Bio America 2017

18th Biotechnology Congress

October 19-20, 2017 | New York, USA

Keynote Forum

Day 1

Andrea Nicolini, J Biotechnol Biomater 2017, 7:4 (Suppl)
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October 19-20, 2017 | New York, USA

Andrea Nicolini

Pisa University, Italy

Hormone-immunotherapy in endocrine-dependent metastatic breast cancer and serum biomarkers

Hormone therapy is currently advised for ER+ metastatic breast cancer patients; however in most of them the arising of resistance is a not yet well understood hurdle to overcome. We hypothesized that in these patients during clinical benefit from antiestrogen therapy the addition of cycles of sequential immunotherapy could prolong the benefit and delay the occurrence of acquired hormone resistance. In order to validate this hypothesis, in 1992 we started an open, prospective exploratory clinical trial. Here we summarize and update the clinical data and focus on the main serum biomarkers that proved helpful to monitor the efficacy of hormone immune therapy.

Biography

Andrea Nicolini mainly devoted his research over the past 20 years to the field of breast and colorectal cancer, particularly the use of serum tumor markers in the "early" detection and treatment of metastatic disease and the function of cell mediated immunity. The role of immunotherapy combined with conventional antiestrogen therapy to overcome the arising of resistance in endocrine dependent metastatic breast cancer was another main explored research field. He has published about 250 original papers/review articles (including book chapters), most of them in peer reviewed journals with I F. He is a part of the Editorial Board of a few high rank scientific journals and regularly serves as reviewer for them and many others.

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Fuad Fares, J Biotechnol Biomater 2017, 7:4 (Suppl)
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Fuad Fares

University of Haifa, Israel

Designing long acting agonists and antagonists of glycoprotein hormones using site directed mutagenesis and gene transfer; from the bench to bedside

Glycoprotein hormones (FSH, LH, hCG and TSH) are a family of heterodimeric proteins composed of two non-covalently linked subunits; α and *β*. Glycoproteins are used clinically in the treatment of many diseases. One major issue regarding the clinical use of many peptides is their short half-life due to the rapid clearance from the circulation. To overcome this problem, we succeeded to ligate the signal sequence of *O*-linked oligosaccharides to the coding sequence of the hormones. The cassette gene that has been used contains the sequence of the carboxyl-terminal peptide (CTP) of human chorionic gonadotropin *β* (hCG*β*) subunit. The CTP contains 28 amino acids with four *O*-linked oligosaccharide recognition sites. It was postulated that O-linked oligosaccharides add flexibility, hydrophilicity and stability to the protein. On the other hand, it was suggested that the four O-linked oligosaccharides play an important role in preventing plasma clearance and thus increasing the half-life of the protein in circulation. Using this strategy, we succeeded to ligate the CTP to the coding sequence of follitropin (FSH), thyrotropin (TSH), erythropoietin (EPO) growth hormone (GH) and thus to increase the longevity and bioactivity of these proteins *in-vivo*. Interestingly, the new analogs of FSH and GH were found to be not immunogenic in human and it is already passed successfully clinical trials phase III and phase II, respectively. Moreover, FSH long acting (ELONVA) was approved by the European Commission (EC) for treatment of fertility since 2010. In addition, our results indicated that long acting GH is not toxic in monkeys and the results from clinical trials phase I and phase II seem to be promising. Designing long acting peptides will diminish the cost of these drugs and perhaps reduce the number of injections in the clinical protocols. On the other hand, we found that deletion of N-linked oligosaccharides from hTSH subunits resulted in a significant decrease in bioactivity. Moreover, deglycosylated variants of TSH compete with normal hTSH and human thyroid stimulating immunoglobulin (hTSI) in a dose dependent manner. Thus, this variant, behaves as a potential antagonist, who may offer a novel therapeutic strategy in the treatment of Grave's disease, the most common form of hyperthyroidism. In conclusion, it was found that addition of O-linked oligosaccharides or deletion of N-linked oligosaccharides could be interesting strategy for designing new analogs of glycoprotein hormones.

Biography

Fuad Fares has completed his MSc and DSc studies at the Faculty of Medicine, Technion-Israel Institute of Technology, and Post-doctoral studies at the Department of Molecular Biology and Pharmacology, School of Medicine, Washington University, St. Louis Missouri. During his studies, he developed a long acting human follitropin. This hormone was approved by the European Commission as "Elonva" for clinical use. He is an Associate Professor at the Department of Human Biology, Faculty of Natural Sciences and Director of the Department of Molecular Genetics at Carmel Medical Centre. He has published more than 90 papers in reputed journals and serving as a member of the Israel Council for Higher Education. He is the inventor and the initiator of PROLOR Biotech Company for "designing long-acting recombinant proteins".

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Jeong-Woo Choi

Sogang University, Republic of Korea

Nanobioelectronic device composed of hybrid materials for biosensor and biocomputing system

Nano-level bioelecronic device based on hybrid material had emerged as the breakthrough with tremendous potentiality for generation of new concepts and technologies to develop new age bioelectronic devices. The biomaterial such as protein and DNA can be used as a functional component in the bioelectronic device. To alter the silicon-based electronic devices, major challenges in bioelectronic device involve the miniaturization, and the demonstration of various functions generated from biomaterial. The conceptual biomemory device based on Metalloprotein was developed to demonstrate memory characteristics including 'write', 'read', and 'erase' function. Furthermore, multi-bit memory function and nanoscale memory function were developed. Afterwards new hybrid material constituted with metalloprotein/DNA/nanoparticle was developed to construct the bioprocessing device to demonstrate various functions. The metalloprotein with redox property was introduced as a biomemory signal source, and various nanoparticles conjugated with complementary DNA and metal ions were introduced as input signals to obtain processed output signals. By this process, various functions including 'information amplification', 'information reinforcement' and 'information regulation' were accomplished in this processing device. Also, hybrid material composed of RNA composite/quantum dot was developed to demonstrate the nanoscale resistive biomemory function. The spectroelectrochemical analysis in the cell chip has been developed as a valuable biosensing technique using nanobioelectroic technology. The electrochemical property and differentiation control in neural stem cell on the chip, and synthesis property of nanoparticle in human cells have been investigated. The proposed hybrid material-based nanobioelectronic device by the integration with neural cell should be the new type of platform to develop the biosensor and biocomputing system. Acknowledgement: This research was supported by the Leading Foreign Research Institute Recruitment Program, through the National Research Foundation of Korea (NRF), funded by the Ministry of Science, ICT and Future Planning (MSIP) (2013K1A4A3055268).

Biography

Jeong-Woo Choi is a Professor in the Department of Chemical & Biomolecular Engineering and a Director of Institute of Integrated Biotechnology, Sogang University, South Korea. He received his PhD in Rutgers University (USA), DEng in Tokyo Institute of Technology (Japan) and DBA in University of Durham (UK). He was a Visiting Scientist in IBM Almaden Research Center and Mitsubishi Electronics Advanced Technology R&D Center. He has published more than 380 articles in peer-reviewed international journals including Science and 21 international patents in biomaterials, biosensor and bioelectronics fields, and he has edited/authored 24 books on advanced biomaterials and biosensors.

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Day 2

Vakhtang Barbakadze, J Biotechnol Biomater 2017, 7:4 (Suppl)
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Vakhtang Barbakadze

Tbilisi State Medical University, Georgia

Biopolyether of medicinal plants with anticancer efficacy

According to IR, 13C, 1H NMR, APT, 1D NOE, 2D heteronuclear 1H/13C HSQC and 2D DOSY experiments the main chemical constituent of high-molecular water-soluble fractions from different species of comfrey and bugluss (family Boraginaceae) was found to be poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl) ethylene] or poly[3-(3,4-dihydroxyphenyl) glyceric acid] (PDPGA). The regular polyoxyethylene chain is the backbone of this polymer molecule. 3,4-Dihydroxyphenyl and carboxyl groups are regular substituents at two carbon atoms in the chain. Such biopolymer has not been known and has been identified for the first time. This compound is a representative of a new class of natural polyethers with a residue of 3-(3,4-dihydroxyphenyl) glyceric acid as the repeating unit. PDPGA exhibited anticomplementary, antioxidant, anti-inflammatory and wound healing properties. PDPGA exerted anti-cancer efficacy *in-vitro* and *in-vivo* against human prostate cancer (PCA) cells via targeting androgen receptor (AR), cell cycle arrest and apoptosis without any toxicity, together with a strong decrease in prostate specific antigen (PSA) level in plasma. PDPGA suppressed the growth and induced death in androgen-dependent (LNCaP) and -independent (22Rv1) PCA cells, with comparatively lesser cytotoxicity towards non-neoplastic human prostate epithelial cells PWR-1E. PDPGA caused G1 phase arrest of cell cycle progression in PCA cells through modulating the expression of cell cycle regulators, especially an increase in cyclin-dependent kinase inhibitors (p21 and p27). PDPGA induced apoptotic death by activating caspases, and also strongly decreased AR and PSA expression revealing some of the plausible underlying mechanisms. In 22Rv1 xenograft model male athymic nude mice with 22Rv1 xenografts was administered orally 5.0 mg/kg dose of PDPGA for five weeks. The tumor volume per mouse was decreased by 88%. Plasma analyses revealed that PDPGA administration caused a strong dose-dependent decrease in PSA levels by 87%. Overall, this study identifies PDPGA as a potent agent against PCA without any toxicity, and supports its pre-clinical and clinical testing

Biography

Vakhtang Barbakadze has his expertise in isolation and structure elucidation of a new series of plant polyethers, which are endowed with pharmacological properties as anti-cancer agents. Besides, he is interested in enantioselective synthesis and biological activities of basic monomeric moiety of these biopolyethers, synthesis of enantiomerically pure epoxides as chiral building blocks for the production of synthetic analogues of natural polyethers. He has completed his PhD and DSci from Institute of Organic Chemistry, Moscow, Russia and Institute of Biochemistry and Biotechnology, Tbilisi, Georgia, respectively. He is the Head of laboratory of plant biopolymers at the Tbilisi State Medical University Institute of Pharmacochemistry. He has been a Visiting Scientist at Utrecht University (faculty of pharmacy), The Netherlands, by university scholarship and The Netherlands organization for scientific research Scholarship Scientific Program, respectively. He has published more than 81 papers in reputed journals

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Helena Nadais

University of Aveiro, Portugal

Biotechnology as a tool for improving resource recovery from complex industrial wastewaters

Biological anaerobic treatment systems are valuable tools for resource recovery from organic wastewaters thus representing an important contribution for circular economy. Traditionally anaerobic systems have been associated with energy production from organic wastes yet these systems are frequently hindered by several limitations stemming from the biological nature of the underlying processes. Biotechnology tools are important aids for systems' monitoring, operation and improvement. Several operational strategies may be used to adapt microbial consortia for the degradation of complex substrates and improve the performance of high-rate anaerobic systems used for treating concentrated industrial wastewaters. A methodology combining conventional molecular techniques based on DNA extraction, amplification and cloning of genes that codify for 16S subunit of ribosomal RNA, followed by sequencing of clones previously selected by analysis of polymorphisms of restriction fragments (RFLP) may be applied for the monitoring of microbial populations striving in anaerobic systems. The development of an adapted microbial population supported by the application of easy-to-use biotechnology monitoring tools results in significant improvements of methane production from complex industrial wastewaters with high fat content. Biotechnology is thus an indispensable instrument for the optimization of resource recovery from wastes and for the integration of wastewater treatment systems with the concept of circular economy

Biography

Helena Nadais has a MSc (1988) and a BSc (1993) in Chemical Engineering from Instituto Superior Técnico of Lisbon University and has a PhD (2002) in sciences applied to the environment from the University of Aveiro. Since 2003, she is the Assistant Professor in the Environment and Planning Department at the University of Aveiro. Her research interests are centered on biological processes for water treatment and for the treatment and material and energetic valorization of wastewaters and wastes. She has more than 50 international scientific publications

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