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Time-resolved optical tomography system for skin cancer detection

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Skin cancer is the most common form of cancer in the U.S. One in five Americans will develop skin cancer in the course of a lifetime. Currently, excisional biopsy followed by histo-pathologic examination of the biopsied tissue is the “gold standard” for detecting neoplastic changes and skin carcinomas. Typically dermatologists do multiple biopsies to detect a single case of melanoma. In some patients with multiple recurrent skin tumors, the need for numerous biopsies in the same area is problematic, both cosmetically and diagnostically, as the cancer can be hidden under scar tissue. One major weakness of biopsy is that it is expensive and takes time for the results to become available, thereby increasing patient anxiety. Moreover, the biopsy must be done exactly within the margins of the tumor, and it does not delineate the tumor borders. The objective of this research is developing a time-resolved optical tomography (TROT) system based on fully software-controlled, desktop-size ultrashort pulsed lasers for in-vivo imaging of skin cancer and tumor. The significance of this novel real-time and non-invasive diagnostic technique is that it can provide a complete 3-D view of the scanned area by which one can detect small tumors and their margins at early stages normally not detected by other techniques. It can differentiate between melanocytic and non-melanocytic pigmented lesions, and will improve diagnostic accuracy. The information gathered is not restricted to a few physical samples, as it is in biopsies.

Biography

Kunal Mitra is currently a Professor in Department of Biomedical Engineering at Florida Institute of Technology. He served first as the Program Chair and subsequently as the Department Head in Biomedical Engineering from August 2008 to May 2014. He has published more than 120 peer reviewed journal papers and conference proceedings, 4 book chapters, and hold 2 patents. He is a Fellow of American Society of Mechanical Engineer and American Society of Laser Medicine and Surgery.

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