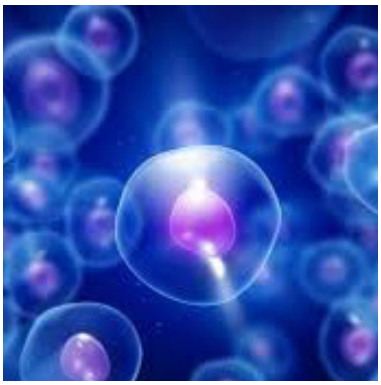
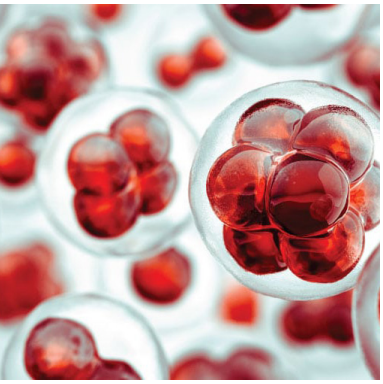
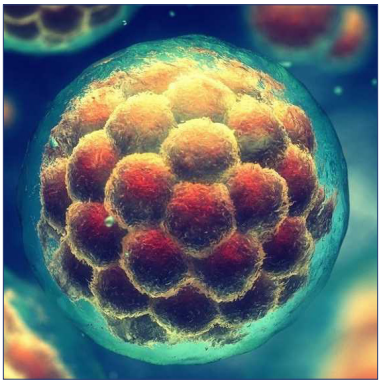
Keynote Forum
March 14, 2019

Tissue Engineering 2019
Stem Cell Congress 2019
Gene Therapy 2019




Joint Event
World Congress on

Tissue Engineering, Stem Cells and Regenerative Medicine
&
International Conference on

Cell and Gene Therapy

March 14-15, 2019 | London, UK

Ming Pei, Biomed Res, Volume 30
DOI: 10.4066/biomedicalresearch-C1-024

Ming Pei

West Virginia University, USA

Matrix microenvironment mediated fate determination of stem cells

Adult stem cells are a promising cell source for tissue regeneration. Due to the limited size of biopsy which provides small amount of stem cells, *ex vivo* expansion is necessary for acquiring a large quantity of stem cells with differentiation capacity. Unfortunately, *in vitro* expansion in 2D renders the cells senescent. Recently, decellularized extracellular matrix provides a 3D matrix microenvironment to efficiently expand tissue-specific stem cells for tissue engineering and regeneration. This matrix microenvironment can not only promote stem cell proliferation capacity but also determine lineage preference of adult stem cells. Despite the necessity for further in-depth investigation, this 3D matrix might bring the potential for future tissue engineering and regeneration.

Speaker Biography

Ming Pei completed his PhD from Beijing University, China and postdoc training from Harvard-MIT Division of Health Sciences and Technology, USA. Currently, he is a tenured professor and director of stem cell and tissue engineering laboratory in the Department of Orthopaedics, West Virginia University, USA. He has over 100 publications that have been cited over 3100 times and his publication h-index is 32 and has been serving as an editorial board member of reputed Journals.

e: mpei@hsc.wvu.edu

Notes:

Diana Anderson, Biomed Res, Volume 30
DOI: 10.4066/biomedicalresearch-C1-024

Diana Anderson

University of Bradford, UK

Induced oxidative DNA damage in spermatogonial stem cells by diethylstilbestrol *in vitro*

The spermatogonial stem cells (SSCs) are the only adult stem cells that are responsible for the transmission of genetic information from an individual to the next generation. SSCs play a very important role in the maintenance of normal tissue and provide an understanding of the rudimentary reproductive biology of gametes and a strategy for diagnosis and treatment of infertility and male reproductive toxicology. Androgens / oestrogens are very important for the suitable maintenance of male germ cells. There is also evidence confirming the damaging effects of oestrogen-like compounds on male reproductive health. We investigated the effects *in vitro*, of DES on mouse spermatogonial stem cells separated using staput unit-gravity velocity sedimentation, evaluating any DNA damage using the comet assay and apoptotic cells detected by the TUNEL assay. Immunocytochemistry assays showed that the purity of isolated mouse spermatogonial cells were 90%, and the viability of this isolated cell was over 96%. The intracellular superoxide anion production in SSCs was detected using the p-Nitro Blue Tetrazolium (NBT) assay. The viability of cells after DES treatment was examined by CCK8 (cell counting kit-8) assay. The results showed DES-induced DNA damage causes an increase in the intracellular superoxide anion. Investigating the mechanism and biology of SSCs not only delivers a better understanding of spermatogonial stem cell regulation but ultimately would also be a new target for male infertility and testicular cancers.

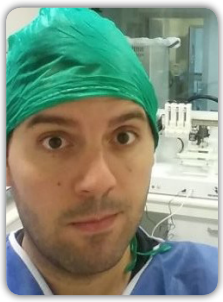
Speaker Biography

Diana Anderson holds the established chair in Biomedical Sciences at the University of Bradford. She obtained her first degree in the University of Wales and second degrees in the faculty of medicine, University of Manchester. She has 450+ peer-reviewed papers, 9 books, has successfully supervised 32 PhDs, is an editorial board member of 10 international journals. She is Editor-in-Chief of a book series on Toxicology for the Royal Society of Chemistry. She gives plenary and key note addresses at various international meetings. She is a consultant for many international organizations, including WHO, EU, NATO, TWAS, UNIDO, OECD.

e: d.anderson1@bradford.ac.uk

Notes:

Jose Manuel Baena, Biomed Res, Volume 30
DOI: 10.4066/biomedicalresearch-C1-024



Jose Manuel Baena

REGEMAT 3D, Spain

Manufacturing of functional tissues *in vitro* using bioprinting and bioreactors: Application in knee cartilage regeneration

Introduction: A lot of efforts have been directed to the creation of functional knee cartilage tissue in the lab. The lack of tissue regeneration in human beings and the deficiency of allogenic transplants in addition to the increasing of life expectancy make this problem to be considered as one of the most important ones of humanity in the current era.

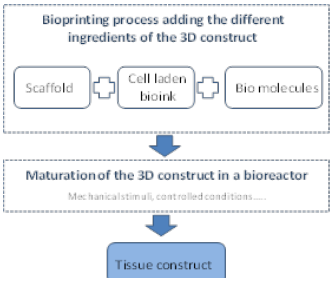
Joint cartilage is a connective tissue that lacks vascularization and innervation and is composed of a specific extracellular matrix. The healing process of cartilage tissue is slow and results in a fibrous scar-like tissue that lacks the functional properties of the hyaline cartilage leading to further tissue degeneration.

However, the results obtained are still far away from the desired. For the creation of a living tissue it is crucial the bioprinting process but also the maturation of the construct. Replicating the human being adult conditions *in vivo* in the lab or the stimuli that occur in embryogenesis could improve the results of tissue engineering towards the clinical application of the technology.

Materials and methods: Here, we propose a unique approach to create functional knee cartilage tissue starting from bio printed constructs (fabricated using bioprinting) and a device that mimic the physiology and apply the right mechanical conditions of the structure to be replaced and through the maturation procedure, applying the right stimuli, creates a functional tissue. We think that the best stress distribution is the real one and other approaches fail as do not mimic the real conditions happening in nature.

Results and discussion: In the present work, we show a method that helps to create functional knee cartilage tissue after bioprinting. For the creation of a living tissue it is crucial the bioprinting process and the ingredients selected to achieve the objective to create a functional specific tissue (first block of the image). But also, the maturation procedure applied to the 3D cell laden constructs, that is even more important (second block of the image). If we think about bioprinting as a technology to recreate all the structure in the same form as shown in a living knee cartilage tissue, we are going to fail. We have to think on bioprinting as a way of creating cell laden 3D constructs as a precursor of a functional tissue. The maturation and tissue formation process will be as important or even more than the bioprinting one. Considering the strategies of both blocks in the diagram will be crucial to obtain the desired functional knee cartilage tissue.

Conclusion: The stress distribution is crucial as stimuli to create the right tissue. Also, the scaffold architecture as it will affect the stimuli distribution and other important parameters as the biodegradation time. The selection of the right ingredients and the bioprinting procedure is very important in the success of the creation of functional knee cartilage tissue, as well as the maturation procedure applied to the 3D cell laden constructs is even more important. This approach opens a wide research area for tissue engineers to develop protocols with different stimuli to create functional knee cartilage tissue after bioprinting.



Speaker Biography

Jose Manuel Baena completed his PhD in Biomedicine from the University of Granada, Spain, MSc Engineering from Polytechnic University of Valencia, Spain and TU Braunschweig, Germany and MSc from Oxford Brookes University, UK. He serves as scientific coordinator of the tissue engineering and 3D printing platform (PITI3D), IDIPAZ, Hospital Universitario de La Paz, Madrid, Spain and he is research associate in the group "Advanced therapies: Differentiation, regeneration and cancer" IBIMER, CIBM, University of Granada, Spain. He has published several research papers and 1 book. He has presented his work in dozens of congresses around the globe. As a biotech entrepreneur, he founded BRECA Health Care, pioneer in 3D printed custom-made implants for orthopaedic surgery and REGEMAT 3D, a leader in the bioprinting industry. He is an expert in innovation, business development and internationalization, lecturer in some business schools and also, he is passionate about biomedicine and technology.

e: josbaema@gmail.com

Aleksandr Proshkin, Biomed Res, Volume 30
DOI: 10.4066/biomedicalresearch-C1-024

Aleksandr Proshkin

Kintaro Cells Power, Japan

Kintaro Flexy – spine-joints recovery program

K3intaro Flexy program is a combination of 3 treatment and rehabilitation methods: The injection of Kintaro Cells (allogenic bone marrow mesenchymal stem cells), taping and therapeutic gymnastics according to the methods and protocols of Kintaro Cells Power Japan. Orthopedic diseases take the first place in the World: Osteochondritis – chronic diseases or pain in the spine or joints, trauma, curvature of the spine in children and adults, flat-footedness etc. We propose a new non-surgical way to restore the functionality of the motor segments of a person with the help of stem cells. The creation of the Kintaro Flexy program is a result of combined 50-year experience in stem cell research in Japan and Russia, 20-year practical experience in sports rehabilitation and 8-year experience in elastic taping. We have created a program for treatment and rehabilitation. Kintaro Flexy is easy to use and effective (total efficiency – 98% (95 treatments in 2017)). Today this program is used not only by orthopedists but also by many cosmetic clinics.

Speaker Biography

Aleksandr Proshkin took a Doctor of Medicine degree at the age of 23 at the Ural state medical academy in Russia. He is currently the medical director of Kintaro Cells Power Japan. He has 20 years of practical experience in sports medicine and orthopedics. He is a winner of Russian Federation's state award. He has published 18 articles, conducted more than 50 workshops, developed 5 intelligent programs among which is Kintaro Flexy.

e: doctoraleksandr@cellspower.com

Notes:

Joint Event
World Congress on
Tissue Engineering, Stem Cells and Regenerative Medicine
&
International Conference on
Cell and Gene Therapy
March 14-15, 2019 | London, UK

Heidi Abrahamse, Biomed Res, Volume 30
DOI: 10.4066/biomedicalresearch-C1-024

Heidi Abrahamse

University of Johannesburg, South Africa

Laser-induced differentiation of immortalized adipose stem cells to neuronal cells

Adult stem cells of mesodermal origin differentiate into other tissues such as cartilage and bone, when treated with specialised induction media *in vitro*. However, transdifferentiating adipose stem cells (ASCs) to other dermal layers is a challenge to researchers and therapists in regenerative medicine. Current activities in phototherapy are focused in optimizing the biological activities of lasers or light on stem cells including human immortalized ASCs (iASCs). A growing body of literature suggests that low intensity laser irradiation (LILI) increase stem cell migration, stimulates proliferation and possibly differentiates them to other cell types. This study used a combination of biological and physical inducers for increasing the differentiation of neurons in culture models. It has used a combination of growth inducers to differentiate iASCs to free-floating neural stem cells called neurospheres. Further, it has applied near infrared (NIR) lasers of wavelength 825nm with fluences ranging from 5 to 15 J/cm^2 on these neurospheres. Changes in the metabolic and redox status of these newly differentiated neurons were gauged from transcriptome. Moreover, neuronal differentiation was determined by immunostaining using early and late markers. This study was able to generate neurospheres from iASCs and differentiate them to neuronal cells *in vitro*. There was a sharp distinction between the metabolic processes of these iASCs with the primary ASCs. Strikingly, there was an increase in an early neuronal marker at 5 J/cm^2 and 15 J/cm^2 signifying the biphasic dose response of NIR laser on living systems. Thus, LILI increased the yield of neurons and effected stem cell differentiation through modulation of cellular redox status. However, these differentiated cells failed to express late neuronal markers. This study found that iASCs, which has the capacity to proliferate indefinitely in culture medium is an excellent model for differentiation. It gives an insight into the cellular and molecular events during neuronal differentiation of iASCs by growth factors and LILI. Further, it has identified the mode of action of NIR laser in differentiating iASCs to other cell types. The outcome of this study has to be taken forward for validation by functionality testing and analysis.

Speaker Biography

Heidi Abrahamse is currently the director of the laser research centre, University of Johannesburg and Department of Science and Technology/National Research Foundation SARChI chair for laser applications in health. Her research interests include photobiology and photochemistry with specific reference to photodynamic cancer therapy, stem cell differentiation and wound healing. She has supervised 40 masters; 15 doctorates and 12 post-doctorate fellows and has published over 150 peer reviewed accredited journal publications, 42 accredited full paper proceedings and 11 chapters. She serves on the editorial boards of 8 peer-reviewed internationally accredited journals while acting as reviewer for over 30 journals. She is also the co-editor in chief of the international accredited journal photomedicine and laser surgery.

e: habrahamse@uj.ac.za

Notes: