

# OBSERVATION UPON SPINAL FLUID CELL COUNTS IN UNTREATED CASES OF CEREBRO-SPINAL SYPHILIS<sup>1</sup>

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Following the adoption of the Swift-Ellis treatment in syphilis of the nervous system many contributors have referred to a reduction of the cell count following such treatment, and often the inference must be made that the reduction has been considered as an index to the value of treatment. The results of cell counting in our series of cases being treated by the Swift-Ellis method were so uncertain that it was determined to make some comparative counts at regular intervals upon untreated cases of paresis, to ascertain the extent of fluctuation in the pleocytosis. Such pronounced variations were found in individual cases that we finally included in the study all available cases of paresis exhibiting every stage of the disease. Some three hundred counts were made upon thirty-four patients, at intervals of two weeks. The Wassermann test upon the blood serum was positive in thirty-three cases, while in one case three trials gave negative results. The same test upon the fluid was positive at some time in all cases, while in three cases only did it, at any time, give faintly positive or negative results. The Noguchi butyric acid test for globulin was more variable and in fifteen cases it was positive, faintly positive and negative at different times.

The Wassermann and globulin tests were made upon the fluid with each cell count but the blood was examined but once in most of the cases. All of the patients were males and no cases presenting any doubt as to the correctness of the clinical diagnosis were included in our list.

All of the serological work and the cell counting was done by the hospital pathologist, Dr. Paul G. Weston, and the possible error due to the personal equation in counting was thus

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reduced to a minimum by comparing the findings of one person in the various counts. The same technique was followed carefully in all instances. The fluid was drawn into a red-cell pipette at the bedside immediately following the puncture. Methyl violet in 36 per cent. acetic acid was used as the staining reagent and all counting was done within an hour from the time of puncture. Before counting the pipette was well shaken and five different drops were counted upon a Zappert-ruled Zeiss slide. The nine large squares were counted with each drop and the average count recorded for each puncture.

In compiling our results some cases showed increase in the count, others a decrease, while many remained practically unchanged. These varying results demonstrated little relation with the stage of the disease or the patients' condition while under investigation as can readily be seen by a review of the abstracts and tables.

TABLE NO. I

*Slight Variation in Count*

No. 1. S———. Case No. 8284. Age, 42 years.

History of syphilitic infection eight years previously. Duration of mental symptoms about two years. Diagnosis, tabo-paresis. Present condition comfortable with practical remission of active symptoms. Blood gave positive Wassermann on two trials. Fluid was positive fifteen times. Globulin, negative twice; positive thirteen times. Cells varied from none to twelve on fifteen counts.

No. 2. F———. Case No. 8298. Age, 36 years.

History of syphilitic infection nineteen years previously. Duration of mental symptoms about one year. Diagnosis, paresis. Present condition elated and mildly demented. Blood gave positive Wassermann on one trial. Fluid was positive thirteen times. Globulin, negative three times; positive ten times. Cells varied from eighty to three hundred on thirteen counts.

No. 3. S———. Case No. 7696. Age 38 years.

History of syphilitic infection thirteen years previously. Duration of mental symptoms about four years. Diagnosis, paresis. Condition, bedridden to time of death. Blood gave positive Wassermann on one trial. Fluid was positive eleven times. Globulin, negative seven times; positive three times. Cells varied from none to two on twelve counts.

No. 4. L———. Case No. 7796. Age, 42 years.

No history of syphilitic infection. Duration of mental symptoms about five years. Diagnosis, tabo-paresis. Present condition well nourished, demented, bedridden patient. Blood gave positive Wassermann on two trials. Fluid was positive six times, faintly positive or negative on last tests. Globulin, negative nine times; positive two times. Cells varied from none to twenty on eleven counts.

No. 5. F———. Case No. 8303. Age, 75 years.

Questionable history of syphilitic infection. Duration of mental symptoms about thirteen years. Diagnosis, paresis. Condition, bedridden to time of death. Blood gave positive Wassermann on one trial. Fluid was positive eleven times. Globulin, positive eleven times. Cells varied from none to fifteen on eleven counts.

No. 6. D———. Case No. 8184. Age, 49 years.

History of syphilitic infection twenty years previously. Duration of mental symptoms about ten years. Diagnosis, tabo-paresis. Condition, helpless and bedridden to time of death. Blood gave positive Wassermann on one trial. Fluid was positive ten times. Globulin, negative nine times, positive once. Cells varied from one to one hundred on ten counts.

No. 7. P———. Case No. 8361. Age, 42 years.

No history of syphilitic infection. Duration of mental symptoms about one year. Diagnosis, tabo-paresis. Present condition, fair remission of active symptoms. Blood gave positive Wassermann on one trial. Fluid was positive ten times. Globulin, positive ten times. Cells varied from none to ten on ten counts.

No. 8. M———. Case No. 7886. Age, 62 years.

History of syphilitic infection thirty-four years previously. Duration of mental symptoms about four years. Diagnosis, tabo-paresis. Condition, bedridden and helpless to time of death. Blood gave positive Wassermann on one trial. Fluid was positive seven times. Globulin, positive seven times. Cells varied from one to twenty on seven counts.

No. 9. P———. Case No. 8483. Age, 64 years.

No history of syphilitic infection. Duration of mental symptoms about one year. Diagnosis, paresis. Present condition, feeble, demented and euphoric. Blood gave positive Wassermann on one trial. Fluid was positive six times. Globulin, positive six times. Cells varied from none to two on six counts.

TABLE I

[illegible]

No. 10. B———. Case No. 8490. Age, 51 years.

No history of syphilitic infection. Duration of mental symptoms about two years. Diagnosis, paresis. Present condition, ambulant with mild degree of euphoric dementia. Blood gave positive Wassermann on one trial. Fluid was positive five times. Globulin, positive five times. Cells varied from none to one hundred on five counts.

Continuous low counts, with little variation, are found in tabo-paresis with remission (Case I), in bedridden and dying patients (Cases Nos. III, IV, V and VIII), also in a rapidly deteriorating grandiose parietic (No. IX). Of the three cases with relatively high count, one (Case No. VI) was a tabo-parietic with optic atrophy, bedridden to time of death, while the other two are cases of advancing paresis with well pronounced grandiose symptoms.

#### TABLE No. II

##### *Decrease in Count*

No. 1. A———. Case No. 8084. Age, 36 years.

History of syphilitic infection thirteen years previously. Duration of mental symptoms about two years. Diagnosis, tabo-paresis. Present condition, remission of active symptoms. Blood gave positive Wassermann on one trial. Fluid was positive thirteen times. Globulin, negative ten times; positive three times. Cells varied from none to two hundred and sixty on thirteen counts.

No. 2. A———. Case No. 8191. Age, 39 years.

History of syphilitic infection twelve years previously. Duration of mental symptoms about one year. Diagnosis, paresis. Present condition, active and strong but shows considerable slowly progressive deterioration. Blood gave positive Wassermann on one trial. Fluid was positive eleven times. Globulin, negative once; positive nine times. Cells varied from none to eighty on eleven counts.

No. 3. B———. Case No. 7747. Age, 47 years.

No history of syphilitic infection. Duration of mental symptoms unknown. Diagnosis, cerebro-spinal syphilis (hemiplegia). Present condition, bedridden and demented. Blood gave positive Wassermann on one trial. Fluid was positive ten times. Globulin, positive ten times. Cells varied from none to one hundred and forty on ten counts.

No. 4. S———. Case No. 8075. Age, 34 years.

No history of syphilitic infection. Duration of mental symptoms about three years. Diagnosis, paresis. Condition, bedridden and demented to time of death. Blood gave positive Wasser-

mann on one trial. Fluid was positive seven times. Globulin, positive seven times. Cells varied from none to fifty on seven counts.

No. 5. A———. Case No. 7528. Age, 41 years.

No history of syphilitic infection. Duration of mental symptoms about three years. Diagnosis, paresis. Condition, bedridden and demented to time of death. Blood gave positive Wassermann on one trial. Fluid was positive eight times. Globulin, negative five times; positive twice. Cells varied from none to thirteen on seven counts.

No. 6. B———. Case No. 8401. Age, 45 years.

No history of syphilitic infection. Duration of mental symptoms about four years. Diagnosis, paresis. Present condition, advanced dementia. Ambulant. Blood gave positive Wassermann on one trial. Fluid was positive seven times. Globulin, positive seven times. Cells varied from one to forty on six counts.

No. 7. R———. Case No. 8435. Age, 47 years.

History of syphilitic infection seven years previously. Duration of mental symptoms about four years. Diagnosis, paresis. Present condition, demented and helpless. Ambulant. Blood gave positive Wassermann on one trial. Fluid was positive six times. Globulin, negative once; positive, five times. Cells varied from two to thirty on six counts.

No. 8. W———. Case No. 8149. Age, 34 years.

History of syphilitic infection ten years previously. Duration of mental symptoms about five years. Diagnosis, cerebral syphilis with optic atrophy. Present condition, blind, slightly unreasonable, ambulant. Now at home. Blood gave positive Wassermann on one trial. Fluid was positive six times. Globulin, positive six times. Cells varied from three to one hundred on six counts.

No. 9. H———. Case No. 7597. Age, 40 years.

No history of syphilitic infection. Duration of mental symptoms about four years. Diagnosis, paresis. Present condition, active and grandiose. Shows little dementia. Blood gave positive Wassermann on three trials. Fluid was positive five times. Globulin, negative three times; positive twice. Cells varied from none to sixty on five counts.

No. 10. McK———. Case No. 7811. Age, 42 years.

History of syphilitic infection seventeen years previously. Duration of mental symptoms about two years. Diagnosis, paresis. Condition, feeble and demented to time of death. Blood

gave positive Wassermann on two trials. Fluid was positive five times. Globulin, positive five times. Cells varied from one to six on four counts.

No. 11. C———. Case No. 7249. Age, 47 years.

No history of syphilitic infection. Duration of mental symptoms about four years. Diagnosis, paresis. Present condition, ambulant and much demented. Blood gave positive Wassermann on one trial. Fluid was positive three times, faintly positive four times and negative six times. Globulin, negative once; positive eleven times. Cells varied from none to one hundred and ten on thirteen counts.

No. 12. W———. Case No. 8136. Age, 32 years.

History of syphilitic infection eleven years previously. Duration of mental symptoms about three years. Diagnosis, paresis. Present condition, ambulant and much demented. Blood gave positive Wassermann on one trial. Fluid was positive eleven times. Globulin, positive eleven times. Cells varied from none to twenty-five on eleven counts.

No. 13. C———. Case No. 8359. Age, 40 years.

No history of syphilitic infection. Duration of mental symptoms unknown. Diagnosis, paresis, with optic atrophy. Present condition, feeble and profoundly demented. Ambulant. Blood gave positive Wassermann on one trial. Fluid was positive eight times, faintly positive twice and negative once. Globulin, positive ten times. Cells varied from none to one hundred and twenty on eleven counts.

No. 14. O———. Case No. 8180. Age, 36 years.

No history of syphilitic infection. Duration of mental symptoms about five years. Diagnosis, paresis. Present condition, ambulant but showing much dementia. Blood gave positive Wassermann on one trial. Fluid was positive ten times. Globulin, positive nine times. Cells varied from none to seventy on ten counts.

No. 15. B———. Case No. 7985. Age, 60 years.

History of syphilitic infection seven years previously. Duration of mental symptoms about two years. Diagnosis, paresis. Condition, bedridden to time of death. Blood gave positive Wassermann on one trial. Fluid was positive nine times. Globulin, negative once; positive eight times. Cells varied from one to one hundred and ten on nine counts.

No. 16. J———. Case No. 8385. Age, 32 years.

History of syphilitic infection eleven years previously. Dura-





tion of mental symptoms about two years. Diagnosis, paresis. Condition, ambulant and progressively deteriorating to a few days before death following epileptiform seizures. Blood gave positive Wassermann on one trial. Fluid was positive eight times. Globulin, positive eight times. Cells varied from none to one hundred on eight counts.

No. 17. D———. Case No. 8271. Age, 48 years.

No history of syphilitic infection. Duration of mental symptoms about three years. Diagnosis, paresis. Condition, bedridden to time of death. Blood gave positive Wassermann on one trial. Fluid was positive seven times. Globulin, negative once; positive six times. Cells varied from none to one hundred and sixty on seven counts.

No. 18. N———. Case No. 8439. Age, 40 years.

History of syphilitic infection eighteen years previously. Duration of mental symptoms about three years. Diagnosis, tabo-paresis. Present condition, ambulant and much demented. Blood gave positive Wassermann on one trial. Fluid was positive seven times. Globulin, positive seven times. Cells varied from two to one hundred and thirty on seven counts.

No. 19. B———. Case No. 7857. Age 60 years.

No history of syphilitic infection. Duration of mental symptoms unknown. Diagnosis, tabo-paresis. Condition, bedridden and demented to time of death. Blood gave positive Wassermann on one trial. Fluid was positive five times. Globulin, negative once; positive four times. Cells varied from none to fifty on five counts.

The decrease in count is seen in both the early and late stages, and in all possible terminations of the disease, and seems to bear little relation to the clinical condition. High counts were seen in periods of comparative remission, and both high and low counts were found in far advanced, dying cases.

### TABLE NO. III

#### *Increase in Count*

No. 1. M———. Case No. 8014. Age, 46 years.

History of syphilitic infection twenty-two years previously. Duration of mental symptoms about three years. Diagnosis, paresis. Present condition, advanced and failing. Blood gave positive Wassermann on one trial. Fluid was positive eleven times. Globulin, positive eleven times. Cells varied from twenty to one hundred and sixty on eleven counts.

No. 2. Y———. Case No. 7117. Age, 54 years.

No history of syphilitic infection. Duration of mental symptoms about five years. Diagnosis, paresis. Condition, bedridden

to time of death. Blood gave positive Wassermann on first trial. Fluid was positive eight times. Globulin, negative five times; positive twice. Cells varied from two to fifteen on eight counts.

No. 3. G———. Case No. 8479. Age, 38 years.

History of syphilitic infection three years previously. Duration of mental symptoms about one year. Diagnosis, paresis. Present condition, feeble and demented, showing slight improvement. Blood gave positive Wassermann on one trial. Fluid was positive six times. Globulin, positive six times. Cells varied from none to thirty on six counts.

No. 4. W———. Case No. 8500. Age, 40 years.

No history of syphilitic infection. Duration of mental symptoms about two years. Diagnosis, tabo-paresis. Present condition, progressive. Blood gave positive Wassermann on one trial. Fluid was positive five times. Globulin, positive five times. Cells varied from two to sixty on five counts.

No. 5. H———. Case No. 8349. Age, 32 years.

No history of syphilitic infection. Duration of mental symptoms about five years. Diagnosis, paresis. Present condition, advanced, but showing slight clinical improvement. Blood gave positive Wassermann on two trials. Fluid was positive five times. Globulin, positive five times. Cells, increased count, varied from two to two hundred on five counts.

Of the five cases with increasing count the one with the greatest increase, Case No. V, shows slight clinical improvement, while the case with the lowest count and least variation progressed to death. The three other cases are slowly deteriorating. All were well marked cases of paresis. All showed positive Wassermann in blood and positive globulin and Wassermann in fluid.

TABLE III

Case No.	No	Diagnosis.	Increase in Count.												Condition.
8014	1	Paresis	28	110	60	30	150	150	80	160	20	50	130		Ambulant.
7117	2	Paresis	2	1	6	0	2	1	2	15	.	.	.	.	Dead.
8479	3	Paresis	0	0	0	0	0	30	.	.	.	.	.	.	Ambulant.
8500	4	Tabo-paresis	10	2	10	45	60	.	.	.	.	.	.	.	Bed-ridden.
8349	5	Paresis	30	2	60	60	200	.	.	.	.	.	.	.	Ambulant.

In a review of our thirty-four cases a count of three or less was found at some time in all but two, both far advanced paretics.

Seven of the cases showing high average counts were paretics exhibiting excitable, grandiose tendencies during the period they were under observation, but similar results were also found in

cases showing pronounced dementia and comparative remission of active symptoms.

High counts were found in all stages of the disease, from the first to the tenth year of well defined parietic symptoms.

In several cases very great variation was shown in the counts at two week intervals without any appreciable changes in the patients' symptoms.

Low average counts were also found to occur in all stages of the disease. Of ten patients with the highest count below twenty, seven are dead or bedridden, two show remission of active symptoms and one is ambulant but much demented. The period of the disease in these cases varied from the first to the thirteenth year.

While it is hardly permissible to draw conclusions concerning the value of the cell count as an index to the result of treatment, inasmuch as our observations were confined at this time to untreated cases, yet the following facts appear to be reasonably well established:

1. Great variation in the cell count may be found at short intervals in any stage of the disease.
2. Both high and low average counts persist for months at a time in various stages of the disease.
3. A low or falling count is common but not universal before death.
4. A reduction in the cell count to the normal limit frequently occurs in progressive, untreated cases at any time during the course of the disease.
5. The reduced cell count, accompanied with persistence of a positive Wassermann in the fluid, cannot be regarded as having valuable prognostic significance.