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Speckle Patterns in Coherence Domain Biomedical Imaging PING YU, Department of Physics and Astronomy, University of Missouri-Columbia — We have shown previously that coherence domain biomedical imaging can be used for optically sectioning small tumors such as rat osteogenic sarcoma (bone tumors). Speckle patterns of such small tumors provided quantitative measures of the health, necrotic, and poisoned tissues. However, the origins of these speckle patterns are not clear. Although the nuclei, mitochondria and other organelles inside cells are responsible for the speckle under the illumination of low coherence light source, these patterns at the imaging plane are related to the photon pathways both inside and outside the tissue. We report systematic experiments and simulation of the speckle patterns from coherence domain imaging of small tumors. The image frames are acquired at different depths inside the tumor tissue and analyzed by using a turbid medium model. The results reveal that the speckle patterns are dominated by the scattering properties of the tissue, which is characterized by the mean free path of the photons, and the collection geometry of the backscattered light photons. This work was supported by a University of Missouri Research Board grant URB-04-072 and NIH grant P50-CA-103130.

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