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Nonhemolytic Group B Streptococci of Human, Bovine, and Ichthyic Origin

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The biochemical and serological characteristics of nonhemolytic group B streptococci of human, bovine, and ichthyic origin were described.

Despite the fact that nonhemolytic group B streptococci have been reported (2-4), this laboratory rarely has the opportunity to examine clinical isolates of these organisms because of the common practice in clinical laboratories of selecting only beta-hemolytic colonies for identification. This report describes such organisms isolated from human, bovine, and ichthyic hosts.

The group B fish pathogen sent to the Center for Disease Control (CDC) most recently for identification was isolated from the kidney, eye, liver, and body fluid of a fish from Mobile Bay, Ala., in September 1972. This organism was apparently the etiological agent of a large number of fish fatalities in the Bay and was sent to us by the Alabama Department of Public Health. The next week, four isolates from the blood, ear, stomach, and nasopharynx of a premature female infant with fatal respiratory distress syndrome were sent by the Minnesota Department of Health. The baby died within two days of delivery which had been preceded by ruptured maternal membranes. In addition, two other groups of nonhemolytic group B streptococci were cultured from samples stored in sand desiccation vials: three vials of the fish pathogen described by Robinson and Meyer (3) and seven isolates from cow milk. They were received in 1965 and 1961, respectively.

These streptococci were similar to each other in several ways. They did not hemolyze rabbit erythrocytes (surface and subsurface colonies on rabbit blood agar plates), they hydrolyzed sodium hippurate, and they contained the group B antigen. The latter was shown by allowing Lancefield extracts of the organisms to react with group B antiserum in capillary precipitin tests (5) and on agar gel diffusion slides (Fig. 1). A line of identity occurred with all extracts and purified group B polysaccharide. The bovine isolates were nontypable. However, Alabama and Arkansas fish isolates were type Ib. Surprisingly, no Ic protein antigen was observed in these strains (6). The human isolates were also type Ib but a small amount of Ic protein could be seen in HCl extracts of the strains on Ouchterlony slides (not shown). Figure 2 shows an agar gel diffusion slide that was set up in exactly the same way as the slide in Fig. 1 except that type Ib antiserum was used instead of group B antiserum and purified type Ib polysaccharide was used instead of group B polysaccharide. A line of identity occurred with the fish and human extracts and Ib polysac-

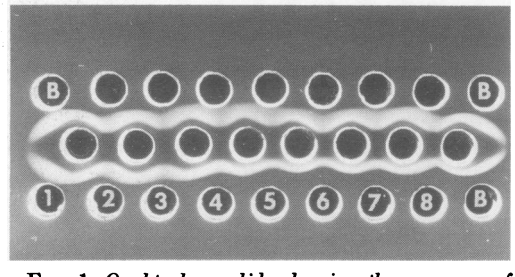

FIG. 1. *Ouchterlony slide showing the presence of group B antigen in nonhemolytic streptococci of human, bovine, and ichthyic origin. Center wells were filled with group B antiserum. Three corner wells (B) were filled with purified group B polysaccharide. Remaining top and bottom wells were filled with Lancefield HCl extracts of the following nonhemolytic streptococci: top row, unmarked wells, seven bovine isolates; bottom row (1) Alabama fish isolate, (2-4) Arkansas fish isolates, (5-8) human isolates.*

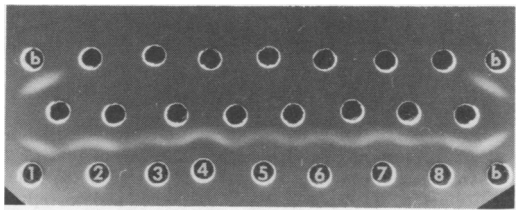

FIG. 2. *Ouchterlony slide showing presence of type Ib antigen in the fish and human nonhemolytic group B isolates. Center wells were filled with Ib antiserum. Three corner wells (b) were filled with purified type Ib polysaccharide. Remaining top and bottom wells were filled with Lancefield HCl extracts, as indicated in Fig. 1.*

charide. No precipitin lines were seen between the antiserum and bovine extracts.

The bovine isolates appeared more typical of group B streptococci in biochemical tests (Table 1) than the other isolates in that the cow strains grew in media containing elevated concentrations of salt and bile, produced acid in litmus milk, and did not grow at 45 C. The human isolates differed by growing at 45 C and by not fermenting lactose. The fish isolates deviated the most because they did not grow on media containing 10 or 40% bile, and they neither produced acid in litmus milk nor fermented any of the sugars tested except sucrose. The Alabama fish isolate differed from all strains tested by producing "gum drop" adherent growth on 5% sucrose agar. It is also interesting that the cow and Arkansas fish isolates were susceptible to bacitracin, whereas the human and Alabama fish isolates were nonsusceptible.

These results were slightly different from those in other reports on the Arkansas group B fish pathogens. Robinson and Meyer (3) found no growth with 4% NaCl, whereas our tests indicated that the organisms were tolerant of this concentration. They reported slow growth of the initial isolates. It would be reasonable to assume that the organisms have become adapted to and by subculture in the laboratory. Furthermore, Butter and deMoor (1) reported that the two Arkansas fish isolates examined in their laboratory did not split sodium hippurate. Our tests were positive for this hydrolysis. Variations of fermentative ability and hemolysis of subcultured group B strains have been noted previously (2, 4). Our results are consistent with the observation that most bovine strains are susceptible and most human strains are nonsusceptible to bacitracin (1). Exceptions occur, however, in both groups of isolates.

In summary, nonhemolytic group B streptococci are occasionally isolated from humans, cows, and fish. The organisms described in this report hydrolyzed sodium hippurate and, except for the nontypable bovine strains, were type Ib. The bovine isolates reacted as typical group B streptococci in biochemical tests. The human pathogen was similar except that it also grew at 45 C. The fish pathogens differed considerably in their intolerance to bile and nonfermentative behavior.

Although no inferences can be drawn from these data about the epidemiological significance of these isolates, it seems worthy of note that nonhemolytic group B streptococci are occasionally isolated from pathological material. Although there is no evidence that infected cattle and fish

TABLE 1. *Characteristics of nonhemolytic group B streptococci of human, bovine, and ichthyic origin*[a]

Group B isolates		Growth in media containing				Growth at 45 C	Adherent gum drop colonies in 5% sucrose agar	Starch hydrolysis	Acid in litmus milk	Fermentation of				Susceptibility to bacitracin
Host	No.	4% NaCl	6.5% NaCl	10% Bile	40% Bile					Lactose	Salicin	Sucrose	Trehalose	
Human	4	+	+	+	+	+	−	−	+	−	+	+	+	−
Cow (milk)	7	+	+[b]	+	+	−	−	+[c]	+	+	+	+	+	+
Fish														
Arkansas	3	+	−[d]	−	−	−	−	−	−	−	−	+	−	+
Alabama	1	+	−	−	−	−	+	−	−	−	−	+	−	−

[a] All isolates were negative in the following tests: catalase, bile-esculin, methylene blue reduction in milk, growth at 10 C, tellurite tolerance, tetrazolium reduction, gelatin liquefaction, and fermentation of sorbitol, mannitol, inulin, esculin, raffinose, glycerol, and arabinose.

[b] Five of seven strains.

[c] Five of seven strains but different from footnote *b*.

[d] Two of three strains.

are potential reservoirs of group B streptococci that might be transmitted to humans, there is also no evidence to the contrary.

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ADDENDUM IN PROOF

In January 1973, John A. Washington, Mayo Clinic, Rochester, Minn., sent us a nonhemolytic group B *Streptococcus* isolated from the blood of a 50-year-old female who had undergone a vaginal hysterectomy in December 1972. This organism, a type Ib, was identical to the human isolate described in this paper.

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