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Inactivation of the general transcription factor TnrA in Bacillus subtilis by proteolysis

Kayumov A., Heinrich A., Sharipova M., Iljinskaya O., Forchhammer K.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Under conditions of nitrogen limitation, the general transcription factor TnrA in Bacillus subtilis activates the expression of genes involved in assimilation of various nitrogen sources. Previously, TnrA activity has been shown to be controlled by protein-protein interaction with glutamine synthetase, the key enzyme of ammonia assimilation. Furthermore, depending on ATP and 2-oxoglutarate levels, TnrA can bind to the GlnK-AmtB complex. Here, we report that upon transfer of nitrate-grown cells to combined nitrogen-depleted medium, TnrA is rapidly eliminated from the cells by proteolysis. As long as TnrA is membrane-bound through GlnK-AmtB interaction it seems to be protected from degradation. Upon removal of nitrogen sources, the localization of TnrA becomes cytosolic and degradation occurs. The proteolytic activity against TnrA was detected in the cytosolic fraction but not in the membrane, and its presence does not depend on the nitrogen regime of cell growth. The proteolytic degradation of TnrA as a response to complete nitrogen starvation might represent a novel mechanism of TnrA control in B. subtilis. © 2008 SGM.

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