Patient's Cells Battle Tumors

By Ron Winslow

In a strategy that combines two of the hottest ideas in cancer research, scientists at the National Institutes of Health said they attacked a woman's disease by using her immune system to home in on genetic mutations unique to her tumors.

The findings, published Thursday by the journal Science, come from just one patient—a 45-year-old woman in Montana. But researchers said her case, in which she received billions of immune cells specially grown to target her tumors, amounts to evidence the technique may be a way to treat many common cancers now considered difficult to target with the immune system.

So-called immunotherapy has so far shown the most promise in relatively rare cancers such as melanoma and kidney cancers.

This new approach "represents the blueprint for making immunotherapy available to treat common cancers," said Steven A. Rosenberg, chief of the Surgery Branch at the National Cancer Institute's Center for Cancer Research and senior author of the study. "We've figured out a way to target what is absolutely unique on each cancer. That is the mutations that make the cancer a cancer."

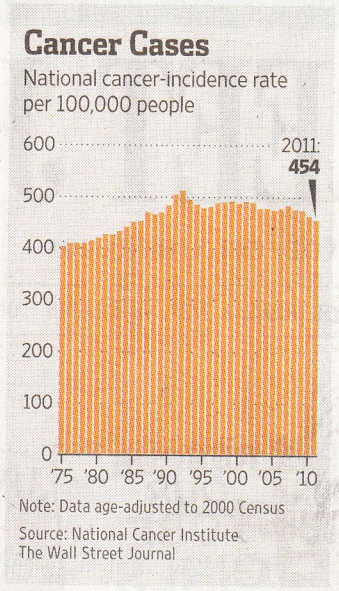
But the method is complex. It involves sophisticated genetic sequencing and analysis and aggressive treatments to destroy a patient's immune system before replacing it with one that recognizes the cancer.

The report "is a tour de force of immune-based science," said Suzanne Topalian, professor of surgery and oncology at Johns Hopkins School of Medicine, who wasn't involved in the research. But how generalizable it is "remains to be seen," and the complexities of the approach mean it "could never be a treatment for everybody," she added.

Oncology is being transformed on two major fronts: on the one hand, drugs that target genetic mutations responsible for tumor growth, and on the other hand, immunotherapies.

The new approach combines both. It is based on long-standing observations that immune-system cells called T-cells often recognize tumors and travel to their locations in the body, but aren't plentiful or strong enough to kill the cancer cells. In the Science paper, researchers said they found a way to create enough useful T-cells to marshal a better attack.

The patient, Melinda Bachini of Billings, Mont., is a paramedic and mother of six. Ms. Bachini was diagnosed with bile duct cancer in 2009. She enrolled in Dr. Rosenberg's research in 2012 after surgery and chemotherapy had failed to control the disease.



Though Ms. Bachini's tumors are rare, Dr. Rosenberg said they are representative of colon, breast and other solid tumors of the type responsible for more than 80% of cancer deaths.

The researchers obtained a biopsy of one of Ms. Bachini's tumors, and in a process that took several weeks, sequenced its DNA and found a match between a mutation and certain T-cells from her body that reacted to the mutation.

They grew huge numbers of the T-cells to serve as her treatment. After she had chemotherapy to knock out her immune system, she was given an infusion that included 42 billion T-cells, about 10 billion of those targeted to the mutation.

For six months, her tumors shrank, the study found, and then stabilized for another six months before they started to grow again. Last October, she underwent a second treatment based on a biopsy from a different tumor, this time with 126 billion cells, 95% of them matched to the mutation. Her cancer responded almost immediately, researchers said.

She isn't considered cured. But she just had a six-month checkup, and the tumors had shrunk considerably.

"This time around in six months they've shrunk more than they did in a year and half" after the first treatment, Ms. Bachini said in an interview. "As far as we know, the cells are still in there fighting the tumors."

The first time she wasn't given enough of the targeted cells, Dr. Rosenberg said. The second time, "we gave her a pure population of cells that just targeted the mutation and that's when her cancer started going away."