SFB 960-/BZR – Kolloquium

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Biology, H 53

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Microbial Biology

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The regulatory power of structured RNAs

Form equals function! This is not only true for proteins but also for regulatory RNA structures. Common structure-dependent RNA elements are ligand-responsive riboswitches and temperature-responsive RNA thermometers (RNATs), which reside in the 5'-untranslated region of many heat shock and virulence genes in bacteria. At low temperature, they trap the ribosome binding site in a secondary structure. A temperature increase destabilizes this structure and permits translation initiation (1).

In search for new RNATs in the foodborne pathogen *Yersinia pseudotuberculosis*, we established two global RNA structuromics approaches and identified various new virulence-associated RNATs (2, 3). I will present results on the structure-function analysis of several candidates that control the expression of a secreted toxin (4), critical components of the type-3-secretion system (5, 6) and small regulatory RNAs. Cumulatively, the data suggest that numerous virulence-related processes, in particular the delivery of secreted virulence factors, are under RNAT-mediated temperature control in bacterial pathogens.

Most intriguingly, recent reports from other groups indicate that eukaryotes and viruses also exploit RNAT-like RNA structures for temperature-mediated regulation of diverse biological processes.

(1) Kortmann J, Narberhaus F. 2012. Nat Rev Microbiol 10:255-265.
(2) Righetti et al. 2016. PNAS 113:7237-7242.
(3) Twittenhoff, Brandenburg, Righetti et al. 2020. Nucleic Acids Res 48:e71.
(4) Twittenhoff et al. 2020. PLoS Pathog 16:e1008184.
(5) Pienkoß et al. 2021. PLoS Pathog 17:e1009650.
(6) Pienkoß, Javadi et al. 2022. J Mol Biol, in press.

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