

Comparative genomics of *E. coli* isolated from adult and paediatric patients with inflammatory bowel disease and controls

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Abstract

Several lines of evidence implicate bacteria in the pathogenesis of inflammatory bowel disease (IBD), and *Escherichia coli* is one of the leading candidate triggers. Our aim was to identify genes of *E. coli* associated with IBD. This study involved whole genome comparisons of 179 *E. coli* strains, isolated from 64 Crohn's disease (CD) patients, 18 ulcerative colitis (UC) patients, and 19 controls. These isolates were obtained from different tissues and sources, such as aphthous ulcers, lymph nodes and intestinal mucosa. We used A5 MiSeq to assemble sequences, PROKKA for annotation, ROARY for pan-genome analyses, and SCOARY to assess phenotype-genotype relationships. We determined the serotype, sequence type (ST), virulence genes, plasmids, bacteriophage, CRISPRs, capsules, bacteriocins, and antibiotic resistance genes for each strain. CD-associated *E. coli* were phylogenetically diverse. The most abundant *E. coli* phylogroup was B2 and the most common ST was ST95. The *E. coli* UTI89 plasmid was significantly associated with paediatric CD isolates compared with controls. Based on total gene content, CD isolates were significantly associated with particular genes associated with adhesion, the toxin-antitoxin system, plasmid partitioning, conjugation transfer, and signal recognition when compared to controls. Genes associated with adhesion and invasion and peroxide scavenging were significantly associated with lymph node *E. coli* isolates from CD patients. Our findings suggest that CD-associated *E. coli* are associated with genes involved in adhesion, and the lymph node strains have properties that allow them to survive intracellularly, within phagolysosomes. This study provides insights into the potential role of *E. coli* in the pathogenesis of IBD.

Biography:

Mukta Das Gupta is a PhD student at Medical School of Australian National University (ANU). She obtained her bachelor degree in Doctor of Veterinary Medicine (DVM) and Master of Science (MS) in Microbiology at Chittagong Veterinary and Animal Sciences University, Bangladesh. She is currently holding a position as an Assistant Professor in Department of Microbiology and Veterinary Public Health at Faculty of Veterinary Medicine, CVASU, Bangladesh. Her research interests are in the area of microbial genomics and bioinformatics.

Mukta has been awarded Endeavour Postgraduate Scholarship, 2017 to do her PhD under the supervision of Dr Claire O'Brien.



Speaker Publications:

- James, B, Tran, L, Vohradsky, J et al 2019, 'SOI thin microdosimeter detectors for low-energy ions and radiation damage studies', IEEE Transactions on Nuclear Science, vol. 66, no. 1, pp. 320-326.
- Khuyagbaatar, J, Yakushev, A, Döllmann, C et al 2019, 'Fusion reaction $Ca\ 48 + Bk\ 249$ leading to formation of the element Ts ($Z=117$)', Physical Review C: Nuclear Physics, vol. 99, no. 5.
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