Towards Better Understanding of Regulation of RNase P Expression

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The central dogma of molecular biology is the transcription of the hereditary information on the DNA (genes) to mRNA which is then translated to the structural functional units of the cell (proteins). This translation process involves different types of RNAs (mRNAs, rRNAs and tRNAs).

The RNase P enzyme is responsible for generating the 5' termini of tRNAs in the cell to yield functionally mature tRNAs required for translation process which is the basis of cell growth. Bacterial RNase P holoenzyme consists of one protein subunit and one RNA subunit in equal ratio. The genes that encode the protein subunit and the RNA subunit, respectively, are located at different positions on the bacterial chromosome. As a result the expression of these genes must be coordinated for the maintenance of RNase P holoenzyme and therefore a steady growth.

The gene which encodes the RNase P RNA is transcribed by a promoter upstream of the gene. The gene which encodes the RNase P protein is found in an operon which means that the transcription of several genes is regulated by the same promoters. Recent studies showed that the RNase P RNA and the RNase P protein genes have different transcription levels in both stationary and exponential growth phases in both *Escherichia coli* and *Mycobacterium marinum* bacteria.

Our results showed the presence of translational regulation to the RNase P protein mRNAs within different growth phases of *E. coli*, which leads to the presence of similar levels of the protein and the RNA subunits of the RNase P holoenzyme. This translational regulation was not detected in *M. marinum*. This indicates that the presence of this translational regulation differs between bacteria, which have different life styles and pattern of growth such as the fast growing Gram-negative bacterium *E. coli* and the slow growing Gram-positive bacterium *M. marinum*.

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