

Section:

OPTICAL TECHNOLOGIES IN BIOPHYSICS & MEDICINE XXV

Title:

Differentiation of healthy and malignant brain tissues using optical coherence tomography

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Abstract:

Optical coherence tomography (OCT) is a low-coherence interferometric method for biological tissue imaging. OCT is widely spread in various fields, including biomedical research and medical practice. OCT became an attractive method for its fast noninvasive imaging of the internal structure of tissues and for its better imaging resolution compared to ultrasound and magnetic resonance imaging. One of the most urgent and challenging problem in surgery is an intraoperative diagnosis of brain tumors and a complete resection of tumor. It is still necessary to develop a novel intraoperative diagnostic method of brain gliomas as existing methods are plagued with limited sensitivity and specificity. Our research aimed at the study of the ability of OCT for the diagnosis

of brain gliomas of different grades according to World Health Organization (WHO). We proposed a set of features such as the attenuation coefficient and its variance within the sample, and local brightness fluctuations in OCT speckle patterns, obtained by means of the wavelet analysis. We applied the linear discriminant analysis (LDA) to compare the benefits of the chosen features for distinguishing intact tissues from glioma of different grades. The results of this study confirmed the perspectives of combined attenuation-speckle signal analysis and demonstrates the prospects of the OCT in an intraoperative neurodiagnostic.

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