BILE SALT DECONJUGATION ACTIVITY OF CULTURES OF *LACTOBACILLUS ACIDOPHILUS* ISOLATED FROM THE INTESTINES

D.K. Walker[1] and S.E. Gilliland[2]

Story in Brief

Nineteen strains of *Lactobacillus acidophilus* were evaluated for their ability to deconjugate sodium taurocholate and sodium taurodeoxycholate. Cells from 18 to 20 hour broth cultures of *L. acidophilus* were inoculated (1%) into broth containing .001 M sodium taurocholate; also 10 ml of the broth culture was inoculated on the surface of agar containing .5% sodium taurodeoxycholate. All strains of *L. acidophilus* tested deconjugated both sodium taurocholate and sodium taurodeoxycholate.

(Key Words: Deconjugation, Bile-acids, *Lactobacillus acidophilus*.)

Introduction

Bile acids are produced in the liver and conjugated with glycine or taurine, concentrated in the gall bladder, and released into the small intestine where their major function is to solubilize dietary lipids (Stryer, 1975). This action increases the digestion and absorption of fat. These bile acids are then reabsorbed from the small intestine and transported back to the liver for reuse. This process is known as the enterohepatic circulation of bile acids. Bacterial modification of bile acids can influence their enterohepatic circulation (Garbutt et al., 1970). The major action of bacteria on the bile acids is deconjugation of the conjugated bile acids. Gilliland and Speck (1977) showed that *L. acidophilus* could deconjugate bile acids.

The purposes of this study were to compare the bile salt deconjugation activity of different cultures of *L. acidophilus* and to evaluate the use of an agar medium to detect the deconjugation activity.

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[1]Graduate Assistant [2]Regents Professor

Materials and Methods

Cultures of *L. acidophilus* were grown at 37°C for 18 to 20 h in MRS broth (Difco Laboratories) prior to experimental use. One percent inocula of a freshly prepared 18 to 20 h broth cultures of *L. acidophilus* were added to 20 ml volumes of MRS broth containing .018 M sodium thioglycolate and .001 M sodium taurocholate (NaTC). The cultures were then incubated for 10 hr at 37°C and analyzed for the liberation of free cholic acid via the method of Irvin et al. (1944).

For detection of deconjugation activity on the agar medium, 10 ml of each broth culture were inoculated on the surface of MRS agar containing .5% sodium taurodeoxycholate (NaTDC). The plates were incubated (upright) anaerobically for 18 h at 37°C. After incubation, the plates were removed and observed for precipitated white zones of white precipitate surrounding the colonies of lactobacilli (Dashkevicz and Feighner, 1989).

Results and Discussion

All strains of *L. acidophilus* deconjugated NaTC in the broth medium. Strains ATCC 23121, RP34, RP43, RP42, GP1B, GP4A, DKW-9, 251, and ATCC 4356 deconjugated significantly ($P<.005$) more NaTC than the other strains (Table 1). The differences in deconjugation among cultures was not

Table 1. Deconjugation activity of *Lactobacillus acidophilus*.

Strain	Cholic Acid[a] (μM/ml)	Plate[a] Assay
ATCC 43121	4.30[b]	+
RP34	3.38[b]	+
251	4.15[b]	+
ATCC 4356	3.59[b]	+
DKW-9	4.30[b]	+
HM2	2.97[c]	+
2	1.78[c]	+
14F1	0.17[d]	+
NCFM-F	2.85[c]	+
NCFM-L	3.69[b]	+
15	2.17[c]	+
14	2.18[c]	+
12	1.60[c]	+
5	1.40[c]	+
P16	3.89[b]	+
GP4A	3.93[b]	+
RP43	3.77[b]	+
RP42	4.06[b]	+
GP1B	3.86[b]	+

[a]Each method was performed three times.
[b,c,d]Means with different superscripts differ significanlty ($P<.005$).

due to differences in growth because strains that tended to grow slower than others in the broth deconjugated similar amounts of NaTC as the faster growing strains (growth data not shown).

All strains of *L. acidophilus* exhibited deconjugation of NaTDC in MRS agar. The basis for this reaction is due to the pKa of free cholic acid (pH 5.0) which at a slightly acidic pH will be protonated and precipitate out of solution; however the taurocholic acid (pKa 1.9) will remain ionized and thus in solution in the agar medium. The formation of zones of white precipitate surrounding bacterial growth on the agar medium was considered a positive reaction.

These results reveal that there is considerable variation among strains of *L. acidophilus* with regard to deconjugation of bile salts. Also a simple procedure for detecting deconjugation can be achieved using MRS agar containing NaTDC. This latter procedure may prove useful as a simple means of screening cultures and/or determining if plasmids control deconjugation activity in *L. acidophilus*.

Literature Cited

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