Abstract

Membrane active compounds and membrane fluidity regulation in *Bacillus subtilis*

In *Bacillus subtilis* there are two main mechanisms for maintaince of the optimal membrane fluidity after cold shock. The long term adaptation consists in the synthesis of low-melting fluidizing anteiso-branched fatty acids. The short-term adaptation employs desaturation of fatty acids in existing membrane phospholipids. The fatty acid desaturase Des synthesis is induced after cold shock being regulated by the two-component system DesK/DesR. DesK component acts as the sensor of the membrane fluidity (AGUILAR et al. 1998) and triggers Des synthesis after sufficient membrane fluidity change, which might be caused not only by decrease in temperature but also by other physical and chemical factors.

The temperature effect on signalisation via DesK was mimicked *in vivo* by fluidizing and rigidifying agents. The same compounds were used *in vitro* (isolated bacterial membranes and lipids) in order to quantify their effect on the key membrane parameters. Membrane fluidity, proportion of gel- to liquid crystalline phase parameters the phase transition were measured by fluorescence spectroscopy (membrane fluorescence probes DPH and Laurdan) and differential scanning calorimetry.

Using this approach it was possible to compare the changes of membrane parameters measured by spectroscopic and calorimetric methods with sensing of membrane fluidity by membrane protein DesK. It was concluded that fluorescence anisotropy of DPH was the method most appropriate for the description of the membrane changes sensed by DesK.

Key words: *Bacillus subtilis*, cold shock, cold shock proteins, two-component system, senzor of membrane fluidity, membrane active compounds, fluorescence polarization methods, differential scanning calorimetry

Klíčová slova: *Bacillus subtilis*, chladový šok, proteiny chladového šoku, dvoukomponentový systém, senzor membránové fluidity, membránově aktivní látky, fluorescenční metody, diferenciální skenovací kalorimetrie