

# From bug to drug—tick saliva could be key to treating heart disease

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Proteins found in tick saliva could be used to treat a potentially fatal form of heart disease, according to new Oxford University research.

Myocarditis can cause sudden cardiac death in young adults, and occurs when the heart muscle becomes inflamed, often as a result of an infection caused by common viruses. The study, funded by the British Heart Foundation, identified a [protein](#) within tick saliva which can bind to and neutralise several chemicals called chemokines, which are released in the heart during myocarditis. The chemokines attract cells which cause inflammation, but by neutralising the chemicals, tick saliva could potentially prevent this inflammation.

The study, funded by the British Heart Foundation, identified a protein within tick saliva which can bind to and neutralise several chemokines, potentially preventing chronic inflammatory disease in the process.

Approximately 30 per cent of people with myocarditis go on to develop dilated cardiomyopathy and heart failure, which in severe cases can result in the person needing a heart transplant.

Tick saliva contains around 1,500 to 3,000 proteins depending on the tick species. Researchers from the University of Oxford have developed a 'bug to drug' formula where hundreds of tick saliva proteins are made into yeast cells, in order to identify the tick [saliva](#) proteins that have anti-inflammatory properties.

These proteins, called evasins, help ticks to feed for eight to ten days without being noticed by the host animal. The evasins are injected into the host where they block the host's chemokines and prevent the painful inflammation which would normally alert the host to the tick's presence.

Newly published in the journal *Scientific Reports*, the research has identified several new tick evasins and shown that one of them, P991\_AMBCA, from the cayenne tick found in the Americas, can bind to and block the effect of chemokines which cause inflammation in myocarditis, heart attack and stroke.

Professor Shoumo Bhattacharya, the study's lead author and Professor of Cardiovascular Medicine at the University of Oxford, said: "Myocarditis is a devastating disease, for which there are currently very few treatments. With this latest research, we hope to be able to take inspiration from the tick's anti-inflammatory strategy and design a life-saving therapy for this dangerous heart condition. We may also be able to use the same drugs to treat other diseases where inflammation plays a big part, such as [heart](#) attack, stroke, pancreatitis, and arthritis."

Professor Jeremy Pearson, Associate Medical Director at the British Heart Foundation, said: "They may not be pretty, but these little creatures could hold the secret to better treatments for a whole range of diseases. There's a long way to go, but [tick saliva](#) looks like an exciting, albeit unconventional, area of research."

**More information:** Kamayani Singh et al. Yeast

surface display identifies a family of evasins from ticks with novel polyvalent CC chemokine-binding activities, *Scientific Reports* (2017). DOI: [10.1038/s41598-017-04378-1](https://doi.org/10.1038/s41598-017-04378-1)

Provided by University of Oxford

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