Drug delivery system successfully treats deadly ovarian cancer in mice

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Credit: AI-generated image (disclaimer)

(Medical Xpress)—Scientists at Rutgers University have developed a targeted drug delivery system that they believe could make ovarian cancer more treatable and increase survival rates for the most deadly gynecological cancer in the United States.

Tamara Minko, professor in the Ernest Mario School of Pharmacy, and Lorna Rodriguez, professor of obstetrics, gynecology and reproductive sciences at Robert Wood Johnson Medical School, say because there is not a good screening method for ovarian cancer, most women with the disease are not diagnosed until after it has metastasized to other organs and surgery and chemotherapy are not as effective.

"Once the ovarian cancer becomes drug resistant we cannot cure it," says Rodriguez a gynecologic oncologist who provides treatment to ovarian cancer patients and is director of the precision medicine initiative at Rutgers Cancer Institute of New Jersey. "Circumventing the development of drug resistance is a reasonable approach and very much needed."

The main reason for advanced-stage ovarian cancer, they say, is an out of control protein CD44, which enables cancerous tumors to proliferate and become resistant to conventional drug treatments. The result: a five-year survival rate for patients with advanced-stage ovarian cancer that is only 30 percent.

In a new study published in *Clinical Cancer Research*, Minko and Rodriguez provide results of animal research in which the cancer is attacked at the genetic level by using small, inhibiting RNA molecules that directly target and decrease the excess CD44 protein in cancer cells while simultaneously treating patients with the anti-cancer drug paclitaxel. This allows cells within the cancerous tumors to be successfully treated even at an advanced stage.

"We expect that the proposed treatment will be especially effective in advanced stages of ovarian cancers, where there are many cancer stem cells in the tumors that resist conventional drug treatment," says Minko.

In their research, scientists at Rutgers created animal models that closely

resemble the cancerous tumors found in women with ovarian cancer by injecting tumor tissues obtained from gynecological cancer patients treated at the Cancer Institute into laboratory mice. They then used a combination of chemotherapy and gene therapy to target the cancer cells directly in order to inhibit growth and prevent metastasis while sparing normal healthy cells. The treatment killed cancerous cells in the mice, shrunk their tumors and left them with fewer side effects.

Since the CD44 protein is expressed on the surface of many cancer stem cells, the approach developed by Rutgers scientists may help in the treatment of other types of cancers. The next step for ovarian cancer research would be to develop a drug for human consumption that could be used in clinical trials. This, they say, could lead to new pharmacological cancer treatments and increase the survival rate of the deadly disease.

More information: "Targeted Nanomedicine for Suppression of CD44 and Simultaneous Cell Death Induction in Ovarian Cancer: An Optimal Delivery of siRNA and Anticancer Drug." Vatsal Shah, Oleh Taratula, Olga B. Garbuzenko, Olena R. Taratula, Lorna Rodriguez-Rodriguez, and Tamara Minko. *Clin Cancer Res* November 15, 2013 19:6193-6204; Published OnlineFirst September 13, 2013; DOI: 10.1158/1078-0432.CCR-13-1536

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