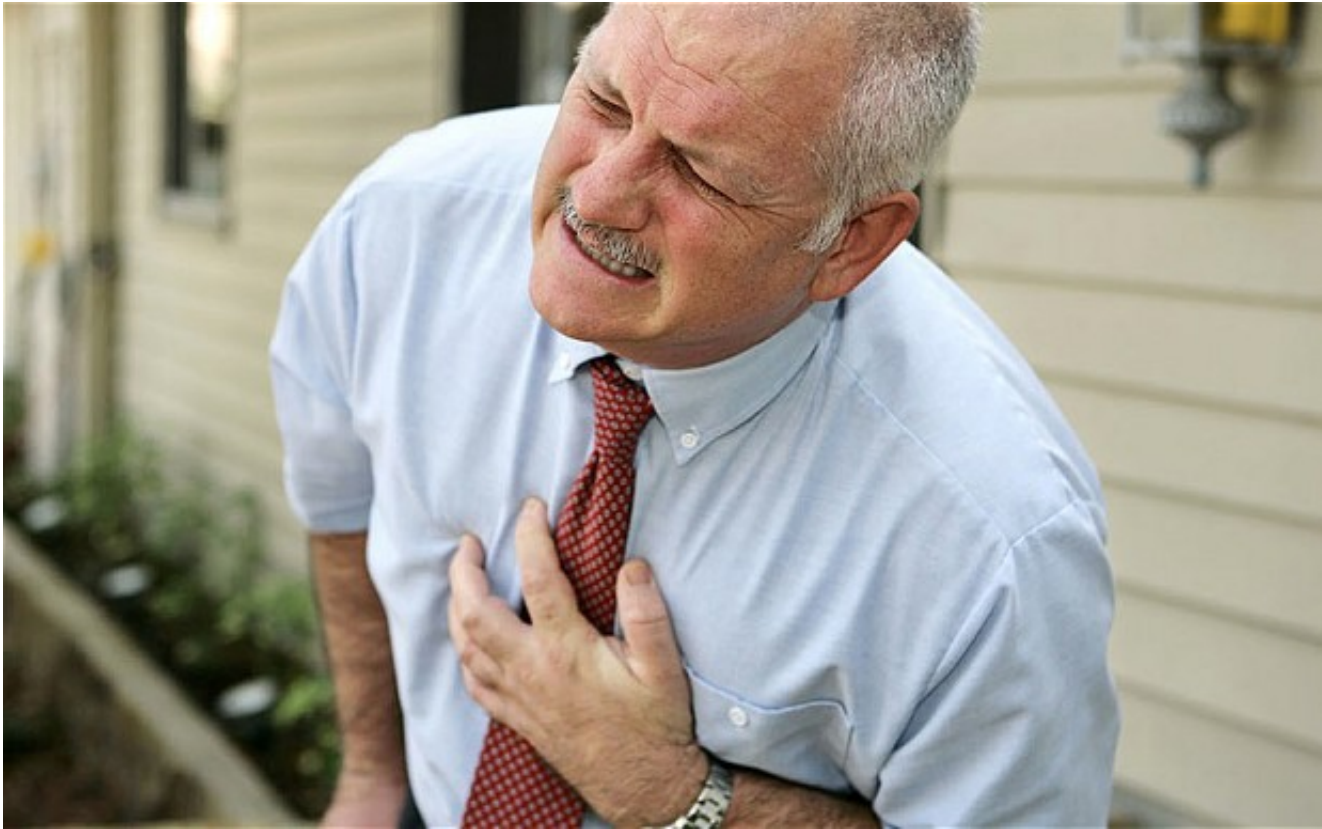


## How stress damages the heart

For the first time scientists have found a direct biological link between stress and inflammation of blood vessels which can lead to heart attacks



Stress damages the heart by inflaming damaged arteries further Photo: ALAMY (STOCK IMAGE)

By Sarah Knapton, Science Correspondent

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It is known that long term stress can cause fatal heart attacks and strokes, but scientists have never known why.

Stress triggers our so-called ‘fight or flight’ mechanism which sends a surge of adrenalin to help the heart pump harder and increase blood flow to enable the body to fight or run when encountering a perceived threat.

But new research suggests that stress also sends the immune system into overdrive, increasing white blood cells and worsening inflammation in the arteries.

And that can cause huge problems if arteries are already thickened with plaque.

When damaged arteries become more inflamed they produce lesions which can break away, leaving an open wound which blood platelets and clotting proteins rush to fill.

A clot can enlarge in a matter of moments and if it completely obstructs the artery, will cause a heart attack.

Dr Matthias Nahrendorf and his team at Massachusetts General Hospital and Harvard Medical School discovered that medical residents who were regularly exposed to chronic stress had a huge white blood cell counts.

They also found that when mice are stressed, the stem cells in their bone marrow were activated and produced large numbers of white blood cells (leukocytes).

Where mice already had thickened arteries (atherosclerosis) the blood cells increased inflammation and caused the same lesion-like plaques to form which rupture in humans and cause heart attacks.

“Exposure to psychosocial stress is a risk factor for many diseases,” said Dr Nahrendorf.

“To explore the impact of stress on the human immune system, we analysed blood samples from 29 medical residents working on a hospital intensive care unit, a challenging, fast-paced work environment that frequently includes the responsibility of life- or-death decisions

“Compared to when off duty, residents working on the ICU reported an increased stress perception.

“When comparing samples taken during work to samples taken off duty, we observed an increase in (white blood cells)

“When atherosclerosis-prone mice were subjected to chronic stress, accelerated (blood cell production) promoted plaque features associated with vulnerable lesions that cause (heart attack) and stroke in humans.”

White blood cells play an important role in the body’s immune system, searching the blood for invading viruses, bacteria, and fungi. However too many cells can be a sign of disease.

Previously it was known that a high white blood cell count could indicate inflammation but Dr Nahrendorf’s team now believe it is actually triggering inflammation.

However the team found that an ‘inhibitor’ drug which stopped stem cells from producing white blood cells also prevented the build-up of plaque in the arteries, offering hope for new treatments to

protect against the damaging effects of stress.

The team said it was the first time that a ‘direct biological link between chronic stress and chronic inflammation’ had been shown.

The findings were published in Nature Medicine.

## How we moderate

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