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Ribosome recycling in prokaryotes and eukaryotes

The ribosome recycling step is the fourth step in protein biosynthesis following the release of nascent completed polypeptides by the termination factors. Itis an essential step in all organisms. The genefor bacterial ribosome recycling factor (RRF) is among the 250 most essential genes. In lower eukaryotes (yeast),this step is catalyzed by eEF3 which is also essential. The substrate of RRF is post-termination complex which consists of ribosome with one tRNA at the P/E-site and mRNA. The yeast PoTC also consists of tRNA and mRNA. The order of events during the disassembly is the release of tRNA, the release of mRNA and the splitting of ribosomes in their order. This is true in yeast and bacteria. We report here that RRF appears to stimulate elongation step but not required for the elongation. eEF3 was originally reported to be an elongation factor. Here, we show that eEF3 stimulatesthe elongation but is not essential for it. Only when poly-U is used as mRNA it becomes essential. Both RRF and EF-G require nucleotide tri-phosphate for their activity though RRF needs a helper, EF-G, while eEF3 can do the recycling reaction by itself. Both factors catalyze the release of mRNA and tRNA during the recycling process. With high affinity mRNA such as short mRNA with strong Shine Dalgarno sequence, one does not see the release because the released mRNA binds to the ribosome again.These results strongly indicate functional similarity between two recycling factors, RRF and eEF3.

Biography

Akira Kaji is a professor of microbiology, School of Medicine, University of Pennsylvania. He contributed to the deciphering of genetic code by his discovery of the fact that the complex of poly-U with ribosome binds specifically tRNA specific for phenylalanine. He also discovered RRF.

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