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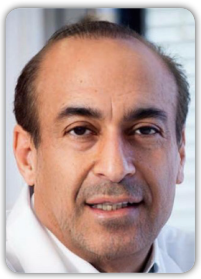

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Graphene, butterfly and stem cells is set to revolutionise medical devices

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 builds in university research environment, the lack of difficulty taking devices to 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 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 realized they had isolated a single layer of carbon atoms on a scotch tape. Since then, graphene has captured the imagination of researchers due to its fascinating properties. Graphene considers as a wonder material, it is the strongest material on the planet, an order of 200 times stronger than steel, super-elastic and conductive. Graphene's carbon atoms are arranged into hexagons, forming a honeycomb-like lattice. The functionalised graphene oxide (FGO) with polyhedral oligomeric silsesquioxane (POSS) from butterfly wing are nontoxic 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-POSS in development of medical sensors, drug, gene and stem cells delivery, as well as the development of human organs with stem cells technology. The materials can be fabricated to human organs with the 3D printer or other fabrication methodologies. The scaffold from these materials is functionalised 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. In conclusion, the graphene, POSS bring new hope for gene, drug and stem cells delivery for repair and replacement of organs.

Speaker 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 period of time at Harvard Medical School looking at the cause of cardiovascular diseases and a year at Johns Hopkins Medical School looking at the treatment of liver. He published more than 647 peer-reviewed research papers and registered 14 UK and international patents. He is currently CEO of NanoRegMed Ltd, working on the commercialization of his research. During his career, he has led and managed many large projects with successful outcomes in terms of commercialization 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". He 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. He has over 15,000 media report from his achievement, include BBC, ITV, WSJ, CNN and many more. Currently, he is working on the development and commercialization of human organs using graphene-based nanocomposite materials and stem cells technology.

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