

# Study of Human Muscle Derived Stem Cells for Urological Application

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Many scientists have looked for other homogenous origins of stem cells: ex fat tissue [1], amniotic fluid [2] or skeletal muscle [3], etc. In studies using rat models, it has been found that stem cells originating from muscles have the ability to differentiate into skeletal muscle, osteocytes and chondrocytes [4-15], or even differentiate into tissue of different organs, such as the hematopoietic system [3]. Furthermore, stem cells originating from skeletal muscle can be used as a vector in gene therapy and reveal its effects in many diseases treatment, such as Duchenne muscular dystrophy, myocardial infarction, stress urinary incontinence (SUI) [16-18], etc.

Some studies [19] have suggested that, after the transplantation of cultured skeletal muscle cells into an injured muscle area, there is massive apoptosis of the transplanted cells but a small amount of cells undergo rapid cell division. This showed that skeletal muscle cells might contain a stem cell-like group. As a result, the first thing we have to overcome is to purify a small amount of divided cells from the muscle cells.

Though studies on the human adult stem cell are not numerous, we have successfully isolated human muscle derived stem cells using a modified preplating technique. We have also purified these cells using antigen-antibody reaction and CD34+ cells. These purified cells have been shown to have the ability of differentiation. Using CD34+ cells, we can test whether the property of differentiating into various kinds of tissue exists or not. Laboratory data has shown that different proportions of differentiate solution and different durations successfully differentiate into smooth muscle cells, skeletal muscle, adipocytes and osteocytes. These results have proved again that we have successfully isolated pluripotent stem cells from human muscle tissue.

In an earlier study, we used mouse muscle derived stem cells and transplanted them into small intestinal submucosa. They successfully differentiated into contractile muscle tissue [20] that was more compliant tissue [21]. Next, to obtain a high differentiation rate, we have to increase the growth stability of these kinds of cells and transform them into a 3D scaffold. If we can make them grow successfully and differentiate into different cellular tissue, in the future, the cell transplantation of tissue reconstructive engineering using human muscle derived stem cells would offer further benefits to people requiring bladder reconstitution, treatment of SUI and those with erectile dysfunction.

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