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Application of multiphoton microscopy in diagnosis and therapy of early cancer

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Multiphoton microscopy uses ultrafast, near-infrared laser as excitation sources and bases on nonlinear optical signals of intrinsic fluorophores in tissues such as two or three photon-excited fluorescence (2PEF or 3PEF) and second or third harmonic generation (SHG or THG), providing enhanced imaging penetration depths in scattering samples, reduced overall specimen photo damage, photo bleaching and photo toxicity. These advantages make it more suitable for studying intact living tissues at the cellular level without the need of fluorescent dyes. Multiphoton endoscopy has been regarded as a method which may be capable of providing immediate histological images. Using LSM 510 META system (Zeiss, Jena, Germany) coupled to a Ti:Sapphire laser (Coherent Mira 900-F), the application of multiphoton microscopy in diagnosis and therapy of early cancer were investigated. It was focused on esophageal cancer, gastric cancer, colorectal cancer and cervical cancer. Relevance between optical diagnostic features and physiological and pathological states of tissue which was used to identify tumor tissue were established. The targeted ablation of pre-invasive cancer cells with micrometer-sized volume precision was also performed. Our findings provided a “seek-and-treat” medical photonics technology for cancer in epithelial tissues at the molecular level. With the implementation of multiphoton microscopy concept in endoscopy applications, multiphoton endoscopy might realize *in vivo* histological diagnosis goal of endoscopists.

Biography

Jianxin Chen received her PhD in 2002 from Harbin Institute of Technology (China) and completed Postdoctoral studies from Peking University (China). She is Professor of College of Photonic and Electronic Engineering, Fujian Normal University and Director of Fujian Provincial Key Laboratory for Photonics Technology. She has authored or coauthored more than 80 papers in the international journals.

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