MS7-O3 When RNP meets RNP: The signal recognition particle and the ribosome

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The signal recognition particle (SRP) is a ribonucleoprotein complex with a central role in co-translational targeting of membrane and secretory proteins. It is found in all three kingdoms of life and exhibits a conserved mode of action while composition and structure have undergone specific adaptations. In most organisms, SRP can be divided into two functional domains. The S domain mediates recognition and transport of ribosome – nascent chain complexes (RNCs) to the translocation channel via the interaction of SRP with the SRP receptor (SR), while the *Alu* domain stalls translation elongation on the ribosome until the nascent chain has been faithfully delivered.

Here we present crystal structures of a complete bacterial SRP *Alu* domain [1] and a ternary complex of human SRP S domain RNA, SRP19, and the SRP68-RBD [2, 3]. The structures reveal highly complex and unprecedented RNA folds and RNA-protein interactions and illustrate the principles of SRP RNA shaping for proper interaction with ribosomal RNA. The crystal structures are placed in high-resolution cryo-EM envelopes of SRP-RNC complexes explaining the modes of RNP-RNP interactions on an atomic level. Highlights of fold and function will be exemplified.

References:

[1] Kempf, G., Wild, K. & Sinning, I. *Nucleic Acids Research* **42**, 12284-94 (2014).

[2] Grotwinkel, J. T., Wild, K., Segnitz B. & Sinning, I. *Science* **344**, 101-4 (2014).

[3] Wild, K. & Sinning, I. *RNA Biol* **11**, 1330-4 (2014).

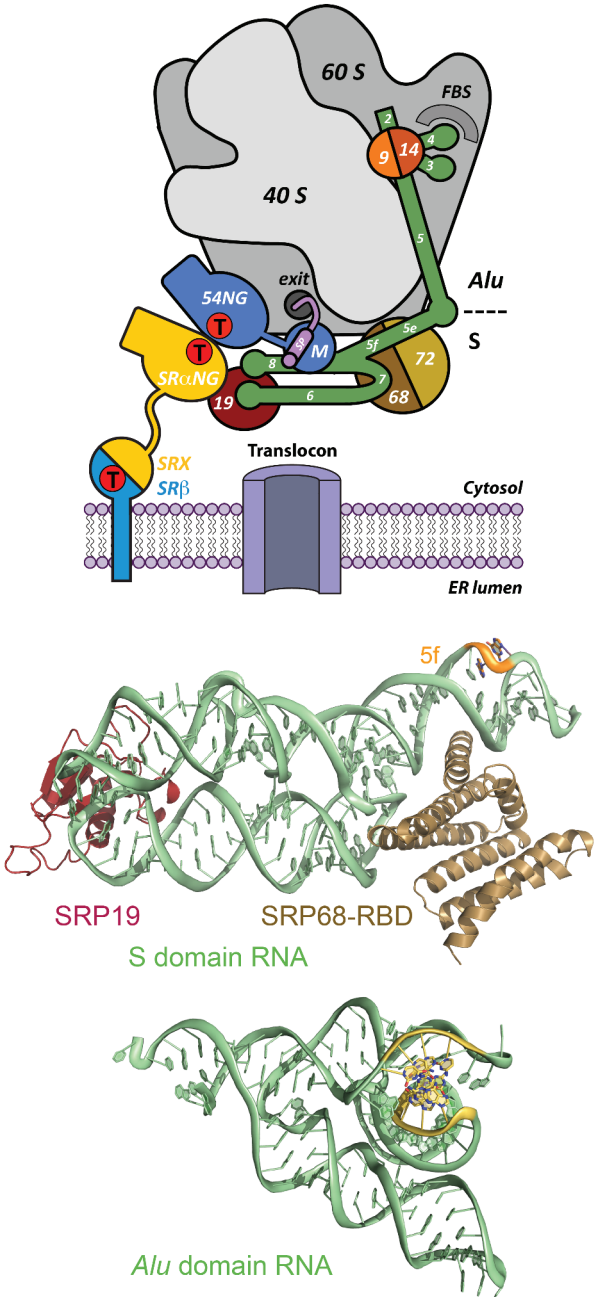

Figure 1. Co-translational targeting by SRP. Top panel: Scheme for the targeting of mammalian SRP-SR/RNC complexes to the translocation channel in the endoplasmic reticulum membrane. Structures are presented for the human S domain (middle) and a bacterial *Alu* domain (bottom).

Keywords: Signal Recognition Particle (SRP), protein targeting, protein-RNA and RNA-RNA interactions, X-ray crystallography