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Low Cost Technique for Measuring Luminance in Biological Systems

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Abstract : In this work, the relationship between the melanin content in a tissue and subsequent absorption of light through that tissue was determined using a digital camera. This technique proved to be simple, cost effective, efficient and reliable. Tissue phantom samples were created using milk and soy sauce to simulate the optical properties of melanin content in human tissue. Increasing the concentration of soy sauce in the milk correlated to an increase in melanin content of an individual. Two methods were employed to measure the light transmitted through the sample. The first was direct measurement of the transmitted intensity using a conventional lux meter. The second method involved correctly calibrating an ordinary digital camera and using image analysis software to calculate the transmitted intensity through the phantom. The results from these methods were then graphically compared to the theoretical relationship between the intensity of transmitted light and the concentration of absorbers in the sample. Conclusions were then drawn about the effectiveness and efficiency of these low cost methods.

Keywords : tissue phantoms, scattering coefficient, albedo, low-cost method
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