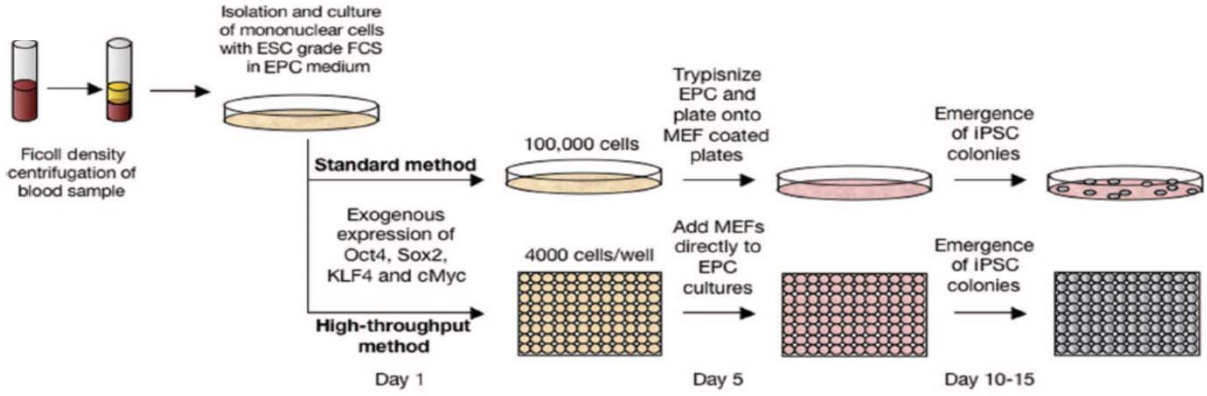
UNIVERSITY OF CAMBRIDGE enterprise

Scalable technology generating iPSCs with high genomic stability for cell therapy applications

A platform technology using blood-derived endothelial progenitors (EPCs) as a substrate for induced Pluripotent Stem Cell (iPSC) generation



- EPCs are **easily available** from small volumes of peripheral blood (20-40 mL in adults) and **rapidly expandable** in culture
- They offer **95% efficiency for reprogramming** into iPSCs with up to a **10-fold higher yield** than fibroblasts
- EPC derived **iPSCs have greater genomic stability** compared to those generated from skin fibroblasts

APPLICATIONS

- Molecular characterisation of disease mechanisms
- Disease specific drug discovery
- Patient specific regenerative medicine applications

COMMERCIAL OPPORTUNITY

- Patent granted in 6 key territories
- Exclusive and non-exclusive licensing opportunities for clinical and non-clinical applications
- Technology validated and currently used by leaders in the stem cell industry

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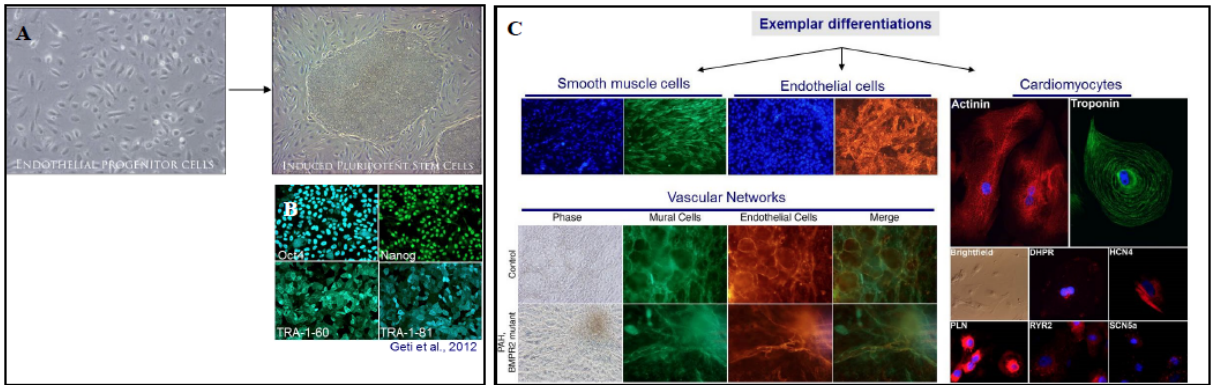
Background

Induced pluripotent stem cells (iPS cells) are adult cells that have been reprogrammed to an embryonic stem cell-like state by the introduction of transcription factors. Fibroblasts from skin biopsies are the most common source (or cellular substrate) for iPS cell reprogramming. However, several obstacles prevent the successful translation of iPS cells technology for clinical and industrial applications: These include:(1) the low kinetics and efficiency with which fibroblasts can be transformed into iPS cells, hindering their high-throughput generation; (2) the lack of readily available cellular substrates, with a non-compromised genome, that can be isolated from patients; (3) the inability to easily derive feeder-free iPS cells whilst maintaining their pluripotent state.



(A) EPCs can be reprogrammed using a variety of reprogramming methods into iPSCs, expressing the correct panel of pluripotent markers (B) and have a wide differentiation potential. (C) Efficient differentiation of EPC-iPSC into mature cardio-vascular lineages and vascular networks

Technology

Prof. Nick Morrell, Dr Amer Rana, Dr Mark Ormiston and Dr Ludovic Vallier at the University of Cambridge have designed a method which employs for the first time endothelial progenitor cells (EPCs) as a substrate to generate iPS cells and that overcomes the obstacles listed above.

EPCs are readily obtainable from modest volumes of peripheral blood and with minimal manipulation. They generate iPS cells with a far greater efficiency than fibroblast and once reprogrammed, the resulting cells grow better than fibroblast-derived ones in the absence of feeder cells. They can be isolated from patients in less than 2 weeks and are highly proliferative, allowing a rapid expansion in culture. They do not contain genome rearrangements and are potentially available from patients with almost any disease or disorder.

This system provides a standardised high throughput platform for the generation of personalised iPS cells, suitable for disease and non-disease states, for large scale academic and commercial iPS cell projects. It is ideal for differentiation assays, disease modelling and drug testing.

Publication

A practical and efficient cellular substrate for the generation of induced pluripotent stem cells from adults: blood-derived endothelial progenitor cells.

Geti I, Ormiston ML, Rouhani F, Toshner M, Movassagh M, Nichols J, Mansfield W, Southwood M, Bradley A, Rana AA, Vallier L, Morrell NW.

Stem Cells Transl Med. 2012 Dec;1(12):855-65