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Imaging of mammalian tissue.

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Abstract

Phase resolved techniques can be used successfully to image the internal structures of mammalian tissue. Our method observes the diffusion of a modulated infrared laser beam through a biological sample. The transmitted wavefront is read by a modulated CCD camera and the DC intensity, AC intensity, phase shift and demodulation are recorded. Images obtained characterize the absorption and scattering of the material. The modulation frequency of the beam controls the spatial resolution of the images whereas the inherent contrast of the images can be changed by using a different illumination wavelength. Hand and teeth images created under various experimental conditions will be presented and compared to x-ray images. The resolution of these images is limited primarily by the camera to about 0.1 mm. Currently, the system is comparable to an x-ray machine but without the ionizing radiation. In the future, it seems feasible that MRI reconstruction techniques or computer aided tomography could be applied to our process to create volumetric images. This work is supported by NIH grant PHS-P41-RR03155.