion Algorithms™ to assist pathologists in the quantitative assessment of clinical biomarkers.)

iScan Coreo Live, an additional feature of the iScan Coreo, supports telepathology without having to scan a slide first. The feature enables pathologists to remotely control the iScan system just as they would a microscope. Once the digital image is created by the iScan, it opens up numerous opportunities for the pathologist to review the case anywhere and anytime with a simple Internet connection.

BioImagene's Crescendo pathology workstation integrates silos of information such as LIS, radiology picture archiving and communication systems (PACS), EMRs, gross

images, online references and differential patient information with digital images of pathology slides to provide pathologists with necessary information to make a diagnosis. A pathologist can simultaneously view multiple slide images and navigate around the images in a synchronized fashion, allowing him to compare the same serial sections of a tissue sample stained with different markers or compare against past images to make a differential diagnosis. The Crescendo incorporates all the features of BioImagene's Virtuoso application, allowing pathologists to benefit from several disease-specific Companion Algorithms to quantitatively assess various biomarkers. Using Crescendo, geographically distributed pathologists can easily collaborate on a case with an Internet connection, allowing second opinions or peer reviews to be sought and rendered across distances instantaneously.

Interfaced, Integration Advances

Cerner CoPathPlus Digital Slide solution is interfaced with Spectrum™ Aperio's DP information management system. The interface is designed to optimize workflow and facilitate access of digital slide images and case data between the two systems. The interface also enables CoPathPlus to drive the Digital Slide Viewer, incorporating it into the pathologist's workflow. Access to Digital Slides is available from virtually any CoPathPlus specimen activity. Slides are uniquely identified with a 2-D bar code on the label, generated by the Advanced Barcoding & Tracking module in CoPathPlus.

In addition to handling labeling, this module provides materials tracking features to improve laboratory workflow and increase patient safety. The Digital Slide Interface allows snapshots to be captured from the digital slide with the click of one button, annotations added, then automatically attached to the patient report.

NovoPath™ from NovoVision, an easy-to-use complete Anatomic Pathology Software Platform, has helped clients streamline workflow in a variety of settings, including hospitals and reference labs.

The NovoPath platform scales to fit every lab. It is designed to be modular to address the unique needs and budgets of each client. This way, a client pays for only those features that are needed immediately while providing the capability of extending desired functionality well into the future.

In addition to NovoPath's Web Outreach Module (remote order entry, resulting, reporting and printing), NovoPath offers dedicated modules for billing/accounts receivable, flow cytometry and cytogenetic testing and has full HL7 connectivity to an array of LIS, HIS, EMR systems and instrument vendors. Other features of interest include batch document scanning, customizable stain panels and histology worksheets, work lists, synoptic reporting, anatomic organ maps, integrated digital voice dictation, barcode interfaces, ad hoc reporting, audit trails, image management and annotation, specimen tracking and an advanced security for compliance well beyond HIPAA recommendations.

McKesson Horizon Anatomic Pathology supports integration with DP applications provided from both Aperio and BioImagene corporations. Horizon Anatomic Pathology launches the appropriate third-party viewer directly from within the case, providing full viewer functionality and supporting direct selection and insertion of areas of interest into the patient report.

Horizon Anatomic Pathology allows the pathologist to expand the case by providing seamless access to other information about the patient electronically. The pathologist can view lab results, prior cases, whole slide images, PACS images and scanned documents to assist in rendering the diagnosis. The pathologist can link this information to the present case; it is permanently attached for future review.

The application also includes a pathologist command console, the Virtual Slide Tray™. This electronic metaphor of a physical slide tray allows the pathologist to launch any function from a single screen within the Horizon Anatomic Pathology solution as well as access to other applications like PACS systems and whole slide imaging systems within the patient context.

MEDITECH's Anatomical Pathology application offers dynamic reporting and allows staff members to include an unlimited number of digital images, graphics and logos to enhance the formatting of their reports. Users also have the ability to create different reports and templates for each new test, department or status. Additionally, Meditech's integrated HCIS allows for seamless flow of information with Imaging and Therapeutic Services and Laboratory, allowing radiology images and results, lab results and signatures to be pulled onto reports.

The image management tools and ability to integrate the drivers of microscope cameras in Orchard Software's Pathology applications make it easy to link digital images and scanned documents to case worksheets and incorporate them onto patient reports. Annotation tools are built within, making it easier for the pathologist to associate pertinent images and comments with each diagnosis.

Information Solutions

DP is an emerging technology that answers the ever-increasing expectations of the pathology laboratory. According to SCC Soft Computer, once DP is integrated with the LIS, it is possible to share data with it, setting the stage for more widespread adoption of DP systems. Success in this dynamic environment is contingent upon a feature-rich anatomic pathology system that offers flexibility, digital integration capability and functionality needed for today's dynamic pathology environment.

PowerPath, Elekta Impac Software's AP LIS, incorporates interfaces between PowerPath and DP systems. By developing a standard interface protocol within PowerPath, Impac Software is able to provide an interface with two leading DP systems today-Aperio - Technologies' Spectrum and BioImagene's Virtuoso. The new interface allows data to be exchanged between PowerPath and the DP system, providing an integrated workflow for

digital slide imaging and analysis, case management and reporting. A pathologist working from within a case in PowerPath can simply click the thumbnail of a slide image to launch the DP image viewer and view the slide image on the monitor. The pathologist can also select an area of interest from the slide image and optionally include it into the pathology report.

Psyche Systems' anatomic pathology solution, Windopath, also supports images-from capture to annotation and editing capabilities. Any image can be integrated into the application, stored directly within the case and is editable with any image editing application. Three types of specimen images and case-specific images are supported, and because all images are stored with the case they are able to be printed or selected to not be printed on the final report. Each image can be assigned specific height and width parameters, have text wrap around the image or be set to have its own area defined within the report for viewing. Multiple image formats are supported, and all images associated with a case or specimen can be shared electronically, emailed, printed, etc.

Sunquest CoPathPlus also has developed integration with DP systems-in conjunction with such firms as Aperio, BioImagene, Apollo, Omnyx and Philips-to provide standard image connectivity. Diagnostic-quality images can be captured, stored and displayed for flexible and seamless review by pathologists using the Pathologist Workstation. The automation of the pathology workflow enhances speed-to-diagnosis and improved patient care.

Meeting Expectations

The increased emphasis on electronic medical records (EMRs) highlights the importance of getting the pathology report stored in the electronic record in a format other than a PDF, text or image. According to representatives from Orchard, the ability to store discrete data fields simplifies the process for mining data for evaluations, correlation studies, quality assurance, regulatory, statistical and many other management reports. Data stored as discrete components can be used for outcome and performance monitoring and cancer registry abstraction.

Additionally, synoptic reporting eliminates the need for transcription, as all reporting is done directly by the pathologist. Synoptic reporting can also streamline the billing process by automatically capturing IDC and CPT codes as a by-product of the process.

If the AP system vendor does not provide synoptic reporting and discrete data storage, third-party vendors such as mTuitive provide solutions that interface and integrate with existing systems.

Specimen tracking and bar coding of requisitions, specimens, cassettes and slides has become a new component of several systems. Sunquest says its goal is "to improve workflow and support patient safety initiatives by positively identifying and matching each asset within a case from specimen acquisition to storage and archival, ensuring that no specimen or subsequent asset is lost while supporting the total anatomic pathology

testing cycle (specimen acquisition through archival) in a more automated workflow." McKesson claims using bar codes results in "positive patient identification without error prone keyboard lookups." Orchard's ability to interface pathology instrumentation for positive sample identification reduces errors and allows the pathology laboratory to move away from the inefficiencies associated with batch processing. Bar coding of specimens, tissue cassettes and slides allow pathologists and technicians to move cases confidently through the analytical process with greater speed and accuracy.

The use of rules also can enhance the pathology workflow and reporting. Rules-based decision support is available throughout Orchard Pathology, and result evaluation rules for reflex testing can be configured to individual workflow scenarios.

McKesson's Anatomic Pathology system provides an expert workflow engine that creates and automatically assigns tasks as needed so the right person is performing the right task on the right specimen for the right patient at the right time. It also captures audit information that provides management reporting and process improvement capabilities. Other vendors can incorporate data from clinical and other systems to use in their rules.

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