

Cardiac resynchronization therapy benefits cancer survivors with heart failure

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A pacemaker-like device restored heart function in a group of cancer survivors—mostly women with breast cancer—who had suffered from heart failure as a result of chemotherapy, a study in the *Journal of the American Medical Association (JAMA)* reports.

The device was evaluated in a small observational clinical trial, led by the University of Rochester Medical Center, at 12 cardio-oncology programs across the U.S., including at UR Medicine's Wilmot Cancer Institute.

Ties between [cancer](#) and heart disease have been in the news lately. Researchers not only suggest that heart disease and [cancer risk](#) may be linked, but also that doctors should be aware of heart disease as a side effect of cancer treatment.

Vicki Dennis, 64, of Moravia, N.Y., was a participant in the study and credits it with saving her life.

In the space of a few months, Dennis went from being a healthy, eight-year breast cancer survivor to suddenly having cancer-related [heart disease](#) serious enough to land her on a transplant list.

"I proved them all wrong," Dennis said. "I made it through the cancer and now I've made it through this. I think I've astounded everybody in Rochester. I know they've done everything they could for me and now it's just a question of hanging in there—which I intend to do for a long time."

Known as the MADIT-CHIC study, it was the first of its kind to assess whether [cardiac resynchronization therapy](#) (CRT) could improve heart function in patients with congestive heart failure and cardiomyopathy, an enlargement of the heart due to chemotherapy side effects.

After six months with the implanted CRT devices, the 30 patients who received cardiac

resynchronization therapy experienced significant improvement. The study, which took place between 2014 and 2018, was designed to address a problem that impacts more than half of people who receive anthracycline chemotherapies.

These patients are prone to heart muscle damage, and about five percent go into full heart failure, said the study's principal investigator and senior author, Valentina Kutyifa, M.D., Ph.D., associate professor of Medicine at the University of Rochester Clinical Cardiovascular Research Center. (Learn more about how chemo and radiation can damage the heart.)

Like Dennis, all of the trial participants did well during six months of follow-up care, Kutyifa said.

"Not only did their [heart function](#) improve, but they were able to take care of themselves, enjoy life, and do just about everything they were able to do before the illness," Kutyifa said. "It really gives hope to patients who have survived cancer."

JAMA published an editorial supporting the study and calling for a more "harmonized approach" to cardiac care for cancer survivors.

Heart problems can arise early on—from six months to two years after cancer treatment—or as far as 15 to 20 years, said Eugene Storozyński, M.D., Ph.D., who directs the Cardio-Oncology clinic associated with Wilmot Cancer Institute, the only such program in upstate New York.

Vicki Dennis' "Remarkable" Story

In 2008 at 53 years old, doctors diagnosed Dennis with breast cancer after a routine mammogram. Because she lives about 80 miles southeast of Rochester, Dennis opted to be treated in Auburn, N.Y. She had a mastectomy, and then six months of chemotherapy. She bounced back from the treatment fairly easily.

"It was a relief to be done with everything," Dennis said.

For years she lived well. In February of 2016, in fact, Dennis had an annual oncology checkup and got another clean bill of health. But weeks later she developed a bad cold and cough. Doctors near her hometown believed it was bronchitis, then pneumonia, and prescribed a variety of medications. She couldn't sleep and had trouble breathing.

"People were telling me I had no color. I didn't know what was happening," Dennis said. She assumed the shortness of breath was part of the respiratory illness. But when her feet and ankles swelled, she called her sister-in-law, a nurse, who urged Dennis to go to the nearest emergency room.

An X-ray revealed a damaged and enlarged heart with fluid buildup. "I was in total shock. It was pretty scary," Dennis said. "At one point they weren't sure I would make it through the night."

An ambulance rushed her to UR Medicine's Strong Memorial Hospital in Rochester, where she was placed in Storzynsky's care. After a week of tests and medical therapy, Dennis learned about Kutylifa's clinical study on cardiac resynchronization therapy.

"I figured that if it could help somebody else, go for it," Dennis said. "I also knew that I would be doing everything that I could to keep myself alive."

On Nov. 1, 2016, the CRT device was implanted in her chest, providing the powerful electrical stimulation needed to synchronize her erratic, weak heart contractions.

Kutylifa said it's important to note that women are more susceptible to heart damage as a chemotherapy side effect. However, women typically represent only about one-third of participants in cardiology studies evaluating implanted devices. For the MADIT-CHIC trial, a concerted effort was made to enroll more women: 87 percent of the participants were females with a mean age of 63, and most had been treated for [breast cancer](#).

Research Makes a Difference

The trial's main objective was to evaluate each patient's ejection fraction (EF), a measurement of how much blood is pumped as the heart beats. A healthy person's EF is typically 60 percent. The study participants had an EF of less than 35 percent when they enrolled—less than 40 percent is evidence of [heart failure](#)—and Dennis' EF was a mere 28 percent.

But six months after cardiac resynchronization therapy, Dennis and others in the study saw their symptoms ease and as their EFs rose into the normal range.

In Dennis' case, 18 months after the start of the trial, her heart had completely normalized in size and function, even at a microscopic level, said Storzynsky, associate professor of Medicine in cardiology.

"I've seen this only rarely in the 10 years I've been following cancer patients," he said. "She does have a very remarkable story in the sense that if it wasn't for this clinical trial... she may be really struggling."

The opportunities to help patients with cancer and heart problems are growing and the study adds another tool for the future, Storzynsky said. He works with oncologists and internists to identify patients who may be at greater risk, and to minimize the heart's reaction to chemotherapy.

"You always want to be aware," Storzynsky said. "If something doesn't seem right, if the heart rate is suddenly higher, that may be an early warning sign. The heart doesn't change from the size of your fist to a football overnight."

Several cancer therapies can impact the heart. In addition to anthracyclines (doxorubicin), which can build up unwanted calcium in the heart muscle, immunotherapy and tyrosine kinase inhibitors can cause left-ventricle damage. Radiation therapy may lead to a thickening of the heart valves, inflammation, and artery blockages.

UR Medicine doctors established a database to track lymphoma patients treated at Wilmot, who

may face risks due to the newer classes of targeted medications that stop the cancer but might induce heart problems, said Ilan Goldenberg, MD., director of UR Medicine's Clinical Cardiovascular Research Center.

"Right now, this is an understudied area," Goldenberg said. "Our plans include collaborating more closely and focusing on how to manage and reverse [heart](#) damage caused by many of the newer medications."

The latest research builds on the legacy of renowned UR cardiologist Arthur J. Moss, who pioneered a vast field of science aimed at preventing and treating sudden death, often with implantable cardiac resynchronization devices. Moss designed and led many successful studies using CRT in different patient populations. Before he died in 2018, Moss launched the study that saved Dennis' life. He designed the MADIT-CHIC trial in 2014 with the *JAMA* corresponding author Jagmeet Singh, M.D., Ph.D., professor of Medicine at Harvard Medical School.

More information: Jagmeet P. Singh et al, Association of Cardiac Resynchronization Therapy With Change in Left Ventricular Ejection Fraction in Patients With Chemotherapy-Induced Cardiomyopathy, *JAMA* (2019). [DOI: 10.1001/jama.2019.16658](https://doi.org/10.1001/jama.2019.16658)

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