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IN VITRO PRODUCTION OF FOREGUT STEM CELLS

A defined culture system and stepwise method to differentiate human pluripotent stem cells into a multipotent population of foregut stem cells.

Key features:

- Provides an expandable population of foregut stem cells that can be differentiated into lung, pancreas and liver.
- Can be expanded in 2D culture in the absence of a feeder population or scaffolds and compliant with large scale production.
- Truly multipotent, producing at least three different types of cells: lung, pancreas and liver
- Reduce variations in the response to differentiation between individual cell lines

Potential use:

- In vitro model for study of human development
- Regenerative and personalised medicine : production of 3 clinically relevant cell types: lung, pancreas, liver

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Background

Human pluripotent stem cells (hPSCs) are non-specialized cells that can be differentiated into presumably all cell types of the human body. Because they also self-renew, they represent an infinite source of clinically relevant cells with potential biomedical applications such as cell therapies, tissue engineering and drug discovery. However, the development of a universal protocol to differentiate hPSCs into a homogenous population of a specific cell type is difficult because of the inherent variability that exists between cell lines. Epigenetic memory, inconsistent reprogramming and genetic background are likely to be the main cause of variability and this represents a major challenge for the development of personalised medicine. Different differentiation protocols must be carried out for each cell line, which increases cost, time and variability.

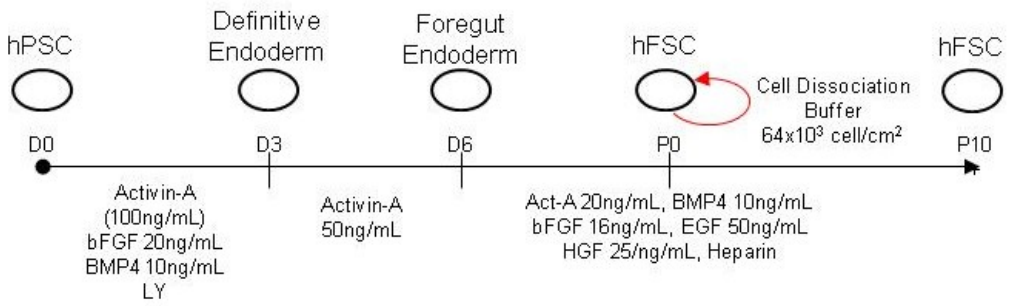
An alternative approach is to establish a self-renewing population of cells that represent an intermediate stage in development. Such an approach allows fully differentiated cells to be generated quickly from a single source without resorting to the use of the original iPSC line.

Technology

Drs Ludovic Vallier and Nicholas Hannan from the University of Cambridge have developed a novel, precisely defined and stepwise method to differentiate hPSCs into a multipotent population of Human Foregut (the upper section of the digestive system) Stem Cells (hFSCs). hFSC self - renew in vitro and are truly multipotent:t hey can produce at least three different cell types: lung, pancreas and liver. Furthermore, near homogenous populations of hFSCs can be obtained from hPSCs lines which are normally refractory to endodermal differentiation. Unlike other models, these cells can be expanded in 2D culture in the absence of supporting feeder population or scaffold, making the technology compliant with large scale amplification or for the production of clinically relevant cell types.

Therefore, hFSCs not only provide a unique *in vitro* model of human development but they also constitute an important tool for the clinical applications of hPSCs and personalised medicine.

Method to differentiate and propagate hFSCs derived from hPSCs



Commercialisation

We are seeking to establish a non exclusive licencing relationship for the commercialisation of this technology.