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Effect of sorbitol, L-sorbose and inositol on myo-inositol-1-phosphate synthase activity in

Neurospora crassa strains.

Protoplasts of Neurospora crassa R2506 carrying the inl 89601 allele are able to regenerate and grow on Vogel's minimal medium containing 1 M sorbitol. We assumed that the defective enzyme which is related to the myo-inositol-1-phosphate synthase (E.C.5.5.1.4) and is produced in this strain (Zsindely et al., 1983, Biochim. Biophys. Acta 741: 273), may be activated by sorbitol; therefore, the strain becomes able to synthesize myo-inositol-1-phosphate.

In order to test this assumption the effect of sorbitol, L-sorbose and inositol on inositol-1-phosphate synthase isolated from wild type (RL-3-8A), from the thermosensitive inositol-requiring mutant (inl (83201(t), FGSC #2257) and from another inositol-requiring strain (89601) was determined. Wild type and inositol-requiring strain 89601 (inositol was present in the medium at a concentration of 6 µg/ml) were cultivated for 20-22 h at 27° C, while the thermosensitive inl mutant was grown at 22° C. The active and the defective enzymes were isolated from the different cultures in a highly purified form (Aradi et al., 1982. Prep. Biochem. 12: 137). Enzyme activity was determined according to Barnett et al. (1970, Biochem. J 119: 183) with glucose-6-phosphate as substrate, measuring inorganic phosphate released from inositol-1-phosphate by periodate oxidation, as described earlier (Zsindely et al., 1977, Acta Biol. Acad. Sci. Hung. 28: 281). One unit of activity is 1 nmol Pi released during 1 h incubation..

It can be seen from the results presented in Table 1 that the activity of enzymes purified from wild type and the thenaosensitive inl mutant was decreased considerably in the presence of sorbitol and L-sorbose, whereas the influence of inositol was significantly smaller. However, the specific activity of the defective enzyme isolated from the inositol-requiring strain became about 2.5 times higher in the presence of sorbitol and L-sorbose.

TABLE I

Effect of sorbitol, L-sorbose and inositol on myo-inositol-1-phosphate synthase and defective enzyme in Neurospora crassa strains

	wild type RL-3-8A		inl-thermosensitive mutant (83201(t))		inl-requiring mutant (89601)	
	Spec. act. U/mg	%	Spec. act. U/mg	%	Spec. act. U/mg	%
control	14520	100	7780	100	28	100
1M sorbitol	632	4.3	990	12.7	75	268
1M L-sorbose	1380	9.5	796	10.2	74	264
1M inositol	7800	53.6	2180	28.0	26	93

Overall, these results suggest that strains carrying the 89601 allele may be regarded as conditional mutants. In the Presence of sorbitol or sorbose, the structure of the defective enzyme is modified and the enzyme activity is increased. A similar "osmotic remedial" effect was observed with yeast by D.C. Hawthorne and J. Friis (1964, Genetics 50: 829). - - - ¹Departments of Biochemistry and ²Biology, University Medical School of Debrecen, H-4012, Hungary.