

Tests with serums of 248 leprosy patients showed that, in differentiating syphilitic from biologic false-positive reactors, the RPCF test is as reliable as the TPI test.

Reactivity of the RPCF Test in Leprosy Compared With Other Syphilis Tests

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LEPROSY stands high on the list of clinical entities known to produce biologic false-positive reactions with the conventional serologic tests for syphilis. Of the many procedures which have been used for the differentiation of the BFP reactor from the syphilitic reactor the *Treponema pallidum* immobilization (TPI) test has been considered to be the most reliable. The data presented in this paper indicate that in persons with leprosy, the Reiter protein complement fixation (RPCF) test is as reliable as the TPI test in differentiating syphilitic and biologic false-positive reactors.

The several serologic tests for syphilis employing lipoidal antigens are known to produce varying degrees of biologic false-positive re-

sults with the serum of leprosy patients. In comparative studies in which crude tissue extract and cardioliipin antigens have been used, the percentage of biologic false-positive reactors has been found to be less with tests employing cardioliipin antigens. However, none of the efforts to eliminate these biologic false-positive reactions by refinement of antigen or other modifications has been completely successful.

Studies have been made of the use of Reiter treponemes in complement fixation tests for syphilis to provide information concerning the reliability of these tests when employed with serum from patients with leprosy. Two such studies in which suspensions of whole Reiter organisms were used as antigen in the complement fixation tests for syphilis with leprosy patients have been reported by Eagle and associates (1) and by Kolmer and associates (2). In both of these studies patients at the Public Health Service Hospital, Carville, La., were the source of their testing material. These reports, which may be considered representative of reports from several sources, indicated that the use of antigen consisting of whole Reiter treponemes produced what was considered an undesirable percentage of false-positive results.

The TPI test was applied by Nelson (3) to the serums of 57 Carville patients who were reactive with a complement fixation test employing cardioliipin and with the VDRL slide test. Sixteen of the 57 serums immobilized the trep-

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Dr. E. B. Johnwick, medical officer in charge, and Dr. R. R. Wolcott, clinical director, Public Health Service Hospital, Carville, provided clinical information and material for this study. Mrs. Marie B. Nifong and Mrs. Frances T. Moon gave technical assistance in performing the treponemal tests.

Table 1. Number of negative results with five serologic tests of serum specimens from 248 leprosy patients

Number of tests negative	TPI	RPCF	TPCF	VDRL	Kahn	Number of patients	Percent of patients
5.....	-	-	-	-	-	130	52.4
4.....	+	-	-	-	-	1	.4
	-	+	-	-	-	1	.4
	-	-	+	-	-	21	8.5
3.....	-	-	-	+	-	5	2.0
	-	-	-	-	+	24	9.7
2.....	-	-	-	+	+	45	18.2
	-	+	+	-	+	1	.4
1.....	-	-	+	+	-	1	.4
	+	-	+	-	+	7	2.8
0.....	+	-	-	+	+	1	.4
	+	+	+	+	+	1	.4
	+	+	+	+	+	5	2.0

onemes. None of the 57 patients had anamnestic or clinical evidences of syphilis. The frequency of reactors with the TPI test with this group was interpreted by Nelson to be more or less indicative of the syphilis to be expected in the racial and socioeconomic groups from which the patients were drawn.

Edmundson and associates (4) made a clinicoserologic study of 224 Carville patients comparing the results of the TPI test with several conventional serologic tests for syphilis. Reactivity percentages were as follows: TPI, 11.2; VDRL, 46.9; Rein-Bossak, 51.8; Kahn, 52.7; and Kolmer (cardiolipin), 63.4. It was concluded that the TPI results were much more consistent with opinions regarding the prevalence of syphilis in this population than were the results of the other tests.

D'Alessandro and Dardanoni (5) tested 19 patients with leprosy and found 9 reactive with the Kahn test, 8 reactive with a complement

fixation test employing whole Reiter treponemes as antigen, 6 reactive with a cardiolipin complement fixation test, and 4 reactive with the full-volume Kolmer test employing Reiter protein antigen. The status of these patients in relation to past or present syphilis infection was not given.

Previous testing in the Venereal Disease Experimental Laboratory with the RPCF test has demonstrated the Reiter protein antigen of D'Alessandro and Dardanoni to have a high degree of specificity. However, these studies have not included leprosy patients. Therefore, this study was undertaken to determine the relative specificity and usefulness of Reiter protein antigen when employed with the serum of presumably nonsyphilitic leprosy patients. To provide serologic comparison the RPCF, TPI, TPCF, VDRL slide, and Kahn standard tests were performed in parallel on all specimens.

Methods and Material

The RPCF test was that described by Cannefax and Garson (6).

The TPCF (*Treponema pallidum* complement fixation) test was the original procedure of Portnoy and Magnuson (7).

The TPI test was that of Nelson and Diesendruck (8) with added complement according to Thompson and Magnuson (9) and increased sodium thioglycolate as recommended by Portnoy, Harris, and Olansky (10).

Table 2. Reactivity to each test of 248 leprosy patients

Test	Positive reactions	
	Number	Percent
TPI.....	12	4.8
RPCF.....	8	3.2
TPCF.....	38	15.3
VDRL.....	68	27.4
Kahn.....	89	35.9

The VDRL and Kahn tests were those described in Serologic Tests for Syphilis, 1955 Manual (11), and were performed at the Public Health Service Hospital, Carville.

The RPCF, TPI, and TPCF tests were performed at the Venereal Disease Experimental Laboratory, Communicable Disease Center, Public Health Service, University of North Carolina School of Public Health, Chapel Hill.

The patients in this study were unselected in regard to previous serologic testing, age, sex, or form of leprosy. The only criterion for inclusion of patients in this study was that they not have a history or clinical evidence of syphilis.

Results

Table 1 gives the results for each of the five tests with serum specimens from 248 leprosy patients. These data are summarized in tables 2, 3, and 4.

The reactivity of the various tests with serum specimens from the 248 patients is shown in table 2. The RPCF test gave the lowest percentage of positive reactions, 3.2 percent, followed closely by the TPI test with 4.8 percent positive. The TPCF test gave 15.3 percent positive reactions. The highest percentage of positive reactions occurred with the Kahn test, 35.9 percent, with the VDRL slide test showing a somewhat smaller proportion, 27.4 percent.

Table 3 summarizes the data of table 1 to show the reactions of a given test compared with those obtained with each of the other tests.

Table 4 presents the percentage of agreement between each pair of tests, figured as the

Table 4. Percentage agreement among test results for all possible pairs of tests

Test	RPCF	TPCF	VDRL	Kahn
TPI-----	96.0	85.5	75.8	68.1
RPCF-----		87.1	74.2	65.7
TPCF-----			68.5	61.7
VDRL-----				87.5

sum of the number of serum specimens giving positive reactions to both tests and negative reactions to both tests divided by the number of serums tested. The highest agreement between any two tests, 96 percent, was between the TPI and RPCF tests. The disagreement in reaction to these two tests was in 7 serums which were TPI positive and RPCF negative and in 3 which were TPI negative and RPCF positive. Agreement between the TPI and TPCF tests was 85.5 percent. The lack of agreement was accounted for in the major part by finding 31 positive reactions to the TPCF test among serums negative to the TPI test. Comparing the reactions of the RPCF test and the TPCF test, the agreement was 87.1 percent. The percentage agreement between the reagin tests, Kahn and VDRL, and the RPCF, TPCF, and TPI tests was a much lower order. In most instances the disagreement was in the direction of more positive reactions with the reagin tests.

Discussion

This study was initiated to determine the relative specificity and usefulness of the RPCF

Table 3. Comparison between pairs of tests of test results of serum specimens from 248 leprosy patients

Test	RPCF		TPCF		VDRL		Kahn	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
TPI { Positive-----	5	7	7	5	10	2	11	1
{ Negative-----	3	233	31	205	58	178	78	158
RPCF { Positive-----			7	1	6	2	6	2
{ Negative-----			31	209	62	178	83	157
TPCF { Positive-----					14	24	16	22
{ Negative-----					54	156	73	137
VDRL { Positive-----							63	5
{ Negative-----							26	154

test when employed with the serum of leprosy patients. The data accumulated demonstrate that the RPCF test possesses a high degree of specificity when used as a serologic test for syphilis in a presumably nonsyphilitic population with leprosy. In only three instances was there a positive reaction to the RPCF test with negative reactions among the other tests. One of these serums was weakly reactive with the RPCF test and nonreactive to all other tests; 1 serum was nonreactive to 3 other tests; 1 serum was nonreactive to 1 other test. The RPCF test was reactive in 5 serums in which results of the other 4 tests were also reactive. Hence, only 2 serums reacted to the RPCF test that would not have been found reactive with at least 2 other tests.

There appeared to be no relationship between the type of leprosy, the activity of the disease, and the response to the different tests. Previous studies which have employed standard serologic tests for syphilis have generally shown an appreciable incidence of biologic false-positive results only among lepromatous cases. The patients were divided into the following categories: active lepromatous, 167; arrested lepromatous, 56; active tuberculoid, 11; and inactive tuberculoid, 14. Of the patients reactive to all tests, 4 were lepromatous in type with positive bacteriology, the remaining 1 was a negative tuberculoid. The single patient weakly reactive with the RPCF test who was negative to all other tests was a positive tuberculoid.

Summary and Conclusions

The serums of 248 presumably nonsyphilitic leprosy patients tested with five serologic tests resulted in the following reactivities: RPCF, 3.2 percent; TPI, 4.8 percent; TPCF, 15.3 percent; VDRL, 27.4 percent; and Kahn, 35.9 percent.

Comparison of the reactivities of the five tests indicates that the RPCF and TPI tests most closely approximated the expected serologic activity in relation to clinical and anamnestic information.

It appears reasonable to conclude from the data accumulated during this study that the reliability of the RPCF test with serum from

patients with leprosy is of the same order of magnitude as the TPI test and more reliable than the TPCF, VDRL, and Kahn tests.

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