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Synthesis and degradation of Ms1 in *Mycobacterium smegmatis*

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Adaptation of microorganisms is necessary for their survival in changing environment. In this process, regulatory roles are played by small non-coding RNAs (sRNAs). Ms1 is an abundant sRNA (rivaling in amounts those of rRNA) found in *Mycobacterium smegmatis* and it has homologs in all mycobacteria including *Mycobacterium turberculosis*. Ms1 forms a complex with the RNA polymerase (RNAP) core and it is a pleiotropic regulator of gene expression, enhancing survival of the cell under various types of stress. Ms1 is highly expressed and stable in stationary phase and it is rapidly degraded when the cell is shifted into nutrient-rich medium. The accumulation of Ms1 in the cell depends both on its synthesis and degradation but the specific mechanisms involved are unknown. Here, we identify and characterize the Ms1 promoter, the dynamics of Ms1 expression and reveal the presence of a transcription factor involved in regulation of its expression. Further, we identify an RNase, Polynucleotide phosphorylase (PNPase) to interact with Ms1. With recombinant PNPase, we demonstrate that it is able to degrade Ms1 *in vitro* and identify Ms1 secondary structures that affect its stability. RNAseq data show that PNPase is expressed ~10x more in exponential than in stationary phase, inversely correlating with the accumulation dynamics of Ms1. In summary, we provide a comprehensive characterization of how the intracellular level of Ms1 is controlled, paving the way to potential future designs altering its expression in the case of pathogenic species.

Biography

Martina Janouskova is currently a PhD student of Charles University in Prague. She has recently published her first article. She works in the Department of Microbial Genetics and Gene Expression at the Institute of Microbiology, Czech Academy of Sciences in Prague.

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