

ICONAN 2016

International Conference on **NANOMEDICINE**
And **NANOBIOTECHNOLOGY**

Sept 28-30, 2016
in Paris



Title: Nano-antibiotics: A rational design of functional nanoparticles to combat bacterial infection

Rabah Boukherroub

Institute of Electronics, Microelectronics and Nanotechnology (IEMN), UMR CNRS
8520, University Lille1, Avenue Poincaré – BP 60069, 59652 Villeneuve d'Ascq,
France

E-mail: rabah.boukherroub@iemn.univ-lille1.fr

Complications related to infectious diseases have significantly reduced, particularly in the developed countries, due to the availability and use of a wide variety of antibiotics and antimicrobial agents. However, excessive use of antibiotics and antimicrobial agents increased the number of drug resistant pathogens, and this has resulted in a significant threat to public health. The inexorable rise in the incidence of antibiotic resistance in bacterial pathogens, coupled with the low rate of emergence of new clinically useful antibiotics, has refocused attention on finding alternatives to overcome antimicrobial resistance. Novel strategies aiming to reduce the amount of antibiotics, but able to prevent and treat animal and human infections should be investigated, evidenced and approved.

Among the various approaches, the use of nanotechnology (engineered nanoparticles) is currently the most promising strategy to overcome microbial drug resistance. Due to their small size, nanoparticles can surmount existing drug resistance mechanisms, including decreased uptake and increased efflux of drug from the microbial cell, biofilm formation, and intracellular bacteria. Moreover, loading multiple antimicrobial agents on the same nanoparticle makes the development of resistance unlikely. Finally, nanoparticles can target antimicrobial agents to the site of infection, so that higher doses of drug are given at the infected site, thereby overcoming resistance.

Despite considerable recent progress in the understanding of the mechanisms underlying bacterial infections, and in the development of nanostructured materials displaying antibacterial properties and activity against biofilms, the quest to design and fabricate new antibacterial nanostructures remains a high research priority.

In this presentation, after an overview on the different nanomaterials possessing antimicrobial activities, I will discuss the use of nanosized drug carriers to efficiently administer antibiotics by improving their pharmacokinetics and bioaccumulation, while reducing the adverse effects of antibiotics.