Statins restore chondrogenesis in iPS cells derived from achondroplasia patients

Suggesting the possibility of expanding the application of approved drugs using disease-specific iPS cell models

**Statins: A general term for drugs that lower blood cholesterol levels by inhibiting the activity of HMGH-CoA reductase*

Dr. Akihiro Yamashita and Professor Noriyuki Tsumaki are featured in the Nature paper.
The results of research by the research group including the Kyoto University Center for iPS Cell Research and Application (CiRA) Clinical Application Research Division have been published!

"Statin treatment rescues FGFR3 skeletal dysplasia phenotypes"

Yamashita A, Morioka M, Kishi H, Kimura T, Yahara Y, Okada M, Fujita K, Sawai H, Ikegawa S, and Tsumaki N., Nature. 2014 Sep 25;513(7519):507-11. doi: 10.1038/nature13775. Epub 2014 Sep 17.

Overview

Mutations in the fibroblast growth factor receptor 3 (FGFR3) gene are associated with thanatophoric dysplasia (TD) and achondroplasia (ACH). This disease leads to skeletal dysplasia similar to that seen in patients with TD1 and ACH. However, the lack of disease models using human cells has hindered the identification of clinically effective treatments for these diseases. In this paper, we generated iPS cells from TD type I (TD1) and ACH patients and showed that statin treatment corrected the cartilage deterioration in both TD1-iPS cells and ACH-iPS cells, which have different mechanisms of chondrocyte differentiation. In addition, when statins were administered to ACH model mice, bone growth was significantly restored. These results suggest that statins may be an effective medical treatment for children with TD1 and ACH diseases.

Dr. Akihiro Yamashita

After working as a dentist at a hospital, he obtained his doctorate and studied abroad at the University of Calgary (Canada). Throughout his time at graduate school and abroad, he conducted research into inducing differentiation into bone and cartilage using ES cells, but in 2012 he joined the Center for iPS Cell Research and Application (CiRA) at Kyoto University to conduct research using human iPS cells. He is currently working on cartilage regeneration using cartilage derived from human iPS cells, as well as elucidating the pathology of bone system diseases and conducting drug discovery research and is continuing to work to bring the results of his research to patients.

**Kyoto University iPS Cell Research Institute CiRA Newsletter October 2014 issue Excerpt from Vol.19*

Multi-beads Shocker®

In this paper, Multi-beads Shocker® was used to generate cartilage tissue derived from iPS cells.

It is being used for tissue pulverization. Compared to manual work using a mortar and pestle, the yield of RNA is 5 times higher, and the purity (A260/280 ratio) has improved to near normal levels of 1.8. Reproducibility is also good. It has been well received by researchers on the same floor. *(From a comment by Dr. Yamashita)*