A Change That Will Affect Our Professional Lives and Improve Patient Care

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The U.S. Food and Drug Administration (FDA) is expected to approve digital whole slide imaging for routine surgical pathological, and therefore dermatopathological, diagnosis to replace diagnosis using conventional light microscopy. Once approved, regulatory agencies in other countries will certainly follow suit. The effects will be far-reaching and change our professional setting in dermatology and dermatopathology, ranging from our education, use of equipment and software, in both clinical dermatological and dermatopathological practices and consultation, to global effects on standardization and quality of care.

Definition of digital dermatopathology

In digital or virtual dermatopathology, computer technology is used to convert analogue microscopic images into digital images. A digital whole slide image (WSI) is a digitized image of the complete tissue specimen on a 25×75 mm glass microscope slide. Usually, the image is captured through a 20X microscope objective. It can be displayed on computer screens at 20X, lower magnification, or electronically enlarged to 40X.

Changes in the equipment and software use

Since diagnoses will be made with digital images and computers are cheaper than microscopes, computers will prevail in educational settings, giving medical students and residents the necessary training in digital dermatopathology. Relatively few microscopes will remain in universities and there will also be fewer microscopes than currently in dermatopathologic practices.

Electronic medical record software, capable of incorporating the ability to link to digital WSIs, will become standard, making clinico-pathologic correlation and collaboration between the clinician and the dermatopathologist more approachable.

Apps for mobile devices, which incorporate digital pathological images for use in education, will become prevalent. Consultation apps will also emerge, making the diagnostic process quicker and collaboration easier. In addition, apps for accessing medical records with links to digital WSIs, which will also have the ability to change the data within them, will be developed. This will result in decreased lag time in both recording diagnoses and therapeutic implementation.

All of these depend on use of the Internet, demanding implementation of increased security in our use of it.

Educational changes

For the reasons mentioned above, dermatopathological instruction of medical students, as well as training of dermatology residents and dermatopathology fellows, will take place almost exclusively in digital format. Consequently, the board/certification examinations will all be digitalized and be based on WSI's. Demand for board/certification review courses and continuing medical education examinations in digital format will subsequently increase.

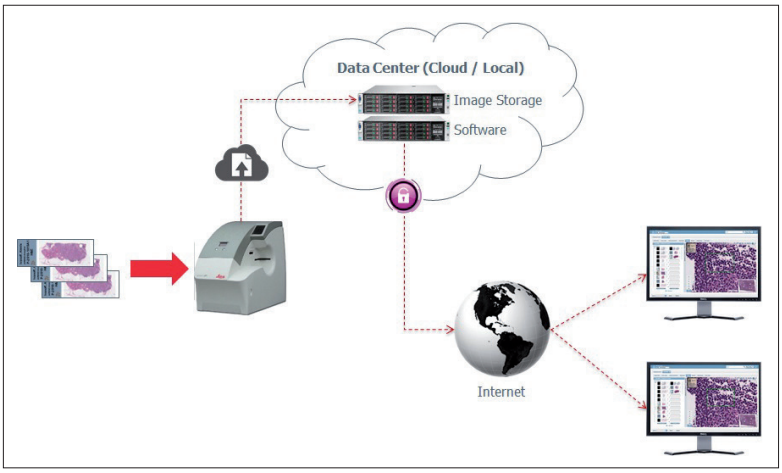

Fig. 1. Whole slide image production and sharing. Courtesy of Colin Doolan, Leica Biosystems.

Increased clinico-pathologic correlation via linking of WSIs in medical records will lead to easier collaboration between the dermatologist and dermatopathologist, which will also be of benefit to the patients. As a result, emphasis on clinico-pathologic correlation and therefore dermatopathological education in dermatology residencies will emerge.

Dermatopathology practices change to digital format

Digital WSI's will not replace the glass microscope slides. The latter still have to be prepared and are the source of the information to be digitized. Also, since glass slides consist of an actual sample of the patient specimen, the corresponding paraffin-embedded tissue can be retrieved for molecular pathology studies.

However, there are many functions that can be achieved with digital WSIs that are impossible with light microscope examinations. These include integrating the workflow of the dermatopathologists with the electronic medical records, including transmission of digital images to the patient's electronic chart and other links, e.g. for use in consultations. Also, retrieval of previous skin biopsy digital images and split screen comparison of two or more images from the same or different cases will be easily achieved, and will be beneficial in the diagnostic process.

With the advent of the use of digital WSIs, diagnosis outside the office will become a possibility, but will have to be approved by regulatory bodies currently limiting diagnoses to the confines of a laboratory that complies with certain standards. However, distant consultation will be made easier with the use of WSIs and this will likely eventuate in regional and international networks of dermatopathology and centres of excellence and/or tertiary care, which will certainly benefit the patients.

Global effect

Congresses will change format to digital WSIs. All self-assessment examinations in clinico-pathologic correlation and dermatopathologic diagnosis will therefore have Internet connections for speakers. This will inevitably lead to some changes in lecture and session format and increased Internet use.

In order to have global networks and centres of excellence in dermatology and dermatopathology, more equivalency and acceptance of board examinations across borders will ensue, leading to international certification committees and standardisation of certification examinations worldwide.

Summary

The evolution of digital dermatopathology as a diagnostic tool will be beneficial to patients and lead to global improvement of quality of care. Increased clinico-pathologic correlation via linking of WSIs in medical records will lead to easier collaboration between the dermatologist and dermatopathologist and benefit the patients. Retrieval of previous WSIs and split screen comparison from the same or different cases will improve the diagnostic process. Apps with WSI links will make consultation easier, thereby speeding up the diagnostic process, as well as decreasing lag time, both in recording diagnoses in electronic medical records and in therapeutic implementation. Distant consultation will lead to the establishment of regional and international networks of dermatopathology and centres of excellence and/or tertiary care. As a consequence, more equivalency and acceptance of board examinations across borders will ensue, increasing international standards of education and thereby patient care.

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*Dr Mooney is the Director of the Nordic Institute of Virtual Dermatopathology. Among the references, which the FDA is using in their approval process, are studies which Dr. Mooney and her collaborators have done on diagnostic accuracy in virtual dermatopathology