

# Gene therapy boosts recovery from heart attack

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(PhysOrg.com) -- Gene therapy could be an effective way to improve survival rates among heart attack patients, new research by academics at the University of Bristol suggests.

Academics at the University of Bristol found that boosting levels of a natural growth factor in the heart could help the muscle to recover after a [heart attack](#). The death rate from a heart attack was halved in mice that received the treatment.

Heart attacks occur when a blood clot blocks off the blood supply to part of the heart muscle. Deprived of oxygen, the tissue dies and cannot regenerate. If the person survives, they can be left with a weakened heart that can't pump blood as effectively - causing severe ill health. Each year, around 140,000 people suffer a heart attack in the UK.

[Nerve growth factor](#) (NGF) is so called because it promotes the growth of [nerve cells](#), but Dr Costanza Emanuelli, a BHF Senior Research Fellow, previously showed that it could also stimulate the growth of new blood vessels.

In a new study published in the journal [Circulation Research](#), Dr Emanuelli and her team in Bristol investigated whether NGF could help the heart recover from a heart attack by encouraging new blood vessels to grow into and nourish the injured muscle.

The researchers used a specially engineered virus to deliver extra copies of the gene for NGF into the hearts of mice. Thirty days after having a heart attack, 80 per cent of the mice that received this treatment were still alive, compared with only 60 per cent of mice that did not. The pumping ability of the heart was also significantly improved in mice that received the NGF gene.

In contrast, mice that were given an antibody that neutralised NGF fared significantly worse after they had a heart attack, with higher rates of cell death and more severely impaired [heart function](#).

When the researchers looked at post mortem human hearts that had suffered a heart attack, they found that levels of NGF near the blood-starved part of the heart were higher than normal, suggesting that increasing NGF production is a normal part of the tissue's response to oxygen deprivation.

Dr Emanuelli, Reader of Research in Experimental Cardiovascular Medicine Research in the Bristol Heart Institute (BHI) at the University of Bristol, said: "We've shown that in mice, NGF gene therapy improves survival rates after a heart attack, through both a direct protective effect on [heart muscle](#) cells and by stimulating the growth of new blood vessels.

"In the laboratory, we can deliver therapy directly to the heart at the time of the heart attack. But in a clinical context the therapy will have to be given hours or days later, ideally without the need for surgery. So next we need to see if we can get similar results in this situation.

"I'm convinced that NGF has huge potential for treating heart attack patients."

Professor Peter Weissberg, Medical Director of the BHF, said: "The discovery that increasing the production of a natural defence chemical in the heart can help the muscle to repair is very exciting. But much more research is needed before we can translate this success into a safe and practical treatment for humans.

"We're hopeful that advances in regenerative medicine over the next decade might mean we can finally reverse the damage caused by a heart attack. Over 700,000 people are living in the UK with heart failure - a debilitating condition with a poor prognosis. We hope that this kind of research holds the key to a much brighter future."

**More information:** M Meloni et al (2010) Nerve Growth Factor promotes cardiac repair following myocardial infarction. *Circulation Research* (Published online ahead of print). [circres.ahajournals.org/](https://circres.ahajournals.org/)

Provided by University of Bristol

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