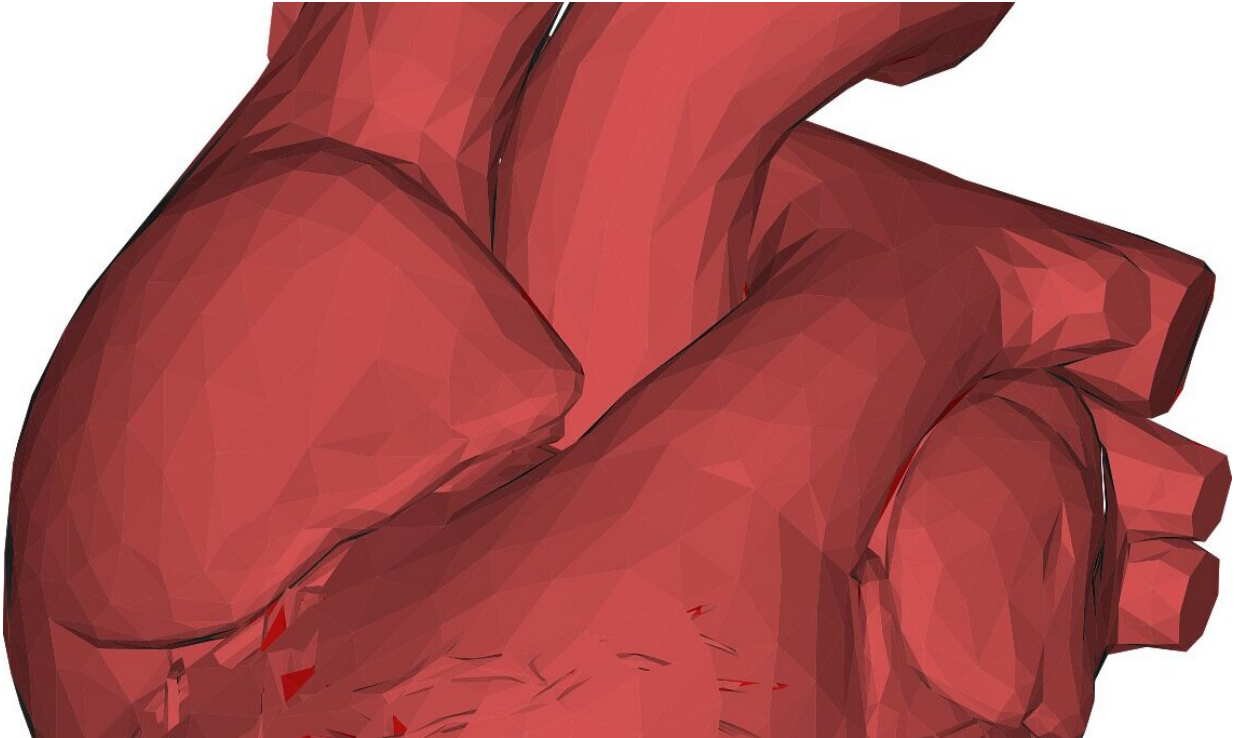


# Heart fat captures researchers' attention

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Everyone has it. It's been known about for hundreds of years. But only recently have scientists begun to unravel its mysteries.

It has an unwieldy name: epicardial adipose tissue, or EAT. But researchers are learning how this pocket of fat beneath the outer lining of the [heart](#) plays a dynamic role in [heart health](#). Like a cardiac version

of Dr. Jekyll and Mr. Hyde, EAT sometimes serves as a protector against [heart problems](#), but can also wreak havoc.

Eventually, it might turn out to play a role in predicting your risk of heart disease.

Since at least the early 1800s, doctors have known that fat surrounding the heart seemed related to [cardiovascular disease](#). But over the past decade, researchers began to realize that EAT, which can cover 80% of the heart muscle and make up 20% of the heart's mass, is special.

EAT stores energy. Sitting right on the heart muscle, it's an important fuel source for the heart, said Samar R. El Khoudary, associate professor of epidemiology at the University of Pittsburgh.

But it's more than that.

"This fat is not just a storage place," she said. "It's active."

When it's functioning normally, EAT generates anti-inflammatory agents that protect the heart, she said. Because it's attached to the heart muscle and near important arteries, those helpful agents can affect the entire cardiovascular system. EAT also reduces friction between the coronary arteries and the sac-like tissue surrounding the heart when it beats.

But when people gain excess weight, EAT also expands. And "once it expands, here's where we have the problem," El Khoudary said.

Dr. Victor A. Ferrari, professor of medicine at the hospital of the University of Pennsylvania in Philadelphia and chair of the Penn Cardiovascular Imaging Council, said EAT can be pushed into a "deranged" mode. It begins to pump out pro-inflammatory cells that spread like a forest fire, encouraging other fat pockets throughout the

body to send out similar agents.

That appears to hurt the heart in three ways, he said.

First, some research shows EAT may be associated with a type of irregular heartbeat called atrial fibrillation. Evidence also suggests malevolent EAT promotes stiffness in the [heart muscle](#), which can lead to heart failure. And several studies suggest EAT plays a direct role in the formation of artery-clogging plaque, although Ferrari said that not everyone is convinced.

What triggers the transformation of EAT from quiet protector to cardiac monster?

"I think that's the million-dollar question," Ferrari said. "It may even be worth more than a million."

If researchers could find the answer, he said, EAT could become a target for treatment with drugs or other therapies.

El Khoudary said EAT is of interest for another reason: It has potential as a tool for helping determine who is most at risk for heart disease.

Some studies have found it can predict [coronary artery](#) disease about as well as the widely accepted test known as the coronary calcium score. Sometimes, it's even better, she said.

EAT can be inconvenient to measure, though, El Khoudary said. The "gold standard" for measuring it is to use an MRI or CT scan (which is also used for the coronary calcium score). Those have drawbacks. The tests can be expensive, and evaluating them takes time.

But, she said, there has been progress in measuring EAT using an

echocardiogram, which would be easier. And a recent study in the American Heart Association journal *Circulation: Cardiovascular Imaging* found artificial intelligence could measure EAT from CT scans in about 30 seconds.

For all its intriguing qualities, much remains to be learned about EAT. El Khoudary has done research showing it seems to be regulated by estrogen—meaning it could be more of an issue for men and postmenopausal women, who have lower levels of the hormone than younger women. EAT levels also vary among ethnicities.

Although some researchers consider the prospects for EAT to be important and fascinating, Ferrari emphasized the best defense against heart disease will remain diet and exercise. But with additional study, he thinks that someday EAT might be a valuable tool for a physician practicing so-called precision medicine, where drugs and treatments are tailored for an individual's particular risk.

"I think it will be more than just a research tool," he said. "But how big a factor it will be in terms of screening or precision medicine remains to be seen."

**More information:** Evann Eisenberg et al. Deep Learning–Based Quantification of Epicardial Adipose Tissue Volume and Attenuation Predicts Major Adverse Cardiovascular Events in Asymptomatic Subjects, *Circulation: Cardiovascular Imaging* (2020). [DOI: 10.1161/CIRCIMAGING.119.009829](https://doi.org/10.1161/CIRCIMAGING.119.009829)

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