

# Fluorescent treponemal antibody tests on cerebrospinal fluid

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Reports of fluorescent treponemal antibody (FTA) testing of cerebrospinal fluids have appeared in the literature from time to time (Harris, Bossak, Deacon, and Bunch, 1960; Vaisman and Hamelin, 1961; Niel and Fribourg-Blanc, 1964).

It has become accepted practice in our laboratory to perform an FTA test, without absorption with Reiter treponemes, on undiluted cerebrospinal fluid (CSF). As no established technique for the fluorescent treponemal antibody absorption (FTA-ABS) test on CSF has appeared at the time of writing this paper, the test has been carried out in our laboratory using the same techniques as for serum. This report concerns our experience with these tests in a routine testing laboratory.

### Material and methods

CSF from 336 patients was sent to the laboratory for routine tests for syphilis. In addition a *Treponema pallidum* immobilization (TPI) test was carried out on each sample of CSF as well as an FTA test and/or an FTA-ABS test. This paper compares the results of the TPI and FTA tests on each specimen of CSF.

CSF was merely substituted for serum in the performance of the TPI and FTA-ABS tests. It was tested undiluted in the FTA test, instead of being diluted 1 in 200 in phosphate buffered saline as is done with serum in the

FTA-200 test. The volume of CSF used in the FTA test was the same as that described in the FTA-200 test for serum. No other changes were made in the techniques. The test methods and optical equipment used were those in daily use in our laboratory (Garner, Grantham, Collins, and Roeder, 1968).

### Results

There was complete agreement between the results in 316 of the 336 samples of CSF examined. FTA tests were carried out on 163 specimens, FTA-ABS tests on 107, and both tests on 46.

Of the 316 specimens of CSF in which there was agreement, reactive TPI test results were obtained on 44, of which eighteen were reactive in the FTA test, eighteen in the FTA-ABS test, and eight in both.

The remaining 272 samples of CSF gave non-reactive TPI test results. The FTA test gave non-reactive results on 145 specimens, the FTA-ABS test on 89, and both tests on 38. Sera from 197 of the 272 patients in this group gave reactive results to the TPI test, 36 were nonreactive, and sera from 39 patients were not tested (Table I).

There were twenty specimens of CSF in which there was some discrepancy between the TPI and FTA test results. In eleven of these the TPI and FTA-ABS test results were reactive and the FTA nonreactive. A history of tabes, neurosyphilis, or

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TABLE I Results of TPI and FTA tests on 316 samples of cerebrospinal fluid in which the results of the tests agreed

Serum			Cerebrospinal fluid test results							
TPI test			Nonreactive				Reactive			
Not done	Nonreactive	Reactive	TPI	FTA	FTA-ABS	FTA and FTA-ABS	TPI	FTA	FTA-ABS	FTA and FTA-ABS
			39	20	12	7				
	36		36	22	13	1				
		197	197	103	64	30				
		44					44	18	18	8
Total			272	145	89	38	44	18	18	8

lightning pains was given by eight patients, one had a history of treated syphilis, and two gave no history relevant to syphilis. The results of the TPI, fluorescent, and standard tests for syphilis on these eleven specimens of CSF are shown in Table II.

There were nine samples of CSF in which TPI and fluorescent test results showed marked discrepancies (Table III). All tests were repeated to eliminate the possibility of technical errors, and in each case the original results were confirmed. A history of cerebrospinal syphilis was given by two patients from whom the CSF gave reactive results in the TPI test and nonreactive FTA and FTA-ABS test results. CSF from a further two patients who had a history of

syphilis gave reactive FTA-ABS and nonreactive TPI and FTA test results. Only one of the fluorescent tests was carried out on the remaining five samples of CSF tested. Of this group, two fluids were reactive in the TPI test and nonreactive in the FTA test; one gave a nonreactive result in the TPI test and a reactive result in the FTA-ABS test; one was reactive in the TPI test and nonreactive in the FTA-ABS test; and one gave a nonreactive TPI test and a reactive FTA-ABS test result. Four of the five samples of CSF were from patients whose sera gave reactive TPI test results and the fifth was from a patient from whom no serum was received but whose history stated that he had Charcot's joints. The results of the standard tests

TABLE II Test results on eleven CSF in which TPI and FTA-ABS tests agreed and FTA test did not agree

History	Test results					
	TPI	FTA-ABS	FTA	CWR	VDRL	RPCF
Tabes	R	R	—	R	—	R
Neurosyphilis	R	R	—	R	R	R
Neurosyphilis	R	R	—	R	—	R
Neurosyphilis	R	R	—	R	—	R
Tertiary syphilis, lightning pains	R	R	—	—	—	—
Tabes	R	R	—	—	±	—
No history except 'blood tests reactive'	R	R	—	—	—	R
Neurosyphilis	R	R	—	—	—	—
Reactivation of G.P.I.	R	R	—	—	—	R
Vaccination 6 months ago	R	R	—	R	±	R
Treated syphilis	R	R	—	R	—	R

R = reactive — = nonreactive ± = weakly reactive

TABLE III TPI, FTA, FTA-ABS test on nine cerebrospinal fluids showing marked discrepancy in test results

Patient No.	History	Serum TPI result	CSF test results					
			TPI	FTA	FTA-ABS	CWR	VDRL	RPCF
1	Syphilitic arachnoiditis	R	R	—	—	—	—	—
2	Chancre, 1915; Tabes, 1964	R	R	—	—	—	—	—
3	Treated syphilis, G.P.I.	R	R	N/D	—	—	—	—
4	Treated syphilis 2 years ago	R	—	—	R	—	—	—
5	Congenital syphilis	N/D	—	—	R	—	—	—
6	Neurosyphilis	R	—	N/D	R	—	—	—
7	Charcot's joints	N/D	R	—	N/D	—	—	—
8	Absent knee jerks	R	R	—	N/D	R	R	R
9	Treated secondary syphilis	R	—	R	N/D	—	—	—

R = reactive — = nonreactive N/D = not done

on these nine specimens of CSF are shown in Table III.

### Discussion

The results of the FTA test agreed with those of the TPI test in 93.2 per cent. (221 out of 237) of the cerebrospinal fluids examined. Harris and others (1960) observed that the FTA test using undiluted CSF and the FTA-200 test using serum should detect similar antibody levels. Our results using the FTA test on CSF showed better agreement with the TPI test than the 90.8 per cent. produced in the laboratory (Garner and others, 1968) using the FTA-200 test on sera.

The FTA-ABS test was carried out on 180 samples of CSF of which 174 (96.6 per cent.) agreed with the TPI test results. This compared favourably with a 95.1 per cent. agreement between the TPI and FTA-ABS test results on sera in our laboratory (Garner and others, 1968).

The differing levels of antibody detection in the FTA and FTA-ABS tests probably account for the results on the eleven spinal fluids in which the TPI and FTA-ABS tests were reactive and the FTA test nonreactive. These results are similar to those to be expected if sera were tested from these patients, *i.e.* long-standing cases of syphilis in which the FTA-ABS test remained reactive but the FTA-200 test was frequently nonreactive. The Reiter protein complement fixation test result agreed with that of the TPI and FTA-ABS tests in eight of these spinal fluids. This is also similar to the usual test result pattern found in our laboratory on sera from many of these patients.

There were three CSF samples (Patients 1, 2, 3: Table III) in which the FTA-ABS test failed to detect syphilitic antibody. The histories indicated syphilitic involvement of the brain or spinal cord and in each CSF the TPI test gave a reactive result. It was reasonable in these three cases to have expected a reactive FTA-ABS test result.

The FTA-ABS test was the only one to give a reactive result in a further three samples of CSF (Patients 4, 5, 6: Table III). In one of these, in which the patient had a clinical history of neuro-syphilis, a reactive instead of a nonreactive TPI test result would have been expected. In the other two patients the histories were of treated syphilis 2 years ago and of congenital syphilis, with no apparent signs of nervous system involvement in either case. It is not possible in these two cases to determine if the reactive FTA-ABS test results on the CSF were due to early involvement of the brain or spinal cord or

were non-specific reactions. A similar case exists with Patient 9 (Table III) whose serum gave a reactive FTA test.

The FTA-200 test on serum frequently fails to detect antibody in long-standing syphilitic infection. It is therefore not surprising that the FTA test, which detects an antibody level similar to that of the FTA-200 test in serum (Harris and others, 1960), did not detect antibodies in four fluids (Patients 1, 2, 7, 8: Table III) in which the TPI test gave a reactive result and the histories in each case indicated long-standing syphilitic infection. In one of these fluids the CWR, VDRL, and RPCF test results were also reactive (Patient 8: Table III).

Until a definite technique is established for FTA testing of cerebrospinal fluid, the FTA-ABS technique, merely substituting CSF for serum, appears to give acceptable results.

### Summary

The TPI, FTA, and FTA-ABS tests were carried out on 336 samples of cerebrospinal fluid, received in a routine testing laboratory for syphilis.

The FTA test showed 93.2 per cent. and the FTA-ABS test 96.6 per cent. agreement with the TPI test.

The discrepancies which occurred between some of the test results in twenty cerebrospinal fluids are discussed.

It is concluded that the FTA-ABS technique used in this series gives acceptable results.

### References

- GARNER, M. F., GRANTHAM, N. M., COLLINS, C. A., and ROEDER, P. J. (1968) *Med. J. Aust.*, **1**, 404  
 HARRIS, A., BOSSAK, H. M., DEACON, W. E., and BUNCH, W. L., JR. (1960) *Brit. J. vener. Dis.*, **36**, 178  
 NIEL, G., and FRIBOURG-BLANC, A. (1964) Unpublished working document WHO/VDT/RES/34.  
 VAISMAN, A., and HAMELIN, A. (1961) *Presse méd.*, **69**, 1157

### Tests à l'anticorps tréponémique fluorescent dans le liquide céphalo-rachidien

#### SOMMAIRE

Le TPI, le FTA et le FTA-ABS ont été appliqués à 336 échantillons de liquide céphalo-rachidien reçus dans un laboratoire pratiquant les tests de routine pour la syphilis.

Par rapport au TPI, le FTA fut en accord dans 93,2 pour cent des cas et le FTA-ABS dans 96,6 pour cent.

Les désaccords trouvés entre quelques uns des résultats pour 20 liquides céphalo-rachidiens sont discutés.

On conclut que la technique du FTA-ABS utilisée dans cette série a donné des résultats acceptables.