Potential new approach to regenerating skeletal muscle tissue

An innovative strategy for regenerating skeletal muscle tissue using cells derived from the amniotic fluid is outlined in new research published by scientists at the UCL Institute of Child Health.
The paper shows that damaged muscle tissues can be treated with cells derived from the fluids which surround the fetus during development, leading to satisfactory regeneration and muscle activity. The treatment resulted in longer survival in mice affected by a muscle variant of spinal muscular atrophy. This is the first time that regeneration of diseased muscle tissue has been obtained using cells derived from amniotic fluid.

The research appears in the journal Stem Cells, is authored by Dr Paolo de Coppi (UCL Institute of Child Health and surgeon at Great Ormond Street Hospital) and colleagues in Paris and Padova, and represents an impressive development in the growing field of regenerative medicine.

Muscle derived stem cells are presently considered the best source for muscle regeneration. However they cannot be used to treat muscular dystrophies because the stem cells themselves are affected in individuals with these conditions. Due to this challenge, other cell sources have been explored but so far no definitive treatment has been successful.

De Coppi's team has demonstrated that intravenous transplantation of amniotic fluid stem (AFS) cells enhances the muscle strength and improves the survival rate of the affected animals. This is the first study to demonstrate the functional and stable integration of AFS cells into skeletal muscle, highlighting their value as a cell source for the treatment of muscular dystrophies.

However, the research is still at a relatively early stage as the work has only been carried out in animal models.

Dr Coppi said: "Spinal muscular atrophy is a genetic disease affecting one in 6,000 births. It is currently incurable and in its most severe form children with the condition may not survive long into childhood. Children with a less severe form face the prospect of progressive muscle wasting, loss of mobility and motor function. There is an urgent need for improved treatments.

"We are excited by this potential new approach for regenerating skeletal muscle tissue, but much more research is needed. We now need to perform more in-depth studies with human AFS cells in mouse models to see if it is viable to use cells derived from the amniotic fluid to treat diseases affecting skeletal muscle tissue."

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