BDR SEMINAR (Kobe & online hybrid)

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Wednesday, January 22, 2025

13:00-14:00

1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom

Zoom meeting URL will be announced on the event day by e-mail.

※This seminar is open only to BDR members.

Co-translational protein maturation by ribosome-associated chaperones

Summary

The decoding of genetic information by translating ribosomes is directly coupled to critical steps in protein maturation, such as enzymatic processing, membrane targeting, native folding, and assembly. Intriguingly, a selected set of chaperones binds next to the ribosomal tunnel exit, allowing their privileged access to nascent polypeptide chains. In eukaryotes, the ribosome-associated J-domain protein complex RAC promotes nascent chain folding by stimulating Hsp70 (Ssb1/2 in yeast). To dissect proteome-wide the co-translational action of RAC in vivo, we determined the nascent chain interactome at subcodon resolution by selective ribosome profiling. RAC engages exposed nascent chains immediately after they emerge from the ribosome, earlier than Ssb, to coordinate its timely recruitment. Within a spectrum of binding patterns, RAC but not Ssb shows a preference for cysteine-rich regions, including zinc-finger and CxxC motifs. We demonstrate that a hydrophobic patch in the J-domain protein Zuo1, comprising His249-Tyr252-Ile253, is required for RAC binding to nascent chains. RAC deletion coincides with impairment of the redox buffering system and increased sensitivity to oxidative stress induced by hydrogen peroxide. We propose that RAC acts in cellular redox homeostasis by protecting cysteine residues in nascent chains from undesired oxidation and promoting the correct formation of zinc-finger domains during co-translational protein folding.

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