Nanotechnology for Treating Brain Tumors

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Technology description

Targeted Nanotherapeutic Agents (TNAs) that penetrate the blood brain barrier (BBB) which will provide a superior drug delivery platform for anticancer treatments.
These novel TNAs deliver robust therapeutic doses of drugs in order to treat metastatic breast cancer to the brain, and to treat only the tumor cells themselves, while sparing the normal tissues.
Furthermore, a sophisticated, non-invasive, quantitative MRI method for measuring the drug dosage to the tumor has been developed.

Background

Recent advances in the systemic treatment of breast cancer have resulted in increased survival over the last decade; however, patients are living long enough that metastatic lesions, particularly to the central nervous system, are a major source of mortality. Brain metastases from breast cancer are the second most frequent central nervous system lesions from all solid tumors. Treatment choices for brain metastases are limited by the fact that most chemotherapeutic drugs do not penetrate the blood-brain barrier in sufficient amounts to provide a therapeutic effect. The current standard of care for brain metastases consists of either radiotherapy or neurosurgical resection, but the survival times with these interventions remain only ~7 months.
Targeted Nanotherapy offers many potential improvements over the current standard of care for metastatic breast cancer to the brain. Designing efficient nanoparticles to deliver therapeutics across the blood brain barrier remains one of the key goals of drug development for brain diseases. Novel nanotechnology-based delivery methods have already been shown to increase a drug’ s therapeutic index by prolonging its circulating half-life and increasing drug accumulation in the tumor, while reducing the risk of off target effects. Yet, there remains an urgent need for further development in treatments which can be delivered systemically and have the ability to penetrate the blood-brain barrier.

Technology Description

A researcher at the University of New Mexico has developed Targeted Nanotherapeutic Agents (TNAs) that penetrate the blood brain barrier (BBB) which will provide a superior drug delivery platform for anticancer treatments. These novel TNAs deliver robust therapeutic doses of drugs in order to treat

metastatic breast cancer to the brain, and to treat only the tumor cells themselves, while sparing the normal tissues. Furthermore, a sophisticated, non-invasive, quantitative MRI method for measuring the drug dosage to the tumor has been developed.

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Application area

Targeted Nanotherapeutic Agents capable of penetrating the blood brain barrier (BBB)
Drugs are released once inside the tumor cell
Superior drug delivery platform for anticancer treatment in comparison, or conjunction, with the currently accepted standard of clinical care, i.e., brain radiotherapy.
Preliminary results have shown penetration through the blood-brain barrier (BBB) and successful encapsulation of drug cargoes into nanoparticles
These targeted nanotherapeutic agents can be tailored to have broad applications to all forms of brain cancer

Institution

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