Vaccine Implants Aim to Train Immune Response Against Melanoma

The approach, called an implantable cancer treatment vaccine, is being tested in a small phase 1 clinical trial.

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Of the many ways scientists are trying to harness the body's immune system to fight cancer, here is one of the most innovative: an approach that involves implanting small, biodegradable, sponge-like disks under the skin to attract key immune cells in the bloodstream—and "train" them to dispatch front-line defender cells (T cells) on a cancer search-and-destroy mission throughout the body.

This approach, called an implantable cancer treatment vaccine, worked well against melanoma tumors in animal models. Now, researchers at Dana-Farber are testing it in a small phase 1 clinical trial of patients with melanoma.

Mary Gooding, 61, of Jamestown, RI, has battled with melanoma several times. In 2017, the cancer had spread, and after surgery to remove part of her left lung, F. Stephen Hodi, MD, director of the Melanoma Treatment Center and the Center for Immuno-Oncology at Dana-Farber, asked Gooding if she was interested in participating in trial of the implantable vaccine. Although the trial is primarily aimed at evaluating its safety, the vaccine might help her immune system mop up cancer cells remaining in her body.

"I looked at him and said, absolutely!" says Gooding.

The vaccine implant is a disk about the size of a baby aspirin and made from a porous biodegradable material like that used in surgical sutures. It was developed at the Wyss Institute for Biologically Inspired Engineering at Harvard University, which is collaborating on the clinical trial with Dana-Farber.

Each implant is individually tailored, containing fragments of the patient's tumor cells along with a white blood cell growth factor that attracts dendritic cells. Dendritic cells are immune cells whose function is to "educate" T cells about the identity of the cancer cells they are to seek out and destroy. They migrate to nearby lymph nodes, where they cause T cells to proliferate and circulate through the body, looking for tumor cells and, hopefully, creating a long-lasting immune memory against the cancer.

Gooding had four implants inserted over a period of weeks—one in each upper arm and one in each thigh. The disks were implanted through one-inch incisions, which Gooding says were “no big deal.” She continues to follow up with Hodi and so far, she says, “everything looks good.”

The trial of the implantable vaccine is nearly finished recruiting patients, and Hodi says data will be analyzed and reported sometime in 2019.

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