EuroStemCell

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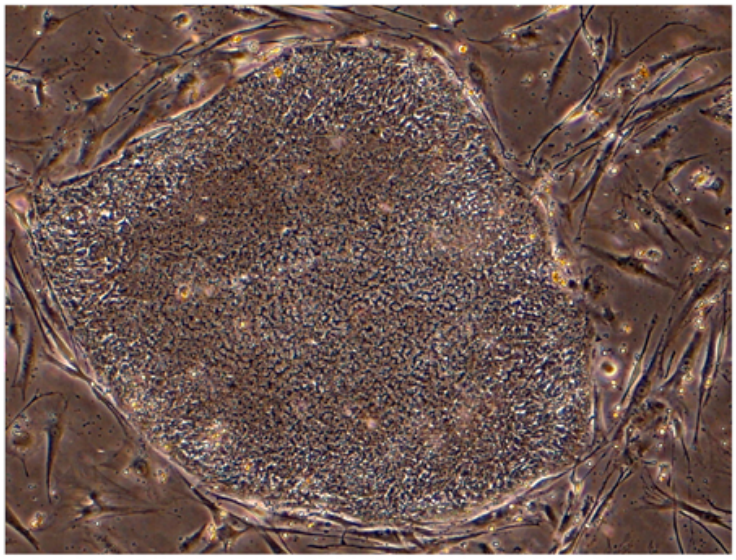
New tools for disease research: reprogrammed cells in disease modelling

What do we know?

Researchers make iPSCs by 'reprogramming' specialised adult cells, such as skin cells. The iPSCs can then be used to make any type of cell found in the body, such as heart or brain cells.

Because iPSCs have the same genes and mutations as the patient they come from, researchers can use iPSCs to recreate diseases in the lab and study how a patient's genetics contribute to their disease.

iPSCs allow researchers to observe and study 'cell differentiation', the process of cells becoming specialised, and what can go wrong during differentiation to cause different diseases.



Human induced pluripotent stem (iPS) cells grown in the lab.

Photo: Christian Unger,
Centre for Stem Cell Biology, University of Sheffiled

What are researchers investigating?

Many diseases are now being studied using iPSC model systems, spanning from neurological diseases, such as amyotrophic lateral sclerosis (ALS), to blood and immunodeficiency conditions.

iPSCs are being used to create diseased cells for testing new drugs and treatments in the lab.

Researchers are using iPSCs to 'turn back the clock' on patients' cells and watch how healthy cells become diseased. iPSCs also let researchers examine how patients' genes, mutations and environmental conditions might impact disease progression.

What are the challenges?

Researchers are still learning about iPSCs.
In theory, iPSCs can make any cell in the body, but researchers must first learn how to direct them to do this.

Although iPSCs provide researchers with cells that contain the genes and mutations associated with a disease, it does not mean specialised cells created from these iPSCs will behave in the lab the way diseased cells in the body behave.

Modelling complex diseases (e.g. those caused by problems occurring between cells that make up complex structures, tissues and organs) with iPSCs is currently not possible but may be in the distant future.

For more information visit: **www.eurostemcell.org/modelling**