Theranostic Nanoparticles for Activation of Tumor-Specific Immune Responses

Published date: Dec. 5, 2016

Technology description

Market Summary

Cancer is the leading cause of death in the developed world and the second leading cause of death in the developing world. PD-L1 is expressed in tumor cells and tumor associated stromal cells to suppress function of cytotoxic T cells. Anti PD-L1 antibodies or peptide blockers are a highly active area of oncology research for pharmaceutical companies. Problems still exist in many tumor types for which current anti-PD1 or PD-L1 antibody mediated therapies are difficult to deliver sufficient therapeutic dose due to the presence of drug delivery physical barriers due to the tumor’s surrounding tissue. Results of clinical trials also showed that PD1/PDL-1 blocking alone only has limited success in a low percentage of cancer patients. A combination therapy that can break through the tumor’s surrounding tissue is required to achieve therapeutic effect. Targeted therapies using nanoparticle drug carriers have the potential to deliver therapeutic agents into tumors and their metastatic lesions.

Technical Summary

Dr. Yang’s group has shown that targeted iron oxide nanoparticles (IONPs) and hyaluronic acid nanoparticles (HANP) have an improved capability of reaching tumors due to increased permeability of the tumor’s vasculature. Researchers at Emory University have developed tumor-targeting IONP/HANP compositions for the delivery of peptides and activation of tumor-specific immune responses. This technology includes PD-L1 blocking peptides conjugated to IONP or HANP created by Dr. Yang’s team. The inventors have developed two PD-1 peptides, each containing a polyhistidine tag for conjugation to NTA-Cu functionalized IONPs/HANPs. Similar in size to an antibody, each nanoparticle can have 10 to 20 peptides conjugated to its surface, which may significantly enhance the efficiency of PD-1/PD-L1 inhibition, whereas an anti-PD-L1 antibody can only block one PD-L1 molecule. Targeted delivery of the nanoparticles into tumors promotes infiltration of immune cells, including cytotoxic T cells. Carrying immune modulators, these nanoparticles are able to activate tumor specific immune responses. These compositions may serve as an alternative to current therapies based on observed, intratumoral delivery for cancers including melanoma, pancreatic, breast, liver, colon, prostate, and lung cancers.

Application area

Tumor-targeted nanoparticles for the delivery of anti-PD-L1 peptides for treatment of cancers.

Advantages

Nanoparticles loaded with a variety of drugs and/or peptides for prolonged therapeutic delivery to tumor sites.
Targeted delivery to tumor sites can reduce level of dosing and side effects.

Institution

Emory University

Inventors

Lily Yang
Professor, Surgery & Radiology
SOM: Surgery: Oncology
Erica Bozeman
Postdoctoral Fellow
SOM: Surgery: Oncology

手 机 : 13414935137
邮 箱 : yeyingsheng@zf-ym.com