Freezing breast tumors helps stop cancer's spread in mice

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Freezing a cancer kills it in its place, and also appears to generate an immune response that helps stop the cancer's spread, leading to improved survival rates over surgery, according to a new study in mice from researchers at the University of Michigan Comprehensive Cancer Center.

Researchers looked at two different cryoablation techniques, which both involve applying a cold probe to a tumor to freeze it. The study was done in mice with breast cancer. One method involves freezing the tumor rapidly, in about 30 seconds; the other freezes the tumor slowly, taking a few minutes. Results from the cryoablation were compared to results from mice whose tumors were removed with surgery.

Both cryoablation techniques successfully killed the breast tumor. The mice treated with the rapid freeze had fewer tumors that spread to the lungs and improved survival compared to mice treated with surgery alone or mice treated with the slower freezing technique. The study showed that the benefit from the rapid freezing is likely due to changes in the immune system that help to kill the tumor. Freezing with the slower technique appeared to make the immune system not as able to kill the tumor.

The study appears online in Annals of Surgical Oncology. Based on these results from mice, researchers are now conducting a clinical trial using cryoablation in patients with breast cancer. In this trial, researchers use the rapid freezing technique.

"Cryoablation has strong potential as a treatment for breast cancer. Not only does it appear effective in treating the primary tumor with little cosmetic concerns, but it also may stimulate an immune response capable of eradicating any cells that have traveled throughout the body, reducing both local and distant recurrence, similar to giving a breast cancer vaccine," says lead study author Michael Sabel, M.D., associate professor of surgery at the U-M Medical School.

"What we learned in this study is that all cryoablation is not equal. The technique used to freeze the tissue can have a significant impact on how the immune system responds. The system we use today appears to be ideal for both destroying the tumor within the breast and generating an anti-cancer immune response," Sabel says.

U-M researchers are participating in a national clinical trial to evaluate using cryoablation for early stage breast cancer. Participants will undergo rapid freezing of their tumor, and their blood samples will be analyzed to assess changes in their immune system. All participants will be treated three to four weeks later with standard surgery to remove their tumor.

More information: Annals of Surgical Oncology, DOI:10.1245/s10434-009-0846-1

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