

## INFLUENCE OF BILE SALTS ON $\beta$ -GALACTOSIDASE ACTIVITY AND CELLULAR INTEGRITY OF *LACTOBACILLUS ACIDOPHILUS*

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Milk supplemented with *Lactobacillus acidophilus* has been shown beneficial for persons who can not adequately digest lactose (clinically classified as "lactose malabsorbers"). The benefit is due to the presence of  $\beta$ -galactosidase in the cells of *L. acidophilus* when they have been grown and prepared properly. The enzyme is intracellular thus it is permitted to pass through the stomach unaltered. Once the organism reaches the intestinal tract the cells interact with bile which apparently alters the permeability and allows lactose to enter the cells to be hydrolyzed or permits the enzyme to exit from the cell to exert its activity. In addition the organism, being bile resistant, is able to grow in the intestinal tract producing additional cells and more enzyme to further assist lactose hydrolysis.

One theory concerning the beneficial use of *L. acidophilus* in improving lactose utilization in humans, is that bile sensitive strains should be selected so that they will lyse in the presence of bile in the intestines to release more enzyme to aid in the hydrolysis of lactose. In preliminary experiments we have compared two cultures of *L. acidophilus* in this regard. One of the cultures grew significantly better in the presence of bile than did the other. There was little difference in the  $\beta$ -galactosidase activity between the two cultures. Nongrowing, whole cells of the organism exhibited little if any  $\beta$ -galactosidase activity. However, activity was increased by both in the presence of added bile. When suspended in a solution containing up to 1 percent oxgall (dried bile) no evidence of cell lysis for either culture was observed. This indicates that bile sensitive cells do not necessarily lyse in the presence of bile. It further suggests that bile sensitive strains should not be selected for use as dietary adjuncts to benefit lactose utilization in humans. If the organism is not able to grow well in the presence of bile it is not likely that any added benefit could be obtained from growth of the organism in the intestinal tract.

Additional cultures are being evaluated to confirm these observations and to make more critical measurements on cellular integrity following exposure to bile.

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