# Scientists explain stress-heart attack link

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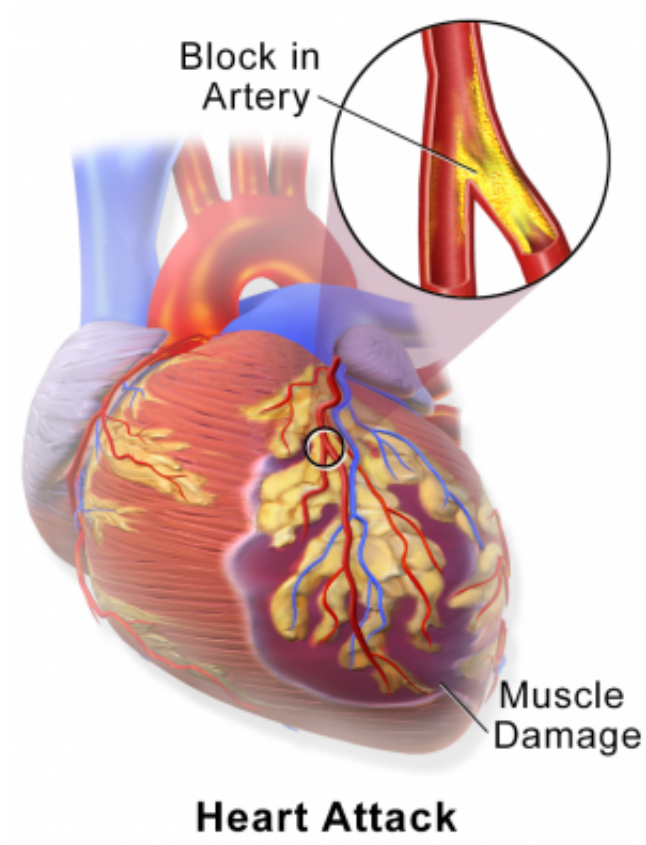


Myocardial Infarction or Heart Attack. Credit: Blausen Medical Communications/Wikipedia/CC-A 3.0

Scientists said Sunday they may have unravelled how chronic stress leads to heart attack and stroke: triggering overproduction of disease-fighting white blood cells which can be harmful in excess.

Surplus cells clump together on the inner walls of arteries, restricting blood flow and encouraging the formation of clots that block circulation or break off and travel to another part of the body.

White blood cells "are important to fight infection and healing, but if you have too many of them, or they are in the wrong place, they can be harmful," said study co-author Matthias Nahrendorf of the Harvard Medical School in Boston.

Doctors have long known that chronic stress leads to cardiovascular disease, but have not understood the mechanism.

To find the link, Nahrendorf and a team studied 29 medical residents working in an intensive care unit.

Their work environment is considered a model for chronic stress exposure given the fast pace and heavy responsibility they carry for life-and-death decisions.

Comparing blood samples taken during work hours and off duty, as well as the results of stress perception questionnaires, the researchers found a link between stress and the immune system.

Particularly, they noticed stress activate bone marrow stem cells, which in turn triggered overproduction of white blood cells, also called leukocytes.

White blood cells, crucial in wound healing and fighting off infection, can turn against their host, with devastating consequences for people with diseases like atherosclerosis—a thickening of artery walls caused by a plaque buildup.

The study then moved on to mice, which were exposed to the rodent equivalent of stress through techniques like crowding and cage tilting.

The team chose atherosclerosis-prone mice.

They found that excess white blood cells produced as a result of stress accumulated on the inside of arteries and boosted plaque growth.

"Here, they (the cells) release enzymes that soften the connective tissue and lead to disruption of the plaque," said Nahrendorf.

"This is the typical cause of myocardial infarction (heart attack) and stroke."

He added leukocytes were only a part of the

picture—factors like high cholesterol and blood pressure, smoking and genetic traits also contribute to heart attack and stroke risk.

"Stress might push these over the brink," the researcher told AFP.

**More information:** Chronic variable stress activates hematopoietic stem cells, *Nature Medicine* (2014) doi:10.1038/nm.3589. www.nature.com/nm/journal/vaop ... nt/full/nm.3589.html