

Toxicology and clinical potential of nanoparticles

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Abstract

In recent years, nanoparticles (NPs) have increasingly found practical applications in technology, research and medicine. The small particle size coupled to their unique chemical and physical properties is thought to underlie their exploitable biomedical activities. Here, we review current toxicity studies of NPs with clinical potential. Mechanisms of cytotoxicity are discussed and the problem of extrapolating knowledge gained from cell-based studies into a human scenario is highlighted. The so-called 'proof-of-principle' approach, whereby ultra-high NP concentrations are used to ensure cytotoxicity, is evaluated on the basis of two considerations; firstly, from a scientific perspective, the concentrations used are in no way related to the actual doses required which, in many instances, discourages further vital investigations. Secondly, these inaccurate results cast doubt on the science of nanomedicine and thus, quite dangerously, encourage unnecessary alarm in the public. In this context, the discrepancies between in vitro and in vivo results are described along with the need for a unifying protocol for reliable and realistic toxicity reports.



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".

Speaker Publications:

1 "Biological applications of quantum dots", Volume 183, Issue 2, 1 December 2007, Pages 812-826

2. "Tracheobronchial transplantation with a stem-cell-seeded bioartificial nanocomposite: a proof-of-concept study", The Lancet, Volume 378, Issue 9808, 10-16 December 2011, Pages 1997-2004

3. "Remote Ischemic Preconditioning: A Novel Protective Method From Ischemia Reperfusion Injury" Journal of Surgical Research, Volume 150, Issue 2, December 2008, Pages 304-33



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 causes 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