

This might be how stress and heart attacks are linked

By Jacqueline Howard, CNN

(CNN) Scientists have long known that [stress can influence your heart health](#), but exactly how this relationship takes place has been something of a mystery -- until now.

Activity in the amygdala, a region of the brain associated with fear and stress, can predict your risk for heart disease and stroke, according to a study published in [the journal The Lancet](#) on Wednesday.

"The study produced several novel findings. It showed, for the first time in animal models or humans, the part of the brain -- the amygdala -- that links to the risk of subsequent cardiovascular disease," said Dr. Ahmed Tawakol, co-director of the cardiac PET/CT program at Massachusetts General Hospital, who was lead author of the study.

"The amygdala is a critical component of the brain's stress network and becomes metabolically active during times of stress," Tawakol said.

He added that the study could provide new insights into how to reduce stress-related cardiovascular diseases.

Cardiovascular diseases -- a class of diseases that involve [the heart](#) or blood vessels -- are the leading cause of death among men and women around the world, according to the [World Health Organization](#).

In the United States, more than [one in three adults](#) has at least one type of cardiovascular disease, and heart disease is the [leading cause of death](#) in the country.

'We were surprised'

The new study involved 293 adults who underwent PET and CT scans at Massachusetts General Hospital in Boston between 2005 and 2008. The scans recorded brain activity, [bone marrow](#) activity, spleen activity and inflammation in the heart arteries.



[Related Article: What is heart failure, heart attack and cardiac arrest?](#)

was associated with a higher risk of a cardiovascular event.

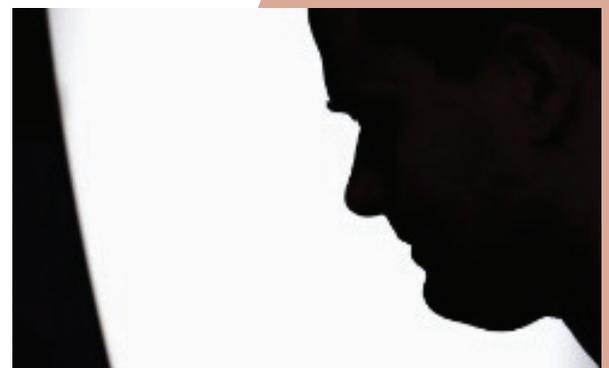
The link between the amygdala and the researchers took other cardiovascular risk factors remained significant even after the researchers took other cardiovascular risk factors into account, such as smoking, diabetes or hypertension.

"We were surprised at how robustly amygdalar activity predicted hard cardiovascular events, along with providing

Some animal studies have suggested that stress can lead to increased activity of cells in [bone marrow](#) and [the spleen](#).

Next, researchers tracked the health of each patient for two to five years, during which 22 of the patients had a cardiovascular disease event, such as a stroke, heart attack or heart failure.

After analyzing the scans and heart health of each patient, the researchers found that higher activity in the amygdala

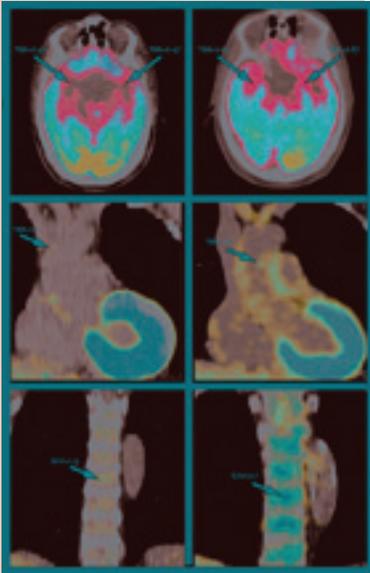


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information on the timing of those events,” Tawakol said.

The researchers also found that amygdalar activity was associated with increased bone marrow activity and inflammation in the arteries.

Views of the amygdala, arteries and bone marrow of two adults, showing differences in low, left, and high amygdala activity.



The finding suggests a complex chain of events that might explain the stress and heart risk link.

Stress may activate the amygdala, leading to extra immune cell production by the bone marrow, which in turn may impact the arteries, causing inflammation, which could lead to a cardiovascular disease event, such as a heart attack or stroke.

Stress has scientists scratching their heads

Still, “the associations noted in this study, while statistically significant, do not prove causation,” Tawakol said. More research is needed to replicate the findings in a larger sample of patients.

“I’d say the findings are definitely novel, show promise and bear replication,” said Thomas Kamarck, a professor of psychology and psychiatry at the University of Pittsburgh. He has written about [psychosocial stress and cardiovascular disease](#) but was not involved in the new study.

Measuring brain activity to predict cardiovascular events is “quite unique and interesting,” Kamarck said. However, “the implication of the paper is that this measure of brain activity can be used as a marker of cumulative exposure to stress. This, I’m not so confident about and will require some additional validation.”

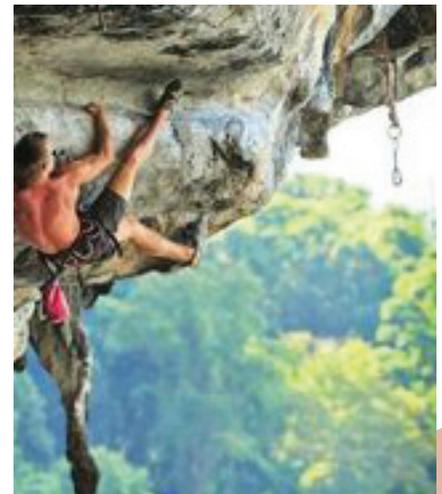
That’s because there has been much debate among scientists about how exactly to measure stress, Kamarck said.

“There is no consensus about the best way to define and to measure stress,” he said. “One of my questions about the measure of resting amygdala activity used by these authors is whether it is best conceptualized as a marker of stressor exposure, stress reactivity or perhaps both.”

Dr. Joel Dimsdale, distinguished professor emeritus at the University of California, San Diego, called the new study “cutting-edge.”

Though he was not involved in this study, Dimsdale has conducted research on [psychological stress and cardiovascular disease](#).

“Certainly, diet, physical activity and genetics play an enormous role in cardiovascular disease. However, this study demonstrates that how the brain perceives stress is also tied up with future risks of cardiovascular disease,” Dimsdale said. “It suggests a new approach for examining the links between stress, emotion and cardiovascular disease.”



[We can't avoid stress, but there are ways to manage stress](#)