Designing a Genetic CRISPR-cas Detection Probe for Adherent Invasive Escherichia coli Utilizing Comparative Genomics

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Several studies have documented marked alterations in the gut microbiota of patients with inflammatory bowel disease (IBD). There are two major subphenotypes of IBD: Ulcerative Colitis (UC) and Crohn's Disease (CD). While E.coli is normally a prominent facultative, anaerobic species of normal intestinal flora, some ileal CD studies report increased proportions of a subset of E.coli, namely, "Adherent Invasive E.coli" (AIEC) isolated from the intestinal mucosa of patients. In this study we sought to identify genes for use as a biomarker for the detection of AIEC in order to develop more efficient processes for gut flora diagnostics. After genomic comparison of AIEC and commensal strains of E.coli, genes LF82_88, LF82_91, LF82_92, LF82_93 and LF82_180 were identified as potential biomarkers and were investigated using specifically designed primers and qPCR analysis to determine if each of these genes would be more highly expressed in CD and IBD samples than Non-IBD samples. Three CRISPR-cas System genes: LF82_88 ($p = 0.007988$), LF82_91 ($p = 0.022641$), and LF82_92 ($p = 0.022641$), via Fischer's Exact Test, were shown to be statistically significant biomarkers for the detection of AIEC exclusively in CD patients.

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