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Relation of Vitamin B (B_1) Intake to Neurological Changes in the Alcohol Addict.

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Cowgill[1] found that the Vitamin B requirement of man could be predicted with reasonable accuracy by the following equation:

$$\frac{\text{Vitamin B mg. Eq.}}{\text{Calories}} = 0.0000284 \text{ Weight in gm.}$$

From the nature of the equation the expression $\frac{\text{Vitamin B mg. Eq.}}{\text{Calories}}$ (hereafter referred to as the Vit/Cal ratio) may be used as an indicator of the adequacy or inadequacy of the diet of any individual in respect to this vitamin.

Peripheral neuritis in the alcohol addict has been attributed to vitamin B deficiency.[2] To obtain more evidence on the deficiency theory we have calculated the Vit/Cal ratio in the diets of 24 alcohol addicts. Only those subjects who gave reliable histories, which we checked by repeated questioning and usually verified through friends or relatives, were used. Average portion weights[3] and Cowgill's[1] tables were used as a basis for calculation of the caloric and vitamin B values of the various foods. Two Vit/Cal ratios were determined, one omitting and the other including the calories derived from alcohol. Each ratio was compared to the predicted requirement.

Neurological observations made shortly after the admission of each patient are compared to the calculated Vit/Cal ratios. When the alcohol calories are omitted, 17 of the 24 subjects appear to have had an adequate vitamin B supply. However, when the alcohol calories are included, the Vit/Cal ratio in 20 of the 24 subjects falls below Cowgill's predicted value, indicating an inadequate vitamin intake. Each subject who showed a peripheral neuritis had an inadequate Vit/Cal ratio for at least 22 days, whereas not a single

1 Cowgill, G. R., *The Vitamin B Requirement of Man,* Yale University Press, 1934.

2 See Minot, G. R., Strauss, M. B., and Cobb, S., *New England J. Med.*, 1933, **208**, 1224, for literature.

3 Unpublished compilation prepared chiefly from Basic Quantity Food Tables, Department of Public Charities, City of New York, 1917.

subject having an adequate Vit/Cal ratio showed significant neurological changes even though alcohol had been used over a long period of time. The consumption of large amounts of spirituous liquor for a period as long as 18 days, with a low Vit/Cal ratio, leads to no abnormal neurological signs except tremor and hyperreflexia. It appears that the alcohol addict, to maintain an adequate Vit/Cal ratio, should supplement an otherwise adequate diet with approximately 250 mg. equivalent (50 Sherman Units) of vitamin B for each ounce of liquor consumed. This amount of vitamin B is contained in about 1.5 gm. of Vegex (autolyzed brewer's yeast).

Six subjects who had cord changes, and 5 with brain changes, had an inadequate Vit/Cal ratio for at least 2 months. It is possible that these changes in the central nervous system are due to vitamin B deficiency, the cord and brain being merely less susceptible to the lack of vitamin B than the peripheral nerves.

Cowgill uses the caloric intake to express for practical purposes the energy exchange of the individual. The practically complete utilization of moderate amounts of alcohol is well known. However, the energy exchange calculated from the caloric intake may not represent the true energy exchange when large quantities of alcohol are consumed, since a considerable portion may be excreted unchanged through the intestinal tract (vomiting and diarrhea), the lungs and kidneys.

Conclusions. The Cowgill formula predicting the vitamin B requirement of man has been applied to the diets of alcohol addicts in order to estimate the adequacy of the vitamin B intake. Sixteen subjects showing peripheral neuritis had for at least 22 days an inadequate Vit/Cal ratio. Four subjects who consumed large amounts of liquor, but with an adequate Vit/Cal ratio, showed no abnormal neurological signs. Four subjects having an inadequate ratio for 18 days or less showed no significant neurological changes. These findings support the theory that peripheral neuritis in the alcohol addict is the result of vitamin B deficiency.