Remodeling of RepE conformation by the molecular chaperones DnaK and DnaJ

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Hsp70 chaperones, together with their Hsp40 cochaperones and nucleotide exchange factors, are essential components of the cellular protein homeostasis network. The Hsp70 chaperone system is involved in multiple essential functions as protein folding, transport across membranes, assembly of macromolecular structures, prevention of protein aggregation and reactivation of aggregates in cooperation with Hsp100 chaperones in bacteria and fungi, and Hsp110 in metazoans. Especially interesting is the ability to modify the function of naturally occurring proteins by conformational remodeling. A good model to study this process is the bacterial protein RepE, the initiation factor of mini F plasmid replication. RepE function depends on its oligomeric state: while the dimer acts as repressor of plasmid replication, monomers are activators. Notably, monomerization of RepE is facilitated by DnaK and DnaJ, the main representatives of the Hsp70 and Hsp40 families in bacteria. Here we present bulk biochemical and biophysical data, as well as nanopore single molecule studies of the interaction of RepE with the chaperones and specific DNA sequences.