Docket #: S08-438

Rapid iPS Cells from Adult Human Adipose Stem Cells

A team of Stanford researchers has developed a novel method for quickly and efficiently generating human induced pluripotent stem cells (hiPSCs) using human adipose stem cells (hASCs) as the starting population. Using this technique, the whole reprogramming process was reduced to ~18 days with approximately 20-fold increase in efficiency compared to fibroblasts. This approach also eliminates the risk of contamination from animal pathogens because it does not use mouse fibroblasts as feeder cells. hASCs are abundant and easily obtained from adult patients, making them and ideal source for hiPSCs that can be used for regenerative medicine and research.

Stage of Research
The inventors have validated this approach through gene expression profiling and demonstrating pluripotency of the hiPSCs in vitro and in vivo.

Ongoing Research
The inventors continue to optimize the reprogramming process.

Related Invention
hASCs can be reprogrammed to hiPSCs with a variety of techniques, including viral-free minicircle DNA as described in Stanford Docket S09-309.

Applications

- **Regenerative medicine** - treatment of neuronal, cardiovascular, diabetic, hepatic, renal, and joint disorders
- **Research**

Advantages

- **Fast** - reprogramming takes ~18 days, compared to 4 weeks for fibroblasts
- **Efficient** - ~20-fold more efficient than reprogramming fibroblasts
- **Feeder-free** - does not rely on mouse embryonic fibroblasts as feeder cells, eliminating risk of contamination with animal pathogens
- **Scalable**:
  - adult adipose cells are easily obtained for derivation of autologous hiPSCs
  - hASCs are available in large quantities without long term ex vivo expansion (100 ml of adipose tissue yields 1 x ~10^6 cells after 2-3 days expansion)

Publications

- Sun N, Panetta NJ, Gupta DM, Wilson KD, Lee A, Jia F, Hu S, Cherry AM, Robbins RC, Longaker MT, Wu JC. "Feeder-free derivation of induced pluripotent stem cells from adult human adipose stem cells." *Proc Natl Acad Sci U S A.* 2009 Sep 15;106(37):15720-5. Epub 2009 Sep 8.

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