Researchers boost immune 'killer cells,' increase antibody effectiveness against cancer

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Researchers at the Kimmel Cancer Center at Jefferson in Philadelphia have devised a novel method to expand the number of immune system "natural killer (NK)" cells from blood cells outside the body. They have found that adding such cells to anti-cancer therapies involving monoclonal antibody drugs is more effective in killing cancer cells, and perhaps someday may improve treatments.

Reporting April 18, 2007 at the annual meeting of the American Association for Cancer Research in Los Angeles, scientists led by Takami Sato, M.D., K. Hasumi Associate Professor of Medical Oncology at Jefferson Medical College of Thomas Jefferson University showed in laboratory studies that adding such NK cells to a monoclonal antibody, Herceptin, which targets the HER2/neu protein on breast cancer cells, was more efficient at killing the cancer cells. The HER2/neu protein is expressed in approximately one-quarter of all breast cancers.

According to Dr. Sato, monoclonal antibodies help kill cancer cells by attaching to the cancer cell surface, in turn stimulating an outpouring of "effector" cells such as NK cells that attempt to neutralize the cancer. NK cells alone are often powerful cancer fighters, he notes, but NK cell function in cancer patients can be diminished, and chemotherapy can make things even worse.

Dr. Sato, international research study coordinator Mizue Terai, M.S., and their co-workers decided to try a different approach. They cultured peripheral blood mononuclear cells, which are a mixture of immune cells, including NK cells, for three weeks in the test tube with their novel technique. The resulting population of NK cells increased 500 to 1,000-fold. In subsequent experiments, they showed that the combination of NK cells and Herceptin was effective in killing HER2/neu-expressing breast cancer cells, though the effect depended on the amount of antibody.

They found that the expanded group of NK cells and antibody had little effect against breast cancer cells that did not express the HER2/neu protein.

"It [the results] doesn’t mean that the antibody and the NK cells will cure the cancer," Dr. Sato notes, "but it shows that using an antibody that recognizes the cancer cell along with added NK cells can be very effective against the tumor."

The researchers also found that the monoclonal antibody Rituxan greatly enhanced the cancer cell-killing ability of the expanded NK cells against another cancer cell line, B-cell lymphoma cell line. Rituxan is typically used in combination with chemotherapy to treat patients with B-cell non-Hodgkin’s lymphoma.

Dr. Sato says that the technique can be applied to "any cancer that has a monoclonal antibody available."

The team’s next step is to test the effectiveness of the added NK cells in an animal model. The group is also in the process of starting an early phase clinical study.

Source: Thomas Jefferson University