

Conférence PROTEO



Prof. Michael Ibba
The Ohio State University

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15h00

Local 3820 pavillon Vachon, Université Laval

Translation Quality Control and the Regulation of Microbial Stress Responses

Gene expression relies on quality control for the accurate transmission of genetic information. One mechanism that helps prevent amino acid misincorporation errors during translation is the editing of misacylated tRNAs by aminoacyl-tRNA synthetases (aaRS). In the absence of editing growth is partially limited upon exposure to non-cognate substrates, amino acid starvation and other stresses, but whether these physiological effects solely result from mistranslation remains unclear. To explore if translation quality control influences cellular processes other than protein synthesis, an *Escherichia coli* strain defective in aminoacyl-tRNA editing was used. The absence of editing reduces the accumulation of deacylated tRNA leading to suppression of amino acid biosynthesis, decreased synthesis of the starvation-inducible second messenger ppGpp and limited induction of stringent response-dependent gene expression. These data reveal that a single quality control mechanism, the editing of misacylated aminoacyl-tRNAs, is a critical checkpoint both for maintaining the accuracy of translation and for determining the sensitivity of transcriptional responses to amino acid starvation. Furthermore, these findings indicate how inhibition of editing provides a means to increase cellular viability under stress by facilitating additional rounds of cell division during which beneficial mutations might be acquired.

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