

# From heart failure to health: Pump shown to restore organ to fitness

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Human heart. Credit: copyright American Heart Association

As we face a shortage of donated hearts for transplant, the study authors are calling for the devices to be considered as a tool which can allow patients to restore their health.

The research examined the effect of mechanical heart pumps, known as left [ventricular assist devices](#) (LVAD).

The devices are used to support [patients](#) with severe [heart failure](#) while they wait for a [heart transplant](#).

Surgeons implant the battery operated, mechanical pump which helps the main pumping chamber of the heart- the left ventricle - - to push blood around the body. Fitted at the six specialist NHS centres across the UK, LVADs are used for patients who have reached the end stage of heart failure.

Publishing today in the *Journal of American College of Cardiology*, the team report that LVAD combined with medication can fully restore heart function in patients.

Dr Djordje Jakovljevic, Senior Research Fellow in Cardiovascular Ageing and Heart Failure within the Institute of Cellular Medicine at Newcastle University, is lead author on the paper.

He said: "We talk about these devices as a bridge-to-transplant, something which can keep a patient alive until a heart is available for transplantation.

"However, we knew that sometimes patients recover to such an extent that they no longer need a heart transplant.

"For the first time, what we have shown is that heart function is restored in some patients - to the extent that they are just like someone healthy who has never had heart disease. In effect, these devices can be a bridge to full recovery in some patients."

## **Tool to recovery**

In the clinical trial, 58 men with heart failure were tested for their heart fitness levels. Of the men, 16 were fitted with an LVAD and then had it removed due to the extent of their recovery. Furthermore 18 still had an LVAD and 24 patients were waiting for a heart transplant. On average, a patient had a device fitted for 396 days before it was removed, though it varied from 22 days to 638 days.

The participants were compared with 97 healthy men who had no known [heart disease](#). All were tested on a treadmill with a face mask to monitor their oxygen utilisation and heart pumping capability.

In the publication the authors report that 38% of people who recover enough to allow the device to be removed demonstrated a heart function which was equivalent to that of a healthy individual of the same age.

Dr Jakovljevic explains: "We can consider these pumps as a tool which can lead to a patient recovering, rather than as a device which keeps people alive until a heart transplant is available.

"Our ongoing and future research is aiming to identify the markers of early heart recovery while patients are fitted with a device. These markers will inform clinical care teams to make right decisions about which patient respond well to device and when to consider potential removal or disconnection of the device while ensuring heart failure will not occur again in the future."

Although heart transplantation offers a second chance of life for patients with advanced heart failure, a shortage of donor hearts has opened doors for developments and use of mechanical devices.

Dr Guy MacGowan, Consultant Cardiologist within the Newcastle upon Tyne Hospitals NHS Foundation Trust, and Honorary Clinical Reader in Heart Failure at Newcastle University, is co-author of the paper.

He said: "It is very difficult to get a heart transplant, especially in the UK, so any alternative treatment is important and recovery of heart function especially so. The UK has a long way to go in comparison with the number of heart transplants in other developed countries.

"Within Newcastle upon Tyne Hospitals NHS Foundation Trust, we are pioneering a new strategy to use the LVAD to enhance chances of recovery, monitor for signs of recovery, and then use a minimally invasive procedure to disconnect the device."

Consultant Cardiac Surgeon within the Newcastle upon Tyne Hospitals NHS Foundation Trust and co-author, Professor Stephan Schueler, added: "In most cases the device reverses the symptoms of heart failure so that patients feel less short of breath and with less fatigue. In a smaller proportion of patients there is actually an improvement in [heart function](#) so that the pump can be disconnected or explanted."

The average price of a LVAD is approximately £80,000 and the transplant operation costs around £69,000.

The team involved researchers at Newcastle, Cambridge, Leeds, London and Louisville (USA) who are currently studying how to identify patients who will respond best to being fitted with an LVAD by identifying markers of early [heart](#) recovery.

**More information:** Left Ventricular Assist Device as a Bridge to Recovery for Patients With Advanced Heart Failure, *Journal of the American College of Cardiology*, 2017. DOI: 10.1016/j.jacc.2017.02.018, [www.sciencedirect.com/science/ .../ii/S0735109717306204](http://www.sciencedirect.com/science/.../ii/S0735109717306204)

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