Contribution ID: **5** Type: **Oral**

Investigation the optical effects of monochromatic light at 635 nm on human lung and liver tissues using Monte Carlo simulation

Saturday, 26 September 2020 12:30 (15 minutes)

In recent decades, light became one of the most versatile components for diagnosis and therapeutic purposes. Advancement in optical science and engineering had led to invention of a wide variety of non-invasive and minimally invasive apparatuses and procedures that are inseparable from today's medicine; namely OCT, PDT, etc. The common component of all of these methods is propagation of photons in tissue. Unfortunately, in vivo experiments could be dangerous and result in permanent damage such as destruction, burning and ablation of the tissue. To avoid these complications various techniques of light-tissue interactions simulation have been developed to prognosticate the behavior of photons in biological tissue. In this work, we simulated the interactions between human lung and liver tissue under irradiation of infinitely narrow beam of monochromatic light at 635 nm. By using Monte Carlo simulations, optical properties of tissue including refractive index n, absorption coefficient μa, scattering coefficient μs, and anisotropy g, were calculated. Also we studied some physical effects: Fluency, reflectance, transmittance, absorption and penetration depth of this monochromatic light for a 5 mm one-layer phantom of lung and liver tissues. In addition, logarithmic figures were plotted to sketch Fluency and absorption for each phantom and as the results we deduced that all graphs attenuate exponentially through tissues. The light Fluency in liver tissue at 635 nm is higher than lung tissue; and in early stages, absorption of lung tissue is higher than liver tissue, though it reduces rapidly. Penetration depth is deeper for liver tissue and light transmission of lung tissue is zero.

Topics

Session D. Biomedical optics and sensors technology

Primary authors: Dr GRANMAYEHRAD, Adeleh (Roudehen Branch,Islamic Azad University); Mr MOHAMMAD HOSSEIN POUR, Seyed Arman (Department of Basic Sciences,Science and Research Branch, Islamic Azad University)

Presenter: Dr GRANMAYEHRAD, Adeleh (Roudehen Branch,Islamic Azad University)

Session Classification: Saturaday Session