Stem cells train heart following heart attack

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Injecting adult stem cells into a heart following a heart attack (infarction) improves the heart function and strengthens the heart wall.

The use of such cells may eventually reduce the chance of heart failure following a heart attack. Researchers from Leiden University discovered this in a project forming part of the Dutch Programme for Tissue Engineering, funded by Technology Foundation STW and the Netherlands Organisation for Health Research and Development (ZonMW).

Following a heart attack, part of the heart tissue dies. It is still not possible to restore the scar tissue arising as a result of this. The majority of stem cell researchers attempt to make new heart muscle cells from stem cells.

Liesbeth Winter of the Leiden University Medical Center, however, was able to prove the concept of using the embryonic potential of adult human cells to train the heart: this cell therapy ensured that less tissue died and that the remaining heart cells functioned better.

The PhD student used the 'Epicardium Derived Cell' or EPDC. This cell plays a crucial role during embryonic heart development: the embryonic EPDCs provide cells for the connective tissue skeleton of the heart and for the walls of the coronary arteries. EPDCs also play an important role in the formation of a thick, compact heart muscle wall. Without EPDCs, the heart muscle would remain very thin and the embryo would die.

Winter used adult human EPDCs that she extracted from the atrium of the heart. She transplanted these cells to a mouse heart that had suffered an infarction. The mice receiving these cells retained a better heart function than mice without these cells, both in the short term and in the longer term of several weeks. The human cells also ensured that less mouse cells died off.

Two weeks following cell transplantation, the treated hearts contained more blood vessels, the heart muscle cells exhibited an increased activity of DNA damage repair, and the wall was thicker where the infarct had occurred. These results suggest that EPDCs have an almost instant stimulating effect on the surrounding heart tissue following transplantation.

The Dutch Programme on Tissue Engineering has been running since 2004. Prior to this, NWO, Technology Foundation STW, and ZonMw had made 3 millions euros available for a pilot programme in this area. The DPTE programme has been funded to the tune of M€ 50. Half of the funding came from a subsidy of M€ 25 obtained from the Dutch government's Bsik programme (Grants for Investments in Knowledge Infrastructure).

Source: NWO