Human ES cells progress slowly in myelin's direction

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Scientists from the University of Wisconsin, USA, report in the journal *Development* the successful generation from human embryonic stem cells of a type of cell that can make myelin, a finding that opens up new possibilities for both basic and clinical research.

The cells the researchers made are called oligodendrocytes, which are responsible for making myelin in the central nervous system. Myelin forms an insulating sheath that surrounds nerve fibres, both protecting them and speeding up the transmission of nerve impulses. Its loss or damage has serious consequences, as is seen in the condition of multiple sclerosis, because without it nerves lose the ability to transmit impulses to each other and to function properly.

Unlike human embryonic stem (ES) cells, it's relatively easy to persuade mouse ES cells to turn into oligodendrocytes; it's often done by exposing these cells to a protein called Sonic Hedgehog, which produces oligodendrocytes in the spinal cord of developing embryos. Now Su-Chun Zhang and his co-workers show in the May issue of *Development* that treating human ES cells with this same protein also turns them into oligodendrocytes - they just take longer to do it, 14 weeks as opposed to the 2 weeks taken by mouse ES cells. They also report another difference between mouse and human ES cells: a growth factor called Fgf2 that promotes oligodendrocyte development in mouse ES cells actually stalls it in human ES cells.

As Dr Zhang reveals, these findings were quite unexpected. 'This was

quite a surprise given that this is exactly how we direct mouse ES cells to become oligodendrocytes. But we have discovered an unexpected twist in the cell's response to the same external factor', explained Dr Zhang. 'It nevertheless explains why so many research groups have failed to persuade human neural stem cells to become oligodendrocytes for the past decade.'

As Dr Zhang went on to discuss, these findings are also of clinical importance. 'We are now able to generate a relatively enriched population of oligodendrocyte precursor cells that may be used to repair lost myelin sheaths. These findings also raise awareness of the direct translatability of animal studies to human biology. In this regard, the human oligodendrocytes generated from human ES cells or the generation of disease-induced pluripotent stem cells can provide a useful tool in the future for screening pharmaceuticals directly on human cells.'

More information: dev.biologists.org

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