

## RSNA Press Release

### Restricted Calorie Diet Improves Heart Function in Obese Patients with Diabetes

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CHICAGO—A low-calorie diet eliminates insulin dependence and leads to improved heart function in obese patients with type 2 diabetes, according to a study presented today at the annual meeting of the Radiological Society of North America (RSNA).

"Lifestyle interventions may have more powerful beneficial cardiac effects than medication in these patients," said the study's lead author, Sebastiaan Hammer, M.D., Ph.D., from the Department of Radiology at Leiden University Medical Center in the Netherlands. "It is striking to see how a relatively simple intervention of a very low calorie diet effectively cures type 2 diabetes mellitus. Moreover, these effects are long term, illustrating the potential of this method."

Diabetes is a chronic illness in which there are high levels of glucose in the blood. According to the Centers for Disease Control and Prevention (CDC), diabetes affects 25.8 million people in the U.S., with 18.8 million diagnosed cases and an estimated seven million undiagnosed cases. Type 2 is the most common form of diabetes, representing 90 to 95 percent of diagnosed cases among adults.

Pericardial fat is a visceral fat compartment around the heart that can be detrimental to cardiac function, especially in people with metabolic disease. Dr. Hammer and colleagues set out to determine the long-term effects of initial weight loss induced by caloric restriction on pericardial fat and cardiac function in obese patients with type 2 diabetes.

Using cardiac MRI, the researchers analyzed cardiac function and pericardial fat in 15 patients—including seven men and eight women—with type 2 diabetes before and after four months of a diet consisting of 500 calories daily. Changes in body mass index (BMI) were also measured.

The results showed that caloric restriction resulted in a decrease in BMI from 35.3 to 27.5 over four months. Pericardial fat decreased from 39 milliliters (ml) to 31 ml, and E/A ratio, a measure of diastolic heart function, improved from 0.96 to 1.2.

After an additional 14 months of follow-up on a regular diet, BMI increased to 31.7, but pericardial fat only increased slightly to 32 ml. E/A ratio after follow-up was 1.06.

"Our results show that 16 weeks of caloric restriction improved heart function in these patients," Dr. Hammer said. "More importantly, despite regain of weight, these beneficial cardiovascular effects were persistent over the long term."

Dr. Hammer pointed out that these findings stress the importance of including imaging strategies in these types of therapy regimens.

"MRI clearly showed all the changes in fat compartments, structural changes in the heart and improvements in diastolic function, making it a very effective method of quantifying the effects of metabolic interventions," he said.

While these results are promising, not all patients are eligible for this type of therapy. Patients should consult with their doctors before embarking on any type of reduced calorie diet.

"It is of utmost importance to follow such a complicated intervention under strict medical supervision," Dr. Hammer said, "especially as patients may be able to stop all anti-diabetic therapy from Day 1."

Coauthors are Jan W. Smit, M.D., Ph.D., Johannes A. Romijn, M.D., Ph.D., Jacqueline Jonker, M.D., Marieke Snel, M.D., Albert De Roos,

#### At A Glance

- A restricted calorie diet leads to loss of fat around the heart and improved heart function in patients with type 2 diabetes.
- After 16 weeks, none of the patients in the study required insulin. More than a year after returning to a regular diet, heart function remained improved.
- Approximately 25.8 million Americans are affected by diabetes.

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Sebastiaan Hammer, M.D., Ph.D.

M.D., Hildo Lamb, M.D., and Rutger W. Van Der Meer, M.D.

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RSNA is an association of more than 48,000 radiologists, radiation oncologists, medical physicists and related scientists committed to excellence in patient care through education and research. The Society is based in Oak Brook, Ill. ([RSNA.org](http://RSNA.org))

Editor's note: The data in these releases may differ from those in the printed abstract and those actually presented at the meeting, as researchers continue to update their data right up until the meeting. To ensure you are using the most up-to-date information, please call the RSNA Newsroom at 1-312-949-3233.

For patient-friendly information on MRI, visit [RadiologyInfo.org](http://RadiologyInfo.org).

Abstract:

► [Sustained Improvements in Left Ventricular Diastolic Function Induced by Weight Loss Are Associated with a Decrease in Pericardial Fat Content in Patients with Type 2 Diabetes Mellitus](#)

 [Press conference video](#)

Images (.JPG format)



Figure 1: Magnetic resonance (4-chamber) images of the heart of a typical patient showing fat around the heart (pericardial fat). The fat is highlighted in red in the right panel.

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Figure 2: Photographs show a typical patient before (left), and after 16 weeks of caloric restriction.

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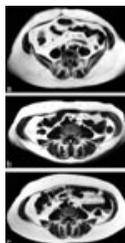


Figure 3: Transverse magnetic resonance images of the abdomen show subcutaneous and intra-abdominal fat content of a typical patient before (A) and after 4 months of caloric restriction (B). Panel C shows fat depots after an additional follow-up of 14 months.

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Figure 4: Philips Freewave Achieva MRI scanner.

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