

New hope for patients: Study shows self-healing powers of the heart

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New study reveals: The heart is able to regenerate damaged tissue – a hope for millions.



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Heart failure is one of the leading causes of death worldwide. According to the Centers for Disease Control (CDC), almost seven million people in the USA are affected, which accounts for 14 percent of all annual deaths in the United States. In Germany, too, cardiovascular diseases lead the statistics on causes of death, according to the Federal Statistical Office.

Although medication can slow the progression of the disease, there is currently no cure. An international team of researchers led by Hesham Sadek of the University of Arizona may have discovered that the heart can heal itself by regenerating heart muscle cells - at least in some patients with an artificial heart.

Pump supports the weakened heart

"This is the strongest evidence to date that human heart muscle cells can actually regenerate," said Sadek. This finding could open up completely new treatment methods for heart failure.

The results of the study, published in the journal *Circulation*, are based on the analysis of tissue samples from patients with a left ventricular assist pump (LVAD). This pump supports the weakened heart and can give those affected years in which a transplant is often the last option.

Why did some patients show exceptional regeneration of heart muscle cells?

The heart's "resting period" enabled by the pump may be the secret. "The pump takes over the job of circulating blood around the body while the heart can recover," Sadek explained. His theory is that the unloading allows the heart muscle cells to regenerate - similar to how injured muscles recover after sufficient rest.

The team analyzed samples provided by colleagues at the University of Utah using carbon dating. Researchers at the Karolinska Institute in Sweden were able to prove that the regenerated cells were indeed newly formed. The patients' heart muscle cells regenerated more than six times faster than those of people with a healthy heart.

Why do only about 25 percent of patients benefit from this extraordinary regeneration?

Sadek and his team now want to investigate what distinguishes the so-called "responders" from others. "It is unclear why some patients respond and others do not," he explained. The researchers hope to decipher the molecular mechanisms that trigger this effect. The goal is that every heart failure patient can benefit from this ability in the future.

These research results build on Sadek's earlier work. In a 2011 study, he showed that heart muscle cells actively grow in the womb but stop dividing after birth. The constant stress of pumping blood seems to inhibit this ability to regenerate. In another study in 2014, he found initial evidence that artificial hearts can restore this ability to divide.

Researchers determined to take next step

"If we fully understand the mechanisms behind this regeneration, we could potentially cure heart failure," said Sadek. What is particularly exciting is that artificial hearts are not a vision of the future. "These devices have been tried and tested and have been used for years," he emphasized. The current findings could therefore benefit millions of people without having to develop completely new technologies.

The researchers are determined to take the next steps. They want to find out why some patients are responders and how this ability can be transferred to others. Sadek sees this as a real opportunity: "The possibility of letting the heart heal itself is no longer just a vision, but a tangible prospect."

The most important things summarized:

- In patients with artificial hearts, heart muscle cells regenerate up to six times faster because the pumps allow the heart to rest.
- Only about 25 percent of patients show this regeneration. Research is working to find out why some respond and others do not.
- The aim is to activate the regenerative capacity in all patients, which could enable a long-term cure for heart failure.


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