Homoserine Dehydrogenase of *Serratia marcescens*

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Homoserine dehydrogenase is a key enzyme in the biosynthesis of methionine, threonine and isoleucine (Greenberg, 1969; Meister, 1965) from aspartate. So far there appear to be only two instances of homoserine dehydrogenase subject to complete repression by methionine, namely in *Escherichia coli* K12 (Patte *et al.*, 1967, 1969) and in *Salmonella typhimurium* (Cafferata & Freundlich, 1969, 1970). However, these organisms possess two homoserine dehydrogenases and the methionine-repressible enzyme is a minor one.

A strain of *Serratia marcescens* seems to possess two homoserine dehydrogenases, one NAD-dependent and the other NADP-dependent. The NAD-dependent enzyme is completely repressed by methionine, homoserine or cysteine (at 1 mM), but is not inhibited by any amino acid either singly or in combination. The NADP-dependent enzyme is partially repressed (70–80%) by the above amino acids. Unlike in *E. coli* K12 (Patte *et al.*, 1967, 1969), these activities are not associated with aspartokinase, as evidenced during purification and in mutants. Two threonineless mutants of this organism lack homoserine dehydrogenase activity but possess normal aspartokinase activity. Further details about the purification and properties of the enzymes will be discussed.

- Cafferata, R. L. & Freundlich, M. (1969) *J. Bacteriol.* **97**, 197
Cafferata, R. L. & Freundlich, M. (1970) *Biochim. Biophys. Acta* **223**, 671
Greenberg, D. (1969) *Metab. Pathways* **3**, 253
Meister, A. (1965) *Biochemistry of the Amino Acids*, vol. 2, p. 674, Academic Press, New York
Patte, J. C., Le Bras, G. & Cohen, G. N. (1967) *Biochim. Biophys. Acta* **136**, 245
Patte, J. C., Le Bras, G. & Cohen, G. N. (1969) *Eur. J. Biochem.* **146**, 1969

Studies on Mammalian Hetero- β -galactosidases

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Hetero- β -galactosidase was purified from the soluble fractions of monkey liver (550-fold) and small intestine (110-fold). Both enzymes are active over a wide range of pH, the liver enzyme with an optimum at pH 5.6 and the intestinal enzyme with an optimum

at pH 7.0. The enzymes are active towards a variety of synthetic hetero- β -galactosides and β -glucosides, but have no action on lactose or cellobiose. The K_m for *o*-nitrophenyl β -D-galactoside was 8.6 mM with the liver enzyme and 8.9 mM with the intestinal enzyme. Phlorrhizin was not a substrate for the enzymes. In both cases there was no evidence for heterogeneity by gel filtration or by ion-exchange chromatography, in contrast with the results obtained with ox liver (Chytil, 1965) and rat liver (Furth & Robinson, 1965) enzymes. On polyacrylamide-gel electrophoresis both the hetero- β -galactosidase and hetero- β -glucosidase activities were present in the same major protein band. Mixed-substrate inhibition revealed that the glucosidase and galactosidase activities are exerted by the same protein. The pig kidney (Patel & Tappel, 1969) and rat kidney (Robinson *et al.*, 1967) purified fractions appear to catalyse the hydrolysis of both hetero- β -galactosides and hetero- β -glucosides. However, a partial separation of β -galactosidase and β -glucosidase activities of rat brain has been reported (Gatt & Rapport, 1966). The purified enzymes from both tissues from the monkey are inhibited by heavy-metal ions such as Cu^{2+} , Hg^{2+} and Ag^+ and by tris, gluconolactone and galactonolactone. The liver enzyme is most probably lysosomal (Alpers, 1969; Sellinger *et al.*, 1960), whereas in the intestine there are two hetero- β -galactosidases, one with a neutral pH optimum in the soluble fraction and one with an acid optimum pH in the particulate fraction (Swaminathan & Radhakrishnan, 1969).

- Alpers, D. H. (1969) *J. Biol. Chem.* **244**, 1238
Chytil, F. (1965) *Biochem. Biophys. Res. Commun.* **19**, 630
Furth, A. J. & Robinson, D. (1965) *Biochem. J.* **97**, 59
Gatt, S. & Rapport, M. M. (1966) *Biochim. Biophys. Acta* **113**, 537
Patel, V. & Tappel, A. L. (1969) *Biochim. Biophys. Acta* **191**, 653
Robinson, D., Price, R. G. & Dance, N. (1967) *Biochem. J.* **101**, 525
Sellinger, O. Z., Beaufy, H., Jacques, P., Doyen, A. & de Duve, C. (1960) *Biochem. J.* **74**, 459
Swaminathan, N. & Radhakrishnan, A. N. (1969) *Arch. Biochem. Biophys.* **135**, 288

Distribution of Sodium-plus-Potassium Ion-Stimulated Adenosine Triphosphatase along the Length of Rat Small Intestine and its Subcellular Localization

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Ever since the $\text{Na}^+ + \text{K}^+$ -stimulated ATPase* was first reported by Skou (1957), considerable sup-

*Abbreviation: ATPase, adenosine triphosphatase.