Comparison of a Latex Agglutination Procedure with the Microimmunofluorescence Test for *Rickettsia typhi*

**JULIA A. RAWLINGS,† L. BRUCE ELLIOTT, AND LYNN M. LITTLE‡**

*Bureau of Laboratories, Texas Department of Health, Austin, Texas 78756-3194*

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Sera submitted to the Texas Department of Health for the serodiagnosis of *Rickettsia typhi* were tested by the microimmunofluorescent antibody technique and a new latex agglutination procedure. Results indicated that the latex agglutination test was sensitive and specific and would serve well as a first-line screening test for murine typhus.

*Rickettsia typhi* is the etiological agent of murine (endemic) typhus. Cases occur worldwide, especially in tropical or semitropical areas where rats and their fleas live in close association with humans. For nearly 10 years, the standard reference test for detecting antibody against *R. typhi* has been the sensitive and specific microimmunofluorescent-antibody technique (mIFA) (5, 6). Unfortunately, many laboratories are not equipped with a fluorescence microscope to perform the mIFA, and the reagents are not available commercially. These laboratories depend on the Weil-Felix test, which requires no elaborate equipment, as a screening procedure for the serodiagnosis of murine typhus.

The Weil-Felix test, an agglutination procedure, relies on a cross-reaction between the OX19 and OX2 strains of *Proteus vulgaris* and *R. typhi* antigens. This test is known to result in a large number of both false-positive and false-negative reactions and, therefore, can provide only presumptive evidence of *R. typhi* infection. On the other hand, studies in our laboratory revealed few false-positive or false-negative reactions with the latex-*R. typhi* test, a latex agglutination screening procedure that detects *R. typhi* antibody (4). The antigen used in this test is erythrocyte-sensitizing substance, obtained by boiling purified *R. typhi* in 0.2 N NaOH (2).

From January 1982 through December 1983, 2,066 specimens from 1,135 patients were submitted to the Texas Department of Health Laboratory for determination of rickettsial antibody titers. These sera were tested by both the mIFA (7) and the latex-*R. typhi* method (4), as previously described, and a comparison of test results was made to determine the sensitivity and specificity of the latex-*R. typhi* test.

Latex reagents (3) were prepared by K. E. Hechemy of the New York State Department of Health. All sera were screened at a 1:16 dilution. Positive sera then were tested quantitatively by mIFA and by the latex-*R. typhi* procedures. The *R. typhi* yolk sac antigen (1) used in the mIFA was provided by the Centers for Disease Control. The conjugate used was a fluorescein-conjugated rabbit anti-human globulin produced by Beckman Instruments, Inc., Fullerton, Calif. A minimum titer of 1:128 for a single serum or a fourfold rise in titer to ≥1:128 for paired sera was considered diagnostic of *R. typhi* infections. Static (unchanging) antibody titers on two or more sera were interpreted as indicating a previous infection at an undetermined time.

By both the mIFA and the latex-*R. typhi* test, 83 patient sera (7.3%) were positive. By mIFA only, nine patients (0.8%) had positive titers. Of these nine, two showed a rise in antibody titer, whereas the remaining seven showed static titers. By using these data to determine the sensitivity of the latex-*R. typhi* test as compared with that of the mIFA, we found the screening procedure to be 90.2% sensitive when static antibody titers were considered and 97.6% sensitive when only rising titers were considered. Ideally, serological tests are used to detect acute cases of murine typhus; the static results indicate infections at an undetermined time and not necessarily current infections.

Latex-*R. typhi* titers of ≥1:32 with absent mIFA titers resulted for 50 (4.4%) of the patient sera tested. Of these 50 patients, 27 developed titers of 1:32 only, 8 developed titers of 1:64, and 15 developed titers of ≥1:128. By using these numbers to determine the specificity of the latex-*R. typhi* procedure, the test was found to be 95.2% specific if titers of ≥1:32 were considered, 97.8% specific if titers of ≥1:64 were considered, and 98.6% specific if titers of ≥1:128 were considered.

These results show the comparable sensitivity and specificity of the latex-*R. typhi* procedure to the mIFA. Results can be obtained within 45 min of receipt of a serum specimen in the laboratory. The speed of the latex-*R. typhi* procedure, its simplicity, and its adaptability to any laboratory make it an excellent replacement for the Weil-Felix screening test.

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**LITERATURE CITED**

1. **Centers for Disease Control.** 1982. Rickettsial indirect fluorescent antibody (IFA) research reagents. Centers for Disease Control, Atlanta.
