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USE OF REFLECTANCE SPECTROPHOTOMETRY (RS) AS A POSSIBLE 3-DIMENSIONAL (3D) SPECTROSCOPIC IMAGING TECHNIQUE. R.L. Barbour, J. Lubowsky and H.L. Graber. Department of Pathology, Biophysics and Scientific/Academic Computing Center, SUNY Health Science Center at Brooklyn, Brooklyn, NY 11203.

RS has proven a useful non-invasive technique for quantifying the oxygenation and redox state of heme proteins in situ. Use of this technique has been complicated due to the uncertainty of knowing the depth of penetration of the emerging light (EL). We have examined the possibility of localizing the 3D position of absorbing objects (AO) in random media (RM) by use of a reflectance measurement. Using a Monte-Carlo simulation, we have calculated the surface intensity pattern of EL in an ideal RM from a collimated source, normally incident. Results showed that: 1) light emerging at increasing radial distance had propagated to increasing depth prior to emergence; 2) the presence of an AO located below the surface was detectable by measurement of EL at increasing distances from the origin. Experimental measurements using a He-Ne laser directed into a synthetic medium, composed of microspheres suspended in water, showed that an AO placed sufficiently below the surface to render it not visible was detected by measurement of the surface pattern of EL. Analysis of multiple surface projections determined the position of the absorber to within 10% of its actual position. These results suggest that RS can be used as a non-invasive 3D imaging technique to identify the absorptive properties of RM such as body tissues.