

INTRINSIC IMAGING OF PANCREATIC TISSUE USING TWO-PHOTON EXCITED NATIVE FLUORESCENCE AND SECOND HARMONIC GENERATION

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Currently there is no effective non-invasive method for early detection of pancreatic carcinoma, which is one of the most commonly occurring cancer worldwide with a death rate nearly equal to the incidence of adenocarcinoma. In recent years, nonlinear optical techniques such as second harmonic generation (SHG) and two-photon excited fluorescence (TPEF) has emerged as a powerful tool for biological tissue imaging and early diagnosis of various diseases[1, 2]. To improve the early diagnosis of pancreatic carcinoma, for the first time we employed TPEF and SHG imaging to explore the intrinsic optical biomarkers of the human pancreatic cancer tissues. We found that the intrinsic autofluorescence of the pancreatic tissues can be achieved and the collagen fibers in the extracellular matrix can be distinguished from the elastic fibers by using SHG and TPEF imaging, respectively. In addition, significant differences in the collagen contents and arrangements were observed between the normal and the cancerous pancreatic tissues, revealing the structural alterations associated with pathological changes of extracellular components. We demonstrated that the combination of TPEF and SHG imaging techniques show great potential to identify changes in cellular behavior and extracellular matrix for early detection of pancreatic carcinoma.

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