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Multispectral imaging system based on light-emitting diodes for the detection of melanomas and basal cell carcinomas: a pilot study.

Delpueyo X, Vilaseca M, Royo S, Ares M, Rey-Barroso L, Sanabria F, Puig S, Pellacani G, Noguero F, Solomita G, Bosch T. J Biomed Opt. 2017 Jun 1;22(6):65006. doi: 10.1117/1.JBO.22.6.065006.

ABSTRACT

This article proposes a multispectral system that uses the analysis of the spatial distribution of color and spectral features to improve the detection of skin cancer lesions, specifically melanomas and basal cell carcinomas. The system consists of a digital camera and light-emitting diodes of eight different wavelengths (414 to 995 nm). The parameters based on spectral features of the lesions such as reflectance and color, as well as others empirically computed using reflectance values, were calculated pixel-by-pixel from the images obtained. Statistical descriptors were calculated for every segmented lesion [mean (\bar{x}), standard deviation (σ), minimum, and maximum]; descriptors based on the first-order statistics of the histogram [entropy (E_p), energy (E_n), and third central moment (μ_3)] were also obtained. The study analyzed 429 pigmented and nonpigmented lesions: 290 nevi and 139 malignant (95 melanomas and 44 basal cell carcinomas), which were split into training and validation sets. Fifteen parameters were found to provide the best sensitivity (87.2% melanomas and 100% basal cell carcinomas) and specificity (54.5%). The results suggest that the extraction of textural information can contribute to the diagnosis of melanomas and basal cell carcinomas as a supporting tool to dermoscopy and confocal microscopy. PMID: 28662242 DOI: 10.1117/1.JBO.22.6.065006