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Abstract

**Virtual Microscopy: A New Tool for Pathology and Anatomy Education**

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Disciplines in the medical sciences such as hematology, anatomical pathology, cytopathology and histology require the teaching of skills in the recognition and interpretation of microscopic images. Virtual microscopy can recreate the experience of microscopy on a personal computer (PC) or a wireless personal digital assistant (PDA) over a computer network. A virtual slide is created by merging serial, overlapping digital photomicrographs of a microscopic field, to produce a large, composite, high-resolution panoramic image. The virtual slide can be displayed using software that enables the user to zoom in or out, and to move from side-to-side, or “pan” the slide.

Software solutions that have been described for virtual microscopy on a PC web browser include Macromedia Flash®, Quicktime VR®, and Flashpix®. A simple software solution is the use of a Java applet to display virtual slides. Java technology (Sun Microsystems, 1995), can be used to build a small application module or applet for use in a web page. An important advantage of Java is that it is platform-independent and will therefore run on most computer operating systems. The java applet is a simple software solution that offers excellent ease-of-use and a realistic simulation of microscopy techniques. Virtual microscopy can be adapted for the wireless PDA by the use of a Macromedia Flash® extension template running on the Pocket PC (PPC) platform. In our trials with networked virtual microscopy on networked PCs and wireless PPCs, virtual microscopy was judged to be effective educational tools by students and tutors.

Limitations of virtual microscopy include the absence of a microscope focusing function, and a lack of the “hands-on” experience of manipulating a microscope. However, web-based simulated microscopy offers significant advantages over conventional microscopy. A web-based virtual slide library enables users to revise materials “anytime, anywhere” without microscopes or glass slides. Unlike conventional glass slides, virtual slides do not deteriorate with time. In proficiency testing of microscopic skills, an important advantage of virtual microscopy is that all users view the same image, which is not possible with traditional microscopy. Further, a web-based format enables on-line entry of responses and rapid delivery of results by electronic mail. Finally, the traditional microscopy classroom is costly, and the maintenance of glass slide teaching sets is a repetitive chore.

With advances in digital imaging and web technology, web-based virtual microscopy is likely to replace the traditional microscopy classroom in medical education.