Keynote Forum
November 06, 2017

Nanomedicine 2017

Global Meet on

Nanomedicine & Healthcare

November 06-07, 2017 | New Orleans, USA

allied academies

Global Meet on

Nanomedicine & Healthcare

November 06-07, 2017 | New Orleans, USA

Orlando Auciello

University of Texas-Dallas, USA

Science and technology of multifunctional ultrananocrystalline diamond (UNCDTM) coatings and applications to a new generation of implantable medical devices

New paradigms in the research and development of nanocarbon thin films are providing the bases for new physics, new materials science and chemistry, and their impact in a new generation of multifunctional biomedical devices. This talk will focus on discussing the science and technology of the new paradigm material named ultrananocrystalline diamond (UNCDTM) in thin film form and integration into a new generation of medical devices and implants as described below: UNCD films co-developed and patented by O. Auciello and colleagues are synthesized by novel microwave plasma chemical vapor deposition and hot filament chemical vapor deposition techniques using an Ar-rich/CH_4 chemistry that produces films with 2-5nm grains. The fundamental science underlying the synthesis and properties of the UNCD films and applications to devices will be discussed. The UNCD films exhibit the lowest friction coefficient (0.02-0.04) compared with metals (≥0.5) currently used in many prostheses (e.g., hips, knees), electrically conductive UNCD coatings with nitrogen in grain boundaries can enable a new generation of neural electrodes, UNCD coatings are extremely biocompatible. Original biomedical implants (OBI-USA) and OBI-México, founded by Auciello and colleagues, are developing new generations of implantable medical devices based on the biocompatible UNCD coatings, namely: UNCD-coated silicon based microchip implantable inside the eye as a key component of the artificial retina to return partial vision blind by genetically-induced degeneration of photoreceptors; new generation of Li-ion batteries with ≥10x longer life and safer, using UNCD-based electrodes, membranes and inner wall battery case, enable next generation of defibrillator/pacemakers; new generation of implantable prostheses (e.g., dental implants, hips, knees) coated with UNCD eliminates failure of current metal-based implants due to synergistic mechanical wear/chemical corrosion by body fluids and UNCD-coated polymer with brain neurons tailored stiffness enables next generation less invasive electrodes for neural stimulation.

Speaker Biography

Orlando Auciello has graduated with MS (1973) and PhD (1976) degrees in Physics from the Physics Institute Dr. Balseiro (Universidad Nacional de Cuyo-Argentina) EE-University of Córdoba-Argentina (1970). He was a Researcher in the University of Toronto-Canada (1979-1984), Associate Professor-NCSU-USA (1985-1988), Distinguished Scientist-MCNC-USA (1988-1996) and a Distinguished Argonne Fellow (1996-2012)-Argonne National Laboratory-USA. Currently, he is the distinguished Chair in University of Texas-Dallas. He is directing basic and applied research programs on multifunctional oxide and novel ultrananocrystalline diamond (UNCD) thin films and application to industrial, high-tech, and medical devices. The UNCD film technology is commercialized for industrial products by Advanced Diamond Technologies, founded by him and his colleagues, (2003, profitable in 2014), and by original biomedical implants (OBI-USA, 2013) and OBI-México (2016) for medical devices. He has Edited 20 books and published about 500 articles in several fields, holds 20 patents. He is an Associate Editor of APL and Integrated Ferroelectrics, he was President of the Materials Research Society (2013) and the Fellow of AAAS and MRS.

e: orlando.auciello@utdallas.edu

Notes:

Chien Ho

Carnegie Mellon University, USA

A new approach to deliver anti-cancer nanodrugs and to reduce toxicity by temporarily blunting the reticuloendothelial system

Nanodrugs, like nanoparticles, are known to be taken up by the cells of the reticuloendothelial system (RES), resulting in a great majority of these particles/drugs not being delivered to the target sites, namely tumors. Consequently, these drugs can cause serious toxic side effects in liver, spleen, and kidney. Various attempts (including the "stealth" strategy) have been made to alleviate these side effects, but none has been fully successful. These toxic effects have presented a serious challenge to making use of these nanodrugs for treatment of diseases. Our approach is to temporarily blunt the RES by a prior administration of an FDA approved nutrition supplement, Intralipid®, before dosing rats with a nanodrug. We have applied four anti-cancer nanodrugs, namely an in-development platinum (Pt)-containing anti-cancer nanodrug, and three FDA approved anti-cancer nanodrugs, Abraxane®, Onivyde®, and Marqibo®, to test our methodology. In this talk, we will give a summary of recent results. We have observed different toxicities for these four nanodrugs and have found that Intralipid® can reduce their toxic side effects in the RES and kidney of rats to different levels. Intralipid® methodology could be a valuable complement to the current techniques, e.g., stealth strategies, to reduce RES uptake and toxicity. Our approach is a general one applicable to any approved and in-development nanodrugs without any modification of the nanoparticles, thus facilitating their translation to clinical settings.

Speaker Biography

Dr. Ho received his BA degree in Chemistry from Williams College and his PhD degree in Physical Chemistry from Yale University. From 1961-64, he took his postdoctoral training in the Departments of Chemistry and of Biology at Massachusetts Institute of Technology. He is Alumni Professor of Biological Sciences at Carnegie Mellon University. His research goal is to understand the relationships between structure and function in biological systems by correlating information obtained from biochemical, biophysical, and molecular biological techniques. He has two major research projects, one on the structure-function relationship in hemoglobin and the other on imaging immune responses *in vivo* by MRI using animal models. He has co-authored over 300 scientific papers. He has received a number of awards and honors including the election to Academician of Academia Sinica, Fellow of the International Society of Magnetic Society (ISMAR), the International Society of Magnetic Resonance in Medicine (ISMRM), and the American Association for the Advancement of Science (AAAS). He is a recipient of a John Simon Guggenheim Fellowship, a MERIT Award of the National Heart, Lung, and Blood Institute, and a Gold Medal of ISMRM for his contribution to the development of *in-vivo* cell tracking methodology by MRI.

e: chienho@andrew.cmu.edu

Notes:

Shaker A Mousa

Albany College of Pharmacy and Health Science, USA

Impact of nanobiotechnology on the future of medicine (nanomedicine): The road toward precision medicine

One of the major advantages of nanobiotechnology is its unique multifunctional characteristics. Targeted delivery of drug incorporated nanoparticles, through conjugation of tumor-specific cell surface markers, such as tumor-specific antibodies or ligands, which can enhance the efficacy of the anticancer drug and reduce the side effects and enable personalization for precision medicines. Additionally, multifunctional characteristics of the nano-carrier system would allow for simultaneous imaging, targeted drug delivery and monitoring (Theranostics). A summary of recent progress in nanotechnology as it relates specifically to nanoparticles and anticancer drug delivery will be reviewed. Nano nutraceuticals using combination of various natural products provide a great potential in diseases prevention. Additionally, various nanomedicine approaches for the detection and treatment of various types of organ specific delivery, vascular targeting, and vaccine will be briefly discussed. Highlight the role of nanobiotechnology and other enabling technologies in the followings: Nano synthesis and assembly of various platforms for targeted delivery, nanobiotechnology in improving efficacy and safety and enabling precision treatment and personalization.

Speaker Biography

Shaker A Mousa is currently an endowed tenure Professor and Executive Vice President and Chairman of the Pharmaceutical Research Institute and Vice Provost for Research at ACPHS. Prior to his academic career, he has held a Senior Scientist and Fellow at The DuPont Pharmaceutical Company for 17 years, where he contributed to the discovery and development of several FDA approved and globally marketed diagnostics and therapeutics. He holds over 350 US and International Patents discovering novel anti-angiogenesis strategies, antithrombotic, anti-integrin, anti-cancer, and non-invasive diagnostic imaging approaches employing various nanotechnology platforms. He has published more than 1,000 journal articles, book chapters, patents, and books as Editor and author. He is a Member of several NIH study sections, Editor-In-Chief, and on the Editorial Board of several high impact journals. His research has focused on diagnostics and therapeutics of angiogenesis-related disorders, thrombosis, vascular and cardiovascular diseases.

e: shaker.mousa@acphs.edu

Esmaiel Jabbari

University of South Carolina, USA

Nanomaterials in regenerative medicine and cancer therapy

Nanomedicine is poised to shape the sustainability of industries and wealth of nations, and transform economies and societies on a global scale. The global market for nanomedicine was $250 billion in 2014 and it is expected to reach $550 billion by 2020. Nanotechnology is the solution to detection, diagnosis, and treatment of many diseases as biological processes and cellular mechanisms work at the nanoscale. Translation of nanoscale discoveries from the laboratory to the market promises new diagnostic tools, drug targeting systems, gene therapy platforms, biomaterials, regenerative tissue constructs, and personalized medicine. A major application of nanotechnology in medicine is in cancer therapy. A major contributing factor to mortality in cancer patients is relapse after therapy and developing resistance. Cancer recurrence and resistance is related to the existence of a very small population of initiating stem cells in the tumor tissue. I will present strategies based on nanomaterials to selectively target chemotherapeutic agents to the stem cell sub-population of cells in the tumor tissue. Another important application of nanomedicine is in regeneration of skeletal tissues. In the process of bone formation, osteogenesis and vascularization are coupled by spatiotemporal regulation of paracrine signaling in which the invading vascular endothelial cells secrete osteogenic morphogens to stimulate cell differentiation and bone formation. The stratified structure of articular cartilage is rooted in the spatiotemporal gradients of morphogens that direct the formation of morphologically distinct cartilage zones. I will present nanoparticle-based strategies for spatiotemporal release of morphogens for coupling osteogenesis and vascularization and to stimulate the formation of zonal architecture of articular cartilage.

Speaker Biography

Dr. Jabbari is a Tenured Full Professor of Chemical and Biomedical Engineering and the Director of Biomaterials, Tissue Engineering and Drug Delivery at the University of South Carolina. He earned his Ph.D. from Purdue University in Chemical Engineering. He began his independent career as an Assistant Professor in the Departments of Biomedical Engineering and Orthopedic Research at Mayo Clinic upon completion of his post-doctoral training at Monsanto and Rice University. Jabbari's research is focused on engineering 3D multi-cellular co-culture systems and the effect of spatiotemporal delivery of growth factors and physico-mechanical factors in the microenvironment on function and fate of stem cells for applications in skeletal tissue regeneration and cancer stem cell therapy. He received the Berton Rahn Award from the AO Foundation in 2012 and the Stephen Milam Award from the Oral and Maxillofacial Surgery Foundation in 2008. He was elected to the College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE) in 2013. He has published >250 books, book chapters, refereed journal articles (107 peer-reviewed), and conference proceedings, and presented >260 seminars at national and international conferences (67 plenary, keynote, and invited seminars). He currently serves as the Technical Chair as well as the Programming Chair for Bionanotechnology theme of the annual conference of Engineering in Medicine & Biology Society (IEE-EMBS). He serves as the Academic Editor for PLOS ONE, Editor of International Journal of Biomaterials, and North America Editor of Journal of Biomaterials and Tissue Engineering. Dr. Jabbari has mentored >130 visiting scholars, medical residents, post-doctoral scientists, and engineering students. He is a member of numerous scientific organizations including AIChE, BMES, ACS, EMBS, SFB, TERMIS, MRS, ACS, and AACR.

e: jabbari@cec.sc.edu

Notes:

Keynote Forum
November 07, 2017

Nanomedicine 2017

Global Meet on

Nanomedicine & Healthcare

November 06-07, 2017 | New Orleans, USA

Shaker A Mousa

Albany College of Pharmacy and Health Science, USA

Advanced drug delivery: Nano-targeted delivery for therapeutic and imaging

Targeted delivery of drug incorporated nanoparticles, through conjugation of tumor-specific cell surface markers, such as tumor-specific antibodies or ligands can not only enhance the efficacy of the anticancer drug but also reduce the unwanted toxicity of the drug. Additionally, multifunctional characteristics of the nano-carrier system would allow for simultaneous imaging of tumor mass, targeted drug delivery and monitoring. A summary of recent progress in nanotechnology, as it relates specifically to nanoparticles and anticancer drug delivery will be reviewed. Nano nutraceuticals using combination of various natural products provide a great potential in cancer management. Additionally, various nanomedicine approaches for the detection and treatment of various types of clots organ specific delivery, vascular targeting, improved PK/PD, and vaccine will be briefly discussed. Highlight the role of nanobiotechnology and other enabling technologies in the followings: Targeted drug delivery; Improved PK and PD; Early detection (imaging); Targeted delivery of chemotherapy for optimal efficacy and safety; Nano synthesis and assembly of various platforms for targeted delivery and nanobiotechnology in shortening the time and risk of drug discovery and development.

Speaker Biography

Shaker A Mousa is currently an endowed tenure Professor and Executive Vice President and Chairman of the Pharmaceutical Research Institute and Vice Provost for Research at ACPHS. Prior to his academic career, he has held a Senior Scientist and Fellow at The DuPont Pharmaceutical Company for 17 years, where he contributed to the discovery and development of several FDA approved and globally marketed diagnostics and therapeutics. He holds over 350 US and International Patents discovering novel anti-angiogenesis strategies, antithrombotic, anti-integrin, anti-cancer, and non-invasive diagnostic imaging approaches employing various nanotechnology platforms. He has published more than 1,000 journal articles, book chapters, patents, and books as Editor and author. He is a Member of several NIH study sections, Editor-In-Chief, and on the Editorial Board of several high impact journals. His research has focused on diagnostics and therapeutics of angiogenesis-related disorders, thrombosis, vascular and cardiovascular diseases.

e: shaker.mousa@acphs.edu

Notes:

N Benkirane Jessel

University of Strasbourg, France

Combined therapeutic medical device and stem cells for regenerative nanomedicine

In our group, we explore a new generation of smart living implants combining not only active therapeutics but also stem cells, as a novel strategy to regenerate stabilized cartilage and avoid prosthesis, by achieving regeneration of its subchondral bone foundation, requirement which is failing today in the clinic. In our group, a unique nanotechnology strategy is used to entrap, protect, and stabilize therapeutic agents into polymer coatings: Nanoreservoirs, covering nanofibres of implantable nanofibrous membranes for bone and cartilage regeneration. Upon contact with cells, therapeutic agents become available through enzymatic degradation of the nanoreservoirs. As cells grow, divide, and infiltrate deeper into the porous membrane, they trigger slow and progressive release of therapeutic agents that, in turn, stimulate further cell proliferation. The nanoreservoirs technology enables to reduce the quantities of required therapeutic agent (compared to soaked membranes for instance) thereby reducing costs.

Speaker Biography

N Benkirane Jessel is Research Director and the Head of the "Osteoarticular and Dental Regenerative Nanomedicine" laboratory, at INSERM (French National Institute for Health and Medical Research), UMR 1109, Strasbourg, France. She was the Leader of "Active Biomaterials and Tissue Engineering" team INSERM 977. She has received her PhD from University Louis Pasteur, ULP, Strasbourg, France for the work on Development of pseudopeptides as synthetic vaccines. Dr. Jessel (Benkirane) then held a postdoctoral position in collaboration with the Institut Pasteur, Paris, France, working on Immunotherapy HIV, and another Postdoctoral position on the application of modified peptides as vaccines against FMDV (Plum Island Animal Disease Center, ARS, USDA, Greenport, NY 11944-0848, USA). She joined the INSERM U595 in 2002 as a post-doc, and received the diploma to direct the research (HDR) in 2004. Dr. Jessel got the permanent position (CR1) in the INSERM 595 laboratory in 2004 and Research Director (DR2) position in the INSERM 977 and head of "active Biomaterials and Tissue Engineering team from 2009 until 2012). Currently Research Director (DR1) in the INSERM UMR 1109 (Osteoarticular and Dental Regenerative Nanomedicine" and heads the team. Dr. Jessel possesses expertise in diverse fields of molecular and cellular biology, immunochemistry, tissue engineering and biomedical engineering. In the last 10 years, she focused her research on the bio-functionalization of multilayered polyelectrolyte architectures with emphasis on the use of these architectures to induce specific cellular responses and gain control over cell proliferation and differentiation. Dr. Benkirane-Jessel have 138 publications (h index: 36) with peer-reviewed publications in high impact factor journals (Proc. Nat. Acad. Sci. USA; Adv. Mater.; Adv. Funct. Mater. Small; Nanoletters, Biomaterials, ACS Nano), 5 chapters reviews and 5 international patents, she is a regular referee for a number of scientific journals (Nature nanotechnology, Nature Materials, ACS nano, Biomaterials, Nanoletters...). She is under the contract (Interface INSERM/Clinic 2008-2013) and she got also "Prime d'Excellence Scientifique" from the INSERM, 2010-2014 and the PEDR from the INSERM on 2016 for 4 years.

e: Nadia.jessel@inserm.fr

Notes:

Elias Jackson

Vyripharm Biopharmaceuticals, USA

Precision nano-theranostic solutions for drug discovery, development and delivery

Drug development is a lengthy, complex, and costly process, entrenched with a high degree of risk and uncertainty that a drug will succeed to market. A major issue with this process is associated with the unknown pathophysiology for many diseases. The brain is enormously complex and that makes target identification extremely challenging. This is further complicated by the fact that *In vitro/vivo* models often cannot simulate the entire disease process. Moreover, other challenges maybe related to heterogeneity of the patient population and how those problems might be alleviated with increased clinical genomic and proteomic data acquisition/mining. These issues put greater emphasis on human data and how it might lead to improved target identification and validation. Presently, there is a lack of validated diagnostic and therapeutic biomarkers that may objectively detect and measure biological states in certain stages of the disease process. Recently, precision nano-theranostics has emerged as an innovative approach to address these problems. It has been noted in the past as well, that precision nano-theranostics yields critical molecular imaging that delivers new target identification and verification and other important patient data that can aid in the drug development process. Precision nano-theranostics can offer a powerful solution to drug discovery, delivery and development by eliminating the challenges associated with drug development, allowing for better evaluation of drug activity/efficacy and toxicity screening, and will benefit the healthcare system by lowering costs associated with drug development.

Speaker Biography

Dr. Elias Jackson is the Director of Scientific Public Relations for Vyripharm Biopharmaceuticals, a Biopharmaceutical firm that develops drugs to target cancer, Neurological disorders and other metabolic diseases. He was previously a professor and research faculty member at the Cardiovascular Research Center at the Yale University School of Medicine, and is a graduate of The University of Texas Medical Branch at Galveston.

e: elias@VyripharmBio.com

Notes: