

YORKSHIRE POST

# Medical device offers hope to heart-damage patients

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A NEW device being designed by engineers in Yorkshire could free seriously-ill heart patients from a lifetime of drug therapy.

Tens of thousands of patients have their lives prolonged with implanted devices to keep their hearts working.

The implants use high-speed turbines to produce a force to help the heart to pump blood around the body - but in some cases they can damage cells within the blood, which increases the risk of clots forming.

As foreign bodies, they also mean patients have life-long anti-rejection drug therapy to suppress their immune systems.

Now experts from Leeds University have invented a specially-woven web which wraps around the hearts of patients who would otherwise require implants.

Inbuilt sensors recognise

when the heart wants to beat and trigger a series of miniature motors which cause the web to contract - assisting the heart to pump blood around the body by squeezing it in the same way a plastic bottle is squeezed to force the liquid inside to rise.

The web is made from biocompatible material which is not rejected by the body.

The device has been developed by experts from the university's School of Mechanical Engineering in partnership with cardiac specialists Kevin Watterson and Osama Jaber from Leeds General Infirmary. The research has been funded by Leeds-based medical charity Heart Research UK.

It is currently at a prototype stage with the team carrying out tests using a computer-simulated model of blood flow and a mechanical rig which replicates the motion of the heart under different conditions.

Once the mechanics have

been perfected, the team

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## Heart research engineers get



## Student & Young Professional Magazine



### Definitely for the faint hearted

A new device from Leeds University could put the beat back into weak hearts and free patients from anti-rejection drugs.

Current implanted heart assist devices suck blood from the ventricles and expel it into downstream vessels. While they have prolonged the lives of heart patients, these devices come into contact with the blood stream: patients require life-long drug therapy to suppress the immune system and prevent blood clotting. Also, many of these devices use high speed turbines to produce the pumping force - this can damage blood cells, increasing the chance of clotting.

The Leeds alternative is less invasive, being a specially-woven web made from biocompatible material which the body will not reject.

The webbing wraps around the heart and does not come into contact with the blood stream. Inbuilt sensors recognise when the heart wants to beat and trigger a series of miniature motors which cause the web to contract - increasing the internal pressure and assisting the heart to pump the blood around the body.

"It's a really simple concept that works in the same way as when you squeeze a plastic bottle, forcing the liquid inside to rise," said engineering PhD student David Keeling (pictured above), who has built a special rig to test the device.

The device is currently at prototype stage with the team (academics from the School of Mechanical Engineering and cardiac consultants from Leeds General Infirmary) using a computer simulated model of the heart within the simulator under different conditions. Current testing aims to refine design and assist strategies. David said: "We've been looking at finding the optimum timing and also length of the compressive squeeze."

The research has been funded by Leeds-based medical charity Heart Research UK. Once perfected, the team intends to simulate the effects of different heart diseases to gauge the potential success of the device. Potential uses are huge. As well as offering support to people suffering from heart and valve problems, the device could also be a bridging aid to patients as they wait for transplants, providing them with a better quality of life. David said: "Recent research has found that with some heart diseases, supporting the heart for a short period with an assistive device reduces the workload on the heart and allows it to rest and recover. Our device also allows for a controlled relaxation of the heart muscle after contraction, which means that it's being supported throughout the whole heartbeat process. It's the same as when you pull a muscle in any part of your body, rest is often the best therapy."

## THE TIMES

### Mesh helps heart to carry on beating



LEEDS A device that is wrapped around the heart to keep it pumping has been designed to help patients with heart disease (Lewis Smith writes).

The invention takes the form of a fine mesh equipped with an array of miniature motors that tightens around the heart to simulate the heart's beat as it pumps blood around the body.

Researchers said that its operation was similar to an adult holding a plastic bottle and squeezing it to force a liquid out of the top.

The device has been tested on a rig built at Leeds General Infirmary.

Implant material he helped to develop

take drugs for life to stop their bodies rejecting them. The new device, developed by Dr Peter Walker and Dr Martin Levesley from the university's School of Mechanical Engineering, uses webbing wrapped around the heart which does not come into contact with the bloodstream. Built-in sensors recognise when the heart wants to beat and

trigger a series of miniature motors which cause the web to contract and assist the heart to pump the blood around the body. Also behind the technology are cardiac consultants Kevin Watterson and Osama Jaber from Leeds General Infirmary and engineering PhD student David Keeling. The research has been funded by Leeds-based charity Heart Research UK.

## Eye for detail

Some images can say a thousand words. The prototype device described in this story was a masterpiece of technology, but not very attractive! We commissioned professional photographers to create a series of beautiful images to showcase the innovation and the PhD student behind it, giving the print and online media even more of a reason to publish.