

Devices, Systems, and Methods for Excavating Cancer Cells

A method to treat, relocate, or remove invasive or inaccessible tumors

Georgia Tech inventors have identified a potential new treatment for pediatric medulloblastomas by exploiting their migratory nature and invasive techniques. Their strategy involves engineering an alternate pathway for tumor cells to migrate away from the tumor site, to an apoptotic “sink”, or to direct therapeutic cells to the tumor. The researchers have designed a nanofiber-based film coated with proteins that attract medulloblastoma cells and encourage unidirectional movement by using a gradient of increasing protein concentration. The tumor will be directed to the surface of the brain for surgical removal or to a “sink” that contains an apoptotic hydrogel. This new method guides the tumor to the drug rather than delivering the drug to the tumor, which is inefficient due to the irregular vasculature and poor transport features of tumor tissues.

Summary Bullets

- Tumors are able to migrate on manufactured fibers or films instead of healthy brain tissue
- Minimally invasive- the device can be deployed directly or using a catheter
- The device is size and shape variable- films can range from nano- to micron- scale

Solution Advantages

- Tumors are able to migrate on manufactured fibers or films instead of healthy brain tissue
- Minimally invasive- the device can be deployed directly or using a catheter
- The device is size and shape variable- films can range from nano- to micron- scale
- Has the potential to be applied to other tumors
- Provides a way to completely remove all cancer cells
- Fibers can be degradable or non-degradable synthetic or biopolymeric materials

Potential Commercial Applications

- Pediatric medulloblastomas treatment
- Treating invasive/inoperable tumors
- Ability to direct the immune system to trigger cells to the tumor site

Background and More Information

Medulloblastomas are the most common form of malignant brain tumors, consisting of 20-40% of all pediatric brain tumors. They originate in the cerebellum and are highly invasive. The two most problematic challenges with therapy include the migratory nature of medulloblastomas and their location in the brain. Medulloblastomas migrate towards the interior of the brain via white matter fiber tracts facilitated by extracellular matrix proteins expressed along the tract. Current treatment involves surgery and radiation- both of which have detrimental effects on the developing central nervous system. Most survivors have a decreased quality of life after enduring radiation at an early developmental stage and many are at risk for recurring tumors.

Inventors

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Publications

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