

Cancer vaccine quest begins at Mayo Clinic

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A few weeks ago, the Mayo Clinic made an intriguing announcement: One of its scientists had discovered a possible way to prevent ovarian and breast cancer with vaccines. And Mayo was ready to start testing them in people.

Within days, word had spread around the globe. Hundreds of women were suddenly vying for a few dozen spots in the [clinical trials](#) in Minnesota.

Keith Knutson, the lead scientist, wasn't surprised: If his experiments pan out, they could signal a turning point in the battle against [cancer](#).

The experiments, set to begin early next year in Rochester, are designed to see if the vaccines can prevent recurrences of ovarian and [breast cancer](#) in women who have survived earlier bouts.

As the search for a cure drags on, there's a surge of interest in prevention, said Fran Visco, president of the National Breast Cancer Coalition in Washington. "Without question, women are desperately looking for something new," she said. "Keith is one of the people who is sort of leading the way."

Knutson is among an elite group of scientists trying to attack cancer the way that their predecessors fought diseases like smallpox and [measles](#).

"Ultimately," he said, "we want to develop a vaccine that can actually prevent breast and [ovarian cancer](#)."

Knutson, who has spent a dozen years on the project, says many women are understandably eager to take a chance on cancer vaccines, even experimental ones.

[Cancer survivors](#), he says, "just feel like sitting ducks." Long after treatment, they live in fear that the disease will return. Often, it does.

"Those patients are still at very high risk, because it's hard to get all the cancer out," he said. So it's only natural for them to ask: "What can I do to protect myself?"

Knutson, 47, began his quest for a vaccine long before joining the Mayo Clinic in 2005. One reason was personal: "I have family members with breast cancer," he said. "I could see that we weren't getting enough ideas into the clinic."

At the same time, as an immunologist, he saw untapped potential in the body's natural defenses.

One of the biggest problems is that cancer has a way of evading the immune system. The challenge, Knutson said, is to teach the immune system how to find it.

In his lab, he and his colleagues focused on two distinctive substances that are often found on the surface of cancer cells. One is a protein, called Her2/neu, found on some of the most aggressive types of breast cancer. The other, folate receptor alpha protein, is found on nearly all ovarian and breast cancers.

He and his team designed vaccines to attack both of them.

In experiments on mice that are bred to develop cancer, both vaccines were able to prevent tumors from growing. They worked best, Knutson

found, when started at the earliest stages. "The animal models have clearly shown that the less disease you have, the more effective vaccines are," he said.

To see if they work the same way in people, Knutson decided to try the vaccines on patients who have been successfully treated for breast or ovarian cancer, and have little or no sign of disease.

Now, for the first time, Mayo has the green light from the Food and Drug Administration to try it on people.

The first goal is to test safety, so fewer than 50 women will be in the first round of trials. "We have to make sure we're not going to do any damage to patients," Knutson said. They'll get the vaccine once a month for the first six months. Then the researchers will track them, both for side effects and any signs the vaccine is working.

"They're going to want us to watch them for a couple of years," said Knutson. Only then, if all goes well, can larger studies begin to prove if the vaccines work.

The field is still in its infancy, though there has been some success with other types of cancer vaccines, scientists say. The FDA has approved two vaccines, Gardasil and Cervarix, to prevent a virus that causes cervical cancer; and a third vaccine, Provenge, to treat advanced prostate cancer.

But Knutson's goal is far more ambitious.

Dr. Sylvia Adams, a breast cancer specialist and vaccine researcher at New York University Cancer Institute, cautioned that Knutson's work is "just a start," but added: "I'm very excited about this work."

She said studies at Mayo, the Cleveland Clinic and other sites have raised the possibility that vaccines could help people at high risk for cancer - such as women with the breast-cancer gene - and possibly offer long-term protection.

For women with ovarian cancer, a [vaccine](#) would be a dream come true, said Kathleen Gavin, executive director of the Minnesota Ovarian Cancer Alliance, which helped fund Knutson's research. Ovarian cancer "is a highly recurring disease," she said. And "usually, once you recur, there's no cure."

Daphne Sackett of Truman, Minn., agreed.

"That would be awesome if they could give us more peace of mind," said Sackett, 49, who was treated for ovarian cancer in 2008. "Not only (for) myself and my family, but a lot of others."

It may not happen anytime soon, but Knutson deserves credit for shooting high, says Christine Norton, president of the Minnesota Breast Cancer Coalition.

"Keith is part of changing the whole conversation," she said. "We have to change it from awareness and pink ribbons to, let's focus on ending this."

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