

Speaker Profile and Abstract

Title: “Restoring colistin killing ability of Gram negative bacteria with the *mcr-1* plasmid”

Abstract: Colistin, a polymyxin, is a last resort antibiotic for the treatment of carbapenem-resistant Gram negative infections. Until recently, mechanisms of colistin resistance were limited to chromosomal mutations which are not transferred between organisms. Meaning that in an infection a resistant bacterium does not transfer that ability to nearby bacteria. However, a recently identified mobile plasmid-mediated colistin resistance mechanism, encoded by the *mcr-1* gene, does allow lateral transfer.

From its identification in NW China about 3 years ago *mcr-1* has spread to over 30 countries. Additionally, it has now moved to other types of bacteria including *K. pneumoniae* and *Pseudomonas*. The *mcr-1* colistin resistance mechanism is a major threat due to its lack of fitness cost and ability to be transferred between strains and species. Acquisition of the *mcr-1* plasmid by cephalosporin- and carbapenem-resistant Gram negative bacteria may result in potentially untreatable infections and increased mortality.

We have designed from basic principles novel compounds that restore the ability of colistin to kill *E. coli* with the *mcr-1* mutation as well as other colistin resistant bacteria. In microbiology studies the MIC of *E. coli* *mcr-1* + strains was decreased from 6.25µg/ml to >0.5µg/ml. We have proven the effectiveness of this combination approach using the standard mouse thigh infection model.

Biography: *Roger Beuerman* has been Scientific Director of the Singapore Eye Research Institute for almost 20 years, as well as Professor of Neuroscience and Behavioral Disorders. He was also the recipient of the President’s First Science and Technology Award here in Singapore. With two NRF Singapore grants, he has formed a productive multi-disciplinary group to develop and test promising new classes of antimicrobials.

The product of their work has resulted in a number of patents and a spinoff that has become a small multi-national pharmaceutical company. They have found new ways of combating and avoiding antibiotic resistance and recent work on fungal infections and coatings for implants has opened new possibilities for treating patients.

The other area of active interest is in proteomics and personalized medicine. He has contributed to our understanding of dry eye disease and with his colleagues coined the term “functional unit” to explain how the tear layer of the eye functions. His seminal work on dry eye and biomarkers has been a focus of development for personalized medicine.

He was an early developer of the clinical confocal microscope and was the first to point out the ability to diagnose fungal infections in the living human cornea. Roger has been involved in ophthalmology for some years, has more than 350 publications along with three books and has worked with the pharmaceutical industry for many years to develop new products.

Bio Summary:

- Scientific Director of the Singapore Eye Research Institute
- Professor, Duke-NUS, SRP Neuroscience & Behavioural Disorders
- Adjunct Professor, Biochemistry Dept. of Biochemistry, NUS, Yong Loo Lin School of Medicine
- Director SingHealth Medical Proteomics Centre
- Programme Director, Proteomics Core Platform Research Tower Space Allocation Committee (SAC) & SGH Pathology Building Central Steering Committee (CSC)
- Adjunct Professor, School of Chemical and Biomedical Engineering Nanyang Technological University

Education

- 1965 B.S: Psychology, Frederick College, Portsmouth, Virginia
- 1973 PhD: Florida State University, Tallahassee, Florida

Research Interests

Development of novel antimicrobials for use in ophthalmology, proteomic studies revealing biomarkers of eye disease, and myopia.

You can find more information about the speaker and his work here;

<https://www.seri.com.sg/people/key-researchers/>