A SINGLE-CENTER CLINICAL STUDY APPLIES MELANOMA IMAGING BIOMARKERS TO STANDARD AND HYPERSPECTRAL DERMOSCOPY FOR EARLY MELANOMA DETECTION

Anna-Marie Hosking, Kenneth G. Linden, Kristen M. Kelly, James Jakowatz, Maki Yamamoto, Janellen Smith, Dorothy Chang, Samantha Lish, Sung Lee, Manuel Valdebran, Faezeh Talebi-Liasi, Dorota Korta, Daniel S. Gareau

University of California, Irvine, CA; UC Irvine Health Chao Family Comprehensive Cancer Center, Orange, CA; Rockefeller University, Laboratory of Investigative Dermatology, New York, NY

Background: Early detection of melanoma is essential to decrease associated morbidity and mortality. Screening classically involves dermoscopy to identify suspicious lesions as benign nevi, atypical nevi, or cancerous growths, with subsequent biopsy and histological examination. However, with current methods, a considerable number of unnecessary biopsies are performed. With the aid of image processing and artificial intelligence algorithms, we have the potential to generate standardized melanoma imaging biomarkers (MIBs). MIBs are characteristics extracted from quantitative analysis of dermoscopy images that correlate with melanoma pathology. MIBs have been shown to be spectrally dependent in Red/Green/Blue (RGB) colour channels, suggesting hyperspectral imaging may further enhance diagnostic power.

Study Design/Materials and Method: After obtaining informed consent, pigmented lesions of 20 patients from UC Irvine were imaged with both standard and hyperspectral dermatoscopes prior to removal and histopathological analysis of suspicious lesions. Each image underwent automated computer analysis, leading to a set of MIBs. Machine learning was applied to combine the MIBs with histological diagnoses, creating a predictive algorithm to identify each pigmented lesion as melanoma or nevus.

Results: The sensitivity and specificity results for melanoma diagnosis in preliminary analysis of 20 lesions were specified by the standard receiver/operator characteristic curve. In addition, hyperspectral imaging biomarkers contained a more robust set of diagnostic information than imaging biomarkers derived from standard dermoscopy. Additional cases will be accrued and analyzed in the final results.

Conclusion: Imaging biomarkers show promise to noninvasively screen melanoma and guide biopsy. With this novel, non-invasive methodology for evaluating pigmented lesions, dermatologists can harness computational power to aid in standardized evaluation. Over time, and with the analysis of more lesions, the computer can gain additional expertise in this area. Continuing work aims to improve the power of the study as well as further investigate the additional diagnostic value of hyperspectral image analysis over RGB image analysis.