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## A Search For a Cure: One Step Closer to Eliminating Breast Cancer

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# A Search for a Cure

## One step closer to eliminating breast cancer

by Patricia A. Ellis and Julie O'Connor

In 2009, there were more than 194,000 new cases of breast cancer, and more than 40,000 deaths caused by this most common form of cancer among women in the United States.

Human epidermal growth factor receptor-2 (HER2) positive breast cancer is one of the more aggressive forms of breast cancer and is prevalent in about one of every three cases of breast cancer. This protein is made in low levels by normal breast cells, but is produced in excessively high levels in HER2-positive breast cancer. In addition, HER2-positive tumors grow faster, recur more often than other breast tumors and are less responsive to hormone treatments.

Wayne State University in conjunction with the Barbara Ann Karmanos Cancer Institute is on the cusp of a new discovery that may someday save many lives. Wei-Zen Wei, professor of immunology and microbiology in the School of Medicine and at Karmanos, is leading a research team that has developed a cancer vaccine that recognizes HER-2 positive cancer cells, and helps to prevent their spread and destroy them.

Currently being tested on tumor cells of mice that no longer responded to other HER2 treatments, results to date have been remarkable, with the vaccine preventing further growth and eliminating toxicity that often occurs with other forms of treatment.

The power in the DNA vaccine is its ability to stimulate a patient's immune system to prevent the disease.

"We each have an immune system to help fight off disease," explained Wei. "However, when cancer develops, the immune system can't always distinguish tumor cells from normal cells, so the full power of the immune system is not harnessed to fight the disease. This vaccine helps to educate the immune system so that it recognizes HER2-positive cancer cells, helps destroy them and prevents them from spreading."

The vaccine consists of "naked" DNA – genes that code for the HER2 receptor – as well as an immune stimulant. The researchers used pulses of electricity to deliver the injected vaccine into leg muscles in mice, where the gene produced a huge quantity of HER2 receptors that activated both antibodies and killer T cells.

"While HER2 receptors are not usually seen by the immune system when they are expressed at low levels on the surface of normal cells, a sudden flood of receptors alerts the body to an invasion that needs to be eliminated," said Wei. "During that process, the immune system learns to attack cancer cells that display large numbers of these receptors."

"Both tumor cells that respond to current targeted therapies and those that are resistant to these treatments were eradicated," said Wei.

"The incredible efforts of Wei and her research team are bringing us closer to new answers for patients with HER2 tumors that are resistant to current treatments available," said Gloria Heppner, associate vice president for research at WSU. "One day soon I hope we will be entering human clinical



### About Dr. WEI-ZEN WEI:

Dr. Wei-Zen Wei received her B.S. in plant pathology from National Taiwan University, her M.S. in medical microbiology from State University of New York and a Ph.D. in biology from Brown University. She joined the Karmanos Cancer Institute in 1983 and Wayne State University in 1994.

trials, ultimately putting us one step closer to eliminating breast cancer."

For more information, visit:

[http://www.med.wayne.edu/immunology/Pages/Faculty\\_Web\\_Pages/wei.html](http://www.med.wayne.edu/immunology/Pages/Faculty_Web_Pages/wei.html)