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Nanotechnology: Driving the future of development of cardiovascular implants

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Application of nanotechnology, nanocomposite materials and stem cells are a new generation of tools in the development of cardiovascular implants. Their research and development is based on a multidisciplinary team approach from basic science to the clinician. We have developed and patented a family of nanoparticles and nanocomposites materials in the development of organs, and in addition have been using stem cells to enhance organ function.

In this talk I will present the development of cardiovascular implants, as well as other organs including trachea using the above materials. I also address our experience in the translation of this technology from the laboratories to the patient, and commercialization of products. Currently we started clinical trial for world first nanocomposite based coronary artery with in-situ endothelization, the transcatheter heart valve and stent are at GLP/GMP preclinical assessment and cardiac patch at early development.

In addition, I will also discuss the applications of nanoparticles including fluorescent nanoparticles "quantum dots" in tracking stem cells.

Biography

Alexander Marcus Seifalian is a Professor of Nanotechnology and Regenerative Medicine, and Director of UCL Centre for Nanotechnology & Regenerative Medicine at University College London (UCL-CNRM). He completed his education at University of London and University College London Medical School. He is a Fellow of the Institute of Nanotechnology (FIoN) and Fellow of Society of Biology (FSB), and has published over 371 peer-reviewed research papers, 31 book chapter contributions and 4 families of UK and International patents. During his career he has led and managed many large projects with multidisciplinary teams with very successful outcomes in terms of commercialisation and translation to patients including: 1) The development and commercialisation of a bypass graft for vascular access for haemodialysis; 2) The development of bioreactors with fluid dynamic systems; 3) Non-invasive techniques to monitor blood shear stress in artery and viscoelastic properties of cardiovascular system *in vivo* and *in vitro* using RF signal from duplex ultrasound system; 4) Techniques to extract RNA from porous scaffolds; 5) Developed laser activated vascular sealants that have been commercialised for vascular, liver and brain surgery, and 6) As part of an EU grant, he worked on the development of a miniature implantable portal blood pump. His role involved designing the pump for biocompatibility and *in vitro* and *in vivo* evaluations.

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