# Effect of Sub-Inhibitory Concentrations of Nano-Meropenem on mexA Gene Expression in Multidrug-Resistant Pseudomonas aeruginosa Clinical Isolates

**Ali Abdulridha Thabit Al-Saeedi**
University of Erciyes, Kayseri, Turkey

**Dr. Mikail Akbulu**
University of Erciyes, Kayseri, Turkey

**Dr. Marwa Hameed M. Alkhafaji**
University of Erciyes, Kayseri, Turkey

**Abstract:**
Pseudomonas aeruginosa is a major opportunistic pathogen related to a wide range of hospital-acquired infections and is characterized by its ability to develop multi-drug resistance through multiple genetic and physiological mechanisms. The increase in spreading of antibiotic resistance has significantly limited the effects of conventional antibiotics, increasing the need for innovative therapeutic treatment approaches. This study investigated the antibacterial activity of the nano-antibiotic meropenem and molecular characteristics of Pseudomonas aeruginosa from various sources and assessed its effect by study of gene expression. Minimum inhibitory concentration (MIC) was determined by microtitration method. Meropenem was synthesized in nanoparticle size and measured by (AFM) before biological evaluation. Gene detection occurred to detect antibiotic resistance gene (mexA) by PCR then gene expression performed by using real-time quantitative polymerase chain reaction (qPCR) after exposing isolates to MIC concentrations. The results presented that the nano-antibiotic exhibited enhanced antibacterial activity compared to the conventional drug and also induced concentration-dependent changes in the expression of resistance-associated genes. These results suggest that nano-formulated meropenem may represent a novel strategy to improve the treatment of multidrug-resistant Pseudomonas aeruginosa infections and provide a basis for future work into nanotechnology-based antimicrobial drugs.