Cutaneous Oncology Screening and Dermoscopy
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Skin cancer is the most common cancer in the U.S., with 1 in 5 Americans developing skin cancer in their lifetime. The majority of skin cancer deaths result from melanoma. An estimated 6850 deaths in U.S. will have been attributed to melanoma in 2020. Basal cell carcinomas (BCCs) and squamous cell carcinomas (SCCs) are highly curable when treated early. The five-year survival rate for melanoma is 92% if detected and treated before spreading to lymph nodes, 65% if detected after spreading to nearby lymph nodes, and 25% if detected after spreading to distant lymph nodes and other organs. Although it is recommended, there is no clear consensus from the American Academy of Dermatology on how to perform a self-examination of the skin or how frequently to do so.

Dermoscopy helps to differentiate between melanocytic and nonmelanocytic lesions, and between benign and malignant neoplasms. The most widely-used dermatoscope has a one-fold magnification. Dermatologists look for reticular networks, cobblestone patterns, globular patterns, homogenous patterns and starburst patterns in skin lesions or tumors. Melanoma presents with atypical pigment networks, irregular dots, globules, streaks, blue-whitish veils and regression. BCCs show arborizing vessels and leaf-like structures. SCCs show hair-pin vessels, vascular loops and glomerular vessels. The Menzies method is used to help differentiate melanocytic lesions from melanoma. Melanoma should not have any negative features of symmetry or presence of a single color, and it must have one or more positive features such as those mentioned previously.

Reflectance confocal microscopy is a noninvasive imaging modality using differences in refractive indices to create images on cellular structures to a depth of 200 micrometers with high-resolution images equivalent to a 30x microscope. Optical coherence tomography uses infrared and near-infrared light to determine differences in refractive indices and generate images in less than one minute, scanning to a depth of 2mm. However, the device cannot identify individual cells and is very expensive. Electrical Impedance Spectroscopy relies on molecular vibrations to generate specific images and is under review in the U.S. Cross-polarized light and fluorescence photography use fluorophores to create images of malignant cells which have increased fluorescence, however there are long incubation times and limited use in identifying high-risk skin cancers. High-frequency ultrasound is also used for diagnosis, surgical planning and lesion monitoring – it has good depth, but poor image quality.