Max Planck Institutes at Fassberg Campus Göttingen
MPI for Biophysical Chemistry
MPI for Dynamics and Self-Organization

MPI Campus Seminar

Wednesday, 07.10.2015, 12.00h

Large Seminar Room

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Catalysis mechanism of EF-Tu and other GTPases involved in translation

Elongation factor Tu (EF-Tu) is a translational GTPase that delivers aminoacyl-tRNAs to the ribosome. Its GTPase activity plays a crucial role in maintaining translational fidelity. The basic reaction mechanism and the way the ribosome contributes to catalysis are a matter of debate. By mutational analysis in combination with measurements of rate/pH profiles and kinetic solvent isotope effects, we dissected the hydrolysis mechanism off and on the ribosome. Contrary to a number of current models, the reaction can proceed in two distinct ways depending on the presence or absence of programmed ribosomes. In free EF-Tu the critical residue H84 in the switch II region does not contribute to catalysis. Binding to the programmed ribosome induces a rearrangement of EF-Tu which renders GTP hydrolysis sensitive to mutations of the P-loop Asp21 and of His84. We suggest that Asp21 and His84 provide a network of interactions that stabilize the positions of the γ-phosphate and the nucleophilic water, respectively, and thus play an indirect catalytic role in the GTPase mechanism on the ribosome.

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