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Tissue Engineering Virtual 2020

September 18, 2020

"Theme: Spotlight on Advancements in Tissue Engineering and Regenerative Medicine"

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Tissue Engineering Virtual 2020
Book of Abstracts

TISSUE ENGINEERING VIRTUAL 2020

September 18, 2020

Theme:

Spotlight on Advancements in Tissue Engineering and Regenerative Medicine

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About MAGNUS GROUP

Magnus Group (MG) is initiated to meet a need and to pursue collective goals of the scientific community specifically focusing in the field of Sciences, Engineering and technology to endorse exchanging of the ideas & knowledge which facilitate the collaboration between the scientists, academicians and researchers of same field or interdisciplinary research. Magnus group is proficient in organizing conferences, meetings, seminars and workshops with the ingenious and peerless speakers throughout the world providing you and your organization with broad range of networking opportunities to globalize your research and create your own identity. Our conference and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

Participation from 90 different countries and 1090 different Universities have contributed to the success of our conferences. Our first International Conference was organized on Oncology and Radiology (ICOR) in Dubai, UAE. Our conferences usually run for 2-3 days completely covering Keynote & Oral sessions along with workshops and poster presentations. Our organization runs promptly with dedicated and proficient employees' managing different conferences throughout the world, without compromising service and quality.

About Tissue Engineering Virtual 2020

Tissue Engineering Virtual 2020 webinar serves as a podium for the interaction between experts in the areas of Tissue Engineering and Regenerative Medicine around the world and aims in sharing some research and translational studies on various advances in the related fields. It is expected to bring together both reputable scientists in advanced stages of their and young researches from many related disciplines. The webinar expects many new ideas to emerge at the interfaces between disciplines aiming to solve the most important problems relating to the health. With its strong emphasis on innovative approaches, the webinar offers a chance for scientists, academicians, doctors, nurses and physicians working in different areas of healthcare to learn new ideas that could help them advance their own research and forge new professional relationships and collaborations. Our honorary speakers will provide you with the most clinically up-to-date relevant information, you'll leave better educated and more invigorated than you thought possible.

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KEYNOTE FORUM

TISSUE ENGINEERING VIRTUAL 2020

SEPTEMBER 18 2020

Dr. Shrikant L. Kulkarni

Kulkarni Clinic, India

Cyclic high hydrostatic pressure treatment to degenerate renal fibrosis in Ckd

Today the chronic kidney diseases (CKD) or end stage renal diseases (ESRD) patients are increasing day by day. Kidney organ allograft transplant or dialysis effective treatment of choice under current circumstances. But because of the limitation of the transplant treatment and complications there is an urgent need to investigate alternative new therapeutic reliable techniques. The main cause for CKD is the presence of fibrosis in renal parenchyma producing a toxic and hostile environment i.e. prevents the regenerative process. Therefore the priority to treat CKD is to dissolve the fibrosis and restore the circulation and elasticity of the arteries which makes the environment friendly to the regeneration of the damaged tissues. Biomechanical microenvironment plays an important role in tissue development and pathogenesis. Accumulation of excessive extracellular matrix (ECM) alters tissue mechanical properties which leads to organ failure Forces potentially operate in fibrosis include hydrostatic osmotic and stretch pressure. Failure to resolve injury and restore haemostasis gives progressive fibrosis which alters the mechanical environment that is matrix deposition and stiffness. A potential regenerative approach is an in-situ repair which is an attractive strategy to tackle this problem.

The physical environment has a key role to play in regulating both cells and the organs' ability to regenerate and repair tissues in response to injury via mechanical factors which often is overlooked in regenerative medicine. Hydrostatic pressure is the most fundamental and common mechanical stimuli in the body playing a critical role in hemostasis of the organ system. Mechanical environment that operates organ function which is a physiological system. Injury alters mechanical hemostasis and initiates reparative processes. Fibrosis represents failure to re-establishment of mechanical hemostasis and mechanical stresses that alter structural and functional properties of cells. After injury tissue rapidly changes in size, shape, composition and their mechanical characteristics. Cells are continuously exposed to a range of mechanical stresses due to the biological environment in which they reside; they play an important role in the process of constructing and modifying organs and tissues.

High hydrostatic pressure has potential to disrupt structure of ECM through protein denaturation. It achieves devitalisation without damaging biomechanical properties. Intra luminal hydrostatic pressure elevation over 20-30 cms. H2O causes degenerative changes in tissues, and fibrosis. When high pressure (HP) is applied by use of a hydrostatic fluid column, a hypoxic condition is created that alters cell function, inhibits collagen matrix production and suppresses the differentiation of fibroblast to myofibroblast phenotype. Therefore, the priority to treat CKD is to therapeutically manipulate fibrosis and restore its micro vascular circulation

The fibrotic cells mechanically compressed between strong renal capsule and elevated intraluminal hydrostatic pressure by artificial obstruction created at pelvi- ureteric junction will act like closed chamber pressure. The effect of cyclic high hydrostatic pressure over renal fibrosis causes first softening of the fibrosis, seperting collagen fibres, then breaking of fibres, thinning and then eliminating the renal fibrosis. In the proposed therapy hypothesis, excessive elevation of intraluminal hydrostatic pressure will degenerate renal fibrosis and restore microcirculation functionality to eventually help to rebuild a healthy kidney from native stem cells. regeneration.

Audience Take Away:

- There is no specific treatment for ckd at present. Elimination of renal fibrosis is the target treatment with the help of antifibrotic medicines it will prolong life of patients with disease.
- The first kidney transplant done in 1953 since that time onwards this is the only treatment alone with the renal dialysis. There was hope when stem cell treatment came into picture but because of the toxic environment created by the fibrosis, regeneration of the stem cells is not possible in chronic kidney disease.
- So to stimulate the regeneration of renal failure patient elimination of fibrosis with the help of cyclic high hydrostatic pressure by blocking of Pelvi Ureteric junction artificially is the treatment of choice to regenerate the damaged renal tissue

Biography

Dr. Shrikant L. Kulkarni completed his M.S.(General Surgery) in 1975 from B.J.Medical College Pune,Maharashtra India. The bachelor's degree M.B.B.S. completed from Miraj Medical College. Since 1971 he has worked at several government hospitals like the Wanless Hospital Miraj, Sangli General Hospital Sangli, Sassoon Hospital Pune and multispecialty hospitals like Ruby Hall Clinic, Pune and Jahangir Nursing Home, Pune. For the last 35 plus years he has been working at his own hospital at Chinchwad, Pune Maharashtra India.

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SPEAKERS

TISSUE ENGINEERING VIRTUAL 2020

SEPTEMBER 18 2020

Asaf Toker, MD
MATRICELF Ltd, Israel

Personalized tissues and organs replacement – A peek into the future

Matricelf developed a technology that enables the production of autologous engineered tissue composed of matrix and cells derived from patients Omentum biopsy. The platform showed remarkable pre-clinical results for several medical conditions. The company recently licensed the technology that enabled scientist at Tel Aviv university that 3D printed a human heart from human cells and matrix for the first time in human history. The company plans to conduct its first human clinical trial for Acute Spinal Cord Injury (SCI) in 2022.

Audience Take Away:

- Audience will learn about past and current trends in tissue engineering, how we printed the first human printed 3D heart, and will get a peek into future trends and research, including a roadmap for clinical trials with engineered tissues and organs

Biography:

Dr. Toker is a seasoned CEO with a proven track record in the biotechnology and healthcare industries. He possesses strong business development skills with prior experience in medical devices, R&D, and Life Sciences.

Dr. Toker is a paediatrician and also has a degree in Health Systems Management and MSc in Biotechnology Engineering from Ben Gurion University of the Negev.

Dr Toker served in several executive positions in the private and public healthcare system and served as a director in several biotechnology and medical device companies.

Anna-Lena Merten
Friedrich-Alexander-University Erlangen-Nuremberg, Germany

Engineering of the IsoStretcher biomechatronics platform into a bioreactor environment for autonomous visualization of live cells under isotropic mechanical strain

Many cells in the human body are exposed to mechanical stress. The stress trig- gers a response in mechanosensitive ion channels (MSCs, e.g. Piezo1 [1] and TRP-channels [2]), which are embedded in the cell membrane. MSCs are correlated to diseases such as deafness [2], osteoporosis [3] and heart failure [4]. Therefore, it is important to examine the- se channels and their reaction to stress in detail. Ion channels can be tagged, for example, with GFP (green uorescent protein) and thus, be studied using uorescence microscopy. Another approach is using ion indicators like Fluo-4 (for calcium), to study ion in ux into living cells.

For this purpose, a device was developed at the Institute of Medical Biotechnology (FAU), the IsoStretcher, which applies isotropic strain to a PDMS membrane via six pins, which are driven apart radially using an iris-like actuation mechanism [5]. Adherent cells (such as HEK cells) can be cultivated on this membrane, will stick to it and are ready for mecha- notransduction studies. Stretching of non-adherent cells (such as cardiomyocytes) is possible through embedding the cells in a hydrogel, which will stick to the PDMS membrane and transmit the stretch to the cells. Especially for cells and tissues from hollow organs, like the heart or the lungs, isotropic stretch is much closer to the physiological situation than uni-axial stretch [6].

In collaboration with Ospin GmbH (Berlin, Germany), the device has been implemented into their modular bioreactor system. This creates the possibility of long term experiments in controlled conditions. In order to have visual control over the sample in the stretching de- vice, di erent optical solutions were engineered that include an in-built compact uorescence microscope as well as a phase contrast microscope. Those were custom-built in order to t the con ned space available in the bioreactor and also provide a su cient image quality to examine biological samples. The IsoStretcher as well as the microscopes (sensors, pumps, etc.) can be controlled from a browser based user interface, which also allows monitoring of the process and data analysis.

Here, we present the technology as well as preliminary experiments using the system.

Audience Take Away:

- The audience will learn about an easy approach to iso- tropic cell stretching. Details of the stand-alone system as well as the combination with a commercial bioreactor system and their respective optical solutions will be presented. Furthermore, the importance of choosing the appropriate set-up (isotropic/multi-axial stretch compared to uni-axial stretch) for a biological experiment in order to gain meaningful results will be explained.
- Finally, results of biological experiments with both systems will be discussed.

Biography:

Anna-Lena Merten studied Life Science Engineering at the Friedrich-Alexander-University Erlangen-Nuremberg (FAU) in Germany and graduated as Master of Science in 2017. Currently, she is working on her PhD project at the Institute of Medical Biotechnology (FAU) while also completing a graduate programme at Erlangen Graduate School in Advanced Optical Technologies (SAOT, FAU).

Elena Salvaterra, Ph.D
Department of education, Sintesy, Italy

Ethical and regulatory issues in stem cell research and regenerative medicine. Puzzling the controversial debate worldwide.

Advances in tissue engineering and regenerative medicine (TERM) have generated considerable interest both in scientific and public domain. Although significant results have been reached over the last two decades in this field, several scientific, commercial and ethical constraints are at stake within the international community.

With regard to ethical and regulatory perspectives, this abstract considers prominent issues related to the use of human stem cells for research and clinical applications such as 1) implications for donors, 2) stem cell tourism, 3) the patient right to try in relation to stem cell based emerging therapies.

While the use of embryonic and fetal cells from aborted fetal tissues raises controversial ethical debate in several countries, adult stem cells have fewer ethical and regulatory constraints. However they encounter some resistance in relation to specific cell manipulations such as "therapeutic cloning" and collection for autologous applications.

Furthemore the use of adult stem cells usually raises a problem of consent. Indeed, due to the unforeseability or uncertainty of the use of stem cells and particularly of immortalized cell lines over the future decades it is quite difficult to obtain a really true informed consent at the time of specimen collection. Therefore the specific nature of stem cell research may raise the need to recontact donors/families over time for a new consent or a re-consent. In addition confidentiality may be controversial with regard to research on hereditary conditions or where genetic disorders are not confirmed. Donors may have concerns about potential genetic discriminations. Another ethical quandary in the development of any novel therapy relates to the patient "right to try" and the ususally associated "stem cell tourism". Given the tension between the need to safeguard public safety and the freedom of patients to access to experimental therapies, it is a challenging to define appropriate policies that strike the right balance. This abstract aims to explore these issues by trying to puzzling the controversial debate worldwide and offering some ethical and policy response which may support an ethical advances of stem cell research and its related applications.

Audience Take Away:

- This presentation contributes to the understanding of ethical, policy and regulatory issues related to stem cell research and clinical applications
- This presentation is helpful for clinicians, bioethicists, lawyers, policy analists/makers
- This presentation is helpful to public understanding

Biography:

Elena Salvaterra is a bioethicist with a deep experience in human and non human biobanking. She earned a Ph.D in Bioethics in 2004 (University of Milano, Italy) and a MA in Clinical Psychology (2020). She worked many years in the research field as bioethicist by serving academic and health care organizations. Since 2014 she works as teacher at a private academic organization (Kern Global School) and as scientific advisor at Sintesy Education (Sintesy). Author of several publications in the bioethical field and invited speaker at several international conferences, she published two books dedicated to ethical and policy issues related to human biobanking. Founder member of the European Society for Biopreservation and Biobanking, she is an active member of Isber and other scientific organizations focused on tissue banking.

Victor Alisson da Silva
Federal University of ABC, Brazil

Evaluation and characterization of neural integration within polymeric scaffold aiming spinal cord regeneration

Tissue therapy in cases of spinal cord injury is of great importance for the development of treatments aimed to nerve regeneration. One of the main methods is the use of polymeric scaffolds, which are structured biomaterials that promote cell support and stimulate cell differentiation at injured sites. However, cellular responses may vary according to the macro and microstructure of these materials. Regarding macro configurations, one can obtain scaffolds ranging from films, cylinders, tubes, channels, and even hydrogels. In addition, the microstructural conformations may be unique, allowing variations in the mean pore diameter, hydrophilicity, composition and other surface characteristics of the biomaterials. However, these properties should be evaluated in vitro before proceeding to the in vivo application.

Objectives: The aim of this study was to evaluate and characterize the cytotoxicity and development of spinal cord cells in contact of polymeric biomaterials films based in chitosan (CHI); poly-L-lactic acid (PLLA); polycaprolactone (PCL) and fibrous polycaprolactone (PCLf) for spine regeneration.

Methods: The sterilization method used was ultraviolet (254 nm, 30 minutes) on each side of the biomaterial. With each polymer were performed: a) VERO cell cultures for cytotoxicity analysis, through direct and extract contact, in addition to MTT tests; b) mixed primary cultures of spinal cord of neonatal rats with 0-3 days postnatal (P0-P3) for evaluation of fixation, cytotoxicity, differentiation, dendritic branching and connectivity through light microscopy and transmission electronics. All experiments were carried out according to protocol 4509160816 approved by CEUA/UFABC.

Results and Conclusions: Based on the cell viability assays (MTT test), it was observed that the PCL (1.067±0.013), PCLf (1.089±0.028), PLLA (1.169±0.066) and CHI (1.068±0.014) composites obtained similar results to the negative control (1.000±0.042) , where the cells developed properly within 24 hours after incubation, demonstrating no cytotoxicity. With the result of non-cytotoxicity of the polymers, the cells of the spinal cord of neonates were incubated on them, allowing observations on the differentiation and development of this culture in direct contact with the biomaterials. In comparison to the negative control, the biomaterials resulted in similar morphologically cells. With all of this in mind, we suggests that the polymeric films of PCL, PCLf, PLLA and CHI allow adhesion and correct differentiation for both Vero cell lines and spinal cord cells. Thus, all the information suggests that the use of scaffolds may be a great alternative for spinal regeneration.

Key-words: cellular viability, spinal cord injury, scaffolds, biomaterial.

Biography:

Biomedical engineer with an emphasis on tissue engineering from Universidade Federal do ABC (UFABC) - Brazil. He has been working for more than 5 years with regenerative medicine applied to the spinal cord, participating in several projects and clinical studies with national and international groups, working with bioprinting techniques, differentiation of stem cells to neuronal lineages and biomaterials applications as regenerative tools. During his education he had the opportunity to study his area of interest in Canada (University of Victoria - 2018) and South Korea (University of Seoul - 2019)

Prof. Sandeep Shrivastava
Datta Meghe Institute of Medical Sciences, Wardha, India

Designing & developing the next generation wound management – STARS therapy

The Wound management over 4000 years have been skillfully developing for providing effective care. These Interventions include Medical care; Local Care of wounds and Surgical Care. With the advent of regenerative Medicine a new dimension of health care is evolving with immense opportunity and hope for complex problems like wounds. We through this study designed, developed and pilot tested a novel concept of "Regenerative Care" through Platelet Rich Plasma (PRP) as the mono therapy. This is through the New protocol developed by the author – Sandeep's Technique for Assisted Regeneration of Skin; STARS therapy, based on triggering and assisting the skin regenerations in wounds from the skin margins.

Methods: This is a prospective clinical study developing and testing the concept of "Regenerative Care" in wound management. At our Centre, we have developed and standardized PRP Intervention through "STARS therapy (Sandeep's technique for assisted regeneration of skin) for wound management". In this study, we present the results in 350 consecutive wounds, between 2011 to 2019. It includes all types wounds - acute wounds associated with massive tissue losses, infections, necrosis and chronic non-healing including diabetic ulcers, bed sores.

Results: The results reveal a complete healing (97.4%) with filling up of defects; excellent control of infection (98%), and good pain control (82% less than 3/10 VAS). The average healing rate was 1.2mm /day. There were no major complications / adverse events observed. Reversal and revival of necrosis and devitalized tissues such as skins, tendons, muscles and bones was achieved towards very effective clinical outcome.

Conclusions: A new dimension of health care for wound management is evolved. This Regenerative Care is propagated through a mono therapy with PRP ; assisting the skin regenerations in wounds through "STARS therapy". A Game Changer solution is built for wound management based on 21st Century advances.

Audience Take Away:

- What is PRP, a regenerative Medicine Product
- How to extract PRP in simple lab. / clinics. From autologous source.
- What is "STARS Therapy" and how to impart in clinically practices.
- How it can help the health care providers to take care of very complex wounds in their practice.
- They will learn - A simple, low cost, low resourced next generation solution for complex wound management.

Biography:

He is Director of Centre of Regenerative Medicine, Director Professor of Orthopaedics, Chief Executive Officer, Hospitals and Ex DEAN of Medical School at Datta Meghe Institute of Medical Sciences, Wardha India. In the field of Regenerative Medicine, he has pioneered the wound management with PRP, and developed "Sandeep's Technique for Assisted Regeneration of Skin,(STARS Therapy). He has 15 Copy-rights & Patents; 3 books, 63 Publications and 75 presentations, several Orations, Key note addresses and guest lectures across 18 countries across the globe including. He is author of "An illustrative Guide on Platelet Rich Plasma". His work is widely published and presented across the World. He is recipient of Lifetime Research Award and Lords of Planet Award.

Rajan Choudhary
National University of Science and Technology "MISiS", Moscow 119049, Russia

Conversion of biowastes into bioceramics

This study aimed to recycle organic wastes for the preparation of value-added material for biomedical applications. Three different silicate bioceramics (wollastonite, diopside, forsterite) were prepared from wastes and their biomineralization and cytocompatibility were evaluated. Raw eggshell and rice husk were used as calcium and silica sources. Silica extracted from rice husk exhibited irregular topography and particle size was noticed in the micron range. The thermal behavior of precursors was analyzed by TG-DSC and phase purity was examined by XRD. Pure wollastonite was formed after calcination at 1100 oC whereas diopside and forsterite were composed of minor impurities even after heating at high temperatures. Scanning electron microscopy revealed that the morphology of samples was irregular and particles were ranging from sub-micron to 10 microns. Wollastonite showed good apatite deposition ability followed by diopside and forsterite. The surface of the diopside after immersion in simulated body fluid was composed of nanorods whereas interconnected nanofibers were noticed on the surface of wollastonite. Chemical composition and dissolution were found to affect their biomineralization ability in the physiological environment. The Hemocompatibility test suggested that all the silicate bioceramics showed compatibility with the mammalian blood cells and the hemolytic activity was less than 1%. Among all samples, the diopside revealed good hemocompatibility at all the concentrations (62.5, 125, and 250 µg/ml) even after 24 hours of incubation followed by wollastonite and forsterite. Lactate Dehydrogenase (LDH) assay did not show statistically significant changes in the proliferation of multipotent mesenchymal stromal cells (MMSCs) after treatment with the bioceramics when compared to control ($p>0.05$). Thus, biowaste derived wollastonite, diopside and forsterite were bioactive and cytocompatible.

Audience Take Away:

- Cost-effective and environment-friendly approach for sustainable recycling of biowastes.
- An effective approach to replace synthetic and toxic chemicals for the development of biomaterials.
- Researchers are attempting to mimic the substitution of essential ions in synthetic materials to accelerate bone regeneration. This study utilizes biogenic waste materials that have the inheritance of Na, Mg, Sr, and Si ions, etc. in a minor amount which can result in significant benefits to physiological function.
- This practice fulfills the European societal challenge of conversion of waste into biomaterial for improving the quality of life of bone disease patients.

Biography:

Dr. Rajan Choudhary studied pharmaceutical chemistry at the Vellore Institute of Technology (VIT), India After graduation he joined the research group of Professor S. Sasikumar at the School of Advanced Sciences, VIT, India. He received his Ph.D. degree in 2018 at the same institution. Currently, he is a postdoctoral fellow under the supervision of Professor Sergey Kaloshkin and Professor Fedor Senatov at the National University of Science and Technology "MISiS", Russia. He is working on the development of custom-designed scaffolds having antibacterial and osteogenic properties. He has published several research articles in Journals indexed in SCOPUS and WOS.

Inna Bulygina
National University of Science and Technology "MISiS", Moscow, Russia

Method of mimicking mammalian trabecular bone architecture for bone implants manufacturing

Abiomimetics is a promising approach allowing to create materials with new specific properties mimicking natural structures. This study demonstrates the direct replication of trabecular bone architecture. The biomimetic scaffold was constructed using chemically inert and biocompatible ultra-high molecular weight polyethylene (UHMWPE) polymer. The main issue associated with UHMWPE is a complex processing, a time-consuming procedure which makes it difficult to prepare a 3D-printed sample. Thus present study proposes a feasible method for fabricating an implant having native trabecular bone architecture. The scanning electron microscopy and computer tomography revealed the samples were composed of macro and microstructures which were found very similar to native bone architecture. The pore size of the UHMWPE was found to be ranging from 500 μm to 700 μm whereas the average thickness of the wall between pores was noticed as 80 μm. This value was observed to be very small as compared to that of bone (200 μm). Moreover, the nanorelief that existed on the surface of the sample can be beneficial for cell proliferation. These structural features indicate the efficiency of this method which can find its potential application in the biomedical field. The observed topography combined with etched surface resulted in enhanced adhesion and proliferation of cells. Multipotent mesenchymal stromal cells (MMSCs) were incubated with the UHMWPE scaffold. After 4 hours 40 % of cells adhered to its surface. Further, when the co-incubation time was increased to 48 hours the proliferation rate grew and reached 75 %. The cytocompatibility study indicated that the sample provided the necessary environment for the adhesion and proliferation of MMSCs.

Audience Take Away:

- Novel method for UHMWPE bone implants manufacturing.
- How to mimic the native trabecular bone architecture.
- Results of the investigation of porous structures by means of SEM and CT.
- Enhanced MMSCs proliferation on UHMWPE pellet surface associated with topography and hydrophilicity.

Biography:

Ms. Inna Bulygina studied Nanomaterials at the National University of Science and Technology "MISiS" (NUST "MISiS"), Moscow, Russia. Being an undergraduate, she joined the research group of Professor S. Kaloshkin at the Center for Composite Materials, NUST "MISiS", Russia. Bachelor's thesis topic covered methods of UHMWPE bone implants with native trabecular bone structure manufacturing. Currently, she is a Master's degree student at Materials Science under the supervision of Professor Fedor Senatov at the NUST "MISiS". She is working on the cellulose hydrogels and PLA-based scaffolds. She has published several research articles in SCOPUS indexed Journals.

Fajar Shodiq Permata
Faculty of Veterinary Medicine, Universitas Brawijaya, Indonesia

Using liquid omental cattle fat accelerated the healing of 3rd degree burns based on VEGF expression and epidermal skin thickness: Study inrat

A third-degree burn is a high severity burn characterized by the colour of the inflamed skin turn to grey until black, no bullae forming, and the surface does not feel pain anymore. The healing of the wound can be marked by the growth of epidermal layer when proliferation occurred. One of the necessary growth factors for wound healing is Vascular Endothelial Growth Factor (VEGF). The omental fat contains several growth factors such as Fibroblast Growth Factor (FGF) and VEGF. This research aimed to know the influence of the giving of liquid omental cattle fat in the treatment of burns towards the increase of VEGF expression and the thickness of skin epidermis of Wistar rat (Rattus novergicus). This study used a complete randomized design with 20 male rats, two months old, 150-200 g with divided into four groups with five replicates. The groups are G1 (negative control), G2 (positive control, given the burns on the dorsal surface), G3 (treated with Bioplacenton® as a burn ointment), and G4 (treated using one ml liquid fat). The method for third-degree burn used fired of the metal coin (diameter one cm) during one minute then set on the dorsal skin of anaesthetized rats in 1 minute. After the burning, one mL of normal saline swept to the surface, continued giving the treatment and the bandage (Melolin®) covered burn area. Ethical clearance of this research was approved by the Research Ethics Committee of Universitas Brawijaya with number certificate No. 928-KEP-UB. The burn ointment and liquid fat were delivered every two days respectively and coincided replacing the dressing. Omental cattle fats were obtained from cattle slaughtering house of Malang then continued sterilization using Autoclave. The lipids were heated five minutes until become liquid then aspirated 1 mL by syringe, and sensed by hand into warm before treatment application. After 14 days of treatment, rats were euthanized, and the skins were collected into 4% formaldehyde. The sample was processed being tissue embedded paraffin. The VEGF area expression observed by Immunohistochemistry method continued measuring with ImmunoRatio while the epidermis thickness measured in Hematoxyline-Eosine (HE) stained tissue. Data were analyzed quantitatively using One Way ANOVA p <0,05 via SPSS ver 25. Results showed that liquid omental cattle fat increased VEGF area expression (36,28±1,39%) and epidermal thickness (17,7 ±1,62 µm) significantly ($p<0.05$) compared positive control (17,08±2,46% and 13,92 ±0,82 µm, respectively) and burn ointment groups (19,97±1,79% and 14,44 ± 1,23 µm, respectively). The acceleration of skin regeneration due to growth factors component from omental fat as leading regeneration. The conclusion was that the liquid omental cattle fat could hasten the regeneration of the skin toward 3rd level burn injury based on the elevation of VEGF and epidermal thickness. The researchers acknowledged to Ministry of Higher Education for funding this research with Student Creativity Program.

Audience Take Away:

- The audience would learn about the potency of omental fat from cattle to treat a burn injury
- The result would be a simple method to solve for a hastening of burn healing using waste product from cattle slaughtering house.
- This invention would be a practical solution for a medical doctor or DVM or industries to utilize omental fat as a burn treatment medicine.

Biography:

Fajar, DVM, M.Biotech studied Biomedical Engineering from Biotechnology Master Program at Universitas Gadjah Mada, Indonesia and graduated as MBiotech in 2013. He is a veterinarian (DVM) since 2009. His master thesis was about nerve xenograft from sheep using decellularization techniques. He is a lecturer in the Faculty of Veterinary Medicine, Universitas Brawijaya started in 2013. He has an active researcher, and he achieved research grant Medical ministry of Indonesia in 2015, which developed xeno-cardiac tissue engineering. He got as the best presenter in Nichi-in Regenerative Medicine event in Tokyo, Japan in 2019. Now he has 7 Scopus articles.

George Mihail Vlăsceanu
University Politehnica of Bucharest, Romania

Bioinspired composite biopolymer blend porous scaffolds reinforced with graphene oxide and hydroxyapatite gradient density manifesting ectopic osteoinductive behavior

Herein, the synthesis and characterization of novel chitosan-gelatin highly porous scaffold reinforced with graphene oxide and hydroxyapatite (HAp), crosslinked with genipin was targeted. In tissue engineering, chitosan and gelatin are two of the most robust biopolymers with wide applicability, due to intrinsic biocompatibility, biodegradability, low antigenicity properties, affordability and ease of processing. HAp, per its exceptional activity in tuning cell-matrix interactions, is acknowledged for its capability of sustaining cellular proliferation by promoting bone-like native micro-media for cell adjustment. Genipin is regarded as a top class cross-linker, while graphene oxide (GO) is viewed as one of the most performant and versatile fillers.

The composites with natural bone HAp/biopolymer ratio were obtained by cascading sonochemical treatments, followed by uncomplicated casting methods and by freeze-drying. Their structure was characterized by Fourier Transform Infrared Spectroscopy and X-ray Diffraction, while overall morphology was investigated by Scanning Electron Microscopy (SEM) and micro-Computer Tomography (μ-CT). Ensuing that, in vitro enzyme degradation was performed to detect the most promising compositions for the development of in vivo assays.

Suitable GO dispersion was ascertained within the biopolymer mix as nanolayers specific signals lack in both FTIR and XRD spectra and the specific spectral features of the polymers persisted with GO load enhancement. Overall, correlations between the GO induced material structuration, crystallinity variations and chemical interaction of the compounds can be correlated with the physical features and bioactivity of each composite formulation. HAp presence reflected in SEM and μ-CT onto the pore smoothness, a requisite for cell attachment mainly highlighted within ex-vivo specimens. Moreover, the HAp distribution within follows an auspicious density gradient tuned for hybrid osseous/cartilage matter architectures which was mirrored in the mice model tests. Hence, the synthesis route of a natural polymer blend/hydroxyapatite-graphene oxide composite material is anticipated to emerge as influential formulation in bone tissue engineering.

Biography:

George Mihail Vlăsceanu, 28, h-index 6, is a doctoral student in Chemical Engineering, part of the Advanced Polymer Materials Group of the University Politehnica of Bucharest, with expertise in the characterization and processing of graphene, advanced techniques for bone regeneration and development of high performance biosensors. His background includes interdisciplinary skills as a result of his Bachelor in Medical Engineering (biopolymers for regenerative medicine) and Master studies in Applied Chemistry and Materials Science (oxidic nanomaterials for advanced application). His research interest are akin to the emerging fields of biomedicine and tissue engineering, as reflected by the 17 publications he co-authored (9 ISI articles in highly regarded journals - Biosensors and Bioelectronics, Composites Part B: Engineering - and 7 book chapters), with the emphasis on graphenic materials composites. Mr. Vlăsceanu is experienced in morpho-structural analysis, polymer and composite materials synthesis, graphene materials processing as a result of his professional engagement within the framework of EU POC-A1-A1.1.4-E-2015 P_37_221, and is trained in complex 3D imaging characterization.

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POSTERS

TISSUE ENGINEERING VIRTUAL 2020

SEPTEMBER 18 2020

María Jesús Rodrigo Sanjuán
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Monitorization of the neuroprotective formulation Brimonidine-Laponite over 6 months in a glaucoma murine

Brimonidine (Bri) is an ocularhypopressure drug widely used for glaucoma treatment as eye drops, and recent studies also showed to be protective to neuroretinal tissue. Intraocular administration needs of long-lasting delivery systems in order to decrease sight-threatened side effects and increase patient's compliance. In this study, the nano-clay Laponite® (Lap) was used as a biocompatible carrier with the aim of obtaining intraocular sustained levels of Brimonidine. Bilateral glaucoma by Morrison's model was induced in 60 Long Evans rats and Bri-Lap formulation was injected into the vitreous humor in right eyes at baseline, and 31 animals served as controls. To study clinical safety, ocular signs and intraocular pressure (with Tonolab®; TiolatOy Helsinki, Finland) were monitored weekly. Functional and structural studies were performed at 0-8-12-18-24 weeks to analyze the neuroretinal tissue, by in vivo electroretinography (ERG)(Roland consult® RETIanimal ERG, Germany), high-resolution optical coherence tomography (OCT) (High Resolution-OCT Spectralis, Heidelberg® Engineering, Germany) and histological studies, respectively. For drug monitorization Bri-Lap quantification by high performance liquid chromatography mass spectrometry (HPLC-Mss), pharmacokinetic study and vitreous signal intensity by in vivo OCT were analyzed. Bri-Lap formulation was well tolerated, early decreased the intraocular pressure (17.36 ±4.10vs 25.26±3.69mmHg; $p<0.001$), exerted both structural -increased thickness of whole retina and axons of retinal ganglion cell (RGC) (25.60±1.67 vs 21.57±5.59; $p=0.038$) by OCT and cell count (23.00±0.39 vs 20.66±0.98; $p=0.040$) compared to non-treated eye- and functional -by maintaining higher amplitude ERG of RGC (41.20±8.75 vs 14.60±12.60; $p=0.015$)- neuroprotective effect up to 6 months. Ocular levels of Bri-Lap progressively decreased (intensity = 30 to 0.22) over follow-up being detectable up to 6 months. In conclusion, Laponite allowed intraocular sustained delivery of Brimonidine. A single eye injection of Bri-Lap formulation exerted both functional and structural protection of the neurorretinal tissue over 6 months.

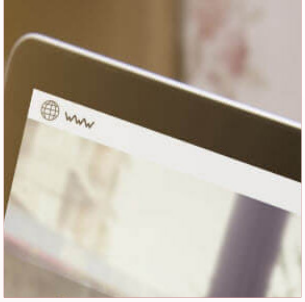
Audience Take Away:

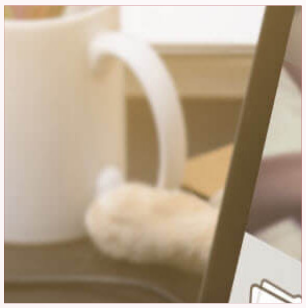
- The nano-clay Laponite allowed sustained delivery of Brimonidine into the eye up to 6 months.
- A single administration of the Brimonidine-Laponite formulation exerted protection on functionality and structure of the neuroretinal tissue over 6 months.
- In vivo monitorization of vitreous levels of the Brimonidine-Laponite formulation could be carried out by using the optical coherence technology.

Laponite® is used as biocompatible carrier for delivering other drugs as antibiotics or anti-cancer and for others routes of administration such as skin pathologies. Our group used for the first time the carrier Laponite® for long-lasting drug delivery into the eye. In previous studies we demonstrated ocular safety and biocompatibility of Laponite as vehicle for dexamethasone delivery after vitreous and suprachoroidal administration, in healthy animals. In this case, a different formulation (Brimonidine-Laponite) was studied in animals suffering from glaucoma, which exerted protection on neuroretinal tissue. In conclusion, Laponite could be considered a new potential carrier for ophthalmological drug delivery.

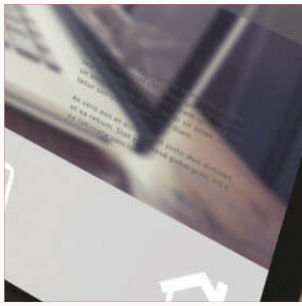
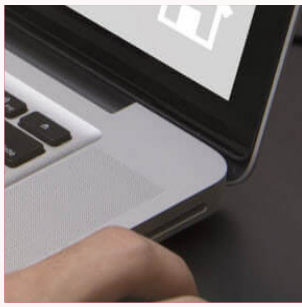
PARTICIPANTS LIST









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