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A novel CTX-M14 related beta-lactamase renders *E. coli* sensitive to the antibiotic nitrofurantoin used to treat urinary tract infections

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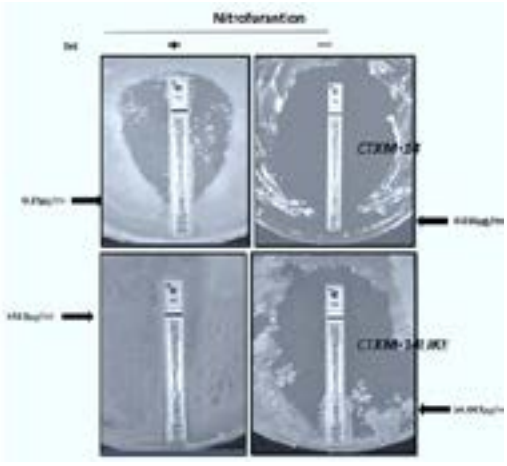
The antibiotic nitrofurantoin is indicated for the treatment of acute or recurrent lower Urinary Tract Infections (UTI) which is caused by strains of *Escherichia coli, Enterococci and Staphylococci, Citrobacter* sp, *Klebsiella* sp or *Enterobactersp*. This study analyzed ESBL-producing bacteria isolated from 300 urine samples of UTI patients from three referral hospitals in North Wales, UK. Multiplex PCR amplification of β-lactamase genes of the *blaCTX-M* groups 1, 2, 9 and 8/25, followed by DNA sequencing revealed one new beta-lactamase gene which is closely related to CTXM-14 at the protein levels. Recombinant expression of this new bla gene renders *Escherichia coli* highly resistant to nitrofurantoin. To characterize this new beta-lactamase, the enzyme was purified from the periplasmic space of *E. coli* or from the growth medium in a highly pure form, utilizing a C-terminal strep-tag. Isoelectric focusing and phostag electrophoresis revealed a high degree of phosphorylation and the presence of at least two distinct protein species. Since this new gene was isolated only from one of the three hospitals, it is quite possible that the new beta-lactamase is responsible for a local increase in nitrofurantoin resistance in UTI patients.



Biography

Yasir Al-Mehdi Edowik is interested in Bacterial Antibiotic Resistance. After earning his Bachelor's degree in Biomedical Science from Bangor University, he went through a one-year training period in the Public Health Wales Microbiology Department at Ysbyty Gwynedd Hospital, Bangor, where he gained experience in routine microbiology. Subsequently, he conducted an MSc (Master of Science) degree in Molecular Biology and Genetics at Bangor University. Currently he is undertaking a PhD in Molecular Microbiology at Bangor University. The research synopsis of his research is epidemiological gene carriage of ESBL-producing bacteria in UTI patients in North Wales.

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