

P10 – Force Generation by Type IV Pili of *Neisseria Gonorrhoeae*

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Type IV pili are major bacterial virulence factors supporting adhesion, surface motility, and gene transfer. During infection they mediate attachment to mammalian host cells and elicit downstream signals. The polymeric pilus fiber is a highly dynamic molecular machine that switches between elongation and retraction. We used laser tweezers to investigate the dynamics of individual pili of the human pathogen *Neisseria gonorrhoeae*. We found that the retraction velocity of bacteria adhered to an abiotic surface is bimodal and that the bimodality depends on force and on the concentration of the putative motor protein PilT [1]. When adhered to host cells the bimodality persisted at higher forces compared to an abiotic environment. This increase in average velocity is consistent with an up-regulation of PilT due to interaction with host cells. Bacteria generated considerable force during infection but the maximum force was reduced from (120 ± 40) pN on abiotic surfaces to (70 ± 20) pN on host cells, most likely due to elastic effects. Velocity and maximum force of pilus retraction were independent of the infection period within 1h and 24h post infection [2]. Thus the force generated by type IV pili during infection is high enough to induce cytoskeletal rearrangements in the host cell.

[1] M. Clausen, M. Koomey and B. Maier, *Biophys. J.* 2009, 96, 1169-1177

[2] D. Opitz, M. Clausen and B. Maier, *ChemPhysChem* 2009, 10, 1614-1618