**Dendritic Pro-drug Doped Injectable Adhesive Hydrogel for Local, Sustained and Selective Treatment of Locally Advanced Triple Negative Breast Cancer**
Technology #18737

**Applications**

The Inventors have developed an injectable and degradable hydrogel that would release drugs selectively and locally to cancer cells in a sustained manner.

**Problem Addressed**

Chemotherapy is an effective cancer treatment modality. However, side effects due to non-cancerous cell toxicity are extremely devastating for patients. Biomaterials have been increasingly used as vehicles for intravenous delivery of chemotherapeutic agents to improve cargo protection, avoid rapid clearance and increase circulation time. Recent efforts have focused on enhancing vehicle accumulation at the tumor site by adding small molecules to actively target tumor cells. However, these targeting moieties are not selective to cancer cells only, and they may affect healthy cells in surrounding tissues, eliciting undesired toxicity. Hence, the development of a pro-drug that can direct small molecules towards cancer cells while evading healthy cells in surrounding tissue is of vital importance for selective treatment.

**Technology**

Dendrimers have been used as effective drug delivery vehicles due to their ability to enter cells and escape the endosome; however they are associated with high levels of toxicity and an inability to distinguish between healthy cells and tumor cells. In order to overcome this drawback, the inventors conjugated the dendrimer with a synthetic epidermal growth factor (EGFR) binding peptide to provide breast cancer cell targeting for efficient delivery of chemotherapeutic drugs. Doxorubicin (a breast cancer chemotherapeutic drug) was conjugated to the dendrimer-peptide to form the dendritic pro-drug. A synthetic EGFR binding peptide was used because of its ability to bind to the EGF receptor without eliciting the response of the actual biological ligand. It is crucial for the design of chemotherapeutic pro-drugs utilizing the EGF receptor to ensure this pathway is not triggered because it leads to further cancer cell proliferation and survival. Therefore, a dendrimer conjugated with a synthetic EGFR binding peptide would selectively enhance RME (receptor mediated endocytosis) in EGFR over-expressing cancer cells, while maintaining healthy cells with basal levels of EGFR intact.

The pro-drug can be released in a local manner with the aid of an adhesive biodegradable hydrogel, allowing for a sustained release of the therapeutic agent over time. In clinical applications, the patients would only need one dose in the form of an intratumoral injection every few weeks, thus avoiding the need to undergo further surgical procedures for any pro-drug implantation.
Advantages

- Highly stable dendritic pro-drug to treat locally advanced triple negative breast cancer
- Maintains the cytotoxic effect in cancer cells while sparing healthy cells both \textit{in vitro} and \textit{in vivo}
- Allows for longer therapeutic times with high tumor effective doses

Categories For This Invention:

- Life Sciences
- Biomaterials
- Clinical Applications
- Oncology
- Therapeutics
- Drug Delivery

Intellectual Property:

Dendritic pro-drug doped injectable adhesive hydrogel for local, sustained and selective treatment of locally advanced triple negative breast cancer
US Patent Pending

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