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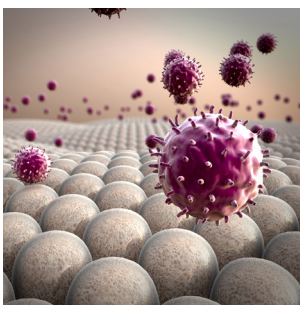
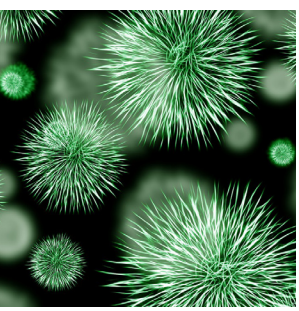
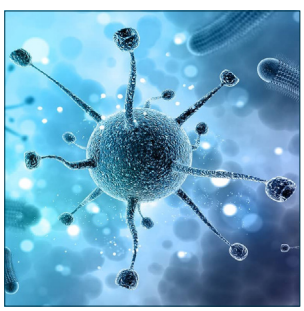
Workshop

Clinical Microbiology 2019 & Biotechnology 2019







Joint Event

8th European Clinical Microbiology and Immunology Congress

&

3rd World congress on Biotechnology

June 12-13, 2019 | Edinburgh, Scotland

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Joint Event

Sergey Suchkov et al., Microbiol Curr Res, Volume 3
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Antibodies with functionality as a new generation of translational tools designed to be pro-grammed via translational resources to predict and to prevent demyelination

Sergey Suchkov[1, 2, 3], Noel Rose[4], Aleks Gabibov[5] and **Harry Schroeder[6]**

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[3]European Association for Prediction, Prevention and Personalized Medicine, Belgium
[4]Johns Hopkins Medical Institutions, USA
[5]Institute for Bioorganic Chemistry, Russia
[6]The University of Alabama at Birmingham, USA

Abs against myelin basic protein/MBP present with the proteolytic-activity (Ab-proteases with functionality) of higher value to observe demyelination to show the evolution of multiple sclerosis (MS). Anti-MBP auto-Abs from MS patients and mice with EAE exhibited particular proteolytic cleavage of MBP which, in turn, markedly vary between: 1. MS patients and healthy controls; 2. Different clinical MS courses; 3. EDSS scales of demyelination to correspond with the disability of MS patients to predict the transformation prior to the changes of clinical course.

Ab-mediated proteolysis of MBP was shown to be sequence-specific while exhibiting 5 sites of preferential proteolysis to be located within the immunodominant regions of MBP and to fall inside into 5 sequences fixed. Some of the latter (with the highest encephalitogenic properties) were evident to act as a specific inducer of EAE and to be attacked by the MBP-targeted Ab-proteases in MS patients with the most severe (pro-gradient) clinical courses. The other ones whilst being less immunogenic happened to be EAE inducers very rare but were shown to be attacked by Ab-proteases in MS patients with moderate (remission-type) clinical courses.

The activity of Ab-proteases was initially registered at the subclinical stages 1-2 years prior to the clinical illness. About 24 percent of the direct MS-related relatives were sero-positive for low active Ab-proteases from which 22 percent of the seropositive relatives established were being monitored for 2 years while demonstrating a stable growth of Ab-associated proteolytic activity. Moreover, some of the low-active Ab-proteases in persons at MS-related risks (at subclinical stages of MS) and primary clinical and MRT manifestations observed were coincided with the activity to have its mid-level reached. Registration in the evolution of highly immunogenic Ab-proteases would illustrate either risks of transformation of subclinical stages into clinical ones, or risks of exacerbations to develop.

The activity of Ab-proteases in joining with particular sequence would confirm an increase subclinical and predictive (translational) value of the tools as applicable for personalized monitoring protocols. Ab-proteases can be programmed and re-programmed to suit the needs of the body metabolism or could be designed for the development of principally new catalysts with no natural counterparts. Future studies on targeted Ab-mediated proteolysis could yield a translational tool for predicting demyelination and thus the disability of the MS patients.

Speaker Biography

Sergey Suchkov graduated from Astrakhan State Medical University and awarded with MD, then in 1985 maintained his PhD at the I M Sechenov Moscow Medical Academy and in 2001, maintained his doctorship degree at the Nat Inst of Immunology, Russia. From 1987 through 1989, he was a senior researcher at Koltzov Inst of Developmental Biology. From 1989 through 1995, he was a head of the lab of clinical immunology, Helmholtz Eye Research Institute in Moscow. From 1995 through 2004, as a chair of the dept for clinical immunology, Moscow Clinical Research Institute (MONIKI). He has been trained at NIH; Wills Eye Hospital, PA, USA; Univ of Florida in Gainesville; UCSF, S-F, CA, USA; Johns Hopkins University, Baltimore, MD, USA. He was an executive secretary-in-chief of the editorial board, biomedical science, an international journal published jointly by the USSR Academy of Sciences and the Royal Society of Chemistry, UK. At present, he is a chair, dept for personalized and translational medicine, I M Sechenov First Moscow State Medical University. He is a member of the: New York Academy of Sciences, USA; American Chemical Society (ACS), USA; American Heart Association (AHA), USA; EPMA (European Association for Predictive, Preventive and Personalized Medicine), Brussels, EU; ARVO (American Association for Research in Vision and Ophthalmology); ISER (International Society for Eye Research) and PMC (Personalized Medicine Coalition), Washington, USA.

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Upcoming Conference

World Congress on
Clinical Microbiology & Infectious Diseases
November 4-5, 2019 | Melbourne, Australia

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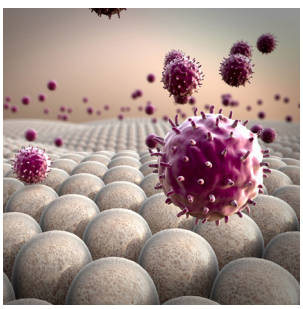
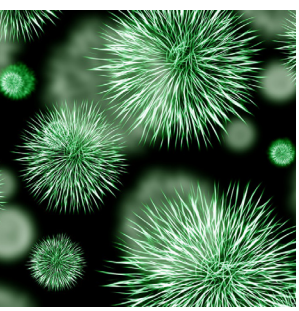
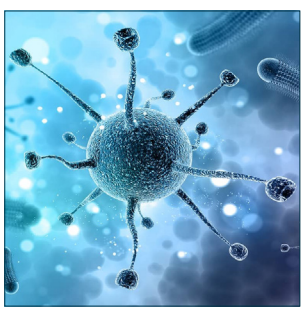
Scientific Tracks & Sessions
June 12, 2019

Clinical Microbiology 2019 & Biotechnology 2019







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Genetic Engineering and rDNA technology | Immunology | Infection Control | Fermentation Techniques | Applied Biotechnology and Microbiology

Chair
Sergey Suchkov
Sechenov University | Russia

Session Introduction

Title: Precision liquid biopsy based nucleic acid based molecular diagnostics powered by xenonucleic acids

Michael J Powell | DiaCarta, Inc | USA

Title: Deciphering the role of fibroblasts and macrophages in bone marrow mediated chemotherapy resistance in acute myeloid leukaemia

Mark Williams | Glasgow Caledonian University | UK

Title: Novel intensified bioreactor by continuous product phase separating

Arjan Oudshoorn | Delft Advanced Biorenewables | The Netherlands

Title: Influenza vaccine coverage and efficacy among King Salman Armed Forces Hospital 2017-2018

Rofayda Mansor Ahmed | King Salman Armed Forces Hospital | Saudi Arabia

Title: Switches, thresholds and flux signals in the control of central metabolism's architecture in *Escherichia coli*

Mansi El-Mansi | University of Africa | Nigeria

Precision liquid biopsy based nucleic acid based molecular diagnostics powered by xenonucleic acids

Michael J Powell
DiaCarta, Inc., USA

Current clinically available molecular tests for detection of pathogenic nucleic acid variations especially tumor derived oncogenic 'driver' and drug resistant somatic mutations that are performed on circulating cell-free nucleic acids present in biological fluids such as patient's blood plasma have limited sensitivity. This is because of the low frequency of these gene variations and the large excess of wild-type nucleic acids present. In order to achieve high sensitivity for the detection of only a few target molecules (mutant alleles) present in a vast excess of non-target molecules (wild-type alleles) sophisticated methodologies that require expensive instrumentation, highly skilled operators and in some cases intensive computational bioinformatics methods such as digital-droplet PCR (ddPCR), BEAMing PCR and next generation deep sequencing (NGS) are being employed in large clinical research centers. The limited availability, high cost and long analysis times of these methods prompted us to develop a new technology that can be performed globally by existing pathology personnel with instrumentation that is already present in every hospital pathology laboratory. At the heart of this innovative technology are novel molecular nucleic acid analogs that we call xenonucleic acids (XNA) that possess all the natural bases that occur in DNA appended to a new chemical backbone that imbibes these oligomeric nucleic acid binding molecules with exquisite specificity and high binding affinity for complementary target sequences. Any variation in the sequence that the XNA binds to creates a differential binding phenomena that can be exploited to develop real-time qPCR and extremely high sensitivity NGS assays that can detect as little as 2 copies of variant templates in a large excess of wild-type templates in DNA obtained from tissue biopsies or more preferably plasma. Commercial CE/IVD Certified Products have been developed and validated that include QClampTM gene specific real-time qPCR based tests, a new highly sensitive blood-based colorectal cancer detection test called ColoScapeTM and a high sensitivity targeted amplicon based target NGS platform called OptiSeqTM. This presentation will discuss the new technology and the improved and widely available opportunities that it affords for improved precision diagnostics and targeted therapies of human diseases particularly cancer.

Speaker Biography

Michael J Powell is currently chief scientific officer at DiaCarta, Inc. where he manages the company's scientific and strategic direction in molecular diagnostics for oncology and infectious disease personalized diagnostics markets, most notably the development of branched DNA (bDNA) signal amplification and a novel somatic gene mutation Real-Time PCR based assay technology called QClampTM for applications in the diagnosis of cancer and infectious diseases and the rapid detection of cancer 'driver' and drug resistance genetic variations. He was previously a founder of Odyssey Thera Inc., a privately held company that commercialized a proprietary fluorescent live cell-based assay and diagnostic imaging technology for the application in target validation and drug discovery. He was the director of new technology at Roche diagnostics (Roche acquired Boehringer Mannheim Corporation in May, 1997 for $11B). Prior to the acquisition by Roche, he was director of new technology at Boehringer mannheim. He was also the director of new technology at Microgenics corporation, in Concord, California. He was pioneer and lead scientist and inventor of the electrochemiluminescence (ECL) assay technology and also developed catalytic antibodies at IGEN, Inc. The ECL technology is the basis of Roche Diagnostics automated '*in-vitro*' diagnostics immunoassay platform: 'ElecSys'. He has held several other R & D senior management positions at integrated genetics Inc., Medisense and Celltech PLC, in the UK. He has published many research papers in leading scientific journals and holds over 30 patents and patent-pending applications. He received his PhD in medicinal organic chemistry from Loughborough University, UK and PhD from University of Nottingham, UK.

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Deciphering the role of fibroblasts and macrophages in bone marrow mediated chemotherapy resistance in acute myeloid leukaemia

Mark Williams[1,2], Barbara McCrorie[1], Abigail Macleod[1], Scott Davidson[2], Gregor McMurray[3], Chris Estell[4], Joanne Hanney[5], Carl Goodyear[6], Gerard Graham[6], Helen Wheadon[6] and **Monica Guzman[7]**

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Acute Myeloid Leukaemia (AML) is one of the most pressing unmet clinical need in the haematology field. For the majority of AML patient's survival is between 5-20%. Chemoresistance is a major contributing factor towards inferior survival in AML, which is significantly influenced by the bone marrow microenvironment (BMME). Within the BMME, AML cells interact with stromal (e.g. fibroblasts) and immune cells (e.g. macrophages [Mϕs]), with a well-established role for these cells impacting upon chemoresistance in blood cancers, including Multiple Myeloma.

The study objectives were to ascertain the role played by fibroblasts and Mϕs in conferring protection of AML cells from cell death induced by traditional chemotherapeutics and a multi-cyclin-dependent kinase/myeloid cell leukaemia 1 inhibitor (multi- CDKi/MCL1 i) AML cells and determine the molecular mechanism(s) underlying this chemoresistance.

U937 cells were incubated with normal media (NM) or conditioned media from the human BM fibroblast cell line HS5 (HS-CM) or primary Mϕs (Mϕ-CM). The U937 cells were then exposed to daunorubicin/doxorubicin (1mM) or the multi-CDKi/MCL1i (0-10 mM) for 24h. HS-CM and Mϕ-CM significantly protected U937 cells from the effects of the daunorubicin/doxorubicin and the multi-CDKi/MCL1i. HS-CM and Mϕ-CM activated various pro-survival and anti-apoptotic pathways in U937 cells including the ERK1/2 and MCL-1 pathways respectively. Initial studies suggest that treatment of U937 cells with the MEK1/2 inhibitor selumetinib re-sensitised the U937 cells to the multi-CDKi/MCL1i in the context of HS-CM.

These findings demonstrate that combining a novel multi-CDKi/MCL1i with selumetinib may overcome fibroblast elicited chemoresistance and may represent a promising therapeutic approach for AML.

Speaker Biography

Mark Williams qualified with a BSc (Hons) in immunology and pharmacology from the University of Strathclyde in 2006. He was then awarded a PhD in immunobiology from Queen's University Belfast in 2010, where he conducted studies investigating the impact of different CFTR mutations on inflammation in cystic fibrosis. He then conducted his postdoctoral research studies in acute lymphoblastic leukaemia and multiple myeloma at the University of Glasgow from 2010-2016. He obtained his lectureship in cell and molecular biology at Glasgow Caledonian University in 2017, in which his research focuses on modelling and therapeutically targeting leukaemia-bone marrow microenvironment interactions in acute myeloid leukaemia. He has published papers in high impact journals including blood and he is also a reviewer for the open access Journal Cancer Drug Resistance, as well as research grants for the Glasgow Children's Hospital Charity and the Carnegie Trust.

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Notes:

Novel intensified bioreactor by continuous product phase separating

Arjan Oudshoorn
Delft Advanced Biorenewables, The Netherlands

Innovations in molecular biology grow the number of products that can be generated by biosynthesis exponentially. Cost effective production is key in order to successfully introduce those biosynthesized products in novel market applications and/or replace, often fossil based, chemicals. Cost effect production requires not only strain improvement but requires all aspects of production to be in-line with one-another. DAB has developed an in-situ product removal (ISPR) methodology and integrated this in a bioreactor for intensified microbial fermentations. This intensified bioreactor allows continuous production and ongoing product removal. The benefit of the ISPR bioreactor, called the FAST (Fermentation Acceleration by Separation Technology), is to increase the productivity (by reducing product inhibition) and to lower the intensity of the downstream processing steps. In this way operational expenditure, especially direct downstream processing cost, can be significantly reduced. This presentation gives an overview of the most interesting results of a one-year successful piloting campaign on multiphase fermentations at the Bioprocess Pilot Facility in Delft. As an example, a sesquiterpene producing *E. coli* extractive fermentation is addressed. Organic phase separation capacity of the intensified 'FAST' reactor can be tailored towards microbial activity. Recovery efficiency can go >95% overall, while fermentation is still ongoing. Based on the technical performance of the reactor in the yearlong pilot campaign, the readiness of the reactor concept is discussed; this, in relation to its applicability in large scale microbial production processes for advanced fuels and chemicals as well as in relation to future cost-effective production biosynthesis of chemicals.

Speaker Biography

Arjan Oudshoorn has a PhD from Delft University of Technology, The Netherlands in separation technology; applied to *in-situ* product removal of butanol fermentations. He is CTO of Delft Advanced Bio-renewables (DAB). He has over 12 years of experience on fermentation product separation and bioprocess development. He worked in three start-up companies and led process development to three successful pilots.

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Switches, thresholds and flux signals in the control of central metabolism's architecture in *Escherichia coli*

Mansi El-Mansi
University of Africa, Nigeria

The ability of microorganisms to reconfigure the topology of central metabolism from acetogenic to gluconeogenic architecture is central to successful adaptation and in turn, survival, as the environment changes from "feast" to "famine". Based on flux analysis, measurements of enzymic activity of isocitrate lyase and its m-RNA transcripts, the author proposes that the central metabolic pathways of *Escherichia coli* are bicyclic in nature and that the organism's ability to switch from one cycle to another is controlled by the "diauxic switch", which is turned "on" or "off" in response to a drop-in flux to ATP to a critical thresh hold as growth rate-diminishes from µmax to ≤0.43h-1. The shortfall in ATP supply is redressed by increasing flux through succinyl CoA synthetase, which under these circumstances, necessitates the operation of the glyoxylate bypass for the provision of succinyl CoA. Uniquely, however, yet in complete harmony with the hypothesis presented, the glycerol phenotype does not appear to employ the "diauxic-switch", as glycerol affords direct entry into the two glycolytic SLP-ATP generating reactions, thus maintain the level of ATP above the critical threshold required for the activation of the diauxic-switch.

Speaker Biography

Mansi El- Mansi is a PhD graduate in microbial biochemistry and molecular enzymology, University College of Wales, Aberystwyth, UK (1982). Immediately after graduating, he joined Dr Harry Holms research group at the University of Glasgow, department of biochemistry; under the leadership of professor Martin Smellie. Such a happy association continued for the best part of a decade in which many discoveries were made on the control of isocitrate dehydrogenase activities and the expression of the glyoxylate bypass operon. During the course of his career at Glasgow University (9 years) and in Edinburgh (17 years) as well as at Sharda University, India (3 years) and more recently at Elizade University and University of Africa, Nigeria. He has had many notable achievements in academic and applied research. In addition to elucidating the signal, which triggers the expression of the ace operon in vivo in preparation for the switch of central metabolism's topology from acetogenic to gluconeogenic architecture.

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Notes:

Upcoming Conference

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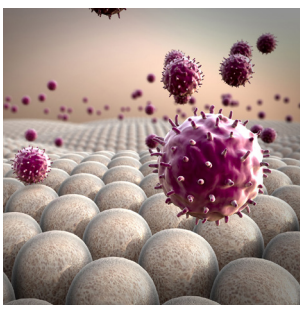

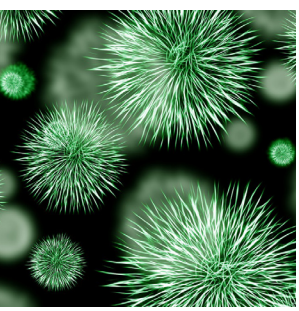

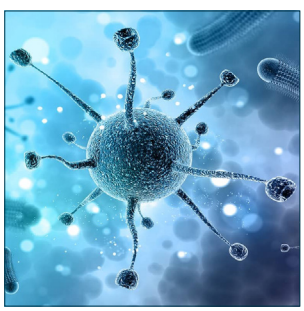

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Interaction between probiotics and skin pathogens within the host

Duaa S Al-Dulaimy, Julian Marchesi and **Eshwar Mahenthiralingam**
Cardiff University, UK

The skin is an ecosystem which frequently interconnects with the outer environment and colonized with a vast number of different microorganisms. These microbial groups are associated with human health and disease. Skin and soft tissue infections (SSTIs) are the infections caused as a result of the microbial invasion of the skin layers and underlying soft tissues. They vary from mild to severe infections. The prolonged appliance of antibiotics can expand the incidence of antibiotic resistance. This has led to the necessity to find a safe long-term alternative treatment for infectious diseases. Many studies have exposed the promising advantages of probiotics in both prevention and treatment of diseases. Probiotic bacteria have many valuable properties to repress the growth of pathogenic microorganisms. Members of the genus *Lactobacillus* are one of the most common probiotics used in fermented and non-fermented dairy products. Animal studies were successfully demonstrated in using the wax moth larvae *Galleria mellonella* as a model to investigate host-pathogen interactions. This project aimed to explore both the *in vitro* antagonistic activity and *in vivo* protective effect of food isolated *Lactobacillus* species against two of the major causes of skin infections: *Staphylococcus aureus*, *Streptococcus pyogenes*. Pathogenic bacteria were isolated from skin infections' patients. *Lactobacillus* species were isolated from fermented food products. Bacterial biodiversity of food samples was evaluated by culture-independent method (16S rRNA gene meta-analysis). Antibacterial activity of *Lactobacillus* on the pathogens was assessed by an overlay assay. To determine the numbers of both *Lactobacillus* and pathogenic isolates, several serial dilutions of bacterial washed cells were injected inside the larvae individually in triplicates. To evaluate the therapeutic potential of *Lactobacillus* against the pathogens and depending on the larval survival percentages, two doses of *Lactobacillus* bacterial cells were injected in the larvae after the injection of several doses of each pathogen. Two *Lactobacillus* species: *Lb. delbrueckii* and *Lb. plantarum* were isolated from food samples (yogurt and olives) inoculated in MRS broth and incubated under anaerobic conditions. However, culture-independent method of these samples inoculated in the same medium and incubated under the same conditions showed an abundance of 0.8% for the first species and no abundance for the second species in the extracted genomic DNA. All lactobacilli revealed the maximum antagonism after 72h under anaerobic conditions. Injection of both *Lactobacillus* species in a dose of 103 – 104 CFU/larvae showed 80% - 100% larval survival. *Strept*. *pyogenes* was more virulent to the larvae than *Staph aureus*. When compared with the control groups, low dose of one of the *Lactobacillus* species has a protective activity against the infection caused by *Strept pyogenes*. It can be concluded that food lactobacilli have an adequate therapeutic potency against skin pathogens used in the study.

Speaker Biography

Duaa S Al-Dulaimy is currently pursuing her PhD in Cardiff University, UK. She has completed her BSc degree from Department of Biology/ School of Biosciences, Mustansiriyah University, Iraq and her MSc degree from the same department. She has published several papers in reputable journals and has been working as a lecturer for more than ten years teaching the undergraduate students of medical microbiology and biotechnology. And, she has supervised several undergraduate students.

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Notes: