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Development of a novel rapid assay for the detection of *Enterobacter cloacae* using conjugated gold nano-particles

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Enterobacter cloacae is a Gram-negative bacterium that contributes to a wide range of nosocomial infections all over the world. It causes blood stream infections in both adults and infants, including neonates. The mortality associated with such infections have reached alarming rates, up to 60% in some instances. The emergence of strains that are highly-resistant to multiple antibiotics adds more complexity to situation. In this work, we are developing a rapid assay for the detection of *E. cloacae* using conjugated gold nano-particles. Bioinformatics analyses of *E. cloacae* proteome identified two peptides that are unique to *E. cloacae*. They are highly conserved among *E. cloacae* strains that are sequenced in Genbank. In addition, they showed almost no similarities to peptides in other members of the Enterobacteriaceae family nor other species within the Enterobacter genus. The two peptides were chemically-synthesised, and their identity and purity were verified, then they were used individually to immunize BALB/C mice to produce specific anti-sera. Gold nano particles (GNPs) were produced with the citrate reduction method and their size was verified using electron microscopy. Antibodies were purified and then conjugated to the GNPs. The developed GNPs were then used to detect *E. cloacae* in solution through microscopic examination, spectrophotometrically, and visual inspection. The developed GNPs detected *E. cloacae* with both high sensitivity and specificity. More importantly the time taken for getting the results was less than 1 hour as compared to the 48 hours required for traditional methods and with much less cost than the nucleic acids-based methods. The developed assay provides a sensitive, rapid, and low-cost tool for detection of *E. cloacae* and would contribute in reducing the harms caused by this pathogen through prompt accurate diagnosis.

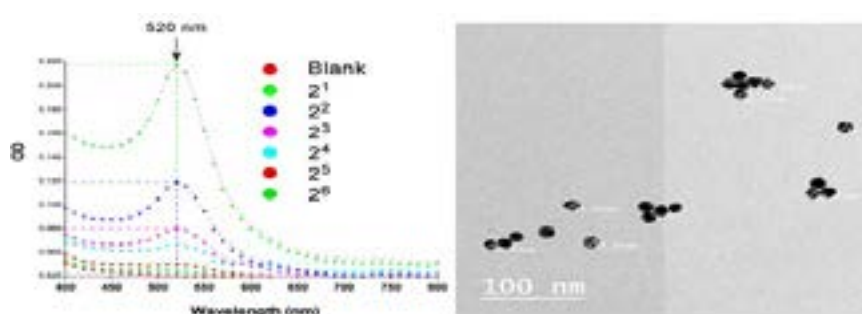


Figure 1. (A) Absorption spectra for different dilutions of the gold nano- particles preparations.
(B) A representative TEM field of the prepared gold nano particles showing range of sizes.

Biography

Ahmed Sherif Attia, works as a Professor of microbiology and immunology, Faculty of Pharmacy, Cairo University. He obtained his PhD in molecular microbiology from the University of Texas Southwestern Medical, USA working on the molecular aspects of the microbial resistance to the complement system. He is working as a postdoctoral fellow at Vanderbilt University, USA, he identified new microbial therapeutic targets and novel host antimicrobial mechanisms using cutting edge technologies. His current research focuses on; i) identifying novel microbial therapeutics, ii) development of new vaccines and biotechnological products, and iii) studying the relationship between microbial infections and therapeutic clinical outcomes in non-infectious diseases. His work is highly recognized both on the national and international stage by being awarded many prestigious awards.

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