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VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI

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z naslovom:

Prokaryote toxin-antitoxin modules: complex regulation of an unclear biological function

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Abstract:

Toxin-antitoxin (TA) modules are small operons in bacteria and archaea that encode a metabolic inhibitor (toxin) and a matching regulatory protein (antitoxin). TA modules are divided into a large number of families that vary significantly with respect to structure and biochemical activity. Most often the translation machinery is targeted, often via ribonucleases that cleave tRNA, rRNA or mRNA, the latter often during translation with stalled ribosomes as a result. Other toxins are kinases AMPylating enzymes that target again components of the translation machinery, but often also gyrase or peptidoglycan synthesis.

While these biochemical activities are well defined, their biological functions remain unclear. Suggested biological roles are stress response including the generation of persister cells, protection against bacteriophages and stabilization of plasmids and non-essential segments on chromosomes. Also, the null-hypothesis of selfish DNA with primary function self-preservation cannot be discarded.

Despite their functional diversity and lack of a common evolutionary origin, many TA modules have evolved strikingly parallel mechanisms for their regulation. The regulatory mechanisms, that are at play at both the level of toxin activity and at the level of transcription, are often complex. Interplay between the multiple levels of regulation in the broader context of the cell as a whole is most likely required for optimum fine-tuning of these systems. They not only prevent accidental activation of TA toxins, but also include mechanisms to restore growth after activation.