

Effects of a Supranormal Diet of Glutamic Acid on the Test Performance of Paretics¹

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An experiment by Albert, Hoch, and Waelsch (1) has given a basis for the hypothesis that secondary mental defect may be improved under glutamic acid medication. This hypothesis has been formally stated by Ruth Woods (2), who also cited supporting studies (3-5):

In other words, it is believed that glutamic acid, a substance affecting brain metabolism, probably aids patients whose intellectual potentialities were basically normal, but have been damaged by brain disease or injury, or inhibited by emotional mechanisms.

Attention should be called to at least three aspects of the Albert, Hoch, and Waelsch experiment (1). In the first place, the size of the sample ($N=8$, with 2 dropped later) was too small for secure conclusions. Second, the diagnosis of secondary mental deficiency was not well established. The authors (1) stated that "in some of our patients the diagnosis was not certain." Third, although possible suggestion effects were taken care of by the use of placebos, it is not clear whether it was known to the testers which patients received the placebo and which the glutamic acid. It is our presumption that the test administrators knew the medication schedule of each subject. This knowledge might well be a biasing factor.

The present experiment was undertaken in an effort to avoid these difficulties in testing the hypothesis that glutamic acid may benefit patients with secondary mental dysfunction. The syndrome chosen for study was general paresis. This offered the following advantages pertinent to our criticism of the Albert, Hoch, and Waelsch experiment:

1. A reasonable number of subjects was available for examination.
2. A clear-cut, reliable diagnosis could be established, insuring the group to be homogeneous with respect to basic pathology.
3. Brain damage could be clearly established to exist and to be secondary in nature.
4. A possibility for improvement remained even though some previous therapeutic measures had failed. Studies of the effects of other therapies on the mental functioning of paretics suggested the possibility of reversing the usual downward trend (6, 7).

The subjects selected for study were 46 institutionalized white male veterans of World War I, diagnosed as follows: syphilis, tertiary, meningoencephalitic manifested by psychotic reaction, general paresis. All were patients in the Veterans Administration Neuropsychiatric Hospital, Palo Alto, and ranged in age

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from 49 to 59. Not included in the sample were patients with mixed diagnoses that might conceivably distort test results by reason other than primary diagnosis. In addition, no case was included that had not been formally reviewed by the medical staff in a diagnostic conference at least twice after the original formulation had been made. The sample chosen was further curtailed in that only patients who produced a scorable response for at least 9 of the initial 11 subtests of the Wechsler-Bellevue Intelligence Scale were included.

Of the 46 subjects, 18 were dropped during the course of the experiment for the following reasons: 6 refused medication, 5 became disturbed and untestable, 3 were transferred to other institutions, 3 became physically ill for reasons extraneous to the study, and 1 left the hospital on a trial visit. Table 1 gives the educational performance of the group.

TABLE 1
ATTAINED EDUCATIONAL LEVEL*

No. subjects	Elementary school grade
1	2
1	3
	4
1	5
2	6
3	7
7	8
	High school grade
2	9
3	10
	11
5	12
	College year
	1
1	2
	3
2	4

* The median level of educational attainment is completion of the eighth grade, which is the same as Wechsler's normals (9).

The entire original group was tested with the Wechsler-Bellevue Intelligence Scale prior to medication. Forms I and II (8,9) were used alternately in this first situation and then later re-alternated in the re-test situations to minimize practice effects. All tests were administered by four Veterans Administration clinical psychology trainees who were not acquainted with the hypotheses or the design of the study.

All the patients in the sample were assigned initial treatment with natural dextrorotatory glutamic acid or a placebo on the basis of selection from a table of random numbers (10). The dosage was 12 g daily. The placebo was especially manufactured by a pharmaceutical firm to be identical in size, shape, and weight with the glutamic acid tablet. The taste was carefully copied, also, but the resemblance although close was not perfect. Since no patient could taste both kinds of tablet at the same time, this lack of absolute similarity was thought not to be a serious hindrance.

TABLE 2
MEANS AND SIGMAS IN WECHSLER-BELLEVUE IQs FOR THE THREE TESTING PERIODS

	Initial test	Initial treatment	First re-test	Second treatment	Second re-test
Experimental group A N = 15	M = 81.53 σ = 12.25	Glutamic acid	M = 79.13 σ = 11.48	Placebo	M = 81.00 σ = 12.77
Experimental group B N = 13	M = 87.69 σ = 11.77	Placebo	M = 84.77 σ = 13.37	Glutamic acid	M = 87.69 σ = 13.79

All medication was dispensed by a centrally located pharmacy on a physician's (FEB) individual prescription. At this pharmacy, in order to preserve the confidential nature of the medication schedule, the bottles containing the pills were labeled A and B. Thus, the nurses and aides who actually dispensed the tablets to the patients did not need to know which patient was receiving the actual medication and which the placebo. The therapy schedule, therefore, was known only to the pharmacist and the experimenters, none of whom was involved in the testing.

After two months of this type of dosage, medication was halted and re-testing was begun. This consumed a period of 21 days; during this time no medication was administered. With testing completed, treatment procedure was again begun. Those patients previously receiving placebo tablets now received a daily 12-g dose of glutamic acid, and those previously on glutamic acid received an equal number of placebo tablets. After two months, medication was again halted and a second re-testing was done.

Table 2 summarizes the test results in chronological order.

The significance of the differences between the means of groups A and B was determined for the initial testing, the first re-testing, and the second re-testing. In addition, the significance of the differences between the means for initial testing and first re-testing and between the first and second re-testing was determined for each of the groups.

None of the changes approaches significance. All differences are within the error of the instrument. As a result, the following conclusions seem evident:

1. The use of glutamic acid to restore mental capacity does not work with chronic parietics of the ages tested.
2. Only two patients gained as much as 10 IQ points. One gained it on glutamic acid medication, and the other gained it on placebo medication.
3. There was no downward trend in the test scores as the date of the end of medication became more remote.

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An Improved Apparatus for Measuring the Electrogastrogram¹

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In order to record more detailed data of the electrogastrogram we have evolved an improved apparatus as a further development and refinement of that used in the report of one of us (ENG) in November 1942 (1).

The present apparatus consists of a Miller-Abbott tube containing an intragastric electrode of .01-gauge pure silver wire with a fused bead 1-2 mm in diameter at its gastric end. This bead is chloridized, and the system made watertight by sealing with polythene cement. The other lumen of the Miller-Abbott tube is fitted with a latex balloon and attached to a strain gauge. The arm electrode consists of a helix of .025-gauge silver wire, chloridized, and placed within a glass bell (Fig. 1).

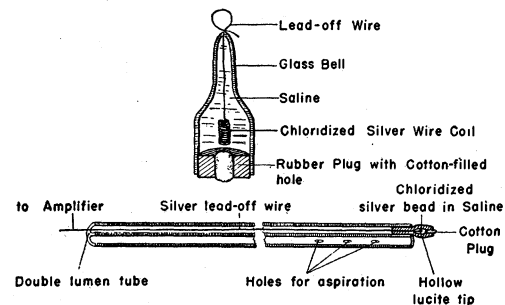


FIG. 1.

¹ This work was made possible by grants from Carola Rothschild, Sidney Rheinstein, and Mr. and Mrs. Robert Sherwood, through the Carola Rothschild Foundation.