Human Embryonic stem cells- can we mend the broken heart?

The adult heart has a limited regenerative capacity, and hence any significant loss of heart cells, as occurs for example during heart attacks is mostly irreversible and may lead to progressive heart failure. A possible novel therapeutic strategy for heart failure may be to increase the number of functional muscle cells within the diseased area by implantation of exogenous myogenic cells. However, sources for large quantities of human heart cells for transplantation are currently lacking.

Human embryonic stem cells are continuously growing stem cells lines originally isolate from human blastocysts. These cells can replicate to create more stem cells and can also differentiate to generate any of the 200 different types of specialised cells that make up the human body.

We have generated a differentiation system in which human embryonic stem cells reproducibly differentiated into human heart cells in the laboratory, and showed that the produced cells had both structural and functional properties typical for human heart cells. We later showed that when transplanted in the heart, the cells can survive, function and integrated with the surrounding tissue. The results of these studies may pave the way for future cell based therapies.