

Characterization of the biochemical properties of actin-like protein MreB from *Leptospira interrogans*

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Abstract

Two decades ago it was thought that actin, as the main component of cytoskeleton, can exist only in eukaryotes. Then, as the microscopic and biochemical studies allowed getting more detailed data about bacteria, it turned out that all three main eukaryotic cytoskeletal proteins can be found in prokaryotes.

The MreB (murein cluster e) proteins were identified as cell shape determinants. Further biochemical and biophysical analyses were needed to confirm the close relationship between actin and MreB and MreB-like proteins, even in a wider sense. First of all, the MreB proteins are able to polymerize into filaments. What is more, the longitudinal repeat of MreB filaments is very similar to actin. Finally, the three dimensional structure of MreB monomer varies from actin monomer only in a little extent.

The in vitro characterization of MreB proteins is just in the early beginning. Biochemical investigations were done mostly in case of *Thermotoga maritima*, *Caulobacter crescentus*, and *Escherichia coli* MreB. The results of these studies are confused: it seems to be possible that the biochemical behaviour of the actin-like proteins can change significantly using altered buffer conditions, and also depends on the species.

We have focused on the biochemical investigation of MreB from *Leptospira interrogans*, which is a Spirochaete, and causes an infection called Leptospirosis. The morphology of these bacteria differs significantly from the previously mentioned ones, but the sequence similarity of MreB from *Leptospira* is closer to eukaryotic actin than the already studied ones.

Using bacterial expression system, we were able to purify *Leptospira* MreB. By the help of different biochemical and biophysical methods we have described the polymerisation properties of MreB, in the presence of various salt conditions. We have determined the critical concentration of *Leptospira* MreB, and we have labelled it with IAEDANS fluorophores successfully.