

Korea designs Myocardial Infarction treatment patch

19 December 2022 | News

Successful transplantation and activation of human mesenchymal stem cell sheet to improve heart function



Myocardial infarction is an ischemic disease in which a coronary artery supplying blood to the heart muscle is stenotic or obstructed, resulting in cardiac tissue necrosis. Due to the irreversible loss of cardiomyocytes, damaged heart tissue cannot be naturally regenerated. The most recent effort to regenerate the damaged heart tissue is to transplant stem cells to the damaged area. However, this approach has low engraftment rates stemming from the highly curved surface of the heart and its dynamic nature – hindering the cells from settling on the heart to allow time for cell regeneration.

A joint team of researchers at Pohang University of Science and Technology (POSTECH) and Catholic University of Korea, along with Kiwon Ban of the City University of Hong Kong, has announced the successful transplantation of a highly integrable *in vivo* priming bone marrow mesenchymal stem cell (BMSC) sheet based on the utilisation of a thermos-responsive nanofiber membrane.

Their work has attracted attention from academic circles for developing a human umbilical vein endothelial cell (HUVEC) sheet specially designed for enhancement of angiogenesis (formation of new blood vessels from pre-existing vessels), which promoted cardiac repair when transplanted together with the BMSC sheet.

After the transplantation, the team found that a prolonged secretion of multiple angiogenic cytokines, such as vascular endothelial growth factor, angiopoietin-1, and insulin-like growth factor-1 promoted angiogenesis, leading to a significant improvement in the cardiac function, including intrinsic contractibility and remodeling.

This technique is assessed to have proposed a new-concept heart patch by improving the heart function for the treatment of myocardial infarction as well as increasing integration and engraftment.