

## TITLE

### A QUICK ASSAY OF PATHOGENIC BACTERIA IN KIDNEY INFECTION USING GOLD NANO-BIOSENSORS

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Infectious disease, commonly caused by bacterial pathogens, is now the world's leading cause of premature death and third overall cause behind cardiovascular disease and cancer. Urinary Tract Infection (UTI), caused by pathogenic E.coli bacteria Escherichia (e.g. O157:H7) infection can rapidly produce a powerful toxin, resulting in hemorrhagic colitis. Other pathogenic bacteria (Cholera, Salmonella, Pseudomonas etc.) also produce harmful toxins for the human system. A gold-based nano-biosensor (or, GNWA-antibody-bound gold Nano Wire Arrays) has been developed for quick quantitative determination of the number of bacteria present in UTI by using a detection method by Electrical Impedance Studies (EIS). Preliminary results indicate that the GNWA biosensors (attached to C11-linkers) can detect as few as 50 E.coli cells on a sensor area of 0.2 cm<sup>2</sup>. GNWA C11-linkers are attached to a specific antibody raised against the specific bacterial antigens. Attachment of a specific linker with a specific chain length is important for optimum binding of the bacterial cells. Our present study is optimized for E.coli only. This quick quantification and identification of the bacteria for binding with its specific antibodies (under specific optimal binding condition) would provide quick treatment of the patients with proper antibiotics or other bacteria-killing drugs.