# Epigenetic regulation of *E. coli* pilus phase-variation-mechanism

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The gram-negative bacterium *E. coli* is a non-pathogenic microorganism, predominating in the colonic flora of humans. Usually it remains harmlessly, but some strains can lead to diseases in the central nervous, or the urinary system [1]. In the latter case, uropathogenic strains of *E. Coli* (UPEC) are responsible for cystitis or pyelonephritis in 75 to 95% of cases [2]. For the migration of the bacteria through the urinary tract, so-called pyelonephritis-associated pili (pap) can be formed which allow them to bind to the urothelium [3,4]. These pili belong to the class of the chaperone-usher pili which is well characterized in its composition and function. By means of a phase-variable mechanism, regulated at the transcriptional level, UPECs can switch between a stable 'on phase' where the pap genes are expressed and a stable 'off phase' where their transcription is repressed. Using an in vitro expression system, our group has observed that, unlike previously thought, this phase-variation mechanism does not rely heavily on cooperative binding of the co-regulators Lrp and PapI. Moreover, there is strong evidence that the topology of DNA itself contributes to the phase variation mechanism [5].
The subject of this work is to clarify the phase variation mechanism of UPEC with respect to the effect of the DNA structure in the pap regulatory region on pili formation. Besides revealing a so far unknown, DNA based mechanism for hysteretic switching of transcription, we expect our work to contribute to the development of new therapies for urinary tract diseases.

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