

Comparison between the results of the Brewer rapid plasma reagin card test and other tests for syphilis

B. S. TIO

*From the Dermatological Department of the Medical Faculty, Rotterdam, the Netherlands
(Head: Prof. C. H. Beek)*

Standard complement-fixation and flocculation tests have major disadvantages in large-scale syphilis screening of populations, migrant workers, and similar groups, because they require fully-equipped laboratories, well-trained staff, and also relatively large blood-samples. First in the search for a rapid direct and simple screening test was Chediak (1932), with a 'thick drop of blood' reaction evolved from the Meinicke microfloculation test. The difficult requirements of the Chediak reaction, defibrination and drying of the blood drops on the slide, were later facilitated by the use of specially prepared absorptive papers. The procedure was still rather too complicated for large-scale testing and required a microscope for reading the results, but a further modification by Kirschner and Kramers (1940) achieved a rapid and distinct flocculation which could be read by the naked eye or a $\times 2$ magnifying glass. Tested on patients in the dermatological department of the Municipal Hospital in Bandoeng, Java, who were sero-positive to the Wassermann reaction, the Chediak-Kirschner reaction gave negative results in 2.3 per cent. of cases; on further examination of 2,034 patients by Tio (1941), the proportion of negative results was lower (0.16 per cent.).

Ott (1943) found the reverse tendency; his examination showed that the Chediak reaction gave 1.8 per cent. more positive results than the Wassermann reaction. Analogous to the Chediak reaction and the modification of Kirschner was the Brewer rapid plasma reagin card (RPRC) test, which was developed in 1956. Portnoy, Garson, and Smith (1957), assessing this procedure, used heparinized blood and not inactivated plasma or serum; they showed that this test gave more positive results than the VDRL slide test in which no differences had been noted when using anticoagulants. Simpson, Mathis, Harris, and Price (1959), examining 47,579 Mexican labourers in California with the RPRC test, found that specimens from 3,913 cases (8.2 per cent.) were reactive,

and from 685 cases weakly reactive. Among those with reactive results were 31 patients with primary and secondary syphilis, 985 with early latent syphilis, and 2,713 with late syphilis. They also tested 1,670 specimens by standard methods, and found an agreement varying from 95.3 per cent. with the Kolmer cardiolipin complement-fixation test to 88.9 per cent. with the VDRL test.

Portnoy, Brewer, and Harris (1962) later compared the RPRC test with the VDRL slide test in 600 cases of syphilis, and found 29 per cent. negative reactions with the RPRC test compared with 21.3 per cent. with the VDRL slide test. In a group of patients without clinical evidence of syphilis, consisting of cases of gonorrhoea, contacts of syphilitic patients, pregnant women, and non-syphilitic patients, the RPRC test yielded 6.5 per cent. of positive reactions compared with 3.8 per cent. yielded by the VDRL test. Muller (1967), performing the RPRC test on 250 sera which were not reactive to the Wassermann reaction, recorded negative results for all specimens. With 298 sera which were reactive to the Wassermann test, the RPRC test was reactive in 295 cases and non-reactive in three. In general most investigators of the RPRC test and the Chediak reaction have been of the opinion that these two procedures are very useful for large-scale testing.

The RPRC test can be performed in two ways:
(1) With the so-called 'teardrop' test, by which blood is obtained from the earlobe or finger-tip;
(2) With serum or plasma.

In our assessment of the reliability and the value of the RPRC test, we used serum to avoid the difficulties experienced by Muller (1967) in obtaining plasma from three drops of blood.

Technique

Part of the blood, obtained for standard serum testing was centrifuged and used unheated for the 18 mm. Brewer RPRC test. As these tests had to be performed dozens of times daily, the Brewer test cards were placed on a mechanical rotator, to make contact as soon as possible.

The case material, the standard tests with which the RPRC test was compared, and the results are presented in Table I.

Among a group of 2,409 patients without syphilitic infection, the RPRC test, the VDRL slide test, the Kline test, and the Wassermann-Kolmer test gave non-reactive results in all cases. The RPRC test as well as the MKR II test gave 0.2 per cent. of non-specific positive reactions. These few positive results do not reduce the value of the RPRC test in large-scale testing, because by the essential further examination of all sera giving reactive results these can easily be recognized as being non-specific.

When the specificity of the RPRC test was tested on 158 patients with primary and secondary syphilis, its specificity agreed well with that of the VDRL and RPRC tests. Some negative results were obtained with all tests in the primary syphilis group and in these cases the RPRC test, the VDRL, and the RPRC test showed with the same accuracy the change of the serological reactions from non-reactive to reactive.

In 22 cases of late acquired syphilis and 11 cases of congenital syphilis, results with the RPRC test were comparable with those of other tests.

In 502 patients with possible syphilitic infection, the RPRC, VDRL, and RPRC tests had essentially the same value.

In large-scale testing of the population, it is important to be able to separate patients with clinically demonstrable syphilis and also those with latent syphilis to be proved by a positive TPI test result. It is therefore of importance to compare results of the RPRC test with those from the TPI test. Nolting and Fegeler (1966) found that only eleven (7.5 per cent.) of 145 patients with a reactive TPI test showed a non-reactive RPRC. Accordingly it might be possible to screen more than nine out of ten patients with a positive TPI test from a large group of persons, merely by performing the RPRC test.

Table II shows the results obtained with four different serum tests performed on 1,155 TPI-reactive sera. The RPRC test and the RPRC test gave 92.2 per cent. and

TABLE I *Diagnosis, number of cases, and results of RPRC test compared with other serological tests*

Diagnosis	Laboratory	Number of cases	RPRC reactive	Reiter PCF reactive	VDRL reactive	MKR II reactive	Kline reactive	Wa.-Kolmer reactive
Non-syphilitic	A	397	0	0	0	—	0	0
	B	1315	4	—	—	6	—	0
	C	697	1	0	0	—	—	0
	Total Percentage	2409	5 0.2	0 0	0 0	6 0.2	0 0	0 0
Syphilis I	A	17	16	17	16	—	—	15
	B	49	23	—	—	—	—	16
	C	49	32	28	25	—	—	23
	Total Percentage	115	71 63	45 67	41 42	—	—	54 47
II	A	9	9	9	8	—	—	8
	B	8	8	—	—	—	—	6
	C	26	26	26	26	—	—	26
	Total Percentage	43	43 100	35 100	34 95	—	—	40 93
III and IV	A	2	2	2	2	—	—	2
	B	10	9	8	—	—	—	7
	C	10	9	9	8	—	—	7
	Total Percentage	22	20 91	19 86	10 83	—	—	16 73
Congenital syphilis	A	1	1	1	1	—	—	1
	B	5	5	4	—	—	—	4
	C	5	5	4	4	—	—	4
	Total Percentage	11	11 100	9 88	5 83	—	—	9 82
Possible syphilitic infection	A	68	64	63	65	—	—	60
	B	237	131	—	—	—	—	78
	C	197	110	119	99	—	—	85
	Total Percentage	502	305 59	182 68	164 61	—	—	223 43

TABLE II Relation between the positive TPI-test and the RPCF-, RPRC-, and classical STS-tests

Number of cases	TPI reactive	RPCF reactive	RPRC reactive	VDRL reactive	Wa.-Kolmer reactive
817	817	817	817	817	817
17	17	17	17	17	0
3	3	3	3	0	3
192	192	192	192	0	0
36	36	36	0	0	0
90	90	0	0	0	0
Total	1155	1065	1029	834	820
Percentage	100	92.2	89.9	72.2	71

89.9 per cent. positive reactions respectively. The percentage agreement with the VDRL and Wassermann Kolmer reactions was significantly lower. Routine has its influence on the results and in our first group of 261 patients with a positive TPI the proportion with a reactive RPRC was only 75 per cent., while in the following 894 cases the proportion reactive to the RPRC reached 93.2 per cent. However it remains impossible, when screening with the RPRC alone, to detect all patients with a positive TPI reaction. Nonetheless, being a technically simple test with high specificity and sensitivity, the RPRC is undoubtedly worthy of use; we found that the short time (only 4 minutes) necessary for obtaining the result of the RPRC reaction is still of especial importance with seamen coming to our clinic and for use in mass screening in all clinics.

Summary

The Brewer rapid plasma reagin card test has been compared with other serological tests for syphilis. It gave only 0.2 per cent. of non-specific positive reactions in tests of 2,409 non-syphilitic sera.

Its sensitivity agreed well with that of the RPCF test in tests of sera from cases of early and late acquired syphilis and congenital syphilis, and in testing 1,155 TPI-reactive sera. The good sensitivity and specificity of this technically simple and rapidly performed procedure make it of especial value for mass screening and in testing special groups like seamen and migrants in whose cases results may be required urgently.

References

- CHEDIAK, A. (1932) *Rev. méd. cuba.*, **43**, 947
 KIRSCHNER, L., and KRAMERS, C. A. (1940) *Geneesk. T. Ned.-Ind.*, **80**, 2843
 MÜLLER, P. (1967) *Dermatologica (Basel)*, **135**, 238
 NOLTING, S., and FEGELER, F. (1966) *Münch. med. Wschr.*, **108**, 845
 OTT, V. (1943) *Schweiz. med. Wschr.*, **73**, 242
 PORTNOY, J., BREWER, J. H., and HARRIS, A. (1962) *Publ. Hlth Rep. (Wash.)*, **77**, 645
 —, GARSON, W., and SMITH, C. A. (1957) *Ibid.*, **72**, 761
 SIMPSON, W. G., MATTHIS, A. W., HARRIS, A., and PRICE, E. V. (1959) *Ibid.*, **74**, 473
 TIO, B. S. (1941) Dissertation 'Syphilis Frequency in the Regency of Bandoeng,' Java.

Comparison entre les résultats du Brewer rapid plasma test sur carte et les autres tests pour la syphilis

SOMMAIRE

L'épreuve du Brewer rapid plasma reagin test sur carte a été comparé avec les autres tests sérologiques pour la syphilis. Cette épreuve a donné seulement 0,2 % de réponses positives non spécifiques à l'examen de 2.409 sérums non syphilitiques.

Sa sensibilité s'accorde bien avec celle du RPCF dans l'examen de sérums provenant de cas de syphilis acquise récente ou tardive et de syphilis congénitale et dans l'examen de 1.155 sérums réactifs au TPI. La bonne sensibilité et la bonne spécificité de ce procédé technique simple et rapide lui donne une valeur spéciale pour les dépistages de masse et l'examen de groupes spéciaux tels que les marins ou les immigrants, pour lesquels les résultats doivent être obtenus d'urgence.