DERMOSCOPY AND SKIN IMAGING

COLOR VARIABILITY IN DIGITAL DERMOSCOPY

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Background: In digital dermoscopy, skin images are acquired typically with a smartphone or SRL camera that is clicked upon a dermatoscope, or with digital dermatoscopes that directly acquire images without the need of a separate camera. Resulting digital image files are visualized on a display system.
Color is an important characteristic in evaluation of skin lesions. It is well known that both the camera system as well as the display can introduce color variability that changes the perceived colors in digital dermoscopy images.

Objective: The objective of this paper is to understand how much color variability is present in digital dermoscopy, and what the relative contribution is of camera versus display.

Materials and Methods: Digital dermoscopy images were acquired of several clinically relevant lesions including melanoma, BCC and SCC. Resulting images were visualized on different displays and with different display settings.
For each configuration, color appearance of the overall image and of specific clinically important features in these images was characterized. The degree of color variability was also numerically calculated. Measurements were done to understand the relative contribution of camera versus display in overall observed color variability.

Results: Large variations in color were observed. Overall color variability exceeded 20 DeltaE2000 values. Color appearance of clinically relevant features varied significantly between different configurations. The largest source of color variability is the automatic exposure and white balance algorithm used in smartphones and SRL cameras. Display characteristics also have an important influence but can be compensated for by means of display calibration.

Conclusions: Digital dermoscopy images can suffer from important color variability, especially when images are acquired with smartphones or external cameras. Display characteristics can contribute to color variability especially for non-calibrated displays. Future work will focus on specific recommendations for improving color reliability in digital dermoscopy.