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Thin shell hollow mesoporous silica nanoparticles as adjuvants for improvement of anti-cancer immunity *in vivo*Yajie Zhou¹, Qianqian Liu², Jintao Zhu² and Juan Tao¹¹HUST, China²Union Hospital, Tongji Medical College, China

Despite tremendous progress in cancer therapy, cancer remains as one of the leading causes of death. An effective, nontoxic, tumor-specific immunotherapy strategy that can enhance immune responses against tumor has been regarded as the ultimate goal in this issue. Development of safe and effective adjuvants for generating robust and long-lasting antitumor immune responses, while still remaining challenging, is crucial for tumor immunotherapy. In recent years, biomaterials have gained increasing importance by being used as vehicles and adjuvants in the formulation of novel cancer vaccines. Mesoporous silica nanoparticles (MSNs) have immune-potentiating action, biocompatibility, drug-loading/release capability, and plasticity of multiple dimensions, including particle size, morphology, structure, and surface functionality. Compared to non-hollow MS with similar particle size, pore size and surface properties, hollow MSN has been proved to be an improvement of anti-cancer immunity. In our study, polyethylenimine (PEI) was used to etch MSNs to get thin shell hollow MSN (e.g., P-THMSNs), which had large surface area, high pore volume, and controllable structure parameters, showed no significant toxicity, and stimulated DCs maturation efficiently. Herein, P-THMSNs were used as vehicles and adjuvants, loaded with tumor specific antigen Trp2 tumor cell fragments. The results showed that, compared to HMSNs, P-THMSNs had better tumor antigen-loading capability, increased cellular uptake of tumor antigen, stimulated DC maturation more efficiently with antigen loaded, which further induced the proliferation and activation of both tumor specific CD8⁺ and CD4⁺ T lymphocytes. Furthermore, P-THMSN enhanced anti-tumor immune responses both in *in vivo* tumor challenge and re-challenge models, loading tumor specific antigen and tumor cell fragments as vaccines, respectively. In short, P-THMSNs had potential to remarkably enhance anti-cancer immune responses without significant side effects and were believed to be a promising vehicles and adjuvant in the preparation of cancer vaccines.

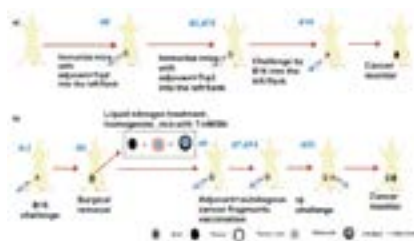


Figure 1: Schematic illustration showing the enhancement of anti-tumor immune responses *in vivo*: (a) P-THMSNs loaded with melanoma specific antigen Trp2 in tumor challenge model; (b) P-THMSNs loaded autologous cancer antigen in tumor re-challenge model.

Biography

Yajie Zhou got her Bachelor's degree in Tongji Medical College of Huazhong University of Science and Technology, China. Currently, she is a PhD candidate in Dermatology in the same university. Her research interest focuses on the generation and application of nanoparticles and nanotechnology in immunotherapy of skin cancers.

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