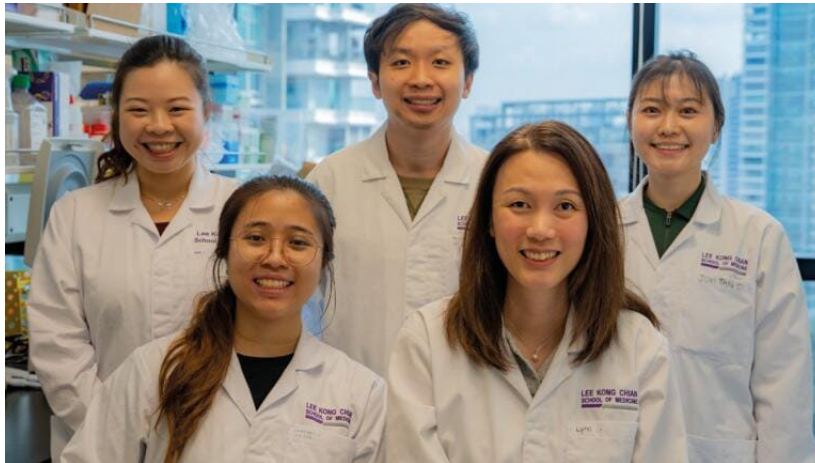


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NTU researchers map stem cell maturation and Midkine protein for heart repair



Researchers at Nanyang Technological University, Singapore, have mapped the maturation process of transplanted cardiovascular progenitor cells inside damaged hearts. The team identified the protein Midkine as a potential agent for blood-vessel repair.

Mapping the Cellular Transformation Within Damaged Heart Tissue

Led by Assistant Professor Lynn Yap of the Lee Kong Chian School of Medicine, the research team uncovered insights that could advance stem-cell-based treatments for heart disease.

Replicating Human Cardiac Conditions in Preclinical Trials

Heart disease accounts for approximately one-third of global deaths. Heart attacks occur when coronary artery blockages restrict oxygen and nutrients to heart muscle cells, or cardiomyocytes. Because adult heart tissue has a limited capacity to replace lost cells, the body typically forms scar tissue that does not contract effectively, weakening the organ over time.

To study how stem cells might restore this lost function, the research team introduced human pluripotent stem cell-derived cardiovascular progenitor cells, or CVPs, into pig hearts following induced heart attacks. Pig hearts share key physiological and anatomical traits with human hearts.

Spatial Transcriptomics Reveals Gene Activity Shifts

Using a technique known as spatial transcriptomics, the team analyzed gene expression across thousands of microscopic locations within the tissue samples while preserving positional data.

After transplantation, the CVPs activated genes tied to metabolism, energy production, protein synthesis, and heart muscle contraction. At the same time, the analysis showed reduced activity among genes linked to scar tissue formation, indicating successful cellular integration and tissue repair support.

Midkine and the Restoration of Essential Blood Supply

Restoring blood supply remains vital after a heart attack because regenerated heart muscle requires an extensive vessel network to deliver nutrients and manage high energy demands.

The research team identified Midkine, a growth factor protein produced by the transplanted stem cells, as a factor in regulating cell growth, movement, survival, and tissue repair. Researchers noted that promoting blood-vessel repair through Midkine could improve recovery following a cardiac event and help maintain the heart's pumping capacity.

<https://www.newsdirectory3.com/ntu-researchers-map-stem-cell-maturation-and-midkine-protein-for-heart-repair/>