Monitoring the Microenvironment and Microvasculature of Primary Pancreatic Tumor Under Photothermal-Induced Immunotherapy by Optical Coherence Tomography

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100-word text abstract

We utilized optical coherence tomography (OCT) to monitor the longitudinal progression of the microenvironment and microvasculature of pancreatic tumors before and after the photothermal therapy-induced immunotherapy *in vivo*. The primary pancreatic tumors implanted on mouse legs and treated via the photothermal therapy-induced immunotherapy were observed every three days for 36 days. The intensity-based OCT structure, uniformity, texture, intrinsic optical attenuation contrast, and vascular structures were detected and analyzed. Our result demonstrated that the photothermal-induced immunotherapy could cause significant changes in the distribution of the tissue structure and vasculature within the microenvironment and microvasculature of the primary pancreatic tumors.

250-word text abstract

Pancreatic tumor is a high mortality cancer and the treatment mainly relied on the high-risk surgery. To further improve the efficacy and minimize the risk of therapeutics, the photothermal therapy-induced immunotherapy was developed to treat the primary pancreatic tumor. In this study, we utilized optical coherence tomography (OCT) to monitor the longitudinal progression of the microenvironment and microvasculature of pancreatic tumors before and after the photothermal therapy-induced immunotherapy *in vivo*. The primary pancreatic tumors were induced by implanting 200,000 Pan02-H7 cells on mouse legs, which were treated via the photothermal, glycated chitosan (GC), and photothermal-GC, when tumor size reached 7×7 mm^2. The structure and blood vessels of primary pancreatic tumors were observed by OCT two-dimensional (2D) and three-dimensional (3D) modes every three days for a period of 36 days after tumor implantation. Our result demonstrated that the structure, uniformity, attenuation coefficient, and texture within primary pancreatic tumors had experienced significant changes under the photothermal therapy and phototherapy-GC immunotherapy. Primary blood vessels of the pancreatic tumors were destructed by the photothermal therapy and phototherapy-GC immunotherapy. Approximately 12 days after the photothermal therapy, the tumor and new blood vessels (angiogenesis) regrow. GC alone did not affect the progression of structure and vasculature of primary pancreatic tumors. Primary tumors and angiogenesises were eliminated completely after the treatment of phototherapy-GC immunotherapy, and no tumorous tissue and angiogenesis regrow except for new normal tissue and blood vessels.

Keyword: primary pancreatic tumor, optical coherence tomography, microenvironment, microvasculature, photothermal therapy-induced immunotherapy, glycated chitosan (GC)