Designer vaccine nanodiscs for personalized cancer immunotherapy

A.A. Schwendeman

Мастер-класс в рамках визита д-ра Анны Швендеман
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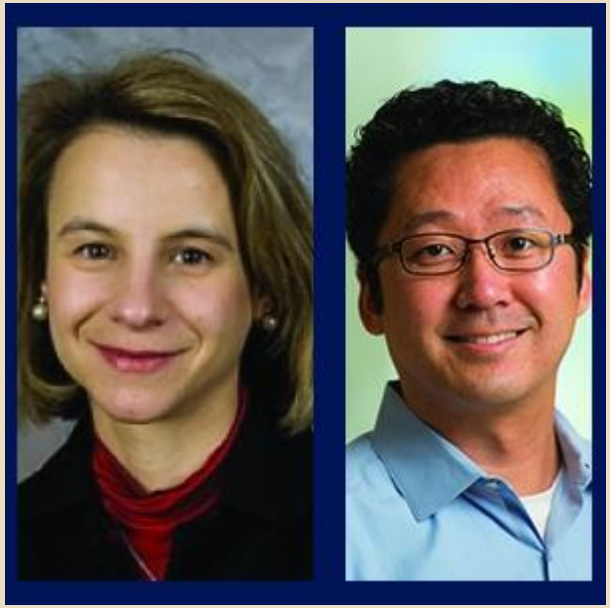


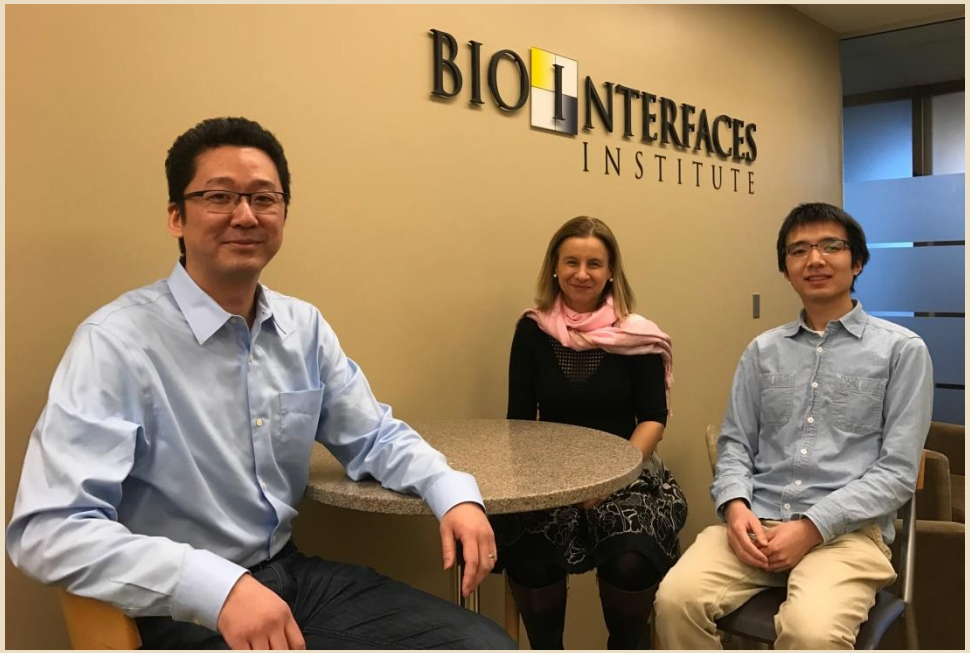
Drs. Anna Schwendeman and James Moon have had initial success in mice using nanodiscs to deliver a customized therapeutic vaccine for the treatment of colon and melanoma cancer tumors.
This press release was originally published by the University of Michigan News Service.

Researchers, Drs. James Moon and Anna Schwendeman, from the University of Michigan College of Pharmacy have had initial success in mice using nanodiscs to deliver a customized therapeutic vaccine for the treatment of colon and melanoma cancer tumors.
"We are basically educating the immune system with these nanodiscs so that immune cells can attack cancer cells in a personalized manner," said James Moon, the John Gideon Searle Assistant Professor of Pharmaceutical Sciences and Biomedical Engineering.
The technology that allows this to happen is made of extremely small, synthetic high density lipoproteins measuring roughly 10 nanometers. By comparison, a human hair is 80,000 to 100,000 nanometers wide.

"It's a powerful vaccine technology that efficiently delivers vaccine components to the right cells in the right tissues. Better delivery translates to better T-cell responses and better efficacy," said study co-senior author Anna Schwendeman, U-M Assistant Professor of Pharmaceutical Sciences. Personalized immunotherapy is a fast-growing field of research in the fight against cancer.

The therapeutic cancer vaccine employs nanodiscs loaded with tumor neoantigens, which are unique mutations found in tumor cells. By generating T-cells that recognize these specific neoantigens, the technology targets cancer mutations and fights to eliminate cancer cells and prevent tumor growth.

Unlike preventive vaccinations, therapeutic cancer vaccines of this type are meant to kill established cancer cells.
"The idea is that these vaccine nanodiscs will trigger the immune system to fight the existing cancer cells in a personalized manner," Moon said.



From left to right: Dr. James Moon, Dr. Anna Schwendeman, and Rui Kuai. Lukasz Ochyl not pictured.

The nanodisc technology was tested in mice with established melanoma and colon cancer tumors. After the vaccination, twenty-seven percent of T-cells in the blood of the mice in the study targeted the tumors.

When combined with immune checkpoint inhibitors, an existing technology that amplifies T-cell tumor-fighting responses, the nanodisc technology killed tumors within 10 days of treatment in the majority of the mice.

After waiting 70 days, researchers then injected the same mice with the same tumor cells, and the tumors were rejected by the immune system and did not grow.

This suggests the immune system 'remembered' the cancer cells for long-term immunity.

The holy grail in cancer immunotherapy is to eradicate tumors and prevent future recurrence without systemic toxicity, and our studies have produced very promising results in mice.

The next step is to test the nanodisc technology in large animals, set-up clinical manufacturing and complete toxicology evaluation to prepare for human testing,

В Мичиганском университете (США) добились успеха в доставке вакцины от рака с помощью нанодисков — синтетических липопротеинов примерно 10 нанометров в диаметре, сообщает журнал Nature Materials.
В нанодиски загружаются неоантигены — антигены опухолевой ткани конкретного злокачественного образования. При контактах с нанодисками иммунная система начинает активно вырабатывать цитотоксические Т-лимфоциты, распознающие эти антигены и уничтожающие раковые клетки.

Фото с сайта theoryandpractice.ru

В опытах на мышах с меланомой и раком кишечника 27% Т-лимфоцитов крови животных атаковали опухоли. В сочетании с ингибиторами иммунных контрольных точек (эта технология усиливает реакцию Т-лимфоцитов на рак) нанодиски уничтожили все опухоли через десять дней лечения. Прождав 70 дней, учёные ввели мышам инъекцию раковых клеток, ранее извлеченных из опухоли, однако иммунная система их сразу отторгла.

Исследователи планируют испытать свои нанодиски на более крупных млекопитающих.