Medical Xpress

Scientists to use tiny particles to fight big diseases

October 23 2014, by Robyn Nissim

Physicians will tell you: They are not winning the war on ovarian cancer. But FIU researchers are crafting a new weapon for that battle. A group of scientists have combined medicine and advanced nanotechnological engineering to create a smarter, more targeted therapy that could overcome the most lethal gynecologic cancer.

"I have spent my entire medical career struggling to treat ovarian cancer. It is a very frustrating cancer for the patient and the treating physician," said Dr. Carolyn Runowicz, executive associate dean for academic affairs and professor of obstetrics and gynecology at FIU's Herbert Wertheim College of Medicine (HWCOM).

Once symptoms of ovarian cancer appear, the disease has usually spread.

"It initially responds to surgery and chemotherapy and more than 80 percent of patients will go into remission. But in the majority of those patients, the cancer will recur. And there lies the Achilles heel. And that's why we need better treatments," she said.

Attacking the Achilles Heel

In 2011, Professor Sakhrat Khizroev, a physicist and electrical engineer in the College of Engineering and Computing, created a new technology that used magneto-electric nanoparticles, or MENS, that were able to overcome the powerful blood-brain barrier to deliver and direct lifesaving therapies to specific targets in the brain.

When Runowicz learned of this innovative nanotechnology, she thought that it may be the key to attacking that Achilles heel. She said Khizroev quickly came up with some great ideas that led to incredible results.

Magnetic nanoparticles open path to treatment

In a study published last fall in *Scientific Reports*, Khizroev and Runowicz reported that loading Taxol, a chemotherapy drug, onto MENS and guiding them remotely by a magnetic field penetrated tumor cells and completely destroyed the tumor within 24 hours. Normal cells, usually collateral damage in chemotherapy, were spared.

Nanotechnology advances let Khizroev and researcher Rakesh Guduru control the function of the cell to regulate proliferation, which would then stop cancer development as soon as possible.

"We knew the concept worked but the next step was to test it with larger tumors," Khizroev said.

Perfecting the approach

Khizroev's lab demonstrated that this same technique worked—with a slightly longer time frame of approximately one month—in a mouse model. In June, Khizroev and Runowicz began a three-year study based on those results supported through funding from the National Science Foundation. Both Runowicz and Khizroev are confident that they will continue to perfect the approach and that it could eventually be used to treat many other cancers.

"We hope that within the three-year period we will finish the animal studies and then partner with a pharmaceutical company that could help us conduct clinical trials," Khizroev said.

Provided by Florida International University

Citation: Scientists to use tiny particles to fight big diseases (2014, October 23) retrieved 9 April 2024 from https://medicalxpress.com/news/2014-10-scientists-tiny-particles-big-diseases.html