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Evaluation of the Pneumoslide Latex Agglutination Test for Identification of *Streptococcus pneumoniae*

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The Pneumoslide latex agglutination test was evaluated with 106 strains of *Streptococcus pneumoniae* and 56 strains representing seven species of viridans streptococci. The Pneumoslide test gave one false-positive and one false-negative reaction. Testing of isolated colonies for solubility in 10% sodium deoxycholate was as accurate but was simpler and less expensive to perform.

Isolates of *Streptococcus pneumoniae* are frequently identified in clinical laboratories by Optochin sensitivity (3), bile solubility (3), or saponin solubility (3). Immunological approaches to the identification of pneumococci have included the quellung reaction (2), counterimmunoelectrophoresis (6), immunofluorescence (7), and coagglutination (4). Of these tests, only bile solubility, the quellung reaction, and coagglutination may be completed within a few minutes and without any special laboratory equipment. For a variety of reasons, as pointed out by Austrian (2), the quellung reaction has become a neglected microbiological technique and is seldom used in clinical laboratories today.

The purpose of this study was to evaluate a rapid latex slide agglutination test (Pneumoslide; BBL Microbiology Systems, Cockeysville, Md.) for identification of pneumococci.

Strains selected for study included 106 gram-positive cocci isolated from clinical specimens, resembling *S. pneumoniae* morphologically on blood agar and microscopically in Gram-stained smears. Of these 106 isolates, 81 were from respiratory tract secretions, 15 were from blood cultures, and 10 were from miscellaneous sources. Also included in the study were 31 strains of viridans streptococci from respiratory secretions and 25 stock strains of viridans streptococci isolated from blood cultures of patients with infective endocarditis. The viridans streptococci were identified as to species by the method of Facklam (5).

All strains were tested for bile solubility by directly applying 10% sodium deoxycholate solution to colonies isolated after 24 h of incubation on blood agar (8). All strains were tested with the Pneumoslide latex agglutination test by the directions of the manufacturer. In brief, two to three colonies were selected from blood agar after 24 h of incubation and emulsified in a drop of saline which was mixed with a drop of *S. pneumoniae* antibody-coated latex bead suspension on a glass slide. After 3 min of rocking or rotating the slide, the mixture was examined for the presence of agglutination (Fig. 1A). A negative control was tested in parallel with each test strain (Fig. 1B). Testing with *S. pneumoniae* antibody by quellung reaction (8) and counterimmunoelectrophoresis (1) with polyvalent antiserum (Omiserum; Staten's Seruminstitut, Copenhagen, Denmark) and by immunofluorescence (1) with fluorescein-labeled anti-*S. pneumoniae* conjugate (FA Pneumococcus Poly; Difco Laboratories, Detroit, Mich.) was limited to strains with discrepant reactions. Strains were not serotyped. Strains yielding discrepant results were also tested for solubility in sodium dodecyl sulfate or Dreft (8).

The distribution of species and number of strains tested by species are listed in Table 1. Two strains gave discrepant reactions. There was one strain classified as *S. pneumoniae* which was not soluble in sodium deoxycholate and gave a negative latex agglutination reaction but which was soluble in sodium dodecyl sulfate and reacted with *S. pneumoniae* antibody in the counterimmunoelectrophoresis and immunofluorescence tests. There was one strain which was classified as *Streptococcus salivarius* on the basis of physiological reactions but gave positive latex agglutination and immunofluorescence reactions, was insoluble in sodium deoxycholate, and did not react with *S. pneumoniae* antibody in the counterimmunoelectrophoresis test.

A clumping reaction (Fig. 1C) in both the test and negative control latex agglutination reagents was observed with 1 (0.9%) of the 106 strains of *S. pneumoniae*. Clumping of the latex particles was also observed in the test reagent with 6 (11%) of the 56 viridans streptococci, in the negative control reagent with 13 (23%) of the 56 viridans streptococci, and in both the test and negative control reagents with 20 (34%) of the 56 viridans streptococci. Clumping was readily distinguishable from agglutination by a trained observer. (Fig. 1A and C) and thus posed few problems in interpretation of the test result. The clumping reaction was not species-specific among viridans streptococci (Table 1).

In conclusion, the Pneumoslide latex agglutination test proved to be a rapid and accurate technique for identifying *S. pneumoniae*, provided care was taken to distinguish between agglutination and clumping of the latex particles. The direct bile solubility test also proved to be accurate but

TABLE 1. Latex agglutination reactions of 163 pneumococci and viridans streptococci

Species	No.	No. agglutinating	No. clumping
S. pneumoniae	106	105	1
S. mitis	29	0	23
S. MG	6	0	3
S. sanguis II	5	0	4
S. salivarius	4	1	2
S. mutans	4	0	3
S. sanguis I	4	0	2
S. morbillorum	1	0	1
S. acidominimus	1	0	0
S. anginosus-constellatus	1	0	0
S. anginosus-constellatus/morbillorum group	1	0	1

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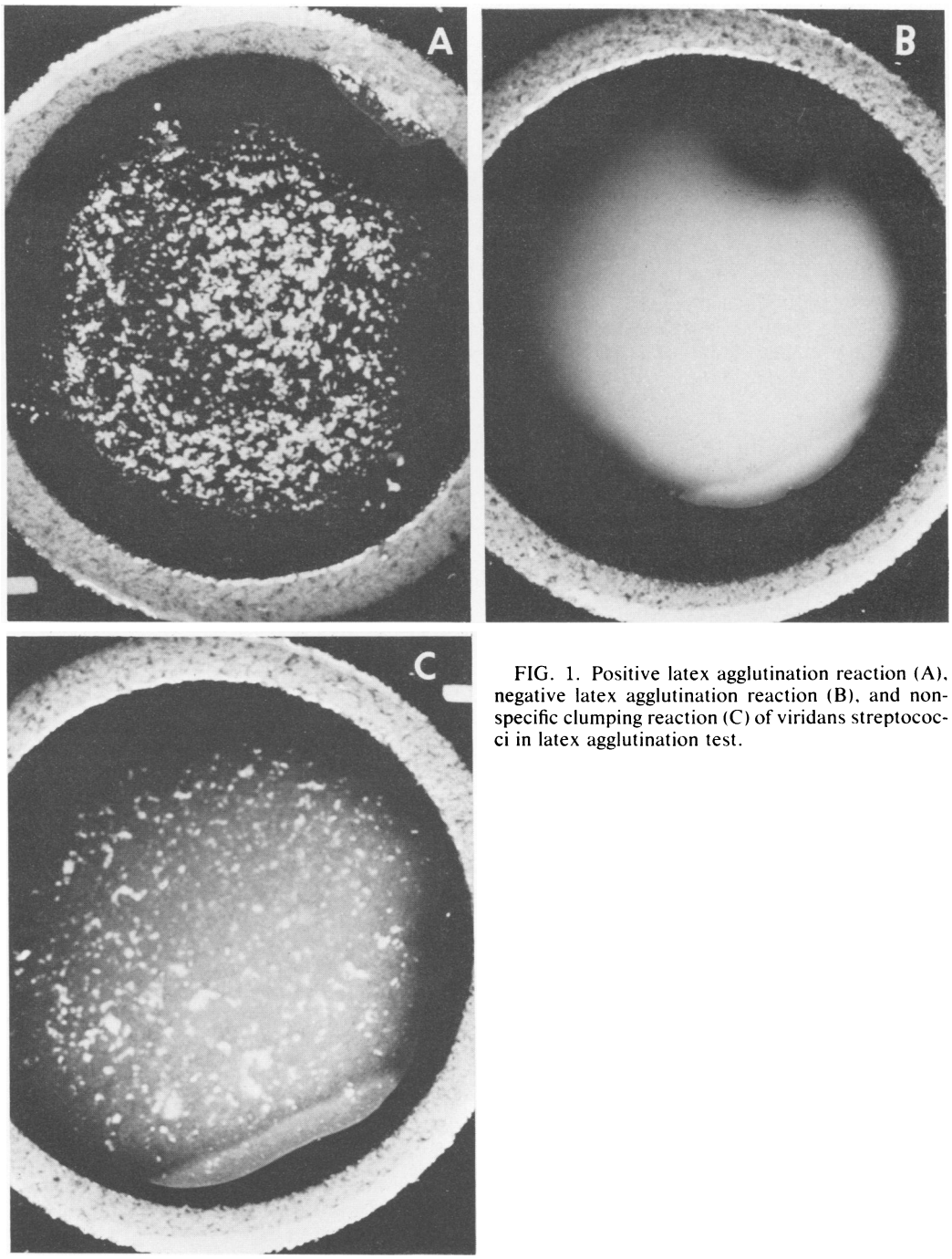

FIG. 1. Positive latex agglutination reaction (A), negative latex agglutination reaction (B), and nonspecific clumping reaction (C) of viridans streptococci in latex agglutination test.

was simpler, more rapid, and less expensive to perform than the latex agglutination test for identifying isolates of *S. pneumoniae* on a routine basis.

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