Microfluidics-Prepared Uniform Conjugated Polymer Nanoparticles for Photo-Triggered Immune Microenvironment Modulation and Cancer Therapy

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Photothermal therapy (PTT) has shown great promise to spatiotemporally ablate cancer cells and further understanding of the immune system response to PTT treatment would contributes to improvement in therapeutic outcomes. Herein, we utilize microfluidic technology to prepare biocompatible conjugated polymer nanoparticles (CP NPs) as PTT agents and assess the immune response triggered by CP-based PTT treatment in vitro and in vivo. Through careful control of the anti-solvent, CP NPs with uniform diameter of 52 nm were obtained. The c-RGD functionalized CP NPs exhibit high photothermal conversion efficiency, inducing effective cancer cell death under 808 nm laser illumination. Using macrophage cells as the model, CP NPs demonstrate effective activation of pro-inflammatory immune response. Furthermore, in tumor-bearing mice model, a single round of CP NPs assisted PTT could efficiently induce anti-tumor immunity activation and ultimately inhibit tumor growth. The study provides detailed understanding of both microfluidic technology for CP NPs fabrication and photothermal-triggered anti-tumor immune responses.

Biography

Eshu Middha expertise in the fabrication of microfluidics devices and nanocarriers for biological applications. Specialized in the production of high-quality polymeric nanocarriers through microfluidics mixers. Keen interest in technology development & commercialization of innovations from the lab. Published 11 research journal papers and hold 2 patents (1 commercialized). Research experience of around 5 years in the formulation of polymer-encapsulated nanoparticles. Industrial experience of over 2 years as a Technologist at Reliance Oil Refinery, India.

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