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Formative Evaluation of Virtual Microscopy for Tissue Quality Control Purposes

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Context: Virtual microscopy (VM), the technique of digitizing microscope slides with common objective magnifications, may be equivalent to original glass slides on microscopes and will provide diagnostic image quality. The objective of the Gynecologic Oncology Group (GOG) Tissue Bank is to fully use this technology to facilitate a more efficient and cost-effective quality control review process of patient tissue submitted by member institutions of the GOG.

Technology: Using the ScanScope (Aperio Technologies, Vista, Calif) T2 linear-array slide scanner, a virtual slide repository, and the ImageServer software (Aperio Technologies), the GOG Tissue Bank personnel digitized slides and made these images available for review via the Internet. Using viewing software, these images were reviewed digitally with the results compared against the original glass slides.

To facilitate the long-term storage and viewing of digital images, the GOG Tissue Bank is collaborating with the Ohio Supercomputer Center (OSC). As a leader in computing and networking, the OSC provides a reliable high performance computing and communications infrastructure and has allocated 10 terabytes of storage capacity for digital imaging projects.

Design: A GOG pathologist who usually reviews the material for diagnosis quality assurance reviewed 25 cases using the digital images and compared these results with the traditional method for the same cases. The diagnosis was reproducible in all 25 cases; in 1 case an endometrioid carcinoma was diagnosed as grade 2 on the slide and grade 3 on digital image.

Results: In this first formative evaluation of providing digital images for review, we report that VM significantly reduced costs while providing an equivalent means of evaluating human tissue. It took 100 minutes to perform the digital reviews, whereas the traditional method required only 65 minutes. Digital review is expected to become faster as reviewers become more experienced with the process and technology improves. To further facilitate the quality control review process, the GOG Tissue Bank will promote electronic pathology review for cases submitted by member institutions. Additional formative and summative evaluations are planned.

Conclusions: VM will facilitate translational research in gynecologic cancer by providing both a Web-based pathology review and a digital archive of original pathology material submitted for confirmation of eligibility criteria in a retrievable database.