

2nd International Congress on Bacteriology & Infectious Diseases

November 17-19, 2014 DoubleTree by Hilton Hotel Chicago-North Shore, USA

Nanotechnology incorporated to the development of tests aiming to the detection of bacterial pathogens

Ikonomopoulos J Agricultural University of Athens, Greece

The social and financial impact of infectious diseases is unfortunately still very significant and therefore the development of new diagnostic tests with improved characteristics continues to be an important research priority. Over the last decade, a large number of reports have been published with various polymerase chain reaction (PCR) and real time PCR assays aiming at the detection of specific sequences of microbial pathogens directly from clinical samples. However, the reliable application of these methods requires highly-specialised personnel, dedicated equipment and space. Vigorous precautions are needed to avoid false positive and negative results that are often associated respectively with the "carry over effect" i.e. successive passage of amplicons from one test sample to the other and the presence of PCR inhibitors. Because of these drawbacks of the "molecular" approach, diagnostic research has targeted several alternatives in the past, the most recent of which is perhaps the incorporation of nanoparticles for the detection of specific bio-molecules.

Today, the advances in nanotechnology render the construction of systems with dimensions comparable to those of biological molecules that can be applied to study biological processes. Nanoparticles can be conjugated to oligonucleotides, antibodies and peptides allowing multi-labeling or multi-target detection within the context of diagnostic applications designed to identify the genetic or the immunogenic footprint of a pathogen. Depending on the properties of the material one is interested to make use of there is a number of metal or polymer nanoparticles from which to choose. New and improved techniques are becoming available with the ability to detect increasingly smaller amounts of biological material even without the need for amplification or high cost equipment which are the main disadvantages of the PCR-based diagnostic methods. Most importantly, nanotechnology offers today the means to accommodate many aspects of the diagnostic investigation of infectious diseases through tests that will be applicable even at poor resource settings because of their small dependency on specialized personnel or dedicated equipment.

ikonomop@aua.gr