October 15, 2009

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19951 Mariner Ave.
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Louise Magruder
Food and Drug Administration
10903 New Hampshire Ave.
Silver Spring, MD 20993-0002

Regarding: Hematology and Pathology Devices Panel (Oct 2009)

Dear Ms. Magruder,

I am writing this letter in reference to the upcoming FDA's Hematology and Pathology Devices Panel meeting, scheduled for October 22-23rd 2009. I want to outline my opinions and experiences with digital pathology primarily as the technology relates to my practice of pathology.

As background, let me give you a short biographical sketch. I am a practicing pathologists in Los Angeles, board certified in Anatomic and Clinical Pathology. I received my medical degree from the University of California, San Francisco, California and my pathology training at Harbor-UCLA Medical Center where I also did a fellowship in hematopathology. I have been Laboratory Director for several Southern California hospitals and have served in key leadership roles for hospital staff and foundation committees. I also served as an information systems and new media consultant to Cedars-Sinai Medical Center in Los Angeles

I am active in several state and national pathology societies including the College of American Pathologists (CAP) where I serve or have served in various leadership or member positions on the Hematology Resource Committee, Publications Committee, Curriculum Committee, Education Council, and Council on Membership and Professional Development. I am a member of the CAP Foundation and former member of the board of directors of the Los Angeles Society of Pathology. I have authored a number of publications and also edited and illustrated the CAP Color Atlas of Hematology, Color Atlas of Body Fluids and Color Atlas of Urinalysis.

Specifically regarding digital pathology, I have lectured on the subject locally and nationally. I am in charge of whole slide imaging at Pathology, Inc., a large reference lab in Southern California. I have also written software to enhance the

digital pathology experience, in terms of tumor conferences, consultations, and teaching. I also serve on the medical advisory board for Aperio.

I am medial director at Pathology, Inc. We purchased a whole slide imaging system from Aperio two years ago. I must say that I was a skeptic at first; I did not think that the technology was proven, practical, and diagnostically acceptable for actual pathology work. But we had experience with an older technology, called ChromaVision, and thought that the platform offered better image analysis options.

But I was very wrong.

Not only has the whole slide imaging system proved to be a superior system for breast marker analysis, it has opened up many other diagnostic avenues.

First, it is an excellent platform for virtual evaluation of immunohistochemical stains. I have used it on many occasions for remote viewing of critical lymphoma marker stains. The quality is excellent and diagnostically robust.

Second, it excels at teaching conferences and archiving of unusual cases. We use it for medical legal and send-out cases, when the original glass slides are unique and irreplaceable.

Third, I have used whole slide images to assist in remote diagnosis of hematopathology cases. The digital image is unquestionably of diagnostic quality. I see no barriers to using whole slide images as a primary diagnostic modality, equivalent—and in some ways superior—to a traditional microscope.

Digital diagnostic devices, such as the Aperio and BioImagine whole slide scanners, can do more than just assist the pathologist in making a primary diagnosis. The digital image can be manipulated to find rare events (e.g., tumor cells, microorganisms, and mitotic figures). It also allows extremely accurate measurement for depth of invasion (relevant for malignant melanoma). And the computer algorithms are valuable adjuncts to the quantitation and interpretation of tumor markers, such as the breast markers ER, PR, Ki67, and HER2.

But equivalency to the microscope is only the beginning. The technology will continue to play a growing role in helping pathologists expedite diagnoses and, in many cases, make more accurate interpretations. More and more computer-assisted imaging algorithms will be developed. The medical school training programs are replacing microscopes in their histology laboratories and the pathologists of tomorrow will expect that digital pathology images are an integral part of their training and work experience.

Every day I become more convinced of the tremendous value and diagnostic opportunities that this new medical device offers. As a practicing pathologist who views microscopic slides using both a traditional microscope and whole slide digital images every day in my practice, I can attest to its diagnostic accuracy and equivalency.

But that being said, validation is critical. Any new modality must past muster. Any pathologist considering implementing a digital pathology device should insure diagnostic equivalency for a particular case mix. Issues to be considered are color accuracy, bright field illumination, histologic detail, any potential for scanning artifacts, z-stack requirements (if any), special stain issues (e.g., amyloid), cases that may require very high magnification (e.g., some hematopathology cases), importance of preparing good histology material before scanning, etc. The principles and rigor that pathologists and other laboratory directors currently use to validate new tests and new equipment must be followed when deploying digital imaging devices for diagnostic purposes. Not all microscopic slides are appropriate to render a diagnosis using digital whole slide images; a list of acceptable tissue and stain types should be developed by the medical director and equivalency documented.

I appreciate the willingness of the FDA to assess the values of this new platform and for taking the time to let me weigh in with my observations and opinions.

Sincerely yours,

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