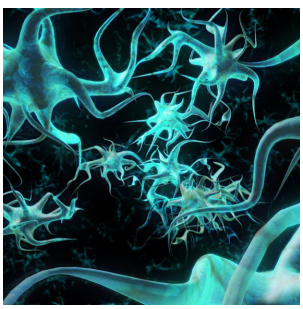
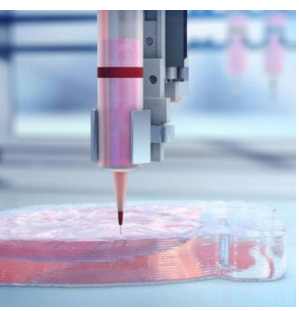
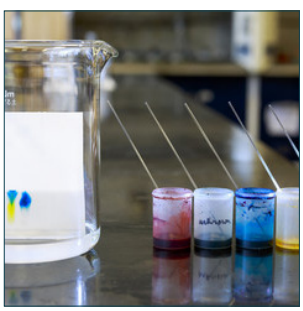
Keynote Forum
June 06, 2019

Tissue Science 2019
Molecular Biology 2019
Separation Techniques 2019




Joint Event on

2nd International Conference on

Tissue Science and Molecular Biology, Stem Cells & Separation Techniques

June 06-07, 2019 | London, UK

Caroline Hoemann, Biomed Res, Volume 30
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Caroline Hoemann

George Mason University, USA

Articular cartilage engineering with innate immune-modulating biomaterial implants deposited in the subchondral bone marrow

Focal articular cartilage lesions are often treated by bone marrow stimulation, a surgical procedure in which the surgeon debrides all damaged cartilage in a lesion, then creates controlled bone fractures that bleed and induce a spontaneous wound repair response. Because the resulting repair tissues are heterogeneous and often incomplete, new methods are under intense investigation that improve the quality and quantity of repair tissue elicited by bone marrow stimulation. Original attempts to enhance microfracture repair used solid scaffolds designed to form a 3-D scaffold that remains intact, degrades very slowly and ultimately interferes with spontaneous repair processes. We have developed an entirely different regenerative medicine approach, based on the concept that cartilage repair can be enhanced by engineering bioactive microparticles into the hematoma that forms in the subchondral bone. Chitosan is a biocompatible and bioactive polysaccharide composed of glucosamine and N-acetyl glucosamine that is well-known for its ability to attract neutrophils and macrophages to healing wounds. A freeze-dried chitosan implant was designed to disperse into microparticles in bleeding subchondral bone. Data from preclinical rabbit and skeletally aged sheep models show that chitosan microparticles are resident in the hematoma, stimulate macrophage recruitment and angiogenesis in the granulation tissue, induce remodeling of the subchondral bone plate and significantly enhance the resulting articular cartilage repair tissue volume and integration with subchondral bone. These data serve as an important proof-of-concept that soft materials implanted in the bone marrow can be used to shift endogenous innate immune responses to regenerate a structurally improved cartilage tissue.

Speaker Biography

Caroline Hoemann is a full professor of bioengineering at George Mason University, USA. She is highly regarded internationally for her work on cartilage and bone tissue engineering and biomaterial-induced blood and innate immune responses. She is the recipient of 2 NIH-Fogarty post-doctoral fellowships, four career fellowships, is a fellow member of the International Cartilage Repair Society and serves on the editorial boards of Cartilage and The Open Orthopaedics Journal. She is co-founder and on the board of directors of ORTHO-RTi, an orthopedic biotech company specializing in implants that repair joint tissues. Her research program focuses on understanding how to use biomaterial-guided immune responses to regenerate bone and cartilage tissues. She has published 68 peer-reviewed papers, 14 book chapters/expert opinion papers, 171 conference abstracts and 8 patent inventions. Her translational research program aims to bring new treatment options to patients with arthritis. In addition to strengthening and expanding the department's research portfolio, she brings specific teaching expertise in biomaterials, molecular cell biology and tissue engineering that will enhance and broaden the department's educational programs at both the undergraduate and graduate levels.

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Notes:

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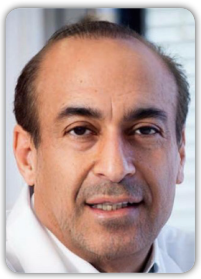

Alexander Seifalian

NanoRegMed Ltd, UK

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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Antonello Petrella

University of Salerno, Italy

Mesoglycan induces keratinocyte differentiation through syndecan-4 and annexin A1/S100A11 complex: A new drug-induced side road to stimulate re-epithelialization

Wound healing is a dynamic process comprising multiple events as inflammation, re-epithelialization and tissue remodelling. Re-epithelialization phase is characterized by the engagement of several cell populations, mainly of keratinocytes that sequentially go through cycles of migration, proliferation and differentiation to restore skin functions. Troubles can arise during the re-epithelialization phase of skin wound healing particularly in keratinocyte migration, resulting in chronic non-healing lesions which represent a serious clinical problem. Over the last decades efforts aimed to find new pharmacological approaches for wound care were made, yet almost all current therapeutic strategies employed remain inadequate or even ineffective. As such, it is crucial to identify new drugs that can enable a proper regeneration of the epithelium in a wounded skin. Here, we have investigated the effects of the fibrinolytic drug mesoglycan, a glycosaminoglycans mixture derived from porcine intestinal mucosa on HaCaT human keratinocytes that were used as *in vitro* experimental model of skin re-epithelialization. We found that mesoglycan induces keratinocyte migration and early differentiation by triggering syndecan-4/PKCα pathway and that this effect was at least in part, due to the formation of the annexin A1/S100A11 complex. Our data suggest that mesoglycan may be useful as new pro-healing drug for skin wound care.

Speaker Biography

Antonello Petrella is professor of Pharmacology at University of Salerno-Department of Pharmacology, Italy. Antonello Petrella has over 60 publications that have been cited over 1300 times and his publication h-index is 23 and has been serving as an editorial board member of reputed Journals.

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