Vaccine shows promising results for early-stage breast cancer patients

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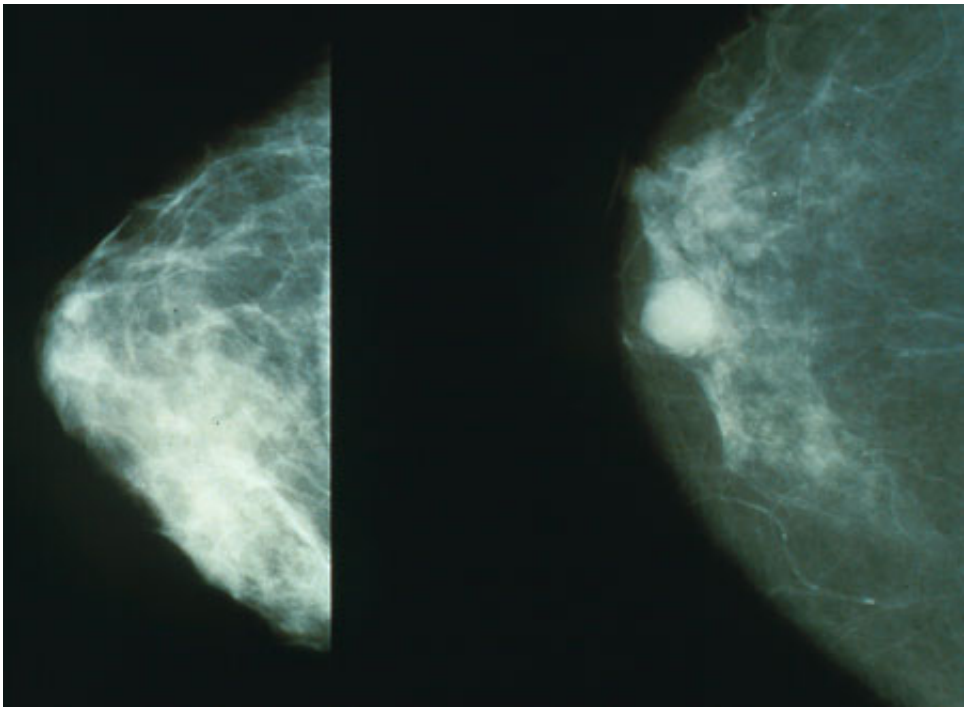

Mammograms showing a normal breast (left) and a breast with cancer (right). Credit: Public Domain

Deregulation and inhibition of the immune system contributes to cancer development. Many therapeutic strategies aim to re-stimulate the immune system to recognize cancer cells and target them for destruction. Researchers from Moffitt Cancer Center report that a dendritic cell vaccine that targets the HER2 protein on breast cancer cells is safe and effectively stimulates the immune system leading to regression of early-

stage breast cancer.

The HER2 protein is overexpressed in 20-25% of all breast cancer tumors and is associated with aggressive disease and poor prognosis. Researchers have previously shown that immune cells are less able to recognize and target cancer cells that express HER2 as breast cancer progresses into a more advanced and invasive stage. This suggests that strategies that can restimulate the immune system to recognize and target HER2 early during cancer development may be effective treatment options.

The researchers previously developed a vaccine that helps the immune system recognize the HER2 protein on breast cancer cells. Their approach involves creating the vaccine from immune cells called dendritic cells that are harvested from each individual patient to create a personalized vaccine.

In order to determine if the HER2-dendritic cell vaccine is safe and effective, the researchers performed a clinical trial in 54 women who have HER2-expressing early-stage breast cancer. The dendritic cell vaccines were prepared by isolating dendritic cells from each patients' blood and exposing them to fragments of the HER2 protein. Patients were injected with a dose of their personal dendritic cell vaccine once a week for 6 weeks into either a lymph node, the breast tumor, or into both sites.

The researchers report that the dendritic cell vaccines were well-tolerated and patients only experienced low-grade toxicities. The most common adverse events were fatigue, injection site reactions, and chills. They also show that the vaccine was able to stimulate an immune response in the majority of the patients. Approximately 80% of evaluable patients had a detectable immune response in their peripheral blood and/or in their sentinel lymph node wherein their cancer is most

likely to spread to first. Importantly, the immune responses among the patients were similar, regardless of the route of vaccine administration.

The Moffitt researchers assessed the effectiveness of the vaccine by determining the percentage of patients who had detectable disease within surgical specimens after resection. The absence of disease is termed a pathological complete response (pCR). They report that 13 patients achieved a pCR and patients who had early non-invasive disease called ductal carcinoma in situ (DCIS) achieved a higher rate of pCR than patients who had early-stage invasive disease. Interestingly, patients who achieved a pCR had a higher immune response within their local sentinel lymph nodes.

"These results suggest that vaccines are more effective in DCIS, thereby warranting further evaluation in DCIS or other minimal disease settings, and the local regional sentinel lymph node may serve as a more meaningful immunologic endpoint," said Brian J. Czerniecki, MD, PhD, Chair of the Department of Breast Oncology at Moffitt Cancer Center.

More information: L. Lowenfeld et al. Dendritic Cell Vaccination Enhances Immune Responses and Induces Regression of HER2pos DCIS Independent of Route: Results of Randomized Selection Design Trial, *Clinical Cancer Research* (2016). DOI: 10.1158/1078-0432.CCR-16-1924

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