Magnetic Nanoparticles Remove Ovarian Cancer Cells from the Abdominal Cavity

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A major complicating factor in the treatment of ovarian cancer is that malignant cells are often shed into the patient's abdominal cavity. These cells can then spread to other tissues, seeding new tumors that make effective therapy difficult. To overcome this problem, researchers at the Georgia Institute of Technology created magnetic nanoparticles that can selectively bind to and remove ovarian tumor cells from abdominal cavity fluid. John F. McDonald led the research team that reported their work in the journal *Nanomedicine*.

Research by other investigators had identified a protein known as EphA2 as a highly selective marker for free-floating ovarian cancer cells. Dr. McDonald and his collaborators coated magnetic cobalt-iron oxide nanoparticles with a molecular mimic of the natural ligand for this protein, a molecule known as ephrin-A1, to serve as a trap for ovarian cancer cells floating in ascites fluid, the liquid found in the intestinal cavity. The idea behind this approach is that the nanoparticles could be added to ascites fluid and then trapped with a magnetic, removing any ovarian cancer cells that had bound to the eprhin-A1 mimic.

They first tested their nanoparticles using ascites fluid from mice with human ovarian tumors and found that they could trap free-floating tumor cells using magnetic separation. They then repeated this experiment using ascites fluid obtained from four women with ovarian cancer, and again showed that they could remove all of the EphA2-positive cells from the intestinal fluid samples. The researchers suggest that these nanoparticles could be used in a system that removes ascites fluid from

the intestinal cavity, using a relatively non-invasive method akin to dialysis, in conjunction with standard ovarian cancer therapy.

This work is detailed in a paper titled, “Selective removal of ovarian cancer cells from human ascites fluid using magnetic nanoparticles.” An abstract of this paper is available at the journal’s Web site.

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