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Singapore designs new biomaterial to show how ageing in heart could be reversed

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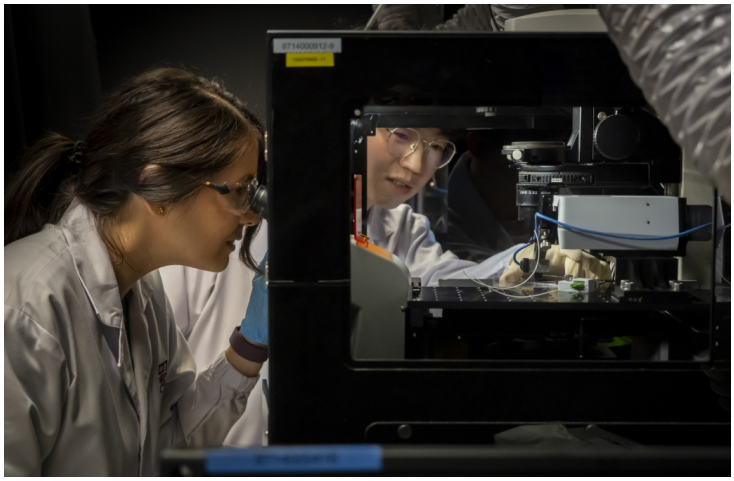
For preserving or restoring heart health during ageing



A new lab-grown material has revealed that some of the effects of ageing in the heart may be slowed and even reversed. The discovery could open the door to therapies that rejuvenate the heart by changing its cellular environment, rather than focusing on the heart cells themselves.

The research was carried out by a team from the Department of Biomedical Engineering in the College of Design and Engineering (CDE) at the National University of Singapore (NUS).

The team focused on the extracellular matrix (ECM)—the complex framework that surrounds and supports heart cells. This net-like scaffolding made of proteins and other components holds cells in place and sends chemical signals that guide how the cells function.

As the heart ages, the ECM becomes stiffer and its biochemical composition changes. These changes can trigger harmful activity in heart cells, contributing to scarring, loss of flexibility, and reduced function.

To investigate this, the team developed a hybrid biomaterial called DECIPHER (DECellularised In Situ Polyacrylamide Hydrogel-ECM hybrid), made by combining natural heart tissue with a synthetic gel to closely mimic the stiffness and composition of the ECM.

When the team placed aged heart cells onto DECIPHER scaffolds that mimicked ‘young’ ECM cues, they found that the cells began to behave more like young cells—even when the material remained stiff. Closer investigation revealed that this included a shift in gene activity across thousands of genes associated with ageing and cell function.

While the work is still in the research phase, the team says their findings open up a new direction for therapies aimed at preserving or restoring heart health during ageing—by targeting the ECM itself.