

Stem cell transplant repairs damaged gut in mouse model of inflammatory bowel disease

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A source of gut stem cells that can repair a type of inflammatory bowel disease when transplanted into mice has been identified by researchers at the Wellcome Trust-Medical Research Council Cambridge Stem Cell Institute at the University of Cambridge and at BRIC, the University of Copenhagen, Denmark.

The findings pave the way for patient-specific regenerative therapies for inflammatory bowel diseases such as ulcerative colitis.

All tissues in our body contain specialised stem cells, which are responsible for the lifelong maintenance of the individual tissue and organ. Stem cells found in adults are restricted to their tissue of origin, for example, stem cells found in the [gut](#) will be able to contribute to the replenishment of the gut whereas stem cells in the skin will only contribute to maintenance of the skin.

The team first looked at developing intestinal tissue in a mouse embryo and found a population of stem cells that were quite different to the [adult stem cells](#) that have been described in the gut. The cells were very actively dividing and could be grown in the laboratory over a long period without becoming specialised into the adult counterpart. Under the correct growth conditions, however, the team could induce the cells to form mature intestinal tissue.

When the team transplanted these cells into mice with a form of [inflammatory bowel disease](#), within three hours the stem cells had

attached to the damaged areas of the mouse intestine and integrated with the gut cells, contributing to the repair of the damaged tissue.

Dr Kim Jensen, a Wellcome Trust researcher and Lundbeck foundation fellow, who led the study, said: "We found that the cells formed a living plaster over the damaged gut. They seemed to respond to the environment they had been placed in and matured accordingly to repair the damage.

"One of the risks of [stem cell transplants](#) like this is that the cells will continue to expand and form a tumour, but we didn't see any evidence of that with this immature stem cell population from the gut."

Cells with similar characteristics were isolated from both mice and humans and the team were also able to generate similar cells by reprogramming adult human cells, so called induced Pluripotent Stem Cells (iPSCs), and growing them in the appropriate conditions.

"We've identified a source of gut [stem cells](#) that can be easily expanded in the laboratory, which could have huge implications for treating human inflammatory bowel diseases. The next step will be to see whether the human cells behave in the same way in the mouse transplant system and then we can consider investigating their use in patients," added Dr Jensen.

The findings are published online today in the journal *Cell Stem Cell*.

Provided by Wellcome Trust

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