

Introduction

This book contains a compilation of works which were presented at the International Conference on Antimicrobial Research (ICAR2010), which took place in Valladolid (Spain), during November 3rd-5th 2010 (<http://www.formatex.org/icar2010>). This inaugural edition was attended by more than 500 delegates from about 60 countries.

Plenary Lectures were given by Paul Williams, from the Centre for Biomolecular Sciences, Nottingham University (UK), who talked about “Quorum sensing as an antibacterial target”; Stephen Bentley, from the Wellcome Trust Sanger Institute, Cambridge (UK), with a speech entitled “Viewing evolution and global spread of drug resistant bacterial pathogens through whole genome sequencing”; and Thierry Jouenne, from the Facility of the European Institute for Peptide Research, University of Rouen (France), who delivered the speech “The Biofilm proteome: the holy grail”.

This conference series will provide a new forum in Europe for the presentation, exchange and dissemination of information and experiences on anti-microbe strategies (against bacteria, fungi or protozoans), in biotic or abiotic environments, in planktonic or adhered states, in biologically specific or unspecific ways, *in vitro* or *in vivo*, in a general context marked by the threat posed by the increasing antimicrobial resistance of pathogenic microorganisms. “Anti” is here taken in a wide sense as “against cell cycle, adhesion, or communication”, when harmful for human health, industry or economy (infectious diseases, chemotherapy, food, biomedicine, agriculture, livestock, biotechnology, water systems...). It will include topics on antimicrobial resistance, (early) microbial and resistance detection, enhancement of innate defences against pathogens, as well as methods & techniques.

The topics discussed at the conference were:

Antimicrobial chemistry (experimental and computational). Analytical detection of antibiotics in complex samples.

Synthesis and screening of novel chemical compounds for antimicrobial action. Natural, synthetic and semi-synthetic antibiotics. Analogs. Structural determination. *In-silico/ab-initio/de-novo* antimicrobials discovery. New targets for antimicrobials. Rational design of antimicrobials. Bioinformatics and comparative genomics for the identification of antimicrobial targets...

Antimicrobial natural products.

Antimicrobial substances from terrestrial and marine organisms. Antimicrobial peptides. Antimicrobial enzymes. Essential oils. Bioactive phytochemicals. Plant/Herbal extracts. Purification. Structural determination...

Antimicrobials mechanisms of action.

Methods and Techniques.

Antimicrobial resistance. Superbugs. Multi-resistant strains. Emerging and re-emerging pathogens.

Microbial resistance to antibiotics and biocides. Molecular mechanisms. Resistance genes. Prevention of resistance. Surveillance & statistics. Genetics and Proteomics. Emerging and re-emerging bacteria and fungi in humans, animals, and plants. Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin Intermediate/Resistant *Staphylococcus aureus* (VISA/VRSA), *Clostridium difficile*, *Mycobacterium tuberculosis*, Vancomycin-resistant *enterococcus* (VRE), *Cryptosporidium*, *Plasmodium parasite*, *Plasmodium falciparum*, *Leishmania* species, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Acinetobacter baumannii*, *Cryptococcus*, *Escherichia coli* O157:H7, *Helicobacter* spp., *Enterobacter sakazakii*, *Serratia* spp., Fluoroquinolone-Resistant *Pseudomonas aeruginosa* (FQRP)...

Antimicrobial microbes.

Microbial-derived toxins. Bacteriocins (colicins, microcins, lantibiotics...). Archaeocins. Biocontrol approach to microbial invasions (probiotics, lactic acid bacteria...). Biosynthesis of antibiotics. Genetic and metabolic engineering. Gene regulation...

Antimicrobial viruses.

Bacteriophages. Phage therapy and biocontrol in humans, animals (agriculture-farm animals, aquaculture), plants, food industry... Materials functionalization with bacteriophages. Using bacteriophages for microbiological detection...

Antimicrobial materials science and surface chemistry. Biofilms.

Antimicrobial, anti-adhesive surfaces & coatings. Microbial adhesion to surfaces. Biofouling. Biofilm formation, control and eradication. Novel characterization techniques. Physical and chemical (inorganic (e.g. silver, copper compounds) and organic) surface modification. Cationic surfaces. Functionalization strategies for polymers, metals, metal oxides, ceramics. Drug-eluting concepts. Biofilms susceptibility to antimicrobials. Antibiotic resistance of microorganisms in biofilms. Genomics and Proteomics...

Antimicrobials in consumer products.

Textiles (hygienic clothing, activewear, medical textiles...), paper industry, active packaging (food industry...), public buildings (hospitals, schools, restaurants, day care centers, nursing homes...). Safety and toxicological aspects...

Antimicrobial physics.

Exploitation of physical properties for killing/inactivating microbes: surface tension (nano-emulsions), radiation, ultrasounds, temperature, specific properties of nano-materials (nano-particles, nano-tubes/wires, nano-crystals, nano-grained materials...). Resistance to physical agents...

Non-antibiotic biocides. Hygiene and Sterilizing.

Disinfectants, antiseptics, preservatives... Mechanism of action. Resistance to non-antibiotic biocides. Combination of physical and chemical treatments. Hygiene and Sterilizing. Sanitizers. Regulatory issues. Good practices...

Techniques and Methods.

Susceptibility Testing. Rapid microbial and resistance detection. Detection of antibiotics in environmental samples. Microscopy, microanalysis & spectroscopy, single-cell studies, high-throughput studies, nanomechanical studies, microfluidics, lab-on-a-chip concepts, miniaturized science, analysis of microbial surfaces, heterogeneity, statistics. Interaction of antimicrobial drugs with model membranes. Analytical techniques...

The Intelligent war.

Interfering microbe-microbe communication (quorum sensing) as antimicrobial strategy.

Strengthening of innate immune system as antimicrobial strategy.

Immunotherapy, immunomodulating agents, cytokines (interleukins, colony-stimulating factors, interferons...), hormones... Novel vaccines for preventing or treating disease...

Antimicrobials evaluation. Pre-clinical and clinical trials.

Public awareness, learning & teaching, influence on policy-makers. Regional regulatory frameworks and experiences on antimicrobials.

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