

CHARACTERISTICS OF THE LACTOSE HYDROLYZING ENZYME OF LACTOBACILLUS ACIDOPHILUS

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Cells of Lactobacillus acidophilus added to milk can improve lactose utilization in persons who can not adequately digest it. To provide information for most effective use of this organism in such manner it is desirable to know as much as possible about the lactose hydrolyzing enzyme involved. Our objective in this study was to isolate and characterize the enzyme(s) involved.

A crude extract containing β -galactosidase (β -gal) was obtained by growing Lactobacillus acidophilus NCFM in a peptonized milk broth and lysing the resulting cells with lysozyme. The enzyme was then purified by ammonium sulfate precipitation and ion exchange chromatography. The rate of hydrolysis of o-nitrophenyl- β -D-galactopyranoside (ONPG) was used to measure enzyme activity. Maximum activity occurred when the enzyme was incubated with magnesium ions and mercaptoethanol in pH 6.6 sodium phosphate buffer at 37 C. Gel filtration₅ chromatographic analysis indicated a molecular weight of 5.7×10^5 . Lactose and galactose both stimulated enzyme activity while glucose inhibited activity. Similar results were obtained when β -gal activity of L. acidophilus NCFM was compared to the activity of β -gal from two other strains of L. acidophilus. β -D-phospho-galactoside galactohydrolase (β -Pgal) activity was not detected in any of the strains.

Additional experiments are needed to determine factors which influence stability of the enzyme. This should provide information to improve the use of L. acidophilus as a dietary adjunct in milk to insure that the "lactose malabsorber" receives a product having adequate enzyme activity to be most beneficial in improving the utilization of lactose. This product should enable them to include milk as a regular part of their diet.

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