# EuroStemCell

iPS cells and reprogramming:
turn any cell of the body into a stem cell

What do we know?

Embryonic stem cells (ESCs) were thought to be the only source of pluripotent cells until Kazutoshi Takahashi and Shinya Yamanaka in 2006 showed that skin cells can be reprogrammed into 'induced' pluripotent stem cells (iPSCs) by artificially adding four genes.

Researchers have been excited by the opportunities iPSCs offer for studying, treating and potentially curing diseases. iPSCs also avoid several moral issues that accompany the use of ESCs.

iPSCs offer researchers an excellent way to create and study diseased cells that contain the same genetics as patients.
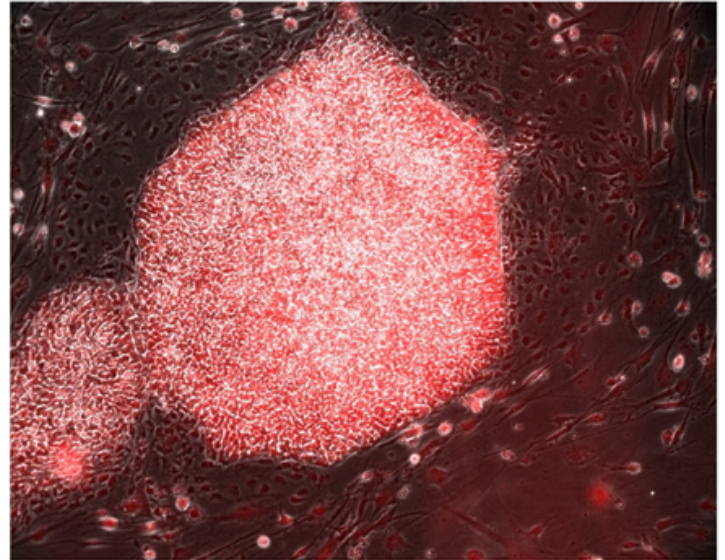
Human iPS cell colonies.

Photo: Johannes Jungverdorben, Reconstructive Neurobiology, Bonn Medical Center

What are researchers investigating?

Researchers are constantly working to better understand how cell reprogramming works in order to develop better methods for controlling stem cell differentiation.

iPSCs are being used to study and develop treatments for many diseases, such as a way to replace cells destroyed by diseases.

Genetic errors that cause diseases vary from patient to patient. Bespoke treatments to fix patient's specific genetic problems could be possible using iPSCs. Additionally, transplantations of iPSCs will not be rejected by patients' immune systems because iPSCs are created from a patient's own cells.

What are the challenges?

Several studies show that iPSCs and ESCs often function differently, likely because iPSCs are not truly '100%' reprogrammed. Researchers are still determining the effect of these differences on research and medicine.

Technical challenges and our still limited understanding of iPSCs make it difficult to control stem cells and how cells made from iPSCs will behave in the body.

Although medical treatments using customised iPSCs may sound attractive, developing affordable and effective iPSC treatments remains a very large challenge.

For more information visit: www.eurostemcell.org/ips