



Proceedings

SY10.04 | Standardization

COLOR CALIBRATION IN DIGITAL PATHOLOGY: THE CLINICAL IMPACT OF A NOVEL TEST OBJECT

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Introduction/ Background

Guidance from the Food and Drug Administration has recommended color standardization for whole slide imaging, as with all other digital systems. However there is known, unresolved and substantial variation in color between digital slide scanners. To address this issue, we created a novel color calibration test object which uniquely utilizes histochemical stains and a tissue-like substrate, affording accurate internal calibration of WSIs.

Aims

We aimed to evaluate the clinical application of the novel test object.

Objectives included: 1. Whether calibration made WSIs appear closer in color to the glass slide counterpart; 2. Whether pathologists prefer calibrated WSIs; and, 3. Whether calibration affected diagnostic confidence.

Methods

Six pathology cases that present known difficulties when viewed using a digital microscope were selected and WSIs were generated. These WSIs were calibrated using a color ICC profile created using spectral measurements from the test object. Twelve pathologists, blinded to intervention, compared calibrated and uncalibrated versions of each WSI on a medical-grade monitor. The display was color calibrated using a colorimeter which accounted for ambient lighting. Three, subjective responses were recorded on 7-point Likert scales.

Results

Calibrated WSIs were closer in appearance to the microscope in 40 of 72 trials, (56%) and were preferred in 46 of 72 trials (64%). Calibration improved diagnostic confidence (median 6.00 vs. 5.00, $p=0.001$). Diagnostic confidence with the calibrated slides was correlated with preference for color calibration ($r=0.499$; $p<0.001$).