



Category: Miscellaneous

Y-shaped morphology in *E.coli* may be linked to peptidoglycan synthesis Pathway

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Abstract

Maintenance of cell shape is a crucial feature among all the kingdoms of life. This is required for performing all the basic functions like sensing, motility, surface attachment and nutrient intake, which is also known to be regulated genetically. *E.coli* is a rod shaped bacteria separated into two parts, the cylindrical central region and a curved or capped polar ends. During cell division bacteria divides at midcell into two identical daughter cells, where the new curved cap form at the midcell. Cell wall and a protein mesh beneath its peptidoglycan layer is known to maintain the rod shaped morphology and MreB is one important protein known to be involved in maintaining the bacterial shape. It has been observed that deletion of MreB results in round shaped bacteria. So, one important question that needs attention is how MreB is involved in maintaining different shapes at poles and mid cell.

The cell shape maintenance is thus probably a coordinated event between pool of proteins and a feedback system gives response to form correct cell shape. We have serendipitously discovered a new Y shaped and X-shaped morphology of *E.coli* cells. The branches to form Y or X shaped phenotypes were observed to be originating from either pole or mid cell regions. When we investigated it further by labelling peptidoglycans and looking at membrane architecture we observed active peptidoglycan in pole regions. Since the cells were not showing any rounded morphology we assume that MreB is intact in the genome and some other pathway is involved in maintaining these unique shapes and thereby also involved in regulating cell shape in *E.coli*. Based on our initial investigation we hypothesize that besides MreB, synthesis of PG and conversion of active form of PG to inactive form is also playing an important role in maintaining cell shape. We aim to perform whole genome sequencing and look at transcriptome level to dissect the pathway for maintaining these unique shapes in bacteria.

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