The basic patent on Muse cells and the isolation method thereof has been granted.

As an outcome of research projects funded by NEDO, Mari Dezawa, MD., Ph.D., who is the Professor at Tohoku University and her colleagues have been awarded the basic patent on multilineage differentiating stress enduring (Muse) cells and the isolation method thereof in Japan. (JP Patent #5185443)

Muse cells are pluripotent stem cells capable of repairing the damaged tissues by virtue of their capability of differentiating any type of cells. In addition, Muse cells are considered to be relatively safe, because they have already been transplanted to the human bodies as in the bone marrow or the mesenchymal stem cells (MSCs) without any adverse effects, and they can be obtained without gene-modification or chemical treatment of them.

It is expected that the development of Muse cells toward the practical use in the regenerative medicine is making great progress, with taking advantages of this patent.
1. Background

As pluripotent stem cells, ES cells and iPS cells are well-known and are making great progress towards the practical use. In addition, the novel pluripotent stem cells (Muse cells) have joined the party in this field.

On the other hand, from the practical application’s stand point, MSCs have been widely used as regenerative medicines. A growing number of reports has pointed that the MSCs resident in the bone marrow and skin fibroblasts differentiated into different types of cells, such as nerve cells, hepatocytes etc. and that transplanting them into the patients suffering from myocardial infarction or cirrhosis showed the tissue recovering effects to a significant extent.

However, the biological entity of the MSCs is turned out to be a cell population comprising various kinds of cells, and it has remained to be unveiled which cells are responsible for differentiating into specialized cells and repairing the damaged tissues.

In 2010, Dr. Mari Dezawa of Tohoku University in Japan first demonstrated that only Muse cells are pluripotent stem cells residing in mesenchyme, and confirmed that they have the ability to repair the damaged tissues, such as skin, nerve, liver, skeletal muscle, by virtue of their capability of differentiating any type of cells.

Additionally, Muse cells are considered to be relatively safe, because they don’t show any tumorigenic growth, they can be obtained without gene-modification or chemical treatment of them, and they have already been transplanted to the human bodies as in the bone marrow or MSCs without any adverse effects.

Furthermore, Muse cells are isolated by conventional instruments such as flow-cytometry with reasonable efficiency. Taken those together, Muse cells are considered to be one of the most promising technologies for regenerative medicine among the existing stem cell treatments.

Many research projects on Muse cells have been energetically conducted for the purpose of the practical use in the regenerative medicine. At the same time, Muse cells are expected to be utilized for developing novel drugs as well as analyzing disease mechanism.

2. Summary of the Muse cell patent

The patent (patent number: 5185443) mainly claiming the following two items has been granted in Japan.

① Muse cell (Patent for Substance)

The Muse cell and cell population including Muse cell which can be obtained from the mesenchymal tissues or cultured mesenchymal cells, and characterized mainly by: i) being positive for SSEA-3 and CD105, ii) being not tumorigenic, and iii) being capable of self-renewal.

② Method for obtaining Muse cell
A method for isolating Muse cell from body tissue, which uses SSEA-3 and CD105 antigens as indices.

※The family patent applications are now under investigation in US, EU, and other countries.

Clio, Inc. which is a biopharmaceutical venture company, has been granted the exclusive license of the all Muse cell related patents by Dr. Mari Dezawa, who is an inventor and an applicant of those patents. The research and/or the application of the Muse cell in academia will be approved for free, but the research and/or application for the commercialization purposes will require the license from Clio, Inc.

3. NEDO's Research projects on Muse cells

NEDO will be continuously dedicated in two research projects related to this technology. In one project, “Fundamental technology for promoting the industrial application of human stem cells”, the method for the quality management of the Muse cells, and the technology platform of the automated system for isolating Muse cells are investigated. In another project, “Research and Development of the next-generation regenerative technology”, a great deal of efforts are spent mainly on reconstituting the mechanism of recruiting Muse cells to a target site of the body at molecular level, and developing the medical instruments using the mechanism.

4. Further information

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