

VDRL, Kahn, and Kolmer Tests for Syphilis

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The diagnosis of central nervous system (CNS) syphilis is frequently dependent on laboratory findings. The spinal fluid tests most widely employed include white cell counts, total protein determinations, colloidal precipitation techniques, and complement fixation or flocculation tests for syphilis.

Several studies comparing the VDRL and Kolmer spinal fluid tests have been reported (1-3), but the laboratory findings were not correlated or compared with physical findings or diagnoses.

In a 6-month cooperative study by the Venereal Disease Research Laboratory of the Division of Venereal Disease, Public Health Service, and the Alto Medical Center of the Georgia State Department of Health, on 5,539 patients admitted to the treatment center, the VDRL, Kahn, and Kolmer tests on the spinal fluid of each patient were evaluated in their relation to other laboratory findings and diagnoses.

Methods

Duplicate tubes of spinal fluid were collected from patients admitted to the treatment center at Alto. A white cell count, total protein determination (biuret method), and Kahn test

were performed on one tube of this fluid in the laboratory at the treatment center. The second tube of spinal fluid was sent to the Venereal Disease Research Laboratory at Chamblee, Ga., by auto (approximately 60 miles and 2 hours away), where the VDRL and Kolmer tests for syphilis and another total protein determination (4) were performed.

For analyses, the results of the VDRL, Kahn, and Kolmer tests are divided into reactive (positive and doubtful) and nonreactive (negative) groupings. The broad relationship of the results of these three tests in this study is shown in table 1.

Disagreement existed between results obtained with VDRL, Kahn, and Kolmer tests on 132 spinal fluids. Agreement-disagreement ratios for these tests for syphilis, on this group of specimens, and correlation of these results with other laboratory findings and diagnoses are recorded in table 2. White cell counts of five or more and total protein of 41 mg. per 100 cc. or greater were considered as abnormal findings for the categories in table 2.

When they were admitted to the treatment center, all patients in this study had evidence of syphilis infection, including a positive or doubtful blood test. Since the doctors at the treatment center received only the results of the Kahn and other tests performed in the laboratory at that facility, positive reactions in the VDRL and Kolmer tests were not used as bases for diagnoses of asymptomatic neurosyphilis. However, positive Kahn tests on spinal fluids were frequently the prime, and sometimes the only, determinants of decisions regarding asymptomatic neuroinvasion phases of syphilitic infection.

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Patients in categories C and D, "No neurosyphilis diagnosis" (table 2), are those who have had no such diagnoses on previous admissions, or during the present admission to the Alto rapid treatment center. However, discharge diagnoses from present admissions may in some instances be altered in this regard if attending physicians consider that cell count and total protein spinal fluid findings indicate neuroinvasion.

Analysis of Test Results

The figures recorded in table 1 show little percentage-wise differences between the three listed tests. However, 12 more positive reactions were reported for the VDRL test than for either the Kahn or Kolmer method. Since admissions to the treatment center at Alto are principally predicated on positive blood tests for syphilis without reference to current spinal fluid findings, and, since spinal fluids used in this study were collected from unselected routine admissions over a period of 6 months, the reactivity rates recorded in table 1 probably represent average expectancy in the selected population group served by this center. Of the 5,539 spinal fluids tested in this study, 9.1 percent (an average of 1 to each 11 admissions to the treatment center) reacted in one or more of the three spinal fluid tests for syphilis.

Results of the Kahn and Kolmer tests (table 1) appear to be in closer agreement than are those of the VDRL test with either of the other two tests. However, reference to the test agreement-disagreement listings in table 2 shows that there is greater agreement between the VDRL and Kolmer tests than between any two of the other tests. In the 132 instances where the three tests failed to agree, the VDRL-Kolmer combination was reactive 38 times and nonreactive 52 times—a total agreement of 90 times. In this group of discrepancies, the Kahn-Kolmer combination showed agreement in 30 instances and the VDRL-Kahn combinations agreed only 12 times.

All other findings in tests for syphilis on the 5,539 spinal fluids used in this study were in agreement, that is, all three tests were nonreactive (5,036) or all three tests were reactive (371). The VDRL and Kolmer tests were in

agreement on 5,497 of 5,539 spinal fluids tested (99.2 percent), the Kolmer and Kahn test combination agreed 5,437 times (98.2 percent), and the VDRL and Kahn test results agreed in 5,419 spinal fluids (97.8 percent), tested in this study.

Table 1. Results obtained with VDRL, Kahn, and Kolmer tests of spinal fluids of 5,539 patients

Tests	Number of spinal fluids			
	Reactive (positive and doubtful)		Nonreactive (negative)	
	Number	Percent	Number	Percent
VDRL.....	437	7.9	5,102	92.1
Kahn.....	425	7.7	5,114	92.3
Kolmer.....	423	7.6	5,116	92.4
1 or more tests.....	503	9.1
All 3 tests.....	371	6.7	5,036	90.9

In categories A and B, made up of patients with a diagnosis of neurosyphilis, as in categories C and D, which were made up of patients in whom this diagnosis was lacking, approximately equal numbers of positive reactions (table 2) were obtained by using the VDRL test alone, the Kolmer test alone, and both the VDRL and the Kolmer test. A large proportion (44 of 52) of the reactions (+) in the Kahn test alone were in the group of patients having neurosyphilis diagnoses. However, these two types of findings were definitely influenced by the fact that many original diagnoses of neurosyphilis were predicated on Kahn spinal fluid test findings alone, since results of the other two tests for syphilis were not available to the attending physicians at the time that the original diagnoses were made. It was also interesting to note (table 2) that in only two instances were reactions in both the Kahn and Kolmer tests accompanied by negative findings in the VDRL test. Although reactions with either the VDRL or Kahn test were associated with negative Kolmer test findings, a negative Kolmer test was found in no instance where both the VDRL and Kahn tests reacted (+).

In patient category A (table 2) 18, 15, and 13 positive or doubtful reactions (+) were ob-

tained with the Kahn, VDRL, and Kolmer tests, respectively. In the B category of this table, 28 Kahn, 18 VDRL, and 14 Kolmer test reactions (+) were reported. Since 19 of the 48 diagnoses in the B category were made on Kahn test findings alone, these figures, and, conversely, those in the C and D categories were weighted in favor of the Kahn test by this factor.

The C category of table 2 shows 13 VDRL, 9 Kolmer, and only 3 Kahn test reactions (+), while the D category contains 20 VDRL, 16 Kolmer, and only 5 Kahn test reactions (+). The significance of the diagnosis on the basis of the Kahn test alone in categories B, C, and D in influencing these findings is stated in the preceding paragraph.

A comparison of the results of the VDRL, Kahn, and Kolmer test findings with abnormalities in the cell count and total protein reports may be visualized by combining findings recorded in categories A and C (table 2). The 53 spinal fluids in these two categories had higher than normal findings in either or both protein content and cell count. In these 53 spinal fluids, positive (+) findings were obtained in 28, 22, and 21 instances by the VDRL, Kolmer, and Kahn tests, respectively. Thus, a slightly greater correlation was obtained between positive findings with the VDRL test and cell count plus total protein results than was

produced by either of the other two tests for syphilis.

The test in use in the laboratory providing the data on which the original diagnosis is based is in a favored position. Since asymptomatic neurosyphilis is a laboratory diagnosis, the result of the test for syphilis often establishes the diagnosis. For example, in the B category, (column 2, table 2), 19 patients were diagnosed asymptomatic CNS syphilis on the basis of a positive Kahn test alone. Had the VDRL or the Kolmer spinal fluid test been used instead, there would have been no diagnosis of CNS syphilis in these instances. In other words, since the diagnosis is based on laboratory findings, the particular test employed in the institution will check 100 percent with the diagnoses. In the category of asymptomatic CNS syphilis, it is impossible to determine the specificity of the spinal fluid tests for syphilis, since the clinical findings are normal. One may be partially guided by the cell count and total protein, but abnormalities in these, although frequently more significant, may be even less specific than the spinal fluid tests for syphilis.

Our findings can point out no marked superiority of any of the test procedures studied. However, since the diagnosis of CNS syphilis may be determined by spinal fluid tests for syphilis, which may disagree, more information is available to the diagnostician if two or more

Table 2. Relationship of 132 discrepant reactions obtained with the VDRL, Kahn, and Kolmer tests on spinal fluids to clinical status of patients

Categories ¹	VDRL+ Kahn- Kolmer-	VDRL- Kahn+ Kolmer-	VDRL- Kahn- Kolmer+	VDRL+ Kahn+ Kolmer-	VDRL+ Kahn- Kolmer+	VDRL- Kahn+ Kolmer+	Total
A. Neurosyphilis (past or present), cell count ² and/or total protein ³ abnormal.	5	18	3	0	10	0	36
B. Neurosyphilis (past or present), cell count and total protein normal.	8	26	2	0	10	2	48
C. No neurosyphilis, cell count ² and/or total protein ³ abnormal.	5	3	1	0	8	0	17
D. No neurosyphilis, cell count and total protein normal.	10	5	6	0	10	0	31
Total.....	28	52	12	0	38	2	132

¹ By diagnosis and present cell count and/or total protein.

² Abnormal cell count=more than 5 per mm.

³ Abnormal total protein=more than 40 mg. per cubic centimeter.

⁴ Includes 19 diagnosed as having asymptomatic CNS syphilis with the Kahn test the only positive spinal fluid finding.

+ Positive or doubtful.

- Negative.

such tests are performed on each spinal fluid. The VDRL-Kolmer combination was in closer agreement than other test combinations discussed in this report.

Summary

1. Results obtained with the VDRL, Kahn, and Kolmer tests for syphilis, plus the status of cell counts and total protein determinations, on 5,539 spinal fluids drawn from patients in the treatment center at Alto, Ga., are presented and discussed.

2. For each 11 admissions to the Alto treatment center, an average of one spinal fluid (9.1 percent) gave positive or doubtful reactions in one or more of the three tests for syphilis used in this study during a 6-month period.

3. Results obtained with the VDRL and Kolmer tests were in closer agreement than were those of the VDRL-Kahn or Kahn-Kolmer test combinations.

4. In 132 spinal fluids, where the results of the VDRL, Kahn, and Kolmer tests were not in agreement, slightly better correlation was obtained between the reactive VDRL tests and increased cell counts and/or total protein findings than existed between these two findings and the reactivity of the Kahn or Kolmer tests.

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Industrial Sickness Absenteeism

Last Two Quarters, 1951

An upward trend in industrial sickness absenteeism is indicated by the frequency rates for the last two quarters of 1951 and the year 1951.

The over-all rates for the third and fourth quarters of 1951 (109.5 and 125.2 absences per 1,000 males) represent 11 and 6 percent increases over the 1950 rates for the same periods (98.6 and 118.0, respectively).

The 1951 third quarter rates for

respiratory diseases, digestive diseases, and nonrespiratory-nondigestive diseases are 16, 14, and 5 percent above the corresponding rates for 1950, while the 1951 fourth quarter rates for the same disease groups are 8, 6, and 7 percent, respectively, above the 1950 rates.

The specific cause rates for 1951 are generally higher than the corresponding ones for 1950. Notable are the increases of 45 percent for influenza and gripe, and 23 percent for infectious and parasitic diseases.

A review of the broad-cause group rates for the third and fourth quarters for the past 10 years, 1942-51, shows for 1951 all but the respiratory group to be above the corresponding 10-year average. The 1951 third and fourth quarter rates for

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this cause group are 10 and 25 percent below the 10-year average of the respective quarters.

The data shown in the accompanying table on 8-day or longer disabilities experienced by approximately 170,000 male employees were derived from periodic reports submitted by industrial sick benefit associations, company relief departments, and group health insurance plans.