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INDUCED PLURIPOTENT STEM CELLS DERIVED FROM CIRCULATORY ENDOTHELIAL PROGENITORS

A platform technology using blood derived endothelial progenitors as substrate for iPSCs generation.

Key features:

- Available from a small volume of peripheral blood (40 ml in adults)
- Can be isolated with 95% efficiency from healthy and non healthy individuals within 2 weeks
- Highly proliferative and rapidly expandable in culture and growing as an adherent cell culture
- Generate iPSCs with a far greater efficiency than fibroblasts and with reduced genetic abnormalities

Potential uses:

- Suitable for large scale academic and commercial iPSCs projects
- Ideal platform for :
  - Molecular characterisation of disease mechanisms
  - Disease specific drug discovery
  - Patient specific regenerative medicine applications

For further information please contact:

Dr Andrew Walsh
✉ andrew.walsh@enterprise.cam.ac.uk
☎ +44 (0)1223 760339

Cambridge Enterprise Limited, University of Cambridge
Hauser Forum, 3 Charles Babbage Road, Cambridge CB3 0GT UK
www.enterprise.cam.ac.uk

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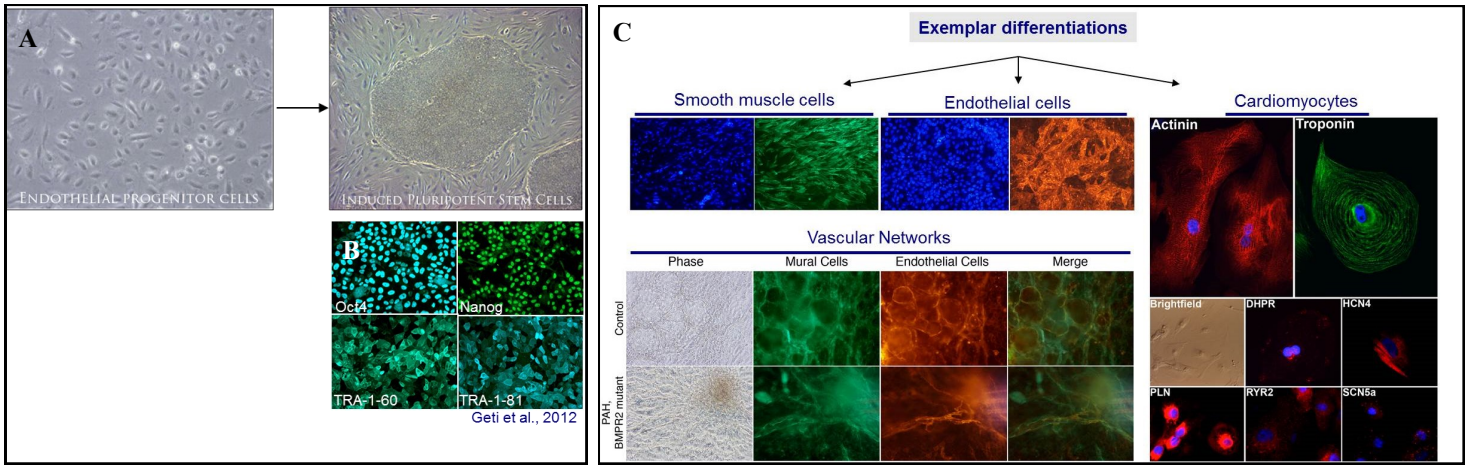
Background

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 fibroblast can be transformed into iPS cells, hindering their high-throughput generation; (2) the lack of readily available cellular substrates, with 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-iPSCs into mature cardiovascular 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 cells projects. It is ideal for differentiation assays, disease modelling and drug testing.

Publication 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*

Commercialisation This technology is protected by a patent application (number 1105413.17) and we are seeking to establish a non exclusive licensing relationship.