JOINT EVENT

22nd Global Congress on **Biotechnology**

&

5th International Conference on

Enzymology and Protein Chemistry

February 28-March 02, 2019 | Berlin, Germany

Scientific Tracks & Abstracts

Day 1

Day-1

SESSIONS

Medical Biotechnology | Algal Biotechnology | Pharmaceutical Biotechnology | Environmental Biotechnology | Plant and Agriculture Biotechnology

Chair: **Nikolaus Stolterfoht,** Helmholtz-Zentrum Berlin, Germany

SESSION INTRODUCTION

Title: **Human metaplastic breast carcinoma and decorin**
Annele Sainio, University of Turku, Finland

Title: **How to produce high quality microalgae proteins from industrial dairy effluent**
Marion Champeaud, Université de Poitiers, France

Title: **Protein engineering applied to obtain biobetters of antitumor enzyme asparaginase**
Gisele Monteiro, University of São Paulo, Brazil

Title: **Cytochrome P450 enzymes as target for drug development**
Klaus Pors, University of Bradford, UK

Title: **Assessment of the optimum sites for industrial-scale microalgae biofuel production in red sea region based on GIS models & estimation by mathematical modelling**
Seifeldin Khedir, University of Khartoum, Sudan

Title: **Detection and evaluation of industrial gas pollutants using optical sensor based on surface plasmon resonance technique**
Sara Mohseni, Niroo Research Institute, Iran

Title: **Overexpression of a tomato annexin gene AnnSp2, enhances abiotic stress tolerance in transgenic tomato through ABA synthesis and modulation of ROS production**
Raina Ijaz, University of Poonch Rawalakot, Pakistan

Title: **Aldehyde dehydrogenases as target for biomarker and drug discovery**
Klaus Pors, University of Bradford, UK

Annele Sainio, J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Human metaplastic breast carcinoma and decorin

Annele Sainio
University of Turku, Finland

Decorin is a central extracellular matrix (ECM) proteoglycan known for its oncosuppressive activity. In various types of cancer, including breast cancer, decorin´s expression in the tumor microenvironment has been reported to be markedly decreased. Furthermore, its reduced expression has been shown to be associated with poorer outcome in invasive breast cancer. Metaplastic breast carcinoma (MBC) is a rare subtype of invasive breast cancer and has poor prognosis. In general, cancers are heterogeneous cellular masses comprised of different cell types and their ECM. However, in MBC little is known about the composition of ECM and its constituents. The aim of our study is to explore decorin immunoreactivity and the effect of adenoviral decorin cDNA (Ad-DCN) transduction in MBC. Methods included multiple immunohistochemical stainings to characterize the massive breast tumour. To explore the effect of Ad-DCN transduction on the tumor tissue, three-dimensional (3D) explant cultures derived from the tumour are transduced with the modified adenovirus. The immunohistochemistry results showed that MBC tumour was completely negative for decorin demonstrating that the malignant cells were not able to synthesize decorin. Furthermore, Ad-DCN transduction resulted in a markedly inhibited cell proliferation and altered cytological phenotype of MBC explants by decreasing the amount of atypical cells. The results of our study favor the development of novel adjuvant therapies based on decorin. Noteworthy is also the idea of "normalization of the tumour microenvironment" whereby decorin in its part could orchestrate cancer cells towards a less malignant phenotype.

Biography

Annele Sainio obtained her Master of Science Degree in Genetics in the Department of Biology at the University of Turku (Finland), and defended her thesis "The role of extracellular matrix macromolecules in cancer and diabetic macroangiopathy - with special reference to decorin and hyaluronan" in the spring 2016 respectively. Currently, she works as a Postdoc in the Department of Medical Biochemistry and Genetics at the same university. Her research is focused on specific extracellular matrix macromolecules, particularly proteoglycans and hyaluronan in various disease processes such as tumorigenesis. She has published more than 15 papers in reputed journals.

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Marion Champeaud et al., J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

How to produce high quality microalgae proteins from industrial dairy effluent

Marion Champeaud, Maryse Laloi and **Olivier Cagnac**
Université de Poitiers, France

Utilization of whey or whey permeate is one of major concerns of the dairy industry nowadays, especially the acid whey, which mostly remains untreated prior to disposal. In 2010, 734 million tons of milk, and 160-180 million tons of whey per year were produced worldwide. In 2014, milk production was higher than 800 million tons and is constantly increasing over the years. Despite the different strategies considered by the industrials to valorize whey: lactose crystallization, food applications in bakery products, dry mixes, snack, and milk replacer, alcoholic fermentation, or biogas conversion, only 50% of this whey is processed. A new industrial fermentation model was developed by Fermentalg to valorize these dairy by-products to obtain added-value bio-products at the same time. During this process, the microalgae Galdieria sulphuraria is able to consume 100% lactose, 98% of lactate and 79% of the citrate present in whey permeate. The biomass production depends on by-product lactose concentration and range from 30 to more than 110 g/l of dry matter. In addition to direct bio-remediation of industrial dairy waste, the algae biomass produced show a real nutritional interest due to its high protein content (>50%) and is naturally rich in essential amino acid. Thanks to its own bioreactor enlightenment system Fermentalg is able to enhance phycocyanin production without modifying the overall protein content of the biomass.

Biography

Marion Champeaud graduated with a Bachelor of Biology five years ago and a Master's degree in Agro-Industry three years ago from Bordeaux University in France and she is currently doing her PhD in partnership between a biotechnology company Fermentalg and Poitiers University in France (UMR CNRS 7267). Her research studies in engineering process and microalgae culture area resulted in 2 patents-pending and 2 publications in progress.

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Gisele Monteiro et al., J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Protein engineering applied to obtain biobetters of antitumor enzyme asparaginase

Gisele Monteiro, Costa I M, Costa-Silva T A, Effer B, Meira-Lima G, Biasoto H P, Silva C, Pessoa A and **Rangel-Yagui C**
University of São Paulo, Brazil

Asparaginase (ASNase), an enzyme biotechnologically produced by bacteria, is one of the most important compounds in polychemotherapy to treat acute lymphoblastic leukemia (ALL) in children. There are only three options available as medicine: native enzyme from *Erwinia chrysanthemi* (ErA) or extracted from *Escherichia coli* (EcA) and formulated as native or PEGylated (PEG-EcA). However, these options yet present some problems in patients, such as to elicit hypersensitivity and allergenic reactions, neurotoxicity, and hyperammonemia. Aiming to avoid some of these problems, our research group has developed several different mutant proteoforms, expressed in bacteria and yeast, in periplasmic or secreted to extracellular space; with improvement in specific activity, kinetic parameters and stability; different oligomerization states, glycosylated or not, through engineering of genes from *E. coli*, *E. chrysanthemi* and *S. cerevisiae*. We obtained mutants from *E. coli* ASNase more resistant to human proteases and less immunogenic. In relation to E. chrysanthemi enzyme, our mutants present higher asparaginase activity than the native form, with improved kcat. In addition, we obtained strains of Pichia pastoris that express glycosylated ASNases from bacteria. Last but noteworthy, we obtained *P. pastoris* and *E. coli* strains that express active ASNases from *S. cerevisiae*, an eukaryotic promising options to replace bacterial formulations.

Biography

Gisele Monteiro has completed her PhD at the University of São Paulo in Molecular Biology. Currently, she is an Associate Professor of Pharmaceutical Biotechnology in the Faculty of Pharmaceutical Sciences (FCF/USP) and the Vice-Coordinator of the Graduate Course in Biochemical-Pharmaceutical Technology. She has published more than 20 papers in reputed journals and has been serving as an Associate Editor of Brazilian Journal of Microbiology. She received 10 scientific awards, national and international. Her main scientific interest is the study of antitumor drugs and the engineering of proteins used as biopharmaceuticals, such as asparaginase.

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Notes:

Klaus Pors, J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Cytochrome P450 enzymes as target for drug development

Klaus Pors
University of Bradford, UK

The cytochrome P450 (CYP) enzymes belong to a superfamily of mixed function oxidases that are unique in their ability to oxidize xenobiotics, but under hypoxic conditions also can reduce certain chemical functionalities. There is now growing evidence that CYP1A1 and 2W1 are overexpressed in many human tumor types. The presence of certain CYPs may reflect a resistance mechanism by diminishing the pharmacological activity of anticancer drugs whilst specific CYPs can also modulate cell proliferation by the formation or conversion of endogenous signaling molecules. The potential for CYP-selective metabolism of xenobiotics coupled to their broad substrate specificity provides a unique opportunity to design drugs whose activity is dependent on a critical functional group that can be unmasked or restored by CYP metabolism selectively in tumor tissue. We have identified duocarmycin natural products which lend themselves to being great candidates for use in prodrug strategies. The electronic distribution and lipophilicity of the embedded chloromethylindoline trigger fragment is a key determinant in regioselective oxidation by specific CYP isoforms. We have synthesized and biologically evaluated several libraries of duocarmycins and have shown them to be bioactivated by CYP1A1 and 2W1 in cell-free and cell-based assays. At the meeting we will update on novel data from our drug discovery programme, which include single agent and combination treatment with standard of care drugs using colorectal cancer xenograft models.

Biography

Klaus Pors is an Associate Professor of Chemical Biology at The Institute of Cancer Therapeutics, University of Bradford, UK. His research group is involved with discovery of novel biological and chemical tools to explore the importance of enzymes in different disease states. Particular focus is on exploiting abnormal cytochrome P450 (CYP), aldehyde dehydrogenase (ALDH) or aldo-keto reductase (AKR) expression in the tumour microenvironment as target for biomarker and drug discovery; he has published 35 papers on these topics. He is a RSC Chemical Biology and Bioorganic Group committee member and the European Editor of Journal of Cancer Metastasis and Treatment.

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Raina Ijaz et al., J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Overexpression of a tomato annexin gene AnnSp2, enhances abiotic stress tolerance in transgenic tomato through ABA synthesis and modulation of ROS production

Raina Ijaz[1], **Javeria Ejaz**[1], **Muhammad Imtiaz**[2] and **Taotao Wang**[3]
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[2]Guangzhou University, China
[3]Huazhong Agricultural University, China

Drought and high salinity are two major abiotic stresses that affect the agricultural crops worldwide. Annexins belongs to a multigene protein family that play an essential role in plant stress responses and various cellular processes. Here, $AnnSp_2$ gene was cloned from wild tomato (Solanum pennelli) and functionally characterized in cultivated tomato. $AnnSp_2$ was found to be induced after exposure to drought, salt, H_2O_2 and ABA. Tomato plants overexpressing AnnSp2 remarkably increased plant tolerance to drought and salt stress, as determined through physiological analysis of the germination rate, root growth, survival rate, leaf water loss and Chl content. AnnSp2 transgenic plants were observed to be less sensitive to ABA during seed germination and seedling stages. However, under drought stress the ABA content significantly increased in the $AnnSp_2$ over expressing plants, reduced water loss, attributed to the enhancement of stress tolerance. Furthermore, we found that AnnSl2 reduced sensitivity of plants to drought by influencing ABA induced stomatal movement and expression of ABA inducible genes, including AREB, DREB, NCED, ERD were clearly up regulated under drought and salt stress conditions. Consistent with the accumulation of reactive oxygen species (ROS), lower lipid peroxidation level, increased peroxidase activities including APX, CAT and SOD all of which contributed to increased tolerance to oxidative stress compared with wild-type plants. These results therefore indicate that $AnnSp_2$ play an important role in the abiotic stress response and that overexpression of AnnSp2 in transgenic tomato improves salt and drought tolerance through ABA signalling and the regulation of ROS production in plants.

Biography

Raina Ijaz is working as an Assistant Professor at University of Poonch Faculty of Agriculture, Rawalakot (Azad Kashmir), and focusing on the fate of biotechnology in the horticultural plant vegetable science. She moved to Wuhan, China by the Scholarship Council (CSC) and finished her PhD under the guidance of Prof. Dr. Ye zhibiao at Huazhong Agricultural University in 2017. She has published five research publications in various well reputed scientific impact factor journals. She has participated in many national and international conferences, seminars and presented her research achievements. She is also serving as reviewer/referee for many national and internationals journals.

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Notes:

Klaus Pors, J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Aldehyde dehydrogenases as target for biomarker and drug discovery

Klaus Pors
University of Bradford, UK

The human aldehyde dehydrogenases (ALDHs) play a major role in detoxifying highly reactive aldehydes into carboxylic acids. Deregulation of ALDHs have implications in a number of cancers. They play an important role as a cancer stem cell (CSC) marker due to high activity found in CSCs while high expression is also known to lead to resistance to chemotherapeutic drugs. Although the exact role of ALDH is not fully understood, emerging information indicates several isoforms from the ALDH1 family, ALDH3A1 and ALDH7A1 play key roles in many cancer types. To probe the role of ALDH functional activity, at this meeting we will present new data on small molecules that inhibits ALDH functional activity using cell free and cell-based assays; diethylbenzaldehyde (DEAB) was used as a control for inhibition while Aldefluor assay was used as an assay to demonstrate functional activity. Furthermore, our investigations in prostate cancer revealed that several ALDH-affinic probe compounds were able to reduce cell viability in both drug-resistant PC3 prostate cancer cells and patient-derived samples while synergistic effect was observed in combination treatment with docetaxel. Our early drug discovery approach will be presented at the meeting and include drug design to target ALDH7A1, an enzyme that is linked with oxidative stress, lysine metabolism and several diseases including cancer.

Biography

Klaus Pors is an Associate Professor of Chemical Biology at The Institute of Cancer Therapeutics, University of Bradford, UK. His research group is involved with discovery of novel biological and chemical tools to explore the importance of enzymes in different disease states. Particular focus is on exploiting abnormal cytochrome P450 (CYP), aldehyde dehydrogenase (ALDH) or aldo-keto reductase (AKR) expression in the tumour microenvironment as target for biomarker and drug discovery; he has published 35 papers on these topics. He is a RSC Chemical Biology and Bioorganic Group committee member and the European Editor of Journal of Cancer Metastasis and Treatment.

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Day 2

Day- 2

SESSIONS

Pharmaceutical Biotechnology | Nano Biotechnology | Medical Biotechnology | Genetics/Genetic Engineering

Chair: **Oara Neumann,** Rice University, USA

SESSION INTRODUCTION

Title: **Green production of bioethanol using solar steam generated with nanoparticles**
Oara Neumann, Rice University, USA

Title: **Protein aggregation characterized by nanotechnology**
Jiali Li, University of Arkansas, USA

Title: **The role of the leader of the academic research group in promoting academic startups of biotechnology**
Gisele Rodrigues Atayde, University of Sao Paulo, Brazil

Oara Neumann, J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Green production of bioethanol using solar steam generated with nanoparticles

Oara Neumann
Rice University, USA

Conventional bioethanol for transportation fuel typically consumes agricultural feedstocks also suitable for human consumption and requires large amounts of energy for conversion of feedstock to fuel. Alternative feedstocks, optimally those not also in demand for human consumption, and off-grid energy sources for processing, would both contribute to making bioethanol far more sustainable than current practices. Cellulosic bioethanol production involves three steps: the extraction of sugars from cellulosic feedstock, the fermentation of sugars to produce ethanol, and the purification of ethanol through distillation. Traditional production methods for extraction and distillation are energy intensive and therefore costly, limiting the advancement of this approach. Here we report an initial demonstration of the conversion of cellulosic feedstock into ethanol by completely off-grid solar processing steps. Our approach is based on nanoparticle-enabled solar steam generation, where high-efficiency steam can be produced by illuminating light-absorbing nanoparticles dispersed in H_2O with sunlight. We used solar-generated steam to successfully hydrolyze feedstock into sugars, then used solar steam distillation to purify ethanol in the final processing step. Coastal hay, a grass grown for livestock feed across the southern U. S., and sugar cane as a control, are successfully converted to ethanol in this proof-of-concept study. This entirely off-grid solar production method has the potential to realize the long-dreamed-of goal of sustainable cellulosic bioethanol production.

Biography

Oara Neumann is the Peter M and Ruth L Nicholas Research Scientist at Rice University (a fully funded, endowed research scientist position at the university). She has completed her PhD and Postdoctoral study in Applied Physics at Rice University, MSc in Chemical Physics at Weizmann Institute of Science, Israel and another MSc in Analytical Chemistry from Bucharest University, Romania. She is the Pioneer of nanoparticle-based solar thermal applications. She holds several patents and has published more than 25 refereed articles and has an h-index of 16.

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Jiali Li et al., J Biotechnol Biomater 2019, Volume 9
DOI: 10.4172/2155-952X-C2-115

Protein aggregation characterized by nanotechnology

Jiali Li, Mitu C Acharjee and **Haopeng Li**
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In this work, we analyze the process of protein aggregation with a nanopore device combined with AFM and DLS. Our model proteins used are ß-lactoglobulin variant A (βLGa) and a neuronal Tau protein. The main component of a nanopore device is a nanometer size pore, 5 to 20 nm in diameter, fabricated in a free-standing silicon nitride membrane supported by a silicon substrate which separates two PDMA chambers containing salt solution. A stable ionic current is established by applying a biased voltage on a pair of silver chloride (AgCl) electrodes across the nanopore membrane. When a charged protein molecule or a protein aggregate passes through a nanopore, a protein aggregate which has larger volume than a single protein molecule would block larger amount of current or generate a greater current drop amplitude, therefore a nanopore device can be used to characterize protein aggregation in salt solution at single molecule level. The volume of translocating protein molecules or aggregates are estimated using a calibrated nanopore by a standard that has known geometry such as a dsDNA molecule. We show that by using a reference dsDNA molecule, solid state nanopore method is capable of measuring protein aggregation number and the aggregation number distribution in the conditions that is close to their native aqueous solution environment. The nanopore experiments were performed under applied voltages from 60-210 mV at different pH, temperature and salt concentration. We present data of βLGa and Tau self-association and aggregation measured by nanopore method, AFM and DLS.

Biography

Jiali Li has completed her PhD in Physics at the City University of New York in 1999 and Postdoctoral studies from Depertment of Physics, Harvard University. She is a Physics Professor at the University of Arkansas since 2002. She has been one of the pioneers in developing solid-state nanopore technology and its applications in single DNA and protein analysis. She has published more than 30 papers in reputed journals. In recent years, she has been working on protein aggregation, detection and characterization with solid-state nanopore device combined with other nanotechnologies.

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