

Relationship Between Permeability to Bromides and Protein Content of the Cerebrospinal Fluid.

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In previous communications^{1, 2, 3, 4} we reported the results of investigations of the passage of bromides from the blood into the cerebrospinal fluid in different types of mental diseases. The determination was carried out by the macrocolorimetric method devised by Walter.¹ In subsequent investigations a microcolorimetric modification of this method⁵ was used with similar results. To determine the mechanisms responsible for the peculiar distribution of the bromides between the blood and cerebrospinal fluid in normals and its modifications in mental diseases, it was deemed necessary to make determinations of other cerebrospinal fluid contents simultaneously.^{6, 7} For variations in these other substances may influence the distribution of the bromides.

In this communication we report the relationship of total protein content in the cerebrospinal fluid and the bromide distribution ratio. In 356 consecutive admissions to this hospital, representing most of the mental diseases met with in hospitals for the insane, the total protein content of the cerebrospinal fluid was determined by the Ayer method,⁸ at the same time determinations were made of the bromide distribution ratio.

The results were as follows: There was a tendency for the high protein contents to be massed with the high bromide contents and the low protein with the low bromide. This was not consistent, however, as in some cases with high protein a decreased bromide

¹ Malamud, Wm., Fuchs, D. M., and Malamud, N., *Arch. Neurol. and Psychiat.*, 1928, **20**, 780.

² Malamud, Wm., Wilson, R. B., *Arch. Neurol. and Psychiat.*, 1929, **22**, 1135.

³ Malamud, Wm., *Proc. Soc. Exp. Biol. and Med.*, 1930, **27**, 477.

⁴ Malamud, Wm., Rothschild, D., *Arch. Neurol. and Psychiat.*, 1930, **24**, 348.

⁵ Malamud, Wm., and Mullins, B. M., *Proc. Soc. Exp. Biol. and Med.*, 1931, **28**, 871.

⁶ Malamud, Wm., Hayward, E. P., *Z. ges. Neurol. und Psychiat.*, 1930, **128**, 295.

⁷ Rothschild, D., and Malamud, Wm., *Arch. Neurol. and Psychiat.*, 1931, **26**, 829.

⁸ Ayer, J. B., Dailey, M. E., Fremont-Smith, F., *Arch. Neurol. and Psychiat.*, 1931, **26**, 1038.

content was found and vice versa. The coefficient of correlation in this group was 0.5734 with a probable error of ± 0.0280 .

It was somewhat different, however, in the case of the determinations in the special syndromes. (1) The group of cases diagnosed psychopathic personality (37) showed a coefficient of 0.7769 with a probable error of ± 0.0440 . (2) The group of schizophrenias (82) showed a coefficient of correlation of 0.7000 and probable error of ± 0.0380 . (3) In the cases diagnosed "without psychosis" (33) the coefficient of correlation was 0.6781, the probable error ± 0.0634 . (4) In the cases where the mental disease was caused by or associated with organic disease (63) the coefficient of correlation was 0.6648, the probable error ± 0.0474 . (5) in the cases of manic depressive psychosis (64) the coefficient of correlation was 0.4181 with the probable error of ± 0.0696 . (6) In the psychoneuroses (46) the coefficient of correlation was 0.4158 with a probable error of ± 0.0823 . All the other cases in the total group belonged to different types of diseases, and the small numbers in each did not permit of statistically valid conclusions.

We believe that the results show primarily that whatever relationship there may exist between the protein content and bromide distribution, it is not that of cause and effect. In all the groups, no matter what the correlation coefficients were, there were cases in which high protein contents occurred in the presence of low bromide permeability and vice versa. We must conclude, therefore, that the peculiar distribution of the bromides cannot be *caused* by the variations in the protein contents of cerebrospinal fluid. The tendency towards correlation, however, would suggest the possibility of similar mechanisms for both in some cases. It is of interest to note that the highest coefficients of correlation were found in the cases of (1) "psychopathic personalities without psychoses" and (2) in the other cases diagnosed "without psychosis" on the one hand, and (3) the organic diseases, as well as (4) the schizophrenias, on the other.