The quest for the holy grail of healthy arteries

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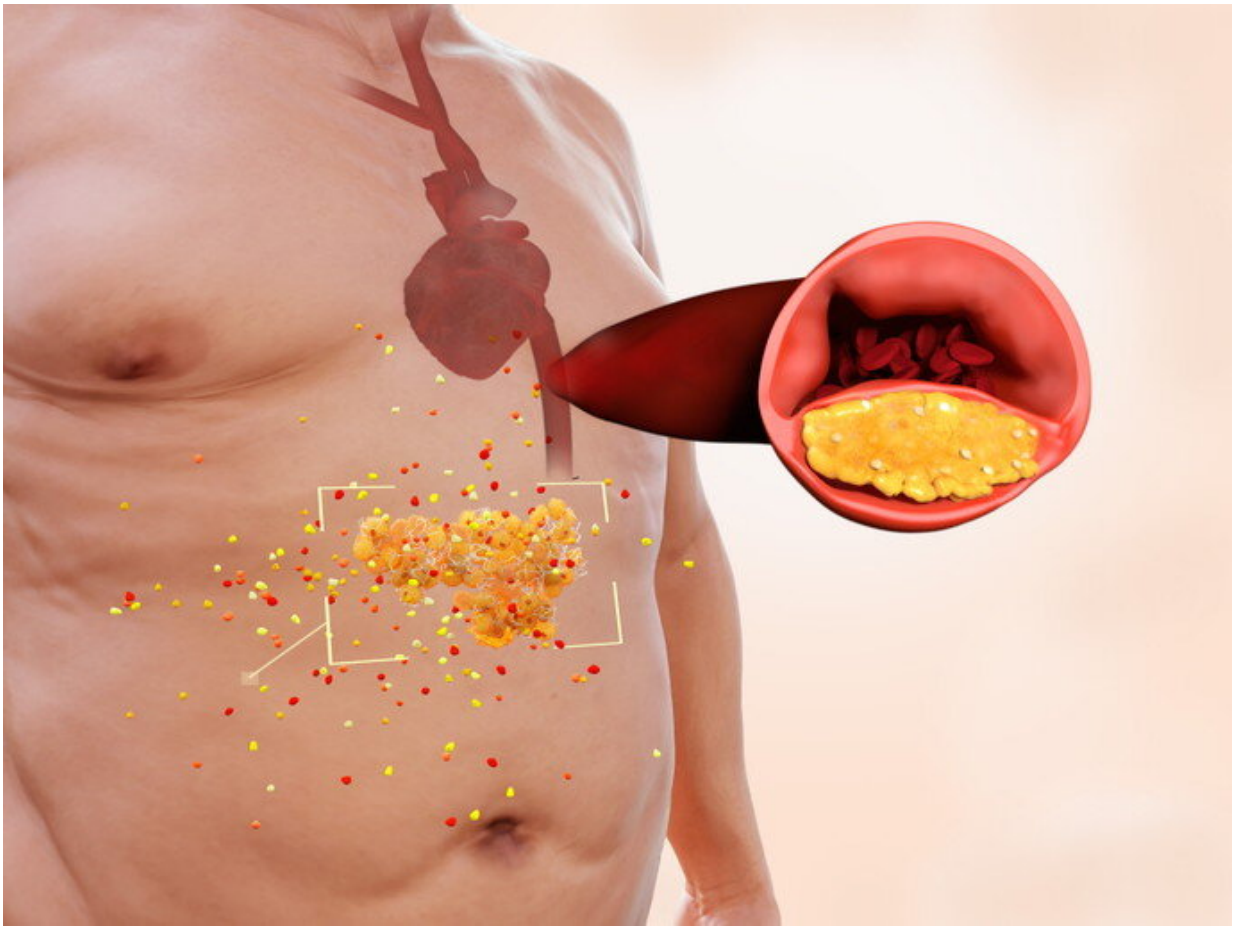

Credit: Juan Gaertner, Shutterstovk

Heart and kidney failure, aneurysms and strokes—these are the

complications that can result from atherosclerosis, a condition in which arteries narrow due to plaque build-up on the artery walls. Severe cases of atherosclerosis are treated with procedures such as bypass surgery or balloon angioplasty that involves widening narrowed or blocked arteries. However, although effective, these procedures have a significant drawback. As Dr. Davide De Lucrezia, coordinator of the EU-funded project THE GRAIL, explains in a news item posted on the 'News Medical' site, "they are mostly short-term solutions, failing to restore vessel integrity in the long term."

To overcome this shortcoming, THE GRAIL team developed a new therapeutic device that can trigger the regeneration of the diseased innermost layer of an artery. The hardened arterial area is replaced with a soft, compliant and intelligent scaffold called a synthesized intimal layer (SIL), which is then repopulated by the patient's own cells.

How does it work?

The novel strategy dispenses with the need for bypass surgery and angioplasty. Instead, the SIL is inserted into the diseased blood vessel using a thin catheter. The intelligent scaffold is made of elastin-like polypeptides and comprises bioactive molecules that can recruit the patient's resident and circulating endothelial cells. These cells, which form the inner cell lining of blood vessels and lymphatic vessels, help the hardened area of the artery to regenerate. Once its task is completed, the bioresorbable scaffold dissolves into the body, leaving behind healthy regenerated tissue.

The project's success has resulted in a number of promising developments. "We demonstrated the scaffold's full biocompatibility invitro and safety in vivo, and preliminary results on efficacy are extremely encouraging. Thanks to five years of EU support, we were able to progress THE GRAIL project from a simple sketch on a paper to

a working prototype, paving the way for the commercial exploitation of the results," says Dr. De Lucrezia, CEO of project coordinator Explora Biotech, an Italian company involved in the development of enabling technologies for biological engineering.

What next?

With a view to marketing the product more effectively, three of the project partners have created a spin-off company that will be working with bigger firms that can support sales. The research team also aims to exploit by-products of the project, such as a different way of performing peripheral vascular bypass surgery. The development of advanced in vivo models for safety and efficacy testing of medicinal products is yet another outcome of the expertise gained during the project's 5-year term and beyond.

Additionally, negotiations are currently underway with venture capital firms in order to raise the capital to develop the technology. If successful, THE GRAIL (Tissue in Host Engineering Guided Regeneration of Arterial Intimal Layer) partners could soon be carrying out the first clinical trials in human patients.

More information: CORDIS project page: cordis.europa.eu/project/rcn/101797/factsheet/en

Provided by CORDIS

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