Anti-gravity treadmill tested for impact on cardiac imaging for heart patients

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Marilyn Cotter recently needed a stress test following a bout of chest tightness. Unable to withstand exercise because of foot problems, Cotter, a 68-year-old grandmother from Delhi Township, wasn't a candidate for a normal stress test that uses a treadmill.

Instead, her physicians at University of Cincinnati Medical Center used a space-age option: an anti-gravity treadmill. "I really don't do much exercise," says Cotter. "I walk in the living room with Leslie Sansone's tape because my feet aren't the best, and I don't want to get out on the pavement. I do have custom orthotics, but I have to put pads on the boney parts of my feet."

Cotter is now one of 50 patients expected to take part in a randomized, single-blind, controlled study at UC Medical Center testing whether an anti-gravity treadmill is safe for heart patients and if its use can provide better tests to diagnose heart disease.

Cotter was placed in neoprene shorts and zippered into a pressurized airtight enclosure from her waist down and suspended over the surface of the treadmill. By inflating the enclosure, UCMC staff were able to reduce Cotter's weight by as much as 50 percent. She was able to reach 121 heart beats per minute, which is less than the 129 heart beats per minutes doctors hoped she would achieve, but still good by her accounts.

"Now, in my younger years I did use a regular treadmill; it's been a long time since I've done it, but that was amazing," said Cotter. "It was like

half my weight was gone. Nothing hurt, but I was really getting tired toward the end because I am not used to exercising all that long. With my walking at home if I get too tired, I can stop for a second and then go on."

Patrick Daly, MD, a principal investigator who recently finished a cardiology fellowship at UC, says Cotter was able to exercise for six minutes on the anti-gravity treadmill. "The important thing to remember is even in patients who did not get to their target heart rate on the anti-gravity treadmill, they still achieve a significant amount of exercise which enables us to better predict clinical outcomes," explains Daly.

Normally, a patient such as Cotter would initially be given regadenoson, a coronary vasodilator used in pharmacologic stress testing. But UC Health physicians believe that exercise as part of a stress test may be more beneficial for assessment of the patient's long-term health prospects and in obtaining better cardiac imaging. Once the heart is stressed, a gamma camera is used to take pictures of your heart to show how well it is supplied with blood.

"Coronary artery disease is still the No. 1 cause of death in the United States," says Myron Gerson, MD, a principal investigator, UC Health cardiologist and emeritus professor of internal medicine in the UC College of Medicine. "The No. 1 approach to diagnosis is stress testing with imaging."

The anti-gravity treadmill is made by AlterG, Inc., a Fremont, California, company that adapted the technology originally developed at the National Aeronautical and Space Administration. A similar device was created to offer astronauts on the International Space Station a way to exercise in a weightless environment. AlterG is providing the anti-gravity treadmill for the study, which is sponsored by the University of Cincinnati.

There are no conflicts of interests involving physicians participating in the clinical study.

"For those of us who tried it out, the anti-gravity treadmill feels like walking on the moon I suppose," says Gerson, also a member of UC Heart, Lung and Vascular Institute. "The sensation of gravity is much less and we can un-weight the patient by 25 percent, 50 percent or even more. In our study, patients are randomized between the default which involves using regadenoson as a pharmacologic stress, or to exercise on the anti-gravity treadmill.

"On the anti-gravity treadmill, we are finding many of these patients can reach target heart rate. We are testing two hypotheses: First, is the anti-gravity treadmill safe for these people, and second, can use of the anti-gravity treadmill improve image quality?"

Gerson says that improved image quality might be achieved when patients reach target heart rates during their stress tests. During the trial, those patients who do not reach target heart rates will be given regadenoson, which is standard of care.

UC Health cardiologists say they can get a lot of information when a patient exercises that's not available with a pharmacologic stress alternative.

The anti-gravity treadmill helps reduce pressure and pain on knees, the back and other areas that make exercise simply not possible for up to half of the cardiovascular patients physicians are seeing at UC Health, says Daly.

Physicians can also examine a patient's cardiovascular capacity or fitness level using the anti-gravity treadmill. "Research shows that exercise capacity is a stronger correlate with long-term survival and

cardiovascular mortality," says Daly.

Stress tests using regadenoson are accurate, but you can't learn the patient's aerobic capacity, says Gerson.

"How long can they walk on a treadmill on a standard protocol? You don't learn what heart rate they can go up to," says Gerson. "For that reason, the national guidelines of the American Heart Association and the College of Cardiology strongly recommend when possible the patient should exercise and only do the regadenoson stress if they can't exercise and get their heart rate up to target."

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