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Water in the Structure-function Relationship of the SRP GTPase at 1.1 Å Resolution. Ursula Ramirez, Douglas Freymann, Molecular Pharmacology & Biological Chemistry, Northwestern Univ., 303 E. Chicago Ave. #T7-715, Chicago, IL 60611 USA.

Ffh, the sole protein component of the prokaryotic signal recognition particle (SRP), undergoes discrete sets of conformational changes to achieve and communicate several different binding states. It recognizes and binds the hydrophobic signal sequence of nascent membrane proteins, binds guanine nucleotide, binds its receptor, FtsY, in its GTP-bound state, and disengages from FtsY through GTP hydrolysis. While the roles of many key conserved residues in the structure-function relationship of Ffh have been identified, the roles of water in this intricate system of conformational changes has not been thoroughly examined. Since water can play a key role in protein structure and function, here we examine the water structure of the NG GTPase domain of Ffh and the NG interface at 1.1 Å resolution, taking advantage of multiple structures of Ffh NG available in different binding states. We identify water molecules which play structural roles, are involved in the binding of nucleotide to Ffh NG, and participate in the functionally driven conformational rearrangements Ffh NG undergoes.