Impact Case Study

UoA 3B: Allied Health Professions, Dentistry, Nursing and Pharmacy (Biomedical Sciences)

Pancreatic derived clonal beta cells

Summary

Understanding the complex mechanisms regulating insulin production by pancreatic beta-cells is fundamental to effective treatment of diabetes. Inherent limitations in the supply of these cells prompted research by Ulster University to establish model human beta-cells that can be grown in limitless amounts in tissue culture.

The University's Diabetes Research Group, located within the SAAD Centre for Pharmacy & Diabetes, is a leading international Centre for pancreatic beta-cell research. Having exploited an approach to establish clonal rodent beta-cells, Ulster's innovative technology developed by Professors Peter Flatt and Neville McClenaghan has resulted in the generation, Intellectual Property protection and commercialisation of unique electrofusion-derived functional human beta-cells.

Impacts

Ulster University's research goal was targeted establishment of world-first electrofusion-derived clonal human pancreatic beta-cells. We successfully utilised our innovative technology to generate and isolate functional model glucose-responsive human insulin-secreting beta-cell clones.

Indicators of the impact of this research broadly fall into three categories.

• Granting of patents

The University's first patent describing human clonal beta-cell products was granted in 2000. This initial priority filing led to growth of Ulster's IP portfolio to include two granted/issued patents on the institutions electrofusion technology for generation of clonal human beta-cells.

Subsequent to granting of patent and further research, Ulster University published its first paper in June 2011 in the Journal of Biological Chemistry. Four clones were made commercially available through ECACC (now Public Health England) in 2010, and recently published key data has established these cells as excellent models for research on human beta-cell function and demise when cultured either as monolayers or aggregated with cell-to-cell contacts in the form of 'pseudoislets'.

• Licensing & commercialisation

To maximise the impact of the cells and allow other researchers and industry to benefit from their availability, in 2010 Ulster partnered with the ECACC which serves as the University's authorized distributor of its three rat cells and four human cells. Since January 2011 they have generated 87 sales. Ulster University's bioengineered insulin-secreting cell lines have proven utility as commercial and non-commercial research tools to study pancreatic beta-cells, including discovery and screening of new drugs/targets.

Ulster's human 1.1B4 and 1.1E7 cells have been licensed to three global pharmaceutical companies for commercial use generating significant licensing revenue, and evaluation licences have been granted to another eight.

• Utility by bio-industry & the international research community

Availability of the human cells developed by Ulster researchers is also leading to original research papers from around the world, including reporting of increased human beta-cell insulin production using the University's human 1.4E7 cells; and a direct effect of hypoxia on human beta-cell proliferation using the human 1.1B4 cells.