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### Differentiation of Crohn's disease-associated isolates from other pathogenic *Escherichia coli* by fimbrial adhesion under shear force

Shear force exerted on uropathogenic *Escherichia coli* adhering to surfaces makes type-1 fimbriae stretch out like springs to catch on to mannosidic receptors. This mechanism is initiated by a disruption of the quaternary interactions between the lectin and the pilin of the two-domain FimH adhesin and transduces allosterically to the mannose-binding pocket of FimH to increase its affinity. Shear stress protects *Escherichia coli* cells adhering to surfaces via catch bonds from detachment by soluble inhibitors present in urine. Mannose-specific adhesion of 14 *E. coli* pathovars was measured under flow, using surface plasmon resonance detection on functionalized graphene-coated gold interfaces. Increasing the shear had important differential consequences on bacterial adhesion. Adherent-invasive *E. coli*, isolated from the feces and biopsies of Crohn's disease patients, consistently changed their adhesion behavior less under shear and displayed lower SPR signals, compared to *E. coli* opportunistically infecting the urinary tract, intestines or loci of knee and hip prostheses. We exemplified this further with the extreme behaviors of the reference strains UTI89 and LF82. Whereas their FimA major pilins have identical sequences, FimH of LF82 *E. coli* is marked by the Thr158Pro mutation. Positioned in the inter-domain region known to carry hot spots of mutations in *E. coli* pathotypes, residue 158 is indicated to play a structural role in the allosteric regulation of type-1 fimbriae-mediated bacterial adhesion. In a next stage, we plan to investigate structure-function relationships of FimH using several mannosylated protein receptors and antagonists immobilized on graphene or supplied in solution and interacting with *E. coli* strains under varying flow conditions.

#### Biography

Julie Bouckaert is associated with Université de Lille, France. She has published several papers in reputed journals. She is committed to highest standards of excellence and is proved through her authorship of many books. Her research interests include Systems Biology, Molecular Biology and Microbiology.

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