

United States and Canadian Academy of Pathology Annual Meeting

Filename: 451208

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Abstract Categories: 23. Techniques

Presentation format: Either Poster or Platform

Title: Whole Slide Imaging Digital Pathology: A Pilot Study Using Paired Subspecialist Correlations

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Background: Whole slide imaging technology offers promise for rapid Internet-based telepathology consultations between institutions. Technical issues, pathologist adaptability, and morphologic pitfalls inherent to this process have not been well characterized.

Design: Histopathology slides of diseases from a variety of anatomic sites with reference diagnoses were selected by an outside laboratory. Virtual slides were made using a Zeiss Mirax scanner. Virtual and glass slides were diagnosed independently by 2 subspecialty pathologists appropriate for each anatomic site. Reference diagnoses were compared to virtual and glass slide interpretations, and correlation data was tabulated. Comments on virtual slide technical issues were gathered.

Result: 53 cases were analyzed. There was agreement between virtual, glass, and reference diagnoses in 45 (85%), and between virtual and glass diagnoses in 48 (91%) cases. There were 5 virtual cases (9%) discordant with both reference and glass slide diagnoses. Further review of these cases indicated an incorrect virtual slide interpretation. By anatomic site, concordance rates between virtual and glass slide reviews were: lung - 89% (8/9), liver/GI tract - 82% (9/11), cardiovascular - 100% (5/5), hematopathology - 80% (4/5), thyroid/salivary gland - 100% (6/6), skin - 50% (1/2), kidney - 100% (6/6), prostate - 100% (1/1), gynecologic - 100% (4/4), bone and soft tissue - 100% (3/3), and neuropathology - 100% (1/1). Neoplastic cases showed better correlation (93%) than did cases of non-neoplastic disease (88%). Comments on discordant cases related to virtual slide technical issues such as fine resolution and navigating ability at high magnification.

Conclusion: Overall concordance between virtual and standard slide interpretations was good at 91%. Adjustments in technology, case selection, and further experience to include identification of pitfalls and technology familiarization should improve performance, making digital whole slide review feasible for broader telepathology application.