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Oxygen self-produced nanoplatform for relieving hypoxia and breaking resistance to sonodynamic treatment of Pancreatic Cancer


Hypoxia as one characteristic hallmark of solid tumors has been demonstrated to involve in cancer metastasis and progression, induce severe resistance to oxygen-dependent therapies and hamper the transportation of theranostic agents. To address these issues, an oxygen self-produced sonodynamic therapy (SDT) nanoplatform involving modified fluorocarbon (FC) chains-mediated oxygen delivery protocol has been established to realize highly-efficient SDT against hypoxic pancreatic cancer. In this nanoplatform, mesopores and FC chains of FC chainsfunctionalized hollow mesoporous organosilica nanoparticles (FHMONs) carriers can provide sufficient storage capacity and binding sites for sonosensitizers (IR780) and oxygen, respectively. In vitro and in vivo experiments demonstrate the nanoplatform involving this distinctive oxygen delivery protocol indeed breaks the hypoxia-specific transportation barriers, supplies sufficient oxygen to hypoxic PANC-1 cells especially upon exposure to ultrasound irradiation and relieves hypoxia. Consequently, hypoxia-induced resistance to SDT is inhibited and sufficient highly reactive oxygen species (ROS) are produced to kill PANC-1 cells and shrinkage hypoxic

PANC-1 pancreatic cancer. This distinctive FC chains-mediated oxygen delivery method provides an avenue to hypoxia oxygenation, and holds great potential in mitigating hypoxia-induced resistance to those oxygen-depleted therapies, e.g., photodynamic therapy (PDT), radiotherapy, chemotherapy, etc.

Speaker Biography

Yongxiang Zhao is the innovative leading talent of National "Ten Thousand Talent Programme", the Director of the National Center for International Research of Biological Targeting Diagnosis and Therapy, the moderator of the BIT's 5th World Gene Convention Keynote Forum, Nobel Laureate Forum, the national talented person of "New Century National Hundred, Thousand and Ten Thousand Talent Project". The leader of National Innovative Talent Promotion Program Innovation Team of National Key Fields, the leader of National Innovation Team for the Changjiang Scholars Project, the expert of National "Ten Thousand Talent Programme" and "Changjiang Scholars Programme", the expert of National Natural Science Foundation of subject review group, the standing Director of Chinese Immunological Society, the member of Chinese Medical Association Professional Committee of Clinical Precision Medicine, the expert of National Science and Technology Award Assessment, the member of Chinese medical science and Technology Award Evaluation Committee, the member of Gene Therapy Branch of Chinese Medical Association. The reviewers and editorial board members of multiple SCI journals such as Nature. He has taken charge of 14 national science and technology major projects and 16 provincial and ministerial projects.

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