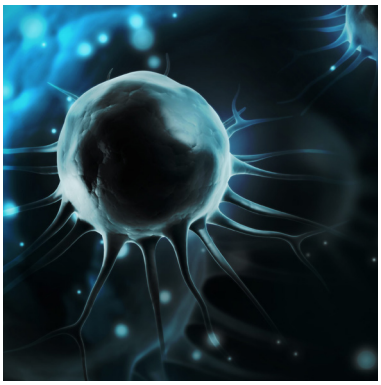
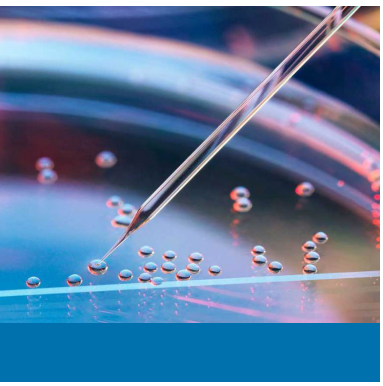
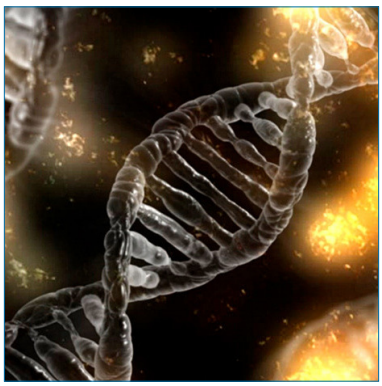
Workshop

Molecular Biology, Tissue Science & Heart Congress 2018







Joint Event

International Conference on

Molecular Biology, Tissue Science and Regenerative Medicine

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4th World Heart Congress

November 19-20, 2018 | Paris, France

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Ki-Chul Hwang

Catholic Kwandong University, South Korea

Modification of mesenchymal stem cells for clinical application

Under proper stimulation, mesenchymal stem cells (MSCs) can be induced to differentiate into myocytes, adipocytes, osteoblasts, chondrocytes, tenocytes and hematopoietic-supporting stroma . With recent reports that MSCs derived from bone marrow can differentiate into cardiac muscle *in vitro* and *in vivo*, MSCs autologous transplantation is a promising, new therapeutic modality for the repair of myocardial infarctions and prevention of post-infarct congestive heart failure. However, in experimental models, poor viability of the transplanted cells is a major limiting factor of cell therapy. The survival rate of transplanted cells into an uninjured mouse heart was very low, 4 days post transplantation. This may require pro-survival strategies to improve stem cell survival/number in the infarcted heart. Although pro-survival strategies have been proven to be successful in vitro, they actually may not solve the problems of poor adhesion of MSCs. However, the major obstacle in the clinical application of MSC-based therapy is the poor viability of the transplanted cells due to harsh microenvironments like ischemia, inflammation and/or anoikis in the infarcted myocardium. Mesenchymal stem cells (MSCs) are multipotent, self-renewing cells harboring multi-lineage differentiation potential and immunosuppressive properties that make them an attractive candidate for biological cell-based regenerative medicine. In addition to its undoubted clinical interest, controlling the fate and behaviors of MSCs is a crucial prerequisite for their therapeutic applications in regenerative medicine. Stem cell differentiation and modulation of functional activities are generally controlled by “cocktails” of growth factors, signaling molecules and/or genetic manipulations.

Speaker Biography

Ki-Chul Hwang is vice-president and Professor of College of Medicine, Catholic Kwandong University and Director, Institute for Bio-Medical Convergence, International St. Mary’s Hospital of Korea. He received his doctor of philosophy degree from the Korea University in Republic of Korea and completed his Postdoctoral Fellowship at the Cleveland Clinic Foundation, Cleveland, OH, USA and the Victor Chang Cardiac Research, NSW University, Sydney, Australia. He has consecutively filled (Senior) Editorial Board at the World Journal of Stem Cells, American Journal of Stem Cells and Journal of Geriatric Cardiology. Much of his research career has focused on the adult stem cells and he is recognized to be at the forefront of the emerging field about functional enhancement in stem cells and its therapeutic role associated with many diseases.

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Alain Chapel, Molecular Biology & Heart Congress 2018, Volume 29
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Alain Chapel

Institute of Radiological Protection and Nuclear Safety, France

Cell therapy the allograft to universal transplant and how to transform a concept in a clinical trial also application in the treatment of the side effects of radiotherapy

Cell therapy was demonstrated of main importance in the management of normal tissue radiation damage. Preclinical and clinical trial data suggest that mesenchymal stem cells (MSCs) are a practical and safe source of cells for stem cell-based therapies of severe tissue damage consecutive to radiation overexposure. MSCs were shown to migrate to damaged tissues supporting wound healing through a "cell drug" mode of action restoring skin and gut functions after irradiation. However, technical limits associated with large-scale ex vivo expansion indicate that alternative source is required to obtain sufficient cell numbers of the appropriate lineage to treat patients with severe disease.

Based on this pluripotency and unlimited expansion potential, induced pluripotent stem cells (iPSCs) are considered a promising resource for regenerative medicine. Like naturally occurring stem cells, these artificially induced cells can self-renew and develop into almost any cell in the body (pluripotency). Clinical iPSC banks of selected universal donors should allow their use for large scale allogeneic grafts.

Our consortium describes a GMP-grade system to produce hiPSCs, a cell population capable of reconstituting human hematopoiesis. We demonstrate that i) hiPSC-derived hematopoietic stem cells (HSCs) from healthy donor are capable of reconstituting a functional human hematopoiesis in a radio-induced aplasia preclinical model, ii) hiPSC-derived HSCs from aplastic anemia patients or acute leukemia affected patients retain this ability.

Our study prepares a new approach of autologous graft (from the cells of the patient) of cells for healthy tissue damage after radiation exposure. It could potentially pave the way to the constitution of universal banks of stem cells, which would radically increase the capacity of support and treatment of tissue exposed to high doses of ionizing radiation and in the management of chronic late radiotherapy side effects.

Speaker Biography

Alain Chapel has been developing gene and cell therapy using non-human primates, immune-tolerant mice and rats to protect against the side effects of radiation. He collaborates with clinicians to develop strategies for treatment of patients after radiotherapy overexposures. He has participated in the first establishment of proof of concept of the therapeutic efficacy of Mesenchymal stem cells (MSCs) for the treatment of hematopoietic deficit, radiodermatitis and over dosages of radiotherapy. He has contributed to the first reported correction of deficient hematopoiesis in patients (graft failure and aplastic anemia) thanks to intravenous injection of MSCs restoring the bone marrow microenvironment, mandatory to sustain hematopoiesis after total body irradiation. He is scientific investigator of clinical phase II trial evaluating the efficacy of systemic MSC injections for the treatment of severe and chronic radiotherapy-induced abdomino-pelvic complications refractory to standard therapy.

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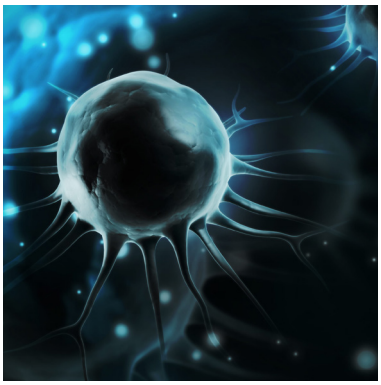
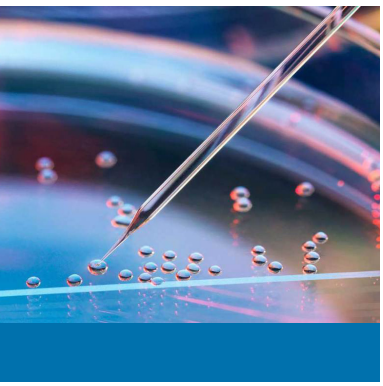
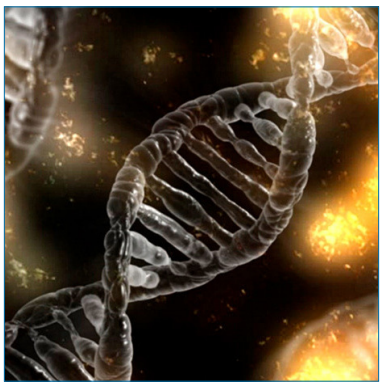
Scientific Tracks & Sessions
November 19, 2018

Molecular Biology, Tissue Science & Heart Congress 2018







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Laparoscopic sleeve gastrectomy in a patient with severe ischemic heart failure requiring a left ventricular assist device as a bridge to cardiac transplantation

Jeffrey E Friedman
University of Florida, USA

Background: Obesity is associated with heart failure due to structural and functional changes within the heart. Obesity increases metabolic demand, total blood volume and stroke volume. This causes left ventricular dilatation, cardiac hypertrophy and atrial enlargement. Definitive treatment for severe heart failure is cardiac transplantation. Transplantation is not an option for patients with a BMI over 35 kg/m^2. We describe our method of laparoscopic sleeve gastrectomy in patients with heart failure requiring a left ventricular assist device as a means for weight loss in order to bridge the patient to cardiac transplantation.

Methods: A 63 year old male with morbid obesity (BMI 40 kg/m^2) and multiple co-morbidities including chronic congestive heart failure with an ejection fraction of 20% requiring left ventricular device support was referred to the bariatric service for laparoscopic sleeve gastrectomy as a method of weight loss in order to become eligible for cardiac transplantation listing. After completing the bariatric work-up, the patient was pre-admitted to the heart failure service and prepared for surgery. Laparoscopic sleeve gastrectomy was performed in a standard fashion over a 36 French bougie.

Results: Post-operatively the patient recovered in the heart failure unit, was immediately started on the bariatric protocol, a heparin drip restarted 6 hours post-operatively and was discharged home when his INR was therapeutic without complication

Conclusion: Sleeve gastrectomy can be safely utilized in patients with end-stage heart failure and morbid obesity in order to achieve weight loss to become eligible for transplant listing.

Speaker Biography

Jeffrey E Friedman, is as an assistant professor in the division of general surgery and a director of bariatric surgery. Friedman earned his medical degree from the University of Mississippi and completed his residency in general surgery at Carraway Methodist Medical Center in Birmingham, Alabama and Mary Imogene Bassett Healthcare in Cooperstown, New York. He served as a research fellow at the Mary Imogene Bassett Research Institute and as a minimally invasive surgery/bariatric surgery fellow at Sacred Heart Health System in Pensacola, Florida. Friedman has previously worked as assistant medical director of the Sacred Heart Institute for Medical Weight Loss, as medical director of the Baptist Healthcare Bariatric Program in Pensacola and as chief of the minimally invasive surgery/bariatric program at Previty Clinic for Surgical Care in Beaumont, Texas. He has twice received the American Medical Association's Physician's Recognition Award and is a member of the American College of Surgeons, the Society of American Gastrointestinal and Endoscopic Surgeons, the Pensacola Surgical Society and the American Society of Metabolic and Bariatric Surgeons.

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4th World Heart Congress

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Structural and functional insights into cholesterol regulation of k+ channels in vasculature and heart

Irena Levitan
University of Illinois at Chicago, USA

Our research focuses on the mechanisms that underlie cholesterol regulation of ion channels with particular focus on inwardly rectifying K+ channels (Kir), which is responsible for regulating membrane potential and excitability in a variety of cells types including cardiomyocytes, smooth muscle cells and endothelial cells. We have found that an increase in membrane cholesterol paradoxically has opposite effects on two types of Kir channels expressed in cardiomyocytes, it simultaneously suppressed the activity of Kir2.1 channels responsible for the basal Kir activity and enhances the activity of cardiac KACh channels which plays a key role in the control of the heart rate. We propose that the loss of basal Kir activity together with enhanced activity of KACh should result in destabilization of the heart rate control and development of arrhythmias. In terms of the molecular mechanisms of cholesterol-induced regulation of the channels, we discovered that the channels interact with an ensemble of cholesterol molecules and identified novel cholesterol binding sites that are specific for open and closed states of the channels. We also show that increase in membrane cholesterol *in vitro* and in vivo suppresses flow sensitivity of Kir2.1 channels, a hallmark of they function in vascular endothelium.

Speaker Biography

Irena Levitan, is a professor of Medicine and adjunct professor of Bioengineering at the University of Illinois at Chicago. Her current research focuses on cholesterol regulation of ion channels and cellular biomechanics. Levitan's group provided the first comprehensive structural insights into cholesterol regulation of K+ channels and the cross-talk between cholesterol and other regulators of these channels. She was named a Guyton distinguished lecturer by the Association of chairs of Departments of Physiology for her quantitative and biophysical work on cholesterol modulation of ion channels and how this can affect integrated organ function. She is an author of more than 70 publications and a leading editor of Cholesterol regulation of Ion Channels and Receptors (Wiley, 2012) and Vascular Ion Channels (Springer, 2016).

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4th World Heart Congress

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Potentiation of the anticancer activity of methylglyoxal by creatine supplementation

Manju Ray[1,2], **Anirban Roy**[1] and **Aparajita Pal**[1]

[1]Bose Institute, India

[2]Institute of Applied Science & Humanities GLA University, India

The creatine kinase (CK) system plays a key role in cellular energy buffering and transport. Our group demonstrated the progressive decrease of phosphocreatine, creatine and CK upon transformation of skeletal muscle into sarcoma. It was convincingly revealed that prominent expression of creatine-synthesizing enzymes L-arginine: Glycine amidinotransferase and N-guanidinoacetatemethyltransferase occurs in sarcoma, ehrlich ascites carcinoma and sarcoma 180 cells; Whereas, both these enzymes were virtually undetectable in skeletal muscle. Simultaneously, our group has been investigating the anticancer activity of the glycolytic intermediate, methylglyoxal. We observed that the tumor inhibitory effect of methylglyoxal was significantly augmented in presence of creatine. Moreover, creatine and CK, which were very low in sarcoma tissue, were significantly elevated with the concomitant regression of tumor. In recent research we verified that the potentiation of the anticancer activity of methylglyoxal by creatine extends to breast carcinoma model as well and formulated a creatine supplemented methylglyoxal based anticancer formulation. Our recent focus has shifted in combating the drug resistant cancer stem cells, which is a major limitation of present day cancer therapy. Unpublished data from our laboratory has revealed the preferential anti-stem cancer cell activity of methylglyoxal in breast carcinoma model. Methylglyoxal at metronomic concentrations targets and reduces the population of CD44hi/CD24lo breast cancer stem cells. As future research, we aim to evaluate the potential of creatine supplementation in intensifying the potency of methylglyoxal to suppress stemness in cancer cells.

Speaker Biography

Manju Ray is an Indian scientist in Molecular Enzymology and Cancer Biochemistry. She has done notable work in the development of anticancer drug and understanding of differentiation process of cells. Her interests cover tumor biochemistry and molecular enzymology. Ray graduated from the Calcutta University with degrees in M.Sc. in Physiology in 1969 and PhD in Biochemistry in 1975. She started her career in the Department of Pharmacy, Jadavpur University and then shifted to Department of Biological Chemistry, Indian Association of Cultivation of Science, India and became a professor. She is now a Hon. Visiting Scientist at Bose Institute, India and also Distinguished Professor, GLA University Mathura. Her research has, over a long span of her career in the department of biochemistry at the Indian Association for the Cultivation of Science (IACS), Jadavpur, in association with a team of scientists and doctors that has led to positive development of a drug for cancer treatment. She is a Shanti Swarup Bhatnagar awardee (Highest honor in science in India).

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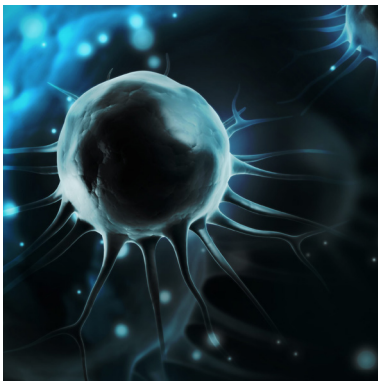
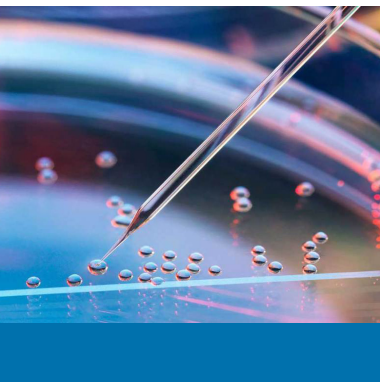
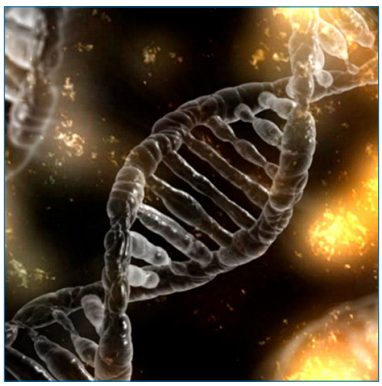
Young Researcher Forum

Molecular Biology, Tissue Science & Heart Congress 2018







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N Phogat, Molecular Biology & Heart Congress 2018, Volume 29
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AptaKan: An R package for the analysis of the data of fluorescent bioassays

N Phogat
Hochschule Furtwangen University, Germany

AptaKan is a contributed package to the statistical software R and has a in-built Shiny app based Graphical User Interface (GUI). It can be used to analyse data of gold nanoparticles and ampicillin aptamer-based assays. The package is useful for: 1. Analysis of the data based on different statistical models; 2. Diagnostic plots of statistical models; 3. Computing the concentration from fluorescent data with the help of different statistical models; 4. Simulation of dissociation constant (Kd) based on sigmoidal and non-sigmoidal models; 5. Analysing the positivity (significance) of the assay statistically. Moreover, a report of results can be downloaded dynamically using the GUI, generated by applying R packages knitr and rmarkdown. Finally, our package provides a template on handling R's S4 classes in Shiny. The package can also be implemented on other experimental data too, by arranging the data in specific template.

Speaker Biography

Navneet 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. He has done Master's in Biomedical Engineering from Furtwangen University, Germany. Currently, he is pursuing his PhD from Tubingen University, Tubingen, Germany. His research interests are in image processing, machine learning, data science and artificial intelligence.

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