Global Engage

GLOBAL BIOMATERIALS & TISSUE ENGINEERING CONGRESS

LONDON, UK

12-13 November 2018

#BiomaterialsTissueCongress

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WARM WELCOME

Global Engage

Global Engage is pleased to announce the **Biomaterials & Tissue Engineering Conference**, taking place on 12th-13th November 2018, in London, UK. The conference will host over 30 individual presentations and 2 extended panel discussions over 4 dedicated tracks, and is expected to attract over 150 expected attendees.

The fields of biomaterials and tissue engineering offer great opportunities for the advancement of human healthcare. Standing at the intersection of biology, engineering and material science, together these areas of research promise to change the way injured tissues and organs are not only repaired, but regenerated and rejuvenated. Designed for experts in academia and industry working in this exciting field, this conference will examine cutting edge research in several key areas. Talks will look to cover the development of scaffold technology for both soft and hard tissues, and the novel biomaterials used in their construction, new platforms for biofabrication, tissue culturing techniques, advances in hydrogels in regenerative medicine, and recent developments in stem cell research. There will also be a track dedicated to the exciting developing field of organ fabrication, reviewing recent advances in bioprinting and ECM de- and recellularization strategies, as well as the challenges to be overcome to advance this to the clinic.

This two-day interactive meeting will allow you the opportunity to keep up to date with cutting edge strategies, technologies and the latest research, and the opportunity to make lasting connections with academics, investors and businesses in your field.

EXPERT SPEAKERS Include:

STEPHEN BADYLAK
Deputy Director of the McGowan Institute for Regenerative Medicine, University of Pittsburgh

MARCY ZENOBI-WONG
Professor, ETH Zurich

CHRISTINE LE MAITRE
Professor of Cell Biology and Tissue Regeneration, Sheffield Hallam University

GABOR FORGACS
Professor of Biological Physics, University of Missouri-Columbia & Scientific Founder, Organovo

CONFERENCE SYNOPSIS

DAY 1, TRACK 1 – SOFT TISSUE ENGINEERING & REGENERATIVE MEDICINE

- Advances in tissue culturing techniques
- Development of novel scaffolds for soft tissues
- Success case studies in regenerative medicine for nerve and cardiac tissue reconstruction
- Reviewing methods of stem cells generation and differentiation (internal and external stimuli)
- Nuclear reprogramming and gene editing approaches (CRISPR-Cas 9 applications)

DAY 1, TRACK 2 – BIOMATERIALS & BIO FABRICATION – PLATFORMS & TECHNOLOGIES

- Advances in materials for scaffolds
- Polymer technology – current and future developments
- Optimising injectable scaffolds
- Challenges in developing nanomaterial & nanofiber technology
- 3D bio-printing techniques
- CAD/CAM techniques

DAY 2, TRACK 1 HARD TISSUE & CARTILAGE ENGINEERING

- Exploring factors in bone degeneration and advances in regeneration techniques
- The role of hydrogels in hard tissue engineering
- Biomaterials (polymer, fibre and beyond)
- Beyond bone: reviewing progress in tissue engineering approaches to cartilage, and regenerative medicine approaches for arthritis

DAY 2, TRACK 2 ORGAN FABRICATION & BIOPRINTING

- Artificial organ and organ-mimicking tissue development
- Overcoming the unique problems of scaffold construction for organ fabrication
- Reviewing methods of cell seeding: transplantation, bio-printing, bioreactor immersion

CONFIRMED SPEAKERS

STEPHEN BADYLAK
Deputy Director of the McGowan Institute for Regenerative Medicine, University of Pittsburgh

GABOR FORGACS
Professor of Biological Physics, University of Missouri-Columbia & Scientific Founder, Organovo

ANNE DES RIEUX
Professor, FNRS Research Associate, UC Louvain

ZHIJIE ZHU
Research Assistant, University of Minnesota

FREDERIK CLAEYSSENS
Senior Lecturer, University of Sheffield

JEROEN ROUWKEMA
Associate Professor, University of Twente

KEVIN SHAKESHEFF
Professor of Drug Discovery and Tissue Engineering, University of Nottingham

CARLIJN BOUTEN
Professor of Cell-Matrix Interaction in Cardiovascular Regeneration, University of Eindhoven

ATHINA MARKAKI
Reader in Tissue Engineering, University of Cambridge

SIAN HARDING
Professor & Interim Head of the National Heart & Lung Institute, Imperial College London

SUWAN JAYASINGHE
Group leader of the BioPhysics Group, University College London

MONICA BOFFITO
Research Associate, Politecnico di Torino

NICK EVANS
Associate Professor in Bioengineering, University of Southampton

MORGAN R ALEXANDER
The School of Pharmacy, University of Nottingham

HANS VAN OOSTERWICK
Professor of Biomechanics, KU Leuven

MARCY ZENOBI-WONG
Professor, ETH Zurich

JOAQUIN CORTIELLA
Professor, Director of Laboratory of Tissue Engineering and Organ Regeneration, University of Texas Medical Branch at Galveston

PAUL HATTON
Professor, University of Sheffield

CHRISTINE LE MAITRE
Professor of Cell Biology and Tissue Regeneration, Sheffield Hallam University

KURT HANKENSON
Professor, Orthopaedic Surgery, University of Michigan

PEDRO BAPTISTA
Group Leader at Aragon Health Research Institute (IIS Aragon), Zaragoza and Assistant Professor at Carlos III University, Madrid

PRASAD SHASTRI
Professor Biofunctional Macromolecular Chemistry, University of Freiburg

SHIRLEY TANG
Associate Professor, University of Waterloo

NURIA MONTSERRAT
Junior Group Leader, Institute for Bioengineering of Catalonia (IBEC)

HELEN BERRY
University Academic Fellow in Cardiovascular Regenerative Therapies & Devices, University of Leeds

CATHY YE
Association Professor, Institute of Biomedical Engineering, University of Oxford

MATHIS RIEHLE
Reader in Cell Engineering, Centre for the Cellular Microenvironment, University of Glasgow

DEBBY GAWLITTA
Associate Professor, Dept. of Oral and Maxillofacial Surgery, UMC Utrecht

JULIAN DYE
Departmental Lecturer, Department of Engineering Science, University of Oxford

08:00-08:55 Registration & Refreshments

08:55-09:00 **Global Engage Welcome Address and Morning Chair's Opening Remarks**

09:00-09:40

KEYNOTE ADDRESS:
STEPHEN BADYLAK

Deputy Director of the McGowan Institute for Regenerative Medicine, University of Pittsburgh

Regenerative Medicine Strategies for Soft Tissue: Lessons from Mother Nature

There are many similarities and differences in the inherent ability of tissues and organs to regenerate across species, and a brief review of these facts will be presented from an evolutionary perspective. Humans progressively lose regenerative ability throughout gestation and in the early postnatal period for reasons that are not well understood. Regenerative medicine attempts to reconstruct functional tissues following injury or congenital abnormalities, and the strategies that have been investigated during the past 25 years will be briefly reviewed. Recent discoveries in related disciplines such as developmental biology and immunology are exciting and relevant to the field of regenerative medicine. These discoveries will be discussed and examples of successful applications in both preclinical studies and human clinical studies will be presented.

09:40-10:15

KEYNOTE ADDRESS:
GABOR FORGACS

Professor of Biological Physics, University of Missouri-Columbia & Scientific Founder, Organovo

3D Organ and Tissue Printing: State of the Art

- Overview of the brief history of bioprinting
- Basic components of the technology
- Examples of the present applications of the technology in basic research and drug development
- Towards therapeutic applications
- The realistic outlook for the field

10:15-10:45

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10:45-11:55 Morning Refreshments / Poster Presentations / One-to-One Meetings

Soft Tissue Engineering & Regenerative Medicine

11:55-12:20

ANNE DES RIEUX

Professor, FNRS Research Associate, UC Louvain

Spinal cord injury: how dental stem cells take up the challenge?

Stem cells from the apical papilla (SCAP) derive from the neural crest and express numerous neurogenic markers. The goal of the present work was to investigate their therapeutic potential regarding the treatment of spinal cord injury (SCI). We evaluated the impact of hydrogel properties on SCAP and we selected a fibrin hydrogel as the most suitable delivery system to evaluate the influence of SCAP for spinal cord regeneration. Then, we observed that implantation of a whole human apical papilla at the lesion site improved gait of spinally injured rats. Finally, we demonstrated that SCAP have immunomodulatory properties and can stimulate oligodendrocyte progenitor cell differentiation. This work underlines the potential therapeutic benefits of SCAP for spinal cord repair.

12:20-12:45

CATHY YE

Association Professor, Institute of Biomedical Engineering, University of Oxford

Engineering 3D human neural network

- Generation and characterisation of neurons from hiPSCs
- Selection and processing of biomaterials for supporting neuronal cells growth in 3D
- Creation of 3D human neural network model

Biomaterials & Biofabrication – Platforms & Technologies

11:55-12:20

ZHIJIE ZHU

Research Assistant, University of Minnesota

3D Printing Functional Materials & Devices

The ability to three-dimensionally interweave biological and functional materials could enable the creation of devices possessing unique geometries, properties, and functionalities. Biology is three-dimensional, often soft and stretchable, and temperature sensitive. This renders most biological platforms incompatible with the fabrication and materials processing methods that have been developed and optimized for functional electronics, which are typically planar, rigid and brittle. Our approach is to use extrusion-based multi-material 3D printing, which is an additive manufacturing technology that offers freeform, autonomous fabrication. This approach addresses the dichotomies presented above by: (1) using 3D printing and imaging for personalized, multifunctional device architectures; (2) employing 'nano-inks' as an enabling route for introducing diverse material functionality; and (3) 3D printing a range of functional inks to enable the interweaving of a diverse palette of materials, from biological to electronic. This blending of 3D printing, functional materials, and 'living' platforms may enable next-generation 3D printed devices.

12:20-12:45

FREDERIK CLAEYSSENS

Senior Lecturer, University of Sheffield

Light-based Additive Manufacturing for tissue engineering

This talk will highlight my group's work in in laser-based additive manufacturing techniques and specifically stereolithography to produce 3D structured biomaterials. In this process we use a UV light source to photocure a light sensitive resin in a spatially controlled manner to build up a 3D object. We produce biodegradable scaffolds with this techniques based on polycaprolactone, poly-lactic acid and poly-glycerol sebacate to be used as implants. Additionally, we use non-degradable materials for building 3D microenvironments for lab-on-a-chip devices with this technology. Recently, we have developed the expertise to combine stereolithography with emulsion templating, this enables

12:20-12:45

Continued

12:45-13:15

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13:15-14:15 Lunch / Poster Presentations / One-to-One Meetings

14:15-14:40

MATHIS RIEHLE

Reader in Cell Engineering, Centre for the Cellular Microenvironment, University of Glasgow

Cells, drugs and bioengineered constructs to aid peripheral nerve repair

Peripheral nerve repair has yet to catch up with the progress other areas of surgery and medical device development. The repair, particularly of larger gaps, continues to be by autologous nerve transplant, which requires second surgery leading to donor site morbidity. To further the use of cells and devices we develop combined adipose derived stem cells with a microfabricated porous scaffold to repair a critical size gap in a pre-clinical rat model. In addition we develop strategies to pattern cells in two and three dimensions on and off the devices using topographic surface modification, electroactive devices and ultrasound to support the regenerative phenotype of neurons and glia. We aim to translate our findings into improved devices and combinatorial strategies for peripheral nerve repair.

14:40-15:30

PANEL DISCUSSION:

Engineering of viable tissue constructs and the challenges of vascularization

Engineering tissue constructs on the macro scale comes with a myriad of challenges, yet the potential of these large scale grafts is undeniable. This panel will provide a discussion forum to explore approaches to producing viable tissues and supporting their integration in vivo, in particular the challenges of designing and implementing a vascular network.

Invitation to Senior Representatives X4

12:20-12:45

additive manufacturing of inherently porous matrices. This opens the route to hierarchical structured materials, where the structure can be independently controlled from nanometre to macroscopic length scales. We have used these scaffold materials for a number of different applications: (i) corneal tissue engineering, (ii) nerve guidance conduits and (iii) scaffolds for bone-on-a-chip devices.

12:45-13:15

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14:15-14:40

KEVIN SHAKESHEFF

Professor of Drug Discovery and Tissue Engineering, University of Nottingham

Injectable and microporous matrices for cell and drug delivery

Precise delivery and retention of cells and drugs at the site of regeneration is essential to maximise the effectiveness and safety of the therapy. Off-the-shelf injectable matrices have largely been borrowed from pharmaceutical applications in which the matric does not need to host angiogenesis and tissue formation. We have developed a new class of biodegradable materials that form a macroporous scaffolds within the body and nurture cells to form tissue at the correct location.

14:40-15:05

ATHINA MARKAKI

Reader in Tissue Engineering, University of Cambridge

Hierachical Vascular Networks for Tissue Engineering

The networks of blood vessels that comprise the circulatory system provide living tissue with the required nutrients and oxygen, whilst removing waste products. Lack of vascularisation within a large and densely populated tissue engineered construct leads to necrotic core formation, preventing fabrication of functional tissues and organs. Strategies for vascularization involve engineering vascularized tissue before transplantation into the patient or by promoting vascularization in situ after transplantation. My talk will focus on our work in this area. More specifically, I will present: (i) A space-filling algorithm for generation of physiologically relevant three-dimensional models of vascular structures. The vascular models are generated in a Computer Aided Design (CAD) environment, and can be exported to any 3D printer format. (ii) A method for production of three-dimensional and hierarchical vascular networks in hydrogels, using sacrificial 3D printing and cellular co-cultures.

15:05-15:30

SUWAN JAYASINGHE

Group leader of the BioPhysics Group, University College London

Direct tissue engineering approaches for regenerative biology and medicine

The ability to manipulate and distribute living mammalian cells with control presents fascinating possibilities for a plethora of applications in our healthcare. These imply several possibilities in tissue engineering and regenerative biology/medicine, to those of a therapeutic nature. The talk will briefly introduce leading technologies, which have been fully validated from a physical, chemical and biological stand point for completely demonstrating their inertness for directly handling the most intricate advanced material known to humankind. Although several technologies will be discussed the talk will focus of bio-electrosprays and cell electrospinning which have truly pushed back the frontiers of tissue engineering and regenerative medicine, previously hither to unachieved by any of its competing

15:05-15:30 Continued

15:05-15:30 technologies. Successful development of these bio-protocols sees the emergence of unique future platform strategies within both a laboratory and a clinical environment having far-reaching consequences for our healthcare.

15:30-16:00 **SOLUTION PROVIDER PRESENTATION**

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16:00-16:50 Afternoon Refreshments / Poster Presentations / One-to-One Meetings

16:50-17:15

JEROEN ROUWKEMA

Associate Professor, University of Twente

Engineering vascularized tissues

Engineered tissues offer a great promise as an alternative for donor tissues, for which the supply is not meeting the demands. However, currently the clinical application of engineered tissues is hampered. The integration of engineered tissues after implantation is limited due to the lack of a vascular network. Adding a vascular network to an engineered tissue, is a promising method to enhance integration after implantation. However, in order to integrate and function properly, the organization of the network is important. Vascular networks in engineered tissues can be patterned using biofabrication techniques, but these structures will often not be stable due to tissue remodeling. Therefore a combination with controllable cues that direct vascular remodeling, is paramount to achieve a controllable long-term organization.

16:50-17:15

JULIAN DYE

Departmental Lecturer, Department of Engineering Science, University of Oxford

The bio-intelligent biomaterial scaffold concept for synthetic skin, an approach to design

- The bio-intelligent biomaterial scaffold concept embodies a method of developing a therapeutic material for soft tissue (re)construction and regenerative healing, by rapid host -cell ingress. The scaffold defines a physiologically protected tissue territory with significant 3-dimensional volume.
- Rapid vacularisation is therefore a fundamental primary requirement for any such scaffold, thus very rapid ingress of endothelial cells and endothelial progenitor cells is essential for angiogenesis and vasculogenesis. Endothelial cells conform closely to scaffold archtiecture and can undergo vasculogenic-type differentiation.
- Fabrication methods must maintain the structure, enzyme function and biological signals contained in extracellular proteins through the sol-gel phase transition. Manufacture formulations must allow controlled assembly of macro-scale scaffolds with hierachical pore structure. Optimal conjoining of structural, biochemical and biological aspects of a scaffold validates its bio-intelligent functionality

17:15-17:40

CARLIJN BOUTEN

Professor of Cell-Matrix Interaction in Cardiovascular Regeneration, University of Eindhoven

In situ heart valve tissue engineering using slow-degrading elastomeric scaffolds

We investigate and design in situ heart valve tissue engineering technologies using instructive, cell-free, biodegradable scaffolds as an approach to create living valves inside the human heart. This lecture addresses the challenges to develop scaffolds that i) function upon implantation and with time of tissue formation and scaffold degradation, ii) are capable of harnessing the natural host response, and iii) provide the necessary cues for a stable and organized load-bearing extracellular matrix in vivo. I will address how biomimetic in vitro models and computational analyses are used in direct comparison with in vivo small-animal experiments (orthotopic aorta implantations) to optimize scaffold biochemical, biophysical, and degradation properties. The resulting scaffold demonstrates sustained mechanical and biological functionality during long-term orthotopic (12 month FU) and transcatheter (6 month FU) implantations as pulmonary valve in sheep. These results offer new perspectives for endogenous heart valve replacement starting from readily-available synthetic grafts.

17:15-17:40

MONICA BOFFITO

Research Associate, Politecnico di Torino

Polyurethanes: a promising platform for tissue engineering and regenerative medicine

The careful selection of the scaffold-forming material and fabrication technology plays a key role in the design of three-dimensional scaffolds for tissue engineering (TE) applications. In this context, polyurethanes (PUs) are an interesting and valuable alternative as their high chemical versatility results in the possibility to synthesize a wide array of polymers with finely modulated physico-chemical properties and suitability to different fabrication technologies, either conventional or advanced. In this contribution, a new platform of biodegradable and biocompatible PUs (either thermoplastic or amphiphilic water-soluble PUs) will be presented and their suitability to conventional and additive manufacturing techniques will be demonstrated. PU chemical versatility can thus be exploited to modulate their final properties to a large extent, allowing their application in several branches of the TE field.

17:40-18:05

SIAN HARDING

Professor & Interim Head of the National Heart & Lung Institute, Imperial College London

Pluripotent stem cell-derived tissues for cardiac repair

With cardiomyocytes and other cardiovascular cell types now readily differentiated from human embryonic or induced pluripotent stem cells, the challenge of delivery is being addressed. Construct types are described, starting with simple hydrogel matrices and building to complex material strategies to add value to the cardiac patch. The additional complexity of testing human tissues in

17:40-18:05

MORGAN R ALEXANDER

The School of Pharmacy, University of Nottingham

Discovery of Bio-instructive Materials

Materials that have been chosen largely on the basis of their availability and mechanical properties dominate the range of biomaterials found in the clinic today. It would be desirable to design our way forward from this situation to new and better biomaterials chosen for positive interactions with surrounding cells and tissues. Unfortunately, our understanding of the interface between most materials and biology is poor. Only in isolated cases is there a

17:40-18:05

an in vivo model, at a scale appropriate for clinical translation, will further be discussed.

17:40-18:05

good understanding of cell-material interactions and fewer still where material-tissue interactions are well characterised and understood. This paucity of information on the mechanism of biomaterial interactions within the body acts as a roadblock to rational design. Consequently we have taken a high throughput screening approach to discover new bio-instructive polymers from large chemical libraries of synthetic monomers presented as micro arrays- this approach is akin to engineering serendipitous discovery and will be exemplified using examples that have been taken from the lab all the way to the clinic.

18:05-18:30

NICK EVANS

Associate Professor in Bioengineering, University of Southampton

Collective cell mechanosensing: the princess and the pea revisited

- Extracellular matrix stiffness plays a fundamental role in cell division, migration and differentiation
- Cells mechanosense materials by deforming them, and by sensing how much deformation occurs
- Stiffness is determined not only by material elastic modulus, but also by material dimensions
- Cells – by acting as integrated, collective units – gather mechanical information about their ECMs that would be impossible if acting alone
- This may be an important driver of many biological processes, such as integration of biomaterials in regenerative medicine, patterning in development, wound healing, and in cancer development/progression

18:05-18:30

HANS VAN OOSTERWICK

Professor of Biomechanics, KU Leuven

Dynamics of vascular ingrowth: visualisation, quantification of cellular forces, prediction

- Vascularisation is essential for successful tissue engineering and regenerative medicine strategies. Our group works on several methodologies that help to unravel the dynamics of vascular ingrowth including:
- 3D in vitro models of angiogenesis compatible with advanced live cell optical microscopy imaging, such as selective plane illumination microscopy
- 4D displacement and traction force microscopy for the quantification of cell-matrix mechanical interactions and their dynamics during vascular ingrowth
- Mechanistic computational models of cell-matrix mechanical interactions
- Multiscale, hybrid computational models of vascular network formation and their application to skeletal tissue regeneration

18:30	Chair's Closing Remarks / End of Day 1
18:30-19:30	Drinks Reception

08:00-08:35 Refreshments

08:35-08:40 **Global Engage Welcome Address and Morning Chair's Opening Remarks**

08:55-09:30

KEYNOTE ADDRESS:
MARCY ZENOBI-WONG

Professor, ETH Zurich

Biomimetic Materials for Cartilage Engineering

- Injectable hydrogels
- Printable hydrogels
- BioLubricants
- Drug Delivery for OA Cartilage

09:30-09:55

JOAQUIN CORTIELLA

Professor, Director of Laboratory of Tissue Engineering and Organ Regeneration, University of Texas Medical Branch at Galveston

Reconstructing and Bioengineering a lung using a decellularized lung scaffold

The bioengineering of new lung tissue and eventually whole organs offers the possibility of developing novel treatments for lung diseases/disorders and may provide an answer for the current organ shortage. Using discarded human lungs, that did not meet requirements for transplantation, as either a cell source (epithelial and vascular) or to produce whole lung scaffolds. We have identified key autocrine and paracrine factors and fine tuned mechanisms of delivery that support lung epithelial and vascular cell expansion, attachment and subsequent tissue formation. We will also present and examine physical mechanisms that impact cell dispersal, cell expansion, cell maturation, and tissue function in whole lung in vitro bioreactor culture.

09:55-10:25

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10:25-11:35 Morning Refreshments / Poster Presentations / One-to-One Meetings

Hard Tissue & Cartilage Engineering

11:35-12:00

PAUL HATTON

Professor, University of Sheffield

Topic: engineering bioactive glass and ceramic for mineralised bone tissue repair

12:00-12:25

CHRISTINE LE MAITRE

Professor of Cell Biology and Tissue Regeneration, Sheffield Hallam University

Injectable hydrogels to repair hard and soft musculoskeletal tissues

Intervertebral disc degeneration, which is strongly associated with low back pain, and bone loss associated with degenerative disease and trauma are significant clinical problems. Current therapies are associated with poor outcomes. This presentation will discuss a novel injectable hydrogel system which can tailor stem cell differentiation towards intervertebral disc cells or bone forming cells. This hydrogel can be injected via fine bore needles into soft or hard tissues where it infiltrates cracks and fissures gelling in situ. Promoting integration to the host tissue and stem cell migration and differentiation, promoting regeneration of these tissues. This presentation will disc the potential applications for this promising hydrogel and the research data derived to date.

12:25-12:50

DEBBY GAWLITTA

Associate Professor, Dept. of Oral and Maxillofacial Surgery, UMC Utrecht

FACEing vascularized bone regeneration

Despite the impressive regenerative capacity of bone tissue, large defects cannot heal without intervention. Patients with large maxillofacial bone defects receive autologous vascularized bone transplants, harvested from a second surgical site, such as the fibula. Bone regenerative strategies could eliminate the need for autologous bone harvesting. This presentation details our approach for the creation of a living bone substitute with an integrated multi-scale, interconnected vasculature. Soft hydrogels were fine-tuned to accommodate differentiation of clinically relevant co-cultures of endothelial progenitors and bone marrow-derived multipotent stromal cells (MSCs). The materials supported self-assembly of capillary-like networks, while also supporting

Bioprinting & Organ Fabrication

11:35-12:00

SHIRLEY TANG

Associate Professor, University of Waterloo

Topic: printing liver mimetics

12:00-12:50

ROUNDTABLE DISCUSSIONS:

Table 1: **Advancing regenerative medicine to the clinic**

Table 2: **The potential of AI for determining cell fate**

Table 3: **Advancing 2D tissue models to 3D for drug testing**

Table 4: **Investment and development: translating research to the market**

12:25-12:50 osteogenesis. Our current focus is on elaboration of the vascular tree by inclusion of electrospun small diameter blood vessels.

12:00-12:50 Continued

12:50-13:20

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15:30-16:00

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13:20-14:20 Lunch / Poster Presentations / One-to-One Meetings

14:20-14:45

KURT HANKENSON

Professor, Orthopaedic Surgery, University of Michigan

Activation of Novel Growth Factor Signaling Pathways for Bone Regeneration

The Hankenson laboratory studies the molecular and cellular basis for osteoblast differentiation, and through these studies seeks to identify novel pathways that can be utilized to enhance bone regeneration. The laboratory has most recently studied agonists of Wnt signaling and Notch signaling and this presentation will discuss the pathway from discovery to translation in pre-clinical animal models of bone healing.

14:20-14:45

PEDRO BAPTISTA

Group Leader at Aragon Health Research Institute (IIS Aragon), Zaragoza and Assistant Professor at Carlos III University, Madrid

Whole-organ bioengineering: current tales of modern alchemy

Liver disease affects more than 650 million people worldwide and accounts for 4% of all deaths. It is particularly costly in terms of human suffering, healthcare resources and premature loss of productivity. To date, the only definitive treatment available is liver transplantation, which substantially improves survival and the quality of life of these patients. However, a lack of donor livers subsists, mainly due to expanding indications and the increase of patients on waiting lists. By integrating multiple distinct enabling technologies in one single advanced therapy medicinal product (ATMP) - a bioengineered human liver - we aim to create and produce bioengineered human livers for transplantation and thereby serve a large patient group with an urgent medical need.

14:45-15:10

PRASAD SHASTRI

Professor Biofunctional Macromolecular Chemistry, University of Freiburg

Topic: Advancing the understanding MSC Biology and the role of the bone mineral phase in bone homeostasis

14:45-15:10

HELEN BERRY

University Academic Fellow in Cardiovascular Regenerative Therapies & Devices, University of Leeds

Decellularised Biological Scaffolds for Regeneration of Heart Valves

Decellularised biological scaffolds provide an attractive off-the-shelf regenerative solution for a wide variety of clinical applications. We developed a decellularisation process that efficiently removes cellular components whilst retaining essential biological and biomechanical characteristics of functional tissues. This talk will introduce the concept of decellularisation, and describe the assessments undertaken, as they relate to development of natural scaffolds for heart valve replacement. We demonstrated that our decellularised heart valves had excellent functional performance in a 12-month sheep model; with progressive recellularisation evident, and no overt calcification or inflammation. An ex-vivo organ culture model has been developed to support future investigations into the mechanisms of early regenerative cellular response, and the role decellularised scaffolds play in the recruitment of site specific stromal cells and progenitor cell types.

15:10-15:35

ORAN KENNEDY (Reserved)

Royal College of Surgeons in Ireland

Topic: joint regeneration and combinational approaches to bone and cartilage repair

15:10-15:35

NURIA MONTSERRAT

Junior Group Leader, Institute for Bioengineering of Catalonia (IBEC)

Topic: The production of kidney organoids from human pluripotent stem cells

15:35-16:00

SUCHITRA SUMITRAN-HOLGERSSON (Reserved)

Professor of Transplantation, University of Goteborg

Topic: utilizing marine animal tissue to develop human bone-like tissue

15:35-16:00 Invitation Out

16:00 Conference Close

London Heathrow Marriott Hotel
Bath Road, Heathrow Airport Hayes,
UB3 5AN, United Kingdom

Located less than half a mile away from the Heathrow Airport, this four-star deluxe hotel offers comfortable, noise-free accommodations and is near attractions such as Legoland and Windsor Castle. Modern and vibrant, discover the culinary delights and more in the London Heathrow Marriott.