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Alexander Seifalian and Mazaher Gholipourmalekabadi*

Nanotechnology & Regenerative Medicine Commercialisation Centre (NanoRegMed Ltd)

London BioScience Innovation Centre, UK

Functionalised Graphene Oxide and its Application in Biotechnology

The world advancing rapidly in the field of technology, a simple example is our mobile phone. However, when compared to healthcare, the diagnostic and treatment of diseases are still very poor and surgery has not changed significantly compared with 50 years ago.

There is plenty of news in academia/media that everything could be diagnosed and cured, but in reality, the invention has been tested in rodents and has not moved to human. This is due to; the complexity of the medical devices developed in a university research environment, the lack of difficulty taking devices to the clinical setting, as well as the positive outcome obtained from in vitro and rodents may not transferable to human. Therefore, need going back to the drawing table and rethink to build medical devices that; commercially feasible, reliable, sensitive, repeatable and non-toxic and biocompatible.

The potential for using advanced/smart nanomaterial and consequent research to replace damaged tissues has also seen a quantum leap in the last decade. In 2010, two scientists in the UK isolated a single layer of carbon atoms on scotch tape. Graphene considers as a wonder material, it is the strongest material on the planet, an order of 100 times stronger than steel, super-elastic and conductive. The functionalized graphene oxide (FGO) is non-toxic and antibacterial. FGO has been used for drug and gene delivery, development of biosensor or in nanocomposite materials development of human organs.

In my talk, I present and discuss our work on the application of FGO in development of medical sensors, drug, gene and stem cells delivery, as well as the development of human organs with stem cells technology. The FGO based materials can be fabricated to human organs. The 3D scaffold from these materials is functionalized with bioactive molecules and stem cells technology, for the development of human organs. The data for the development of organs using these materials will be presented.

Biography:

Alexander Seifalian, Professor of Nanotechnology and Regenerative Medicine worked at the Royal Free Hospital and University College London for over 26 years, during this time he spent a year at Harvard Medical School looking at caused of cardiovascular diseases and a year at Johns Hopkins Medical School looking at the treatment of liver cancer. He published more than 647 peer-reviewed research papers and registered 14 UK and International patents. On editorial boards of 41 journals. He is currently CEO of NanoRegMed Ltd, working on the commercialisation of his research. During his career, Prof Seifalian has led and managed many large projects with successful outcomes in terms of commercialisation and translation to patients. In 2007 he was awarded the top prize in the field for the development of nanomaterials and technologies for cardiovascular implants by Medical Future Innovation and in 2009 he received a Business Innovation Award from UK Trade & Investment (UKTI). He was the European Life Science Awards' Winner of Most Innovative New Product 2012 for the "synthetic trachea". Prof Seifalian won the Nanosmat Prize in 2013 and in 2016 he received the Distinguish Research Award in recognition of his outstanding work in regenerative medicine from Heals Healthy Life Extension Society. His achievements include the development of the world first synthetic trachea, lacrimal drainage conduit and vascular bypass graft using nanocomposite materials, bioactive molecules and stem cell technology. Currently, he is working on the development and commercialisation of human organs using graphene-based nanocomposite materials and stem cells technology. Recently he has commercialised a novel functionalised graphene oxide for drug/gene/vaccine delivery and synthetic graphene-based nanocomposite materials for surgical and medical devices application. He is currently working on the development of facial organs, heart valves and tendons. Due to COVID-19, he has been working in development of nanoparticles, for vaccine delivery as well as development of filters for face mask and air ventilation system using graphene to stop/kill Coronavirus.