Drug Delivery Vehicle for Use in the Treatment of Central and Peripheral Nervous System Disorders

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Technology description

Liposomal Nanoparticles for delivering Therapeutic and Imaging Agents to Neural Cells

These liposomal nanoparticles deliver therapeutic, labeling, and imaging agents to disease sites within the central or the peripheral nervous system. Neurological disorders are diseases of the central and peripheral nervous system. Neurological disorders are an important cause of mortality and cause approximately 12 percent of deaths worldwide. Current treatments cannot effectively reach the disease sites in the central and peripheral nervous systems, because: (1) the extreme selectivity of the blood brain barrier, which is a major challenge in getting therapy to brain cells, and (2) the extensive lengths of peripheral nerves and the blood nerve barrier. Therefore, neurological disorders represent a large area of unmet medical need. Researchers at the University of Florida have developed liposomal nanoparticles that can deliver therapeutic agents to disease sites within the central or the peripheral nervous system in models. These liposomal nanoparticle formulations are optimized for preferential uptake by endothelia, neurons and Schwann cells and could be a potential vehicle in delivering small molecule compounds or biological molecules for a variety of neurological indications.

Technology

These liposomal nanoparticles can deliver therapeutic compounds, such as antisense oligonucleotides, to cells in the central or peripheral nervous system. The nanoparticles allow the selected compounds to cross the highly selective blood brain barrier, making them suitable for therapeutic purposes and imaging contrast agents that may not otherwise gain access to regions of the brain. The delivery system is particularly advantageous for targeting neural cells and endothelial cells of the blood vessels that serve the brain, as well as brain tumors like glioblastoma. Additionally, these liposomal nanoparticles were engineered to cross the blood nerve barrier, making them suitable to deliver reagents to Schwann cells of the peripheral nervous system. The nanoparticles have especially high potential to deliver therapeutic agents to treat peripheral neuropathies associated with acquired medical conditions such as diabetes, or genetic abnormalities (e.g., Charcot-Marie-Tooth neuropathies).

Application area

Liposomal nanoparticles can be optimized for efficiently delivering therapeutics to disease sites of the central and peripheral nervous system

Advantages

Capable of crossing the blood brain barrier, and reaching brain tumors in vivo through systemic administration
Crosses the blood nerve barrier in vivo through local and systemic administration, enabling entrance into myelinated peripheral nerves
Utilizes biodegradable phospholipid nanoparticles that are cleared by the body, thereby minimizing toxicity

Institution

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