Interactions of bacterial transcription elongation complex with the transcription terminator Rho

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The bacterial transcription terminator Rho is a highly conserved RNA-dependent helicase that dislodges an elongating RNA polymerase. Rho binds to certain C-rich sequence stretches on mRNA and, using its helicase activity, catches up with the transcription elongation complex (EC). Rho most likely interacts with the RNA exit channel of the EC, omega-subunit, before inducing inactivation, following which RNAP dislodges from the DNA. Transcription elongation factor, NusG, being bound to the EC, interacts with Rho.

Recent cryo-EM structures of EC and Rho complexes revealed static pictures of regions of EC, including the active centre, RNA exit channel, omega subunit and NusG interacting or getting affected due to the presence of Rho near the RNA exit channel. We employed detailed mutagenesis analysis of different regions around the active centre, RNA exit channel, omega subunit and Rho hexamer to get a detailed functional basis of all these interactions between Rho and various regions of the EC. Taken together, the genetic, biochemical and genomic data suggest a unified model of functional interplay between Rho, NusG, omega subunit and regions around the active centre and RNA exit channel during the termination process.