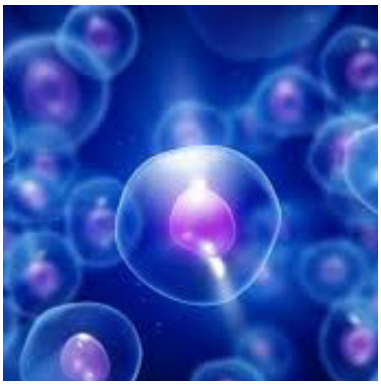
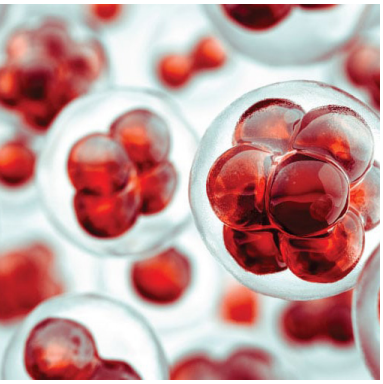
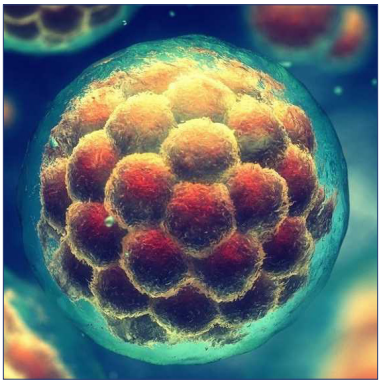
Video Presentation

Tissue Engineering 2019
Stem Cell Congress 2019
Gene Therapy 2019




Joint Event
World Congress on

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Cell and Gene Therapy

March 14-15, 2019 | London, UK

N Phogat et al., Biomed Res, Volume 30
DOI: 10.4066/biomedicalresearch-C1-026

Image processing, detection of sepsis biomarkers and computation of concentration from intensity in duplex LFIA

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R is a well - know open-source software for statistical analysis. The complete algorithm is developed in R-software utilizing the packages EB Image, ggplot2 and ggpmisc. The algorithm involves the image-processing of the duplex LFIA green and red quantum dots strips, through R package EB Image, followed by linearly fitted calibration plots to compute the concentration from intensity. These calibration plots also provide the quantitative analysis of the duplex LFIA assay. The calibration plots of red quantum dots at different specific concentrations of green quantum dots, followed by green quantum dots at different concentrations of red quantum dots, explain the fate and effect of green and red QDs with respect to each other's presence in duplex LFIA assay. In future, the algorithm can be implemented in an R package, utilizing a Shiny app to provide a user-friendly stand-alone and web-based app.

Speaker Biography

N Phogat has done master's in marine biotechnology from Goa University, Goa, India. During this time, he was awarded fellowship for two years from department of biotechnology, Government of India. During master's studies, he also worked at national chemical laboratory (NCL), Pune. He worked in the fields of nanobiotechnology, bioinformatics and molecular biology. Later, he did his Master's in biomedical engineering from Furtwangen University, Germany. During this time, he worked as a programmer in the area of bioinformatics. Currently, he is pursuing his Ph.D. from Tubingen University, Tubingen, Germany. His PhD work is in the field of artificial intelligence, deep learning and neural networks to develop new algorithm and software to detect and predict the DNA nanostructures. Currently, along with PhD, he is also developing the new algorithm and software for lateral flow and biological assays, utilizing the concepts of image processing and machine learning. His research interests are in data science, artificial intelligence and cryptography.

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Notes:

Poster Presentation

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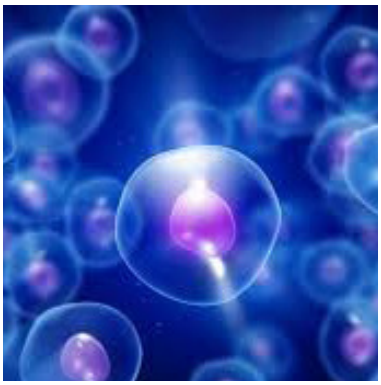

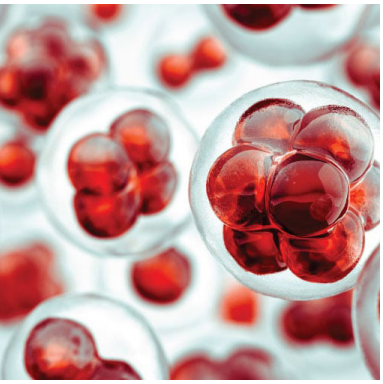
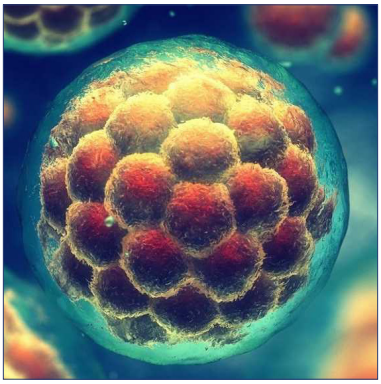


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Soukaina Bahsoun et al., Biomed Res, Volume 30
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The role of dissolved oxygen level on human mesenchymal stem cells culture and its implication on the cryopreservation process

Soukaina Bahsoun, K Coopman and **E Akam**
Loughborough University, UK

Human mesenchymal stem cells (hMSCs) are viewed by many as strong candidates for cell therapy. The translation from bench to bed side requires an expansion process with no compromise on the cells' safety, viability, purity and potency. hMSCs culture conditions have been the subject of vast research and a debate still exists on how to describe hMSCs "best performance". Culturing hMSCs in low oxygen (hypoxia) has become a popular option aiming to improve yield and functionality. A review of the literature was conducted by (Bahsoun et al. 2018) to gather evidence on how hypoxia affects hMSCs attributes including marker expression, differentiation potential, growth, attachment, migration, genomic stability and paracrine activity. Despite the disparities noticed across the literature in the terminology and the equipment used, it was concluded that hypoxia improves most of the attributes assessed.

Cryopreserved human bone marrow mesenchymal stem cells (hBM-MSCs) are one of the most common types of cells used in clinical trials. Whether autologous or allogeneic, cryopreservation is an integral part of cell therapy manufacturing. While using cryopreserved cells is sometimes taken for granted, developing optimal cryopreservation processes is still a challenge. Using hypoxia pre-conditioning to improve hBM-MSCs recovery after cryopreservation is a novel approach. Preliminary data shows hypoxia pre-conditioning improves the post-thaw osteogenic potential of hBM-MSCs.

Speaker Biography

Soukaina Bahsoun has completed a three-year degree in biology. She moved to the University of Victoria in Canada and studied five high-level molecular biology modules, two of which are directed studies completed under the supervision of professor David Levin and professor Francis Choy. After moving to UK, she joined the Open University and completed Bachelor of Science (with honours) first class degree. Her motivation for graduate studies and research allowed her to secure a position on the postragduate training programme in regenerative medicine at Loughborough University, UK.

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Notes:

E-Poster

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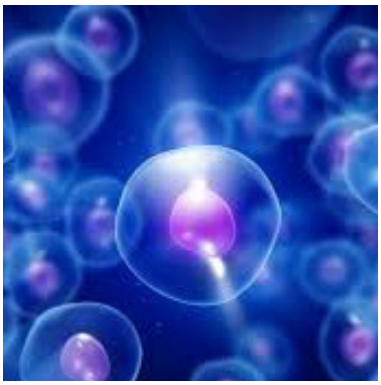

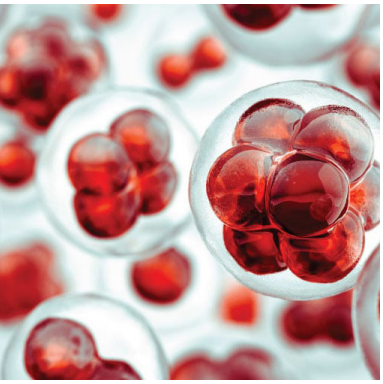
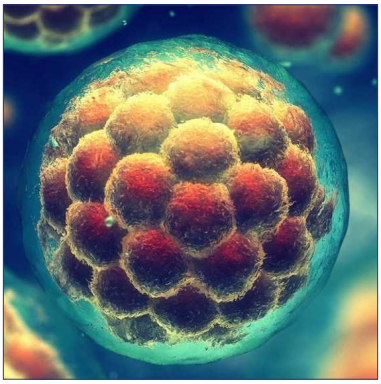


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Jaba Tkemaladze, Biomed Res, Volume 30
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Senolytic effect of dasatinib and quercetin on human beings

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Senescent cells are the last generation of cell differentiation. If programmed cell death (apoptosis) is not activated, then it becomes the main source of intoxication for organism. After 36 years their amount is so great, that signs of aging start strongly manifesting. For many years, scientists try to find combination of substances that could kill part of senescent cells. In our experiment we examine the senolytic effect of dasatinib and quercetin on people. Dasatinib is a treatment for oncology diseases, especially widely used when other treatments are no longer working. Quercetin is the vitamin from bioflavonoid group. So as to assess the anti-aging effect of dasatinib and quercetin, we went through clinical trial. For this trial we picked up certain volunteers. Our volunteers were only men participants in spectrum of middle and old ages (36-40 y.o.). We eliminated all female participants, because mutagenous impact of dasatinib on ovicells is not examined properly. As for the male-participants they were recommended to avoid fertilization for the first 3 months after the clinical trial.

Generally, 64 men took part in our clinical trial. We classified all these participants into 4 groups, by 16 people for each group. First group of participants had to orally administer 50mg of dasatinib along with 500 mg of quercetin; second group of participants orally administered 50mg of dasatinib and 500 mg of placebo; while third group also took quercetin and placebo, but with different oral dose namely 500mg of quercetin along with 50mg of placebo. The participants of fourth group orally administered two compounds, and both were placebo with a dosage of 500mg and 50mg. These participants of 4 groups must orally administer these compounds once a day after meal for 5 days overall.

For the accurate assessment of anti-aging effect of all compounds stair ascending test was done by participants a day prior to the start of trial and 21 days after the end of trial along with medical screening each time. Complete blood count was performed on participants all this time, and also since the start of the test participants' blood pressure was measured each 10 minutes with 3 overall estimates.

By the end of the trial with the help of all the gathered data it was possible to make a solid conclusion, namely among all four group the first group of participants who orally administered 50mg of dasatinib and 500mg of quercetin demonstrated remarkably outstanding improvement of physical endurance as compared to the rest of the groups. The simultaneous oral administration of dasatinib (50mg) and quercetin (500mg) showcased obvious senolytic (anti-aging) effect.

Speaker Biography

Jaba Tkemaladze was previously working as a research scientist at State Institute of Morphology, TV Anchor at Georgian Public Broadcasting, adviser at The Ministry of Defense of Georgia, and research scientist at Georgian Mental Health Coalition. His papers include programming and implementation of age-related changes, gerontology research in Georgia, potential role of centrioles in determining the morphogenetic status of animal somatic cells, centriolar mechanisms of differentiation and replicative aging of higher animal cell, centrosomal hypothesis of cellular aging and differentiation, discovery of centrosomal RNA and centrosomal hypothesis of cellular aging and differentiation and centriole, differentiation, and senescence. Jaba was graduate of medicine at State Medical Institute in 1995 with the dissertation "Centriolar theory at age related changes". His researches include embryogenesis and radical rejuvenation. He got PhD in Psychology at the Scientific Research Institute of Psychiatry in 1995 with the dissertation "Senescence, psychosis, cancer". Currently, he is CEO of Longevity Alliance of Georgia.

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Accepted Abstracts

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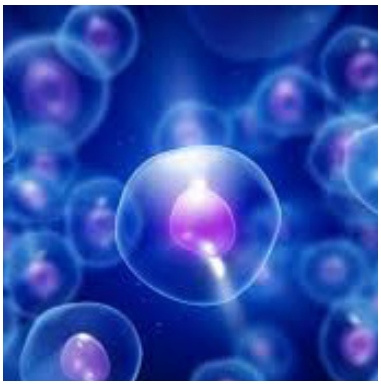

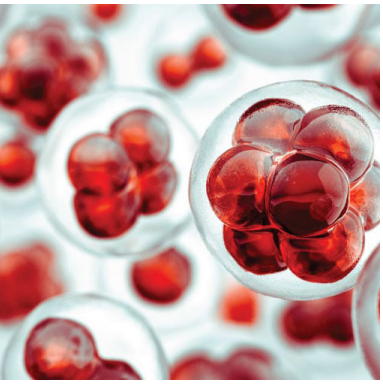
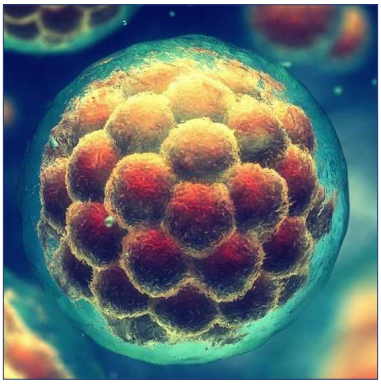


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Next generation of cell based therapies for cancer

Khalid Shah
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Cell-based therapies are emerging as a promising strategy to tackle cancer. Multiple cell types (T cells, stem cells and cancer cells) have been shown to exhibit inherent tropism towards tumors. Moreover, when engineered to enhance their homing capability and to release therapeutic agents, these cells effectively target sites of malignancy. This keynote considers the current status of cell-based treatments for cancer and provides a rationale for translating the most promising preclinical studies into the clinic.

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Label-free and non-invasive cell analysis in 3D tissue models and quality assurance of blood products using Raman trapping microscopy

Schutze K[1], Steinke M[2], Kronstein-Wiedemann R[3] and **Tonn T[3]**
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Raman trapping microscopy (RTM) is a non-invasive, label-free, highly sensitive analytical method for efficient and fast identification and characterization of single cells in solution or within 3D-tissue. Here, we present RTM as a novel tool for gentle yet highly precise cell analysis in three independent experiments, providing an overview about the large versatility of this method.

We could show evidence that RTM is a suitable tool to investigate if primary human tracheobronchial epithelial cells used within an engineered 3D human airway mucosa tissue model display tumour-specific characteristic. Furthermore, we could observe cellular differentiation in 3D mucosa scaffolds and monitor condition of blood products such as erythrocyte and thrombocyte concentrates. Here, we could show that both erythrocytes and thrombocytes have their own Raman profile. In addition, change of Raman spectra with time was consistent with routine quality control studies of decrease in platelet activation capacity as well as with the correlation in metabolic consumption. The identified Raman parameters could become a quality feature for tissue models, but also for blood products with regard to aging and functionality. First results also give hint that RTM can identify bacterial contamination within erythrocyte concentrates.

Increasingly there is a need to test functionality, integrity and sterility of cell-based products during manufacture and of the final product prior to transplantation. As Raman trapping microscopy works label-free and requires less than 500 cells for analysis it has the potential to become a standard for fast, efficient and highly reliable quality control of any advanced therapy medicinal product.

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New class of biodegradable polymeric implants for bone regeneration

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The explantation surgery of an implanted prosthesis often causes clinical complications and the patient suffers from the countless post-surgical symptoms such as infection and the lack of mobility. This issue has been clinically addressed using biodegradable polymers such as poly (lactic acid) with favourable physical and biological properties. However, the acidic degradation of these polymers causes delays in the tissue regeneration process and necrosis. We attempted to address this issue by developing new classes of biomaterials. For example, we introduce a biodegradable material based on poly (propylene carbonate) (PPC) and starch with benign degradation by-products that is only water and carbon dioxide. This polymer has superior characteristics compared with other polyesters. The results of *in vitro* and *in vivo* studies endorsed the biocompatibility of this polymer blends. In addition, we observed *in vivo* osseo integration effects of this implant in a rat hemiarthroplasty model. Therefore, this product is superior for orthopaedic fixation implantation. In yet another study, we synthesized a thermo-responsive hydrogel with the capacity to chemically bond with primary amine groups of proteins. This hydrogel has favourable gelation time that can be used as an injectable material for delivery of active compounds. The results of *in vitro* and *in vivo* studies show that this hydrogel is biocompatible with tenable mechanical properties and adhesiveness that make them suitable for broad tissue range of musculoskeletal repair. Our recent clinical study demonstrates that this hydrogel can be used successfully for socket preservation. We have also developed new class of elastic hydrogels with superior properties that can be used for 3D printing.

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3D bioprinting of organ-on-a-chip

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Zhejiang University,China

Organ-on-a-chip is a technology to building organ prototype on the microfluidics, which can be widely used in drug screening and understanding disease. Here, we reported some progress of our group about the fabrication of organ-on-a-chip with 3D bioprinting. We developed some new 3D printing methods which can directly print 3D PDMS-based biofluidics, hydrogel-based biofluidics. Also our group offered a novel bioprinting method, in which scaffold and built-in microchannels in the cell-laden hydrogel 3D structures can be concurrently fabricated. With these methods we successfully fabricated heart chips and vascular chips.

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Role of point of care pharmacist in patient receiving oral chemotherapeutic agents

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American Hospital Dubai, UAE

Background: Oral chemotherapeutic agents have been conceptualized as a convenient, less toxic form of therapy that is preferred by the patients. However, many safety issues related to chemotherapeutic agents are appreciated. Safety issues which include lack of check and balance to avoid medication errors, drug interactions, side effects, administration issues, lack of patient adherence and shift of responsibility for managing a potential complicated oral regimen from oncologists, nurses and pharmacists to the patient and caregivers. As a result of these factors oncology pharmacist can be utilized as point of care pharmacist (PCP) and can be consulted to identify drug related problems (DRPs) and to provide patient counseling.

Objectives: To evaluate the 1) role of point of care pharmacist (PCP) service provided to the patients receiving oral chemotherapeutic agents 2) Number of DRPs identified by the PCP and 3) Type of recommendations made for management of DRPs.

Study design: This is prospective observational study. PCP can help the patient with everything to get the oral chemotherapy to start and provides the cost estimate for insurance, corporate and self-payers. PCP can help in designing standard order forms for oral chemotherapeutic agents which includes all the information including diagnosis, cycle number and body surface area and dosing calculations. PCP met with patient receiving oral chemotherapeutic agents and takes the patient medication history (PMH), check for drug-drug, drug-food interactions and provides patient counseling and patient education materials. Complete pre and post counseling questionnaire to capture the understanding of their oral chemotherapeutic agents.

Methodology: PCP Receives Protocol → Provide Cost Estimate → Medication Procurement → PCP Receives Consult → Pre–Counselling Questionnaire → PCP Completes PMH, Interaction Checking, Counselling & Providing Patient Education Materials → Post Counselling Questionnaire→ Recommendations

Intended outcomes: The intended outcomes are as follows: Peace of mind for physicians, nurses and patients by expert support from point of care pharmacist, standard order forms for oral chemotherapy in order to keep the cycle track, reducing medication errors by multiple checking of order forms from oncologists, PCP and nurses, helps in resolving tough administration issues e.g. IV to oral switching, can be crushed or not, can be given through nasogastric tubes, extemporaneous compounding options etc., identifies drug interactions, communicate to oncologists and document the recommendations, reduction in DRPs and to improve understanding of oral chemotherapy by the patients.

Conclusion: The study will suggest that the consult service of PCP for oral chemotherapeutic agent is beneficial and should be continued.

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Free floating brain sections: An advanced and accurate tool for pre-clinical efficacy histological evaluation

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"Free floating sections" is regarded as a novel histological method that can be used for immune fluorescence staining. This method is clearly the most qualitative tool for optimal Ab expression in the tissue. The usage of the method is changing the position of histology in pre-clinical trials from a mostly safety contex, to a potent tool for the efficacy studies. This is the result of a high quality of the immunohistochemistry cross sections and the accuracy of morphometric quantification tools that are often combined with this advanced method. This presentation covers the technical work pattern of the method starting with the tissue preparation and conservation, threw brain accurate dissection and staining. The method is very suitable for morphometry quantification of histological data, here method of image analysis will be presented and the scientific value will be discussed. Furthermore, examples are presented of projects that had combined the method such as ALS, stroke and Parkinson models in lab animals. Finally a discussion will be presented were the advantages of the current method will be pointed compared to the classical immunohistochemistry methods.

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In-vitro pancreatic cancer cell imaging by indocyanine green based polymeric nanoprobes

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Indocyanine green (ICG) provides an advantage in the imaging of deep tumors as it can reach deeper location without being absorbed in the upper layers of biological tissues in the wavelengths, which named 'therapeutic window' in the tissue engineering. Unfortunately, rapid elimination and short-term stability in aqueous media limited its use as a fluorescence probe for the early detection of cancerous tissue. In this study, stabilization of ICG was performed by encapsulating it into the biodegradable polymer composited with poly (L-lactic acid) and poly(e-caprolactone) via a simple one-step multiaxial electrospinning. Confocal microscopy was used to image the encapsulated ICG within electro spun nanofibers and ICG uptake by MIA PaCa-2 pancreatic cancer cells. The stability of encapsulated ICG is demonstrated by the in vitro release profile up to 21 days. These results suggest the potential of the ability of internalization and accommodation of encapsulated ICG into the pancreatic cell cytoplasm

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Small periodontal involvement make big difference

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Lasers have been used in many different fields in medicine and dentistry since their introduction in the 1960s. Lasers have demonstrated bactericidal effects which are promising for periodontal therapy, for this reason, laser therapy used as an adjunct to conventional therapy, has been proposed as a novel treatment option in controlling the subgingival microorganisms and studying the shift in inflammatory mediators. This study investigated cytokine profiles in response to diode laser irradiation of chronic periodontal pockets to show an inflammatory response to *P. ginvivalis* infection. The purpose of the study was to reveal the activation profiles of inflammatory cytokines in response to diode laser.

Material and methods: This study was carried out as randomized controlled clinical trial; split mouth design. Twenty patients having generalized chronic periodontitis with moderate clinical attachment loss, were treated randomly using conventional treatment alone or with application of diode laser on the other side. Blood panel and collection of GCF were taken before starting the treatment for each patient and 2, 6 months for follow up in order to compare the effect of diode laser as an adjunctive therapy to scaling and root planning. All data was collected for statistical analysis.

Results: In this study, significant differences were found on the three gingival crevicular fluid (GCF) cytokine levels tested before and after periodontal therapy. C-reactive protein (CRP) and tumor necrosis factor (TNF) alpha were the only cytokines that decreased immediately after treatment and remained at significantly lower levels until the end of the study period.

At two weeks following treatment of either scaling and root planning alone or in conjunction of laser disinfection gingival index (GI) level in the test site ranged between 0.1 to 0.5 whereas in the control site it was 0.5 to 1.25. As for the inflammatory mediators IL-1β ranged between 20.12 to 24.48 in comparison to 21.22 to 26.78 in control site. TNF alpha ranged from (1.01-3.7) in comparison with (1.21 - 1.89) and CRP level was (0.39-0.67) in comparison with (0.23-67).

In all parameters the test sites showed better decrease in the inflammatory mediators and clinical parameters.

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In vitro differentiation of mesenchymal stem cells from human umbilical cord Wharton's jelly into functioning hepatocytes

Mervat Dawood
Mansoura University, Egypt

Back ground: The human umbilical cord (UC) is non-invasive, primitive and abundant sources of mesenchymal stromal cells (MSCs) that have increasingly. Liver disease is a major cause of mortality and morbidity in Egypt. There are many inflammatory liver conditions for which treatments are not effective and often such patients will progress to end-stage liver disease and require liver transplantation. To prevent progression to end-stage liver disease, mesenchymal stromal cell (MSC) therapies have been considered and shown to have potential in such liver diseases.

Objectives: The aim of our study was to investigate the *in vitro* differentiation of human umbilical cord Wharton's jelly (HU-MSC) into hepatocyte lineage.

Materials & methods: Human umbilical cord Wharton's jelly (WJ) were separated by mixed explant & enzymatic method by use of trypsin. The time required for the primary culture range from 10-14 days. The isolated cells were characterized for expression of MSC-specific markers such as CD73, CD90 and CD105 & CD45. Also cells were counted by automated cell counter for stem cells (showing count, viability, cluster cells). After passage 4, the isolated cells induced to differentiate into hepatocyte-like cells by incubation in basal media with cocktail hepatocyte growth factors for 20 days.

Results: *In vitro* functional characterization of hepatocyte detectable by PAS staining for glycogen and immunofluorescent staining for albumin by anti-human albumin with FITC stain.

Conclusion: HU-MSC can differentiate into functional hepatocyte like cells & serve as a cell source for tissue engineering and cell therapy for hepatic tissues.

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Ex vivo generation of germ cells from marrow derived mesenchymal stem cells in rat

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Germ cells must develop along distinct male or female paths to produce the spermatozoa or oocyte required for sexual reproduction. Mesenchymal stem cells (MSCs) have the capacity to transdifferentiate into multilineage cells, such as muscle of mesoderm, lung and liver of endoderm, and brain and skin of ectoderm origin. Here we show that the bone marrow derived stromal cells can transdifferentiate to germ cell-like cells suggesting that bone marrow can be a potential source of germ cells that could sustain sperm/oocyte production. The bone marrow derived cells were characterized using MSC specific markers (CD73, CD90 and CD105) by molecular, immunocytochemistry and FACS analysis and termed them rBM-MSC. These rBM-MSCs were subjected to insitu differentiation into germ cells (GCs) with the help of retinoic acid. Briefly, the semi confluent cells were treated with low glucose DMEM medium with FBS and supplemented with 10-6 M RA for a period of 21 days. At the end of the treatment, the existence of germ-like cells in the cultures were confirmed by assessments of changes in cell morphology, expressions of GC-specific marker genes i.e. Stella and Fregilis by RTPCR, FACS and immunocytochemistry. Further, the differentiated cells also expressed the known molecular markers of spermatogonial stem cells viz c-kit, Stra8, dazl, Daz, Tex18 and Tp2. The study revealed that the mesenchymal stem cells derived from bone marrow have the potentiality to differentiate into germ cells and opens the possibilities for use of these cells in reproductive medicine.

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Role of aminoacyl-tRNA synthetases (AARS) gene in epileptic encephalopathy, early infantile, 29 in Pakistani population

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Epilepsy is one of the most common neurological disorders and is more common in developing countries as compared to developed one. Epilepsy has a various type of phenotype depends upon the pathways involved in the signaling process. Epilepsy is a group of neurological disorders characterized by recurrent epileptic seizures. Genetics is believed to be involved in the majority of cases. During the last decade, many genes and mutations associated with epilepsies have been identified. To find out the genuine cause of the epilepsy in Pakistani idiopathic epilepsy patients was the major factor behind this project. Five patients suffering from early infantile were selected on the basis of the clinical findings. Although it is understood that SCN1A gene is the most causative factor for genetic epilepsies and majority of the cases of early infantile are found to be responsible by SCN1A gene. In current study Central Punjab from Pakistan was selected for the identification of epilepsy patients to conduct molecular study for now and future. Epilepsy questionnaire (from NINDS) was used which is the short form of the questionnaire. Whole Exome sequencing was the key technique to find out the molecular alterations. Aminoacyl-tRNA synthetases are indispensable enzymes in protein production because they allege tRNAs with their cognate amino acids. In this study we found that epileptic encephalopathy, early infantile, 29 is caused by the mutation in AARS gene.

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