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Effect of a chemical analogue of autoinducers of microbial anabiosis on the Ca2+ response of mycelial fungi

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Abstract

The microbial alkylhydroxybenzenes (AHB), which are anabiosis autoinducers also termed d1 factors, participate in the stress response of mycelial fungi, as determined from changes in intracellular Ca2+ concentration. By using the genetically modified strain Aspergillus awamori 66A, which produces the recombinant Ca2+ -dependent protein aequorin, the dynamics of Ca2+ was studied in the cytosol of cells exposed to mechanical shock in the presence of protective doses (0.001-0.01% w/vol) of a chemical AHB analogue, 4-n-hexylre-sorcinol. As under stressful conditions, Ca2+ concentration increases in the cell cytosol in response to an enhanced AHB level in a growing fungal culture; thus, AHB is perceived by cells as a stress signal. The level of cell response, which was determined from the amplitude of luminescence dependent on the Ca2+ concentration in the cytosol, was related to the physiological age of the cells and the AHB concentration. Micromycete preincubation with AHB was found to protect cells from subsequent stress; this was reflected in the Ca2+ response. The protective AHB effect was manifested as (1) a significant decrease in the amplitude of luminescence and, thus, in Ca2+ accumulation in the cytosol during subsequent mechanical stress (as compared to the control-mechanical stress only); (2) development of a secondary Ca2+ response, which was not observed in the control; and (3) a high level of Ca 2+ retained in the cytosol for a long time in the presence of AHB (as compared to the control without preincubation with AHB). The mechanisms underlying the AHB effect on Ca2+ transport systems are discussed. © 2004 MAIK "Nauka/Interperiodica".

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Keywords

Alkylhydroxybenzenes, Aspergillus awamori, Ca2+ dynamics, Mycelial fungi, Protection from stress, Recombinant aequorin, Stress