

Colour Calibration in Digital Pathology: the Clinical Impact of a Novel Test Object

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Purpose of the Study

Virtual slide scanners have been in use for over a decade; yet digital image viewing has yet to be fully integrated into clinical practice. Colour calibration of virtual slides is one aspect that has remained largely un-investigated, but may influence diagnosis. We created a colour calibration test object, and aimed to evaluate its effectiveness in the clinical setting. The objectives were to investigate: 1. Whether colour calibrated virtual slides are closer in appearance to the glass slides as viewed through the microscope, when compared to uncalibrated virtual slides, 2. To determine whether colour calibrated virtual slides are preferred by pathologists and 3. To ascertain whether colour calibration increases confidence in diagnosis.

Methods

Six glass slides of varying tissue types and stains were selected and scanned to produce virtual slides. These virtual slides then underwent colour calibration using a colour profile created with the test object. A colour calibrated, medical grade monitor was used to view the virtual slides. Twelve consultant pathologists took part in the experiment and were asked to compare the colour calibrated virtual slides with the uncalibrated virtual slides. Subjective responses were recorded on 7-point Likert scales.

Summary of Results

Colour calibrated virtual slides were closer in appearance to the microscope (40 of 72 trials, 56%) and calibrated slides were also preferred by pathologists (46 of 72 trials, 64%). Colour calibration improved diagnostic confidence (median 6.00 vs. 5.00, $p=0.001$).

Conclusions

Colour calibration of virtual slides may be beneficial to clinicians by increasing confidence in diagnosis. It also affords virtual slide colour standardisation; an unmet need highlighted by the US Food and Drug Administration and the International Colour Consortium. Further research should focus on the effect of calibrated virtual slides on diagnostic accuracy.