DEVELOPING ANTIBIOTIC ALTERNATIVES

A discussion of new approaches to overcoming antimicrobial resistance

ABSTRACTS

8th - 10th November 2016
Location: Online
In the face of rising levels of antibiotic resistance, this international event will explore alternative strategies to infection control.

This event has CPD accreditation

http://lifescienceevents.com/antibiotics2016/

#AntibioticsESC

The abstract book will be finalised two weeks before the event
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Invited Speakers Abstracts

Complementary and Alternative Medicine as an alternative to antibiotics
Dr. Mubashir Arain, University of Calgary, Alberta, Canada
Complementary and Alternative Medicines are getting more and more attention in the last few decades. This includes homeopathic medicine, batch flower therapy, herbal medicine etc. Some of these have been found to be very useful in treating infections without needing antibiotics. For antibiotic resistant cases, such an alternative should be considered. There is a lack of rigorous research for most of the alternative system of medicine. A good research can combine traditional medicine and alternative medicine to develop formulas that can be used to treat cases where traditional medical treatment may not be appropriate.

New perspectives to fight Burkholderia cenocepacia, a very dangerous Cystic Fibrosis pathogen
Silvia Buroni PhD, University of Pavia, Pavia, Italy
Burkholderia cenocepacia is a Gram-negative bacterium that is widespread in the environment and an opportunistic pathogen for Cystic Fibrosis patients. It causes an increased decline of lung function and can lead to a fatal pneumonia. B. cenocepacia shows resistance to numerous classes of antibiotics (aminoglycosides, cephalosporins, polymyxins, and β-lactams). Different resistant mechanisms have been identified in these bacteria, including alteration of drug target site, enzymatic drug inactivation or modification, reduced membrane permeability, and/or activation of efflux systems. Our research is focused on the identification of new drugs and alternative targets to improve the clinical approach.

Novel enzyme-based antibacterials against Gram-negative pathogens that do not provoke resistance development
Dr Yves Briers, Laboratory of Applied Biotechnology, Ghent University – Campus Schoonmeersen, Gent, Belgium
Artilysin®s represent a novel, promising class of antibacterials, combining the lytic power of bacteriophage-encoded endolysins and outer membrane penetrating peptides. Selected peptides that locally destabilize the outer membrane of Gram-negative bacteria have been covalently fused to endolysins that degrade the peptidoglycan layer. These peptides promote the transfer of the fused endolysin to the peptidoglycan layer across the outer membrane. Time-lapse microscopy has shown that cells are killed within seconds due to active peptidoglycan degradation and subsequent cell lysis. Artilysin®s are active against multidrug-resistant bacteria and persisters.

Bacteriophages as Natural, Self-Regulating and Self-Limiting Antimicrobials
Dr Elizabeth Martin Kutter, Lab I, The Evergreen State College, Olympia, WA, United States
Nemesis Symbiotics: novel biological therapeutics to inactivate antibiotic resistance
Professor Conrad Lichtenstein, Nemesis Bioscience Ltd, United Kingdom
We seek to resurrect sensitivity to antibiotics in antimicrobial resistant (AMR) pathogens using a programmable RNA-guided DNA endonuclease gene editing technology expressing multiple guide RNAs to target multiple families of AMR genes. Our experiments suggest that such multi-functional gene targeting systems may obviate the need for prior diagnostic screens for antibiotic resistance and can be used generally as a companion biological therapeutic, that we call Nemesis Symbiotics, together with well-established antibiotics such as ampicillin for both therapeutic treatment of infections as well as prophylactic treatment by preventing the spread of resistance genes.
Quorum sensing inhibition to control bacterial disease: aquaculture as a case study
Tom Defoirdt, Ghent University, Ghent, Belgium
Due to large-scale use of antibiotics, many pathogenic bacteria have acquired (multiple) resistance, and therefore, alternative treatments to control disease are needed.
More than ten years ago, we proposed inhibition of quorum sensing, bacterial cell-to-cell communication, as a novel strategy to control infections caused by antibiotic-resistant bacteria in aquaculture. In this presentation, I will discuss our current knowledge on the impact of quorum sensing and quorum sensing disruption on the virulence of aquaculture pathogens towards different host organisms.
The data we obtained thus far indicate that quorum sensing disruption is a valid alternative biocontrol strategy for aquaculture, that biocontrol agents with quorum sensing-disrupting activity can be obtained from the aquatic environment and that these agents have a beneficial effect on cultured organisms.

Bacteriophage therapy- still promising, but not yet delivering
Dr. David R. Harper, Evolution Biotechnologies, Bedfordshire, United Kingdom
When the antibiotic crisis became apparent in the 1990's, bacteriophage therapy was identified as one of the most promising approaches to countering this. The first new companies were set up to develop this technology twenty years ago. So why are there no therapeutic products on the market, or even close to it? The causes are manifold, ranging from inability to export or finance technologies to corporate failure. However, the basic technology continues to show promise, when and if properly applied. What can be learned from activities to date, and how is this best applied to getting medicines to market?

The viability of using bacteriophages to target infectious disease
Dr Jim O'Mahony, Department of Biological Sciences, Cork Institute of Technology, Cork, Ireland
Bacteriophages are one of the most abundant life forms on earth and act as natural predators for their much larger bacterial hosts. Over the last century, the discovery, isolation and propagation of bacteriophages has opened up a world of new potential for biological research. Most notably is the application of bacteriophages as novel antimicrobial agents. Their ease of propagation, host specificity and well characterised genetic composition makes them well suited as alternatives to conventional antimicrobial therapies.
In our laboratory we have dedicated many years to optimising the isolation, purification and molecular characterisation of bacteriophages for a range of significant pathogens. We have demonstrated their efficacy against clinical hosts such as MRSA, animal pathogens including mycobacteria, and plant based pathogens such as Pectobacterium. A range of strategies have been employed including the use of single phages, cocktails of phages, as well as more sophisticated molecular approaches where the phage genome is used to identify genes coding for enzymes with potent anti-bacterial activities. Subsequent cloning, expression and purification of these novel enzymes has resulted in significant anti-microbial activity, even against many drug resistant pathogens.
This talk will focus on our experience in this area and discuss the advantages and disadvantages of pursuing this option as a viable strategy in the war against antimicrobial resistance.

Extremely thermostable enzymes of bacteriophage origin - their use against Gram-negative bacteria
Dr Magdalena Plotka, University of Gdansk, Department of Microbiology Gdansk, Poland
Lytic enzymes (endolysins) are highly evolved enzymes produced by bacteriophage to lyse bacterial cell for phage progeny release. Endolysins may represent an effective way to control pathogens without disturbing normal microflora. External lysis was widely described in Gram-positive bacteria, while in Gram-negatives an outer membrane (OM) is a barrier preventing the endolysin to reach its target (a peptidoglycan layer of the bacterial cell wall). Our group is interested in small endolysins...
derived from thermophilic, Gram-negative bacteria. Those enzymes can naturally pass the outer membrane barrier and are active against important Gram-negative pathogens such as carbapenem-resistant Acinetobacter baumannii or Pseudomonas aeruginosa.

**High-Throughput Screening of Antibiotic-Resistant Bacteria in Picodroplets**

Dr. Clive Smith, Sphere Fluidics Limited, Cambridge, United Kingdom

We have recently developed a novel microfluidic-based picodroplet platform which enables high-throughput assessment and isolation of antibiotic-resistant bacteria in a label-free manner. As a proof-of-concept, the system was used to isolate fusidic acid-resistant mutants and estimate the frequency of resistance among a population of Escherichia coli (strain HS151). This approach allowed us to screen 1 billion bacteria, in order to isolate the spontaneous mutants and determine the frequency of resistance (FOR). It can be used for rapid screening of rare antibiotic-resistant mutants and to help identify novel compound/target pairs.

**New strategies for detection and control of antibiotic resistant bacteria**

Dr. Iryna Sorokulova, Auburn University, Auburn, United States

Emergence of antibiotic-resistant bacteria is one of the most serious threats for healthcare and public safety worldwide. Resistant strains of pathogens are implicated in serious infections and nosocomial outbreaks. Early detection of antibiotic-resistant pathogens as well as adequate therapy are needed for the treatment and preventing the spread of infection. In previous years successful response to emerging resistance was discovering of new antibacterials. Today this strategy has failed, because resistance is accumulated faster than new antibiotics have been developed. We demonstrated new approaches for detection of antibiotic-resistant bacteria in real time and for control of these pathogens.

**Novel antivirulence agents against bacterial pathogens**

Dr Menachem Shoham, Case Western Reserve University, U.S.A.

Antivirulence agents present an alternative or an adjuvant to antibiotics. In contrast to antibiotics, antivirulence agents are not bactericidal and not even bacteriostatic. Their mechanism of action is based upon disarming the pathogen of toxins and virulence factors without killing it, thereby decreasing the pressure on the pathogen to develop resistance. We have discovered small-molecule quorum-sensing inhibitors against MRSA that promote healing of infected wounds and reduce bacterial load in invasive infections in murine models. Efficacy has been demonstrated against other Gram-positive pathogens, such as Staphylococcus epidermidis, Streptococcus pyogenes, Streptococcus pneumoniae and Bacillus anthracis.

**Disarming Pathogens: Benefits and Challenges of developing antimicrobials that target virulence instead of viability**

Dr. Makrina Totsika, Queensland University of Technology, Brisbane, Australia

The WHO has declared antimicrobial resistance (AMR) a public health priority. No action will result in more AMR deaths than cancer by 2050. New therapies against multidrug resistant pathogens are urgently needed. Unlike antibiotics, antivirulence drugs inhibit bacterial virulence instead of growth, offering a new class of ‘evolution-proof’ and ‘tailored-spectrum’ antimicrobials. I will discuss the latest evidence on the promised benefits of antivirulence drugs, highlighting the challenges in evaluating these for each virulence strategy targeted. Overcoming such challenges constitutes an important step in the development of antivirulence antimicrobials into next-generation therapies for common infections that are now refractory to antibiotics.
**Oral Presentation Abstracts**
Oral presentations will be added after the submission deadline

Day 1:

Day 2:

Day 3:

**Poster Presentation Abstracts**
Poster abstracts will be finalised weeks before the event