

## Cerebrospinal Fluid Studies in Convulsive Disorders.

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Absence of pathological findings in cerebrospinal fluids of epileptics is considered the rule (Lennox and Merritt<sup>1</sup>). Nevertheless it seems probable that any process involving chronic destructive changes of the brain tissue should cause the appearance of protein and lipid cleavage products in the cerebrospinal fluid. In order to detect such cleavage products interferometry and conductivity methods have been used. The NaCl concentrations which give the same conductivity as the cerebrospinal fluids are computed and expressed in interferometric values (= IE, the interferometric values of the electrolytes). When IE is deducted from the interferometric value of the cerebrospinal fluid, the difference is equal to the interferometric value of the nonelectrolytes (= INE). This is represented in the cerebrospinal fluid by proteins, sugar, lipoids, cleavage products. The ratio INE/IE is independent of concentration changes in the cerebrospinal fluid. Furthermore, by combining the results of the physicochemical methods with the results of chemical investigations (protein, sugar, chlorides determinations) it is possible to compute the residual interferometric value (RIV), which is not accounted for by the said determinations. This is done by computing the protein and sugar concentrations in terms of interferometric values and deducting these values from INE.

In Table I the average INE/IE and RIV found in 60 cases with convulsive seizures are recorded together with the analogous values found in normal cases (14), in cases with other organic nervous disturbances (49), and in cases with brain tumors (25).

A comparison of the figures indicates that the average INE/IE and

TABLE I.  
The Nonelectrolyte-electrolyte Ratio (INE/IE) in 60 Cases of Convulsive Seizure.

	INE/IE	RIV
Normal cases (14), (Hysteria, Headache, Surgical cases)	.22	53
Organic nerv. diseases (49), (Convulsions and brain tumors excluded)	.30	82
Convulsive disorders (60)	.32	92
Brain tumors (25)	.69	109

<sup>1</sup> Lennox, W. G., and Merritt, H. H., *J. Neurol. and Psychopath.*, 1936, **17**, 97.

RIV in convulsive states is not only higher than in the normal cases, but also higher than in the cases with other nervous disorders and inferior only to the analogous figures in brain tumors. This seems to indicate that products not covered by the usual chemical investigations, *e. g.*, lipoids and other brain cleavage products, exist in increased amounts in the cerebrospinal fluids of cases with convulsive seizures. These conclusions are partially confirmed by recent reports of lipid increase in the cerebrospinal fluid of epileptics.<sup>2</sup>

A closer examination of the individual cases with convulsive disorders shows that there seems to exist a relationship between the severity of the case and the frequency of the seizures on the one hand, and the INE/IE and the RIV on the other hand. Thirty-five cases with grand mal attacks were classified as severe either because of long duration, increasing frequency of attacks or subsequent mental deterioration. These cases showed the highest INE/IE and RIV. The lowest corresponding values were shown by 8 cases of symptomatic convulsions (allergy, calcified brain tumor, hypoglycemia, metabolic or endocrine disorders, depressed skull fracture, etc.). Mild cases of "genuine" convulsions (10 cases), showing only petit mal attacks or marked improvement for several years, and all babies with convulsions (3 cases) have INE/IE and RIV between the severe genuine and the symptomatic cases. In 4 cases the available clinical information did not permit a classification. The results are summarized in Table II.

TABLE II.  
60 Cases of Convulsive Disorders.

Classification	No. of cases	INE/IE	RIV
Severe cases of grand mal:			
a. Lasting for several years	35	.34	97
b. Getting worse			
c. Mental deterioration			
Mild cases			
a. Showing only petit mal	10	.30	86
b. Showing improvement			
Babies (up to 23 months) with convulsions	3	.27	86
Symptomatic convulsions	8	.27	68
Clinical diagnosis not clear	4	.32	94

These results seem to point to a possible diagnostic and prognostic value of the INE/IE and RIV determinations in convulsive disorders.

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<sup>2</sup> Knauer, H., and Heidrich, L., *Z. f. d. ges. Neurol.*, 1931, **136**, 433.