

Joanna Szczepaniak: How do Gram-negative bacteria coordinate septation of the cell envelope's many layers?

The outer membrane (OM) is integral to the Gram-negative bacterial cell envelope, impeding the influx of many classes of antibiotics. The energised Tol-Pal system, which is composed of the three inner membrane proteins TolQ, TolR, TolA, the periplasmic protein TolB and the OM lipoprotein Pal, spans the cell envelope, to invaginate the OM at the division site. *tol-pal* mutations give rise to a pleiotropic phenotype, characterized by a loss of antibiotic resistance, OM blebbing, and cell chaining. Recent evidence suggests that instead of failing to invaginate the OM, *tol-pal* cells chain due to impairment of peptidoglycan (PG) remodelling although the underlying mechanism is unclear. Using electron, atomic force and fluorescence microscopy and cryo-electron tomography, we focus on the interplay between *cpoB*, which is a part of the *tol-pal* operon but does not yield a typical *tol* phenotype when deleted, and the force-transduction protein TolA. We show that loss of *cpoB* in *tolA* cells diminishes cell chaining and significantly remodels structure of the septum, suggesting the splitting defects of *tolA* mutants arise because of the hyperactivity of CpoB at the division.



