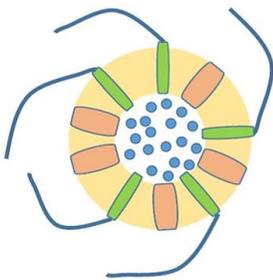


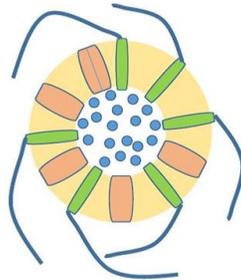
Targeted Delivery and Rapid Release of Anti-Cancer Drugs in Tumors (RFT-470)

Invention Summary

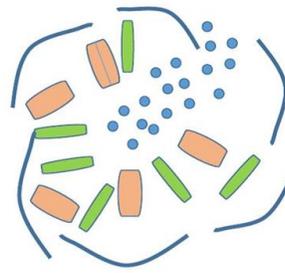
NDSU Scientists have developed a liposome-based delivery method with potential to reduce chemotherapy side effects while maintaining or even increasing cancer drug efficacy. The liposome is stabilized in the bloodstream using polyethylene glycol (PEG) and remains stable in the vicinity of healthy cells. However, upon arrival at a tumor the liposome rapidly disintegrates, releasing its contents to be taken up by tumor cells. This disintegration is triggered by conditions found in the tumor extracellular matrix (ECM), specifically the reducing conditions and the presence of Matrix Metalloproteinase 9 (MMP-9). As a result, these liposomes can carry drugs and imaging agents to tumors, releasing them so that a high concentration is available for rapid uptake into tumor cells, and reducing the amount of time these agents spend in the circulatory system or in the vicinity of healthy cells. A reduction in tumor growth was observed using this technology to deliver drugs in a mouse model of pancreatic cancer.



Intact Liposome
In Healthy Cell
Extracellular Matrix



Intact
Liposome in
Bloodstream



Liposome Disintegrates
In Tumor Cell
Extracellular Matrix

Benefits

- Target high concentration of drugs and imaging agents to tumors
- Reduce delivery of these materials to non-tumor cells
- Potential to reduce dosage
- Potential to reduce side effects that may result from exposure of non-tumor cells to anti-cancer drugs
- Minimally-invasive approach to deliver imaging agent directly to any tumor with vasculature, to show size, shape, and location

Applications

Delivery of anti-cancer drugs and tumor imaging agents

Technology

The liposome-based delivery system incorporates POPE-SS-PEG synthetic lipids which protect the liposome in circulation, but lead to rapid removal of the protective PEG molecules once the liposomes reach tumor ECM. Removal of PEG at the tumor exposes MMP-9 'trigger polypeptides' that are cleaved by matrix metalloproteinase 9, also present at a high concentration in the tumor ECM. This releases the liposome contents within the tumor. The rapid removal of PEG and disintegration of the liposome in conditions found in the tumor ECM results in a high concentration of active ingredient available for uptake into the tumor cells, while minimizing non-target delivery and time spent in the bloodstream so side-effects are also reduced.

Patents

This technology is the subject of issued US Patent No. 9,457,041 and is available for licensing/partnering opportunities.

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NDSURF Tech Key

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