HNODS04

Micro-vascularoscopy: A valuable technique for localised optical tissue assessment?

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Keywords: Photodynamic therapy; Laryngeal cancer; Photosensitizer

Clinical observation of early laryngeal cancer photodynamic therapy

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Keywords: Photodynamic therapy; Laryngeal cancer; Photosensitizer

Objective: To observe the cure rate and adverse reaction of photodynamic therapy (PDT) in patients with early laryngeal cancer.

Methods: 45 patients with early laryngeal cancer were diagnosed pathologically as having squamous carcinoma in two hospitals from March 2002 to August 2009. The enrolled patients were treated with intravenous administration of PHOTOFIN or PHOTOSAN as the photosensitizer at the dose of 2 mg/kg. After 4 h, 630 nm laser irradiation was performed through optical fiber that passed through the biopsy channel of a flexible endoscope. After 24 h, the necrotic tissue was removed, and the primary sites and other newly identified sites were subjected to a second irradiation and then the residual necrotic tissue was removed according to the patients’ condition. Endoscopy examination was performed to observe the effect on tumor after one month.

Results: The cure rate of PDT was 90% in these patients.

Conclusion: PDT is effective and safe in the treatment of early laryngeal cancer, which may not only cure the cancer, but also maintain the function of the organ.

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HNODS05

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HNODS06

Monitoring photodynamic therapy using quantitative reflectance and fluorescence spectroscopic measurements performed with a single optical fiber

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Background: Optical measurements of reflectance and fluorescence remitted from tissue undergoing photodynamic therapy (PDT) treatments can provide insight into tissue physiology and photosensitizer fluorescence; information that may aid in PDT dosimetry. Classical optical techniques are often limited by large sampling volumes (losing information about local tissue properties) and by distortion from background tissue optical properties. Our group has focused on small fiber optic devices that sample small tissue volumes, and have developed analysis algorithms that account for the effect of tissue optical properties on the collected signal. This study presents novel advancements of these methods for single fiber optical probes.

Methods: Monte Carlo simulations and experiments were used to investigate single fiber reflectance (SFR) and fluorescence (SFF) over a wide range of optical properties. Mathematical models are developed to relate SFR and SFF intensities to the scattering properties of the sampled medium. This approach is related to data from an ongoing clinical study of m-THPC mediated PDT in patients with head and neck cancer.

Results: A mathematical model-based approach is presented that utilizes SFR measurements to estimate reduced scattering coefficient and information about the scattering phase function, and correct for the effect of scattering properties on SFF. Implications of this approach to analysis of clinical data are presented.

Conclusion: This study presents a novel approach to quantitatively determine tissue scattering properties from SFR measurements and estimate SFF independently of the effects of scattering. The approach has potential clinical utility to quantitatively monitor optical parameters in tissue undergoing PDT.

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HNODS07

Non-invasive monitoring of photodynamic therapy of oral cancers by fluorescence differential path-length spectroscopy

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Background: In vivo monitoring of the three essential constituents of photodynamic therapy (light, oxygen, and photosensitizer) is an important step to understand the procedure and eventually individualize treatment parameters. Classical spectroscopic techniques can provide information about tissue oxygen supply and photosensitizer content, but are often limited by...