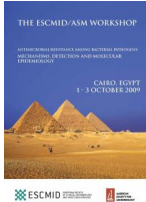


Antimicrobial Resistance among Bacterial Pathogens: Mechanisms, Detection and Molecular Epidemiology

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A workshop on antimicrobial resistance and epidemiology was held in El Cairo, Egypt from 1 – 3 October 2009. This workshop was carried out with the support of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), in collaboration with the American Society for Microbiology (ASM) and the Cairo University and the Society of Practitioners of Infection Control of Egypt (SPIC Egypt).

The objective of the workshop was to provide the participants with updated background information and a short practical approach to the study of the mechanisms of antimicrobial resistance as well as the molecular epidemiology in clinically relevant Gram-positive and Gram-negative microorganisms.

The event took place at the School of Medicine, Cairo University. One hundred students from different African countries met for a theoretical presentation during the morning and 20 students from selected institutions from these countries participated in the afternoon microbiology practice sessions.

The first day was dedicated to Gram-positive bacteria. In the first presentation, Dr Amani El Kholly, Professor of Clinical Pathology, Faculty of Medicine, Cairo University Director of Microbiology Laboratory, Children Hospital, offered a review of the regional epidemiology of the antimicrobial resistance in these microorganisms. Dr Stephen Brecher, from VA Boston Healthcare System, USA, presented the evolution, mechanisms, and laboratory detection of antibiotic resistance in *S. aureus* and coagulase-negative *Staphylococcus*. Then, Dr Stephen Jenkins, New York Presbyterian Hospital, New York, NY, USA, gave two talks presenting relevant aspects on the antimicrobial resistance in *Streptococcus pneumoniae* and macrolide-resistance in group A streptococci and later on Dr Brecher, discussed the important aspects of the evolution of bacterial resistance in enterococci and how to detect it in the laboratory. As the

final talk of the day, Dr David P. Nicolau, from the Center for Anti-Infective Research and Development, Hartford, CT, USA, gave a lecture titled “Resistance among less common Gram-positive bacteria and PK/PD presentation”.

On the following day, Gram-negative bacteria were reviewed. Dr John Klena, Molecular Epidemiology Unit, US Naval Medical Research Unit No. 3, Cairo, Egypt (NAMRU-3), presented the most important aspects of the regional epidemiology of bacterial resistance in Gram-negative bacilli and Dr Matilda Nicklasson from the same institution presented the main procedures to extract DNA for further analysis. “*Acinetobacter baumannii* and *Pseudomonas aeruginosa* as paradigms of multiresistant bacteria” was then presented by Prof Jordi Vila, from Hospital Clinic and School of Medicine, University of Barcelona, Spain, in two lectures. The multiple mechanisms for antimicrobial resistance, its molecular basis and its evolution together with clinical impact were analyzed in these lectures. In addition, the role of biofilm formation in the antimicrobial resistance in *P. aeruginosa* was discussed. Prof Gian Maria Rossolini, from Siena University, Italy, lectured on the emergence, dissemination and clinical impact of the carbapenemases in *Enterobacteriaceae* and non-fermentative Gram-negative bacilli. In addition, he gave a lecture on extended spectrum beta-lactamases, with special emphasis on their epidemiology and laboratory methodology to detect them. In the last presentation, Prof Luis Martínez-Martínez from the Hospital Marquez de Valdecilla in Santander, Spain, discussed the mechanisms and epidemiology of quinolone resistance in *Enterobacteriaceae*.

The last day was devoted to different topics. First of all, new tools on diagnosis of infectious diseases, antimicrobial resistance investigation and genetic units of resistance were discussed by Prof Vila, Martínez-Martínez and Rossolini, respectively. In addition, in this first part of the day, Dr Scott Spencer from The Verification Research, Training and Information Centre (VERTIC) discussed the legal aspects of biosafety and biosecurity. The second part of this day was dedicated to epidemiological aspects. Dr David P. Calfee, Mount Sinai School of Medicine, New York, NY, USA, gave two talks, one on “Surveillance cultures: When? How? To whom?” and another on “How to control the spread of

microorganisms?” In addition, Dr Atef El-Gendy, Molecular Epidemiology Unit, United States Naval Medical Research Unit No. 3, Cairo, Egypt (NAMRU-3), presented the background of molecular epidemiology mainly analysis of chromosomal DNA by digestion with low-frequency restriction enzymes and pulsed field gel electrophoresis.

During the afternoon practical sessions participants learned about the background and performance of some tools applied to search for mechanisms of resistance to antimicrobial agents. Specifically, the mutations in the *gyrA* and *griA* genes associated with quinolone resistance in *S. aureus* were determined by PCR-RFLP, followed by characterization of the cassette carrying the *mecA* gene in the same microorganism. In addition, the detection of the *bla*_{TEM} and *bla*_{OXA} genes was also carried out. On the last day the background of the applied tools as well as the data obtained was discussed in depth.

We think that this was a good opportunity for the young clinical microbiologists and infectious diseases specialists from Africa to know better what ESCMID is about and improve their knowledge through the activities performed.