A step closer to muscle regeneration

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(Medical Xpress)—Muscle cell therapy to treat some degenerative diseases, including Muscular Dystrophy, could be a more realistic clinical possibility, now that scientists have found a way to isolate muscle cells from embryonic tissue.

PhD Student Bianca Borchin and Associate Professor Tiziano Barberi from the Australian Regenerative Medicine Institute (ARMI) at Monash University have developed a method to generate skeletal muscle cells, paving the way for future applications in regenerative medicine.

Scientists, for the first time, have found a way to isolate muscle precursor cells from pluripotent stem cells using a purification technique that allows them to differentiate further into muscle cells, providing a platform to test new drugs on human tissue in the lab. Pluripotent stem cells have the ability to become any cell in the human body including, skin, blood, brain matter and skeletal muscles that control movement.

Once the stem cells have begun to differentiate, the challenge for researchers is to control the process and produce only the desired, specific cells. By successfully controlling this process, scientists could provide a variety of specialised cells for replacement in the treatment of a variety of degenerative diseases such as Muscular Dystrophy and Parkinson's disease.

"There is an urgent need to find a source of muscle cells that could be used to replace the defective muscle fibers in degenerative disease. Pluripotent stem cells could be the source of these muscle cells,"

Professor Barberi said.

"Beyond obtaining muscle from pluripotent stem cells, we also found a way to isolate the muscle precursor cells we generated, which is a prerequisite for their use in regenerative medicine.

"The production of a large number of pure muscle precursor cells does not only have potential therapeutic applications, but also provides a platform for large scale screening of new drugs against muscle disease."

Using a technology known as fluorescence activated cell sorting (FACS), the researchers identified the precise combination of protein markers expressed in muscle precursor cells that enabled them to isolate those cells from the rest of the cultures.

Ms Borchin said there were existing clinical trials based on the use of specialised cells derived from pluripotent stem cells in the treatment of some degenerative diseases but deriving muscle cells from pluripotent stem cells proved to be challenging.

"These results are extremely promising because they mark a significant step towards the use of pluripotent stem cells for muscle repair," Ms Borchin said.

The study was published in the journal *Stem Cell Reports*.

More information: www.cell.com/stem-cell-reports/abstract/S2213-6711%2813%2900119-7

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