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A synergistic therapy for multi-drug resistant cancers

A synthetic polymer that targets cancer cell membranes and works synergistically with existing chemotherapeutic drugs to treat drug-resistant solid tumors.

Technology No. 2019-141

IP Status: US Patent Issued #11,382,929

Applications

- Solid tumor chemotherapy
- Treatment for multi-drug resistant tumors
- Permeabilize cells to facilitate entry of therapeutics

Key Benefits & Differentiators

- **Overcomes multi-drug resistance:** Membranolytic polymer facilitates the entry of chemotherapeutics into cancer cells, overriding drug removal by efflux pumps.
- **Broadly applicable:** Polymer works synergistically with a range of existing FDA-approved drugs as well as future drugs.
- **Simple formulation:** Polymer-chemotherapeutic drug combination is achieved without the need for any chemical conjugation or encapsulation steps.
- **Reduces toxic side effects:** Synergistic action allows the reduction in dose of chemotherapeutic drugs, decreasing potential toxic side effects.

Killing cancer cells: the first step is getting inside

Many current (and future) anticancer drugs have difficulty entering cancer cells either due to physical properties or the action of membrane efflux pumps that actively remove drugs from the cells. Synthetic polymers are used extensively to improve the delivery of chemotherapeutic drugs. However, many such polymers require complex chemistry to conjugate or encapsulate drugs, and can be inefficient at releasing the drugs after entering cells. Chun Wang’s lab at the University of Minnesota engineered an elegant solution to these limitations combining synthetic mebranolytic polymer and chemotherapeutic drugs without the

need to physically link the two components, facilitating easy formulation and delivery of effective cancer treatments.

Synthetic polymers provide access to chemotherapeutic drugs

Dr. Wang’s lab has developed a synthetic membranolytic polymer, poly(6-amino-1-hexyl methacrylate) (PAHM), that enhances the permeability of cancer cells to anticancer drugs. In vitro tests and mouse models of solid tumors have shown that use of PAHM in combination with typical chemotherapeutic drugs (like doxorubicin) results in synergistic killing of cancer cells. This synergy facilitates massive reduction in the amount of chemotherapeutic drug required, which would likely minimize associated side effects when translated to humans. The polymer’s ability to work with a variety of existing compounds indicates that this approach is applicable to enhance treatments to a wide variety of solid tumors, including those that are drug resistant.

Phase of Development

In vitro tests indicate synergistic cytotoxicity of PAHM with chemotherapeutic drugs to multiple types of cancer cell lines. In vivo tumor models indicate the approach greatly reduces or eliminates tumor growth.

Researchers

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Desired Partnerships

This technology is now available for:

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- Sponsored research
- Co-development

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