

Biopolymer coatings for enhanced endothelialisation of intra-vascular devices

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These fully synthetic biocompatible polymers support effective human endothelial cell growth and endothelialisation, whilst minimising platelet attachment. The polymer materials can be applied as a thin coating to intra-vascular devices and have the potential to minimise problems associated with vascular intervention surgery, such as stent failure or repeat surgery.

Therapeutic strategies using a patient's own stem cells to repair and regenerate damaged tissue have been explored for years. Since circulating endothelial progenitor cells (EPC) were discovered, strategies involving direct implantation or infusion have been limited by poor homing and engraftment in target tissue. This loss of control of cell fate results in transplanted cell death. Introducing a biomaterial scaffold that attracts and supports EPC differentiation to form a mature endothelium should help resolve such issues by promoting cellular engraftment and provide a template to guide new tissue growth.

University of Edinburgh researchers have identified a family of biopolymers capable of promoting adhesion and differentiation of human EPC. When used as surface coatings for 3-D scaffolds, they were shown to be significantly better than the current gold standard GFR-M, providing a potential coating for intra-vascular devices.

Ultimately, the use of selected polymers to enhance the biocompatibility of intra-vascular stents and conduits by supporting EPC adhesion and differentiation could help to minimise neointima (new or thickened tissue) formation and improve post-surgical outcomes following revascularisation.

Key Benefits

- Potential to improve post-surgical outcomes via improved endothelialisation of intravascular devices
- Scope for complementary anti-thrombotic functionality
- Desirable regulatory characteristics amenable to GMP manufacture
- Suitable for scale up and industrial application

Potential Applications

- Coating for stents and other intravascular devices
- Cell culture medium and/or lab ware

Key Publications

- Pernagallo *et al.* (2012) Novel biopolymers to enhance endothelialisation of intra-vascular devices. Adv. Healthc. Mater. 1:646-56 <http://www.ncbi.nlm.nih.gov/pubmed/23184801>

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The patent publication document, detailing invention, methods and results, will be provided following acceptance of the University's Open Technology standard terms and conditions.