Drug Derivatives and Drug Carriers for Targeting Tumor Cells via Caveolin-1/Caveolae

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Technology description

The Need

According to the National Cancer Institute, there are approximately 15 million people living with cancer in the United States. Current cancer treatments include chemotherapy, surgical intervention, radiation therapy and targeted immunological and hormonal treatments. Chemotherapy treatments travel throughout the body and attack widespread cancers, however, there are toxic side effects and development of resistance to the chemical agents. Thus, the demand for targeted therapy technology is driving cancer therapeutics research. Limitations of available targeted therapies include therapy-resistant cancer cells and the complexity of target structure and the way its function is regulated in the cell.

The Technology

Researchers at The Ohio State University, led by Drs. Terence Williams and Robert Lee, have developed drug carrier and biomarkers for targeting tumor cells via Caveolin-1 (Cav-1) plasma membrane proteins. Cav-1 is selectively overexpressed in cancer cells, including those of pancreas, lung, breast (triple negative), prostate, and is associated with invasion, metastasis, and poor prognosis. Cav-1 is responsible for albumin transport via endocytosis and facilitates uptake of drugs that are chemically conjugated or tightly bound to albumin. This invention in one aspect pertains to the use of Cav-1 as a prognostic biomarker that can be used to identify cancer patients who can benefit from albumin--coupled therapeutics. In another aspect, it covers the compositions of novel albumin drug conjugates, albumin binding drug derivatives, and albumin coated liposomes and nanoparticles loaded with drugs. The advantages are increased therapeutic efficacy and increased systemic circulation time of targeted chemotherapeutic drugs and reduced side effects.

Research Interests

The Ohio State University laboratory that developed this technology has expertise in a range of areas related to lipid nanoparticles. They specialize in custom-design LNP for various cargo and in developing products tailored to the specific clinical application. The lab is focused on nucleic acid drug

delivery and can be used for mRNA, plasmid DNA, siRNA, miRNA, antisense ODN, CpG ODNs and sgRNA for CRISPR gene editing, and any gene therapy related applications. The laboratory is open for collaboration for additional cargos and investigational routes.
The use of plasma membrane proteins as a biomarker and drug transport mechanism for cancer patients.

Application area

Cancer treatment
Breast (triple negative)
Pancreas
Lung
Prostate
Colorectal
Head and neck
Brain (glioma)
Sarcoma
Skin cancer (melanoma)

Advantages

Prognostic potential in cancer treatment
Increased therapeutic efficacy
Reduced side effects

Institution

Ventech Solutions

Inventors

Robert Lee
Terence Williams

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com