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Bacterial Macroscopic Rope-like Fibers with Cytophathic and Adhesive Properties

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We present a body of ultrastructural, biochemical, and genetic evidence that demonstrates the oligomerization of virulence-associated auto-secreted proteins EspC or EspP produced by deadly human pathogens enterohemorrhagic (EHEC) and enteropathogenic (EPEC) *Escherichia coli*[1] into novel macroscopic rope-like structures (>2-cm long). These proteins exhibit serine protease and cytopathic activities on host cells and are self-exported to the milieu via a type 5 secretion mechanism[2]. The *E. coli* ropes showed high aggregation and insolubility, stability to anionic detergents and boiling, and bound to Congo Red and Thioflavin T dyes. These properties are consistent with those of human amyloidogenic proteins. The macroscopic ropes were not observed in cultures of isogenic *espP* or *espC* deletion mutants of EHEC or EPEC, respectively or in non-pathogenic *E. coli*. They were produced by an *E. coli* K-12 strain carrying a plasmid expressing *espP*. The ropes bound to cultured epithelial cells and served as a substratum for bacterial adherence and biofilm formation, and protected bacteria from antimicrobial compounds. We hypothesize that these ropes play a biologically significant role in the survival and pathogenic scheme of these organisms.

References

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