Diagnosing Tumours Using fNIR Imaging System

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Free-space broadband functional near infrared (fNIR) spectroscopy technique has been used to clinically measure the optical properties of ganglion cysts and lipomas tumors. The fNIR system measures broadband (30MHz-1000MHz) insertion loss (IL) and insertion phase (IP) of modulated light to perform spectroscopic imaging of six patients with right hand wrist tumors (both ganglion and lipomas). The study is divided into two stages. The first stage is dedicated to performing IL and IP measurements over 30MHz-1000MHz in back-scattering, while in the second stage of broadband measurements using the forward scattering is to extract the ganglion cyst optical absorption and scattering parameters. The result of the second stage is then used to perform 3D numerical simulation using multi-physics tool (COMSOL). Diagnosing ganglion cysts fluid and lipomas fat tumor without invasive biopsy requires knowledge of other type of cysts, tumors and bone optical properties. The reduced scattering coefficient of the ganglion cyst ranges from 1.2 to 1.83/cm while the reduced scattering coefficient of the lipomas ranges from 7.8 to 11.51/cm, and from the backscattering measurements of the IP a distinguishable tumor can be identified. This shows how sensitive and accurate the fNIR imaging system is in diagnosing biomaterial.

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