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The Relationship of Changes in Daily Tryptophane Consumption to Changes in Psychologic State

by

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An earlier report disclosed a significant positive parallelism between daily tryptophane consumption and psychologic state. Specifically, it was observed that presumably healthy subjects consuming greater amounts of tryptophane displayed more favorable psychologic scores. The obvious question rose as to whether this relationship was simply a significant correlation or whether there was indeed a possible cause-and-effect sequence. This report shows that a more favorable change in psychologic scores occurred in a group of subjects who increased daily tryptophane consumption over a one-year period. In another group characterized by no increase in tryptophane intake, there was no significant improvement in psychologic state.

Introduction

In an earlier study[1], 215 presumably healthy dentists and their wives participated in an experiment in which daily tryptophane consumption, as judged by a dietary frequency questionnaire, was correlated with psychologic state as measured by controlled association tests. The results suggested that the higher the tryptophane intake, the better the psychic rating. Additionally, the data indicated the possible need for a higher intake of tryptophane than traditionally held. The question immediately arises whether the **relationship** between psychologic state and tryptophane is simply one of **parallelism** or whether there is indeed **cause-and-effect.**

This report is designed to cast additional light upon the possible interdependency of psychologic state and tryptophane intake. Specifically, an attempt will be made to answer the following five questions:

1. What is the daily tryptophane consumption of a sample of presumably healthy subjects?
2. How do the findings compare with the recommended dietary allowances?
3. What is the effect of health education lectures upon daily tryptophane consumption?
4. Is there any cause-and-effect relationship between daily tryptophane intake change and psychologic state change?
5. Of what significance are these findings?

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Method of Investigation

Sixty-one presumably healthy dentists and 57 of their wives shared in this experiment. The individuals are currently participating in a multiple-testing health evaluation program. The age and sex distribution is summarized (Table I).

Table I

initial age and sex distribution

age groups	male group	female group
<30	1 [1.6%]	3 [5.3%]
30-39	16 [26.2%]	20 [35.1%]
40-49	29 [47.5%]	22 [38.6%]
50+	15 [24.6%]	12 [21.1%]
total	61 [100.0%]*	57 [100.0%]*
mean	43.9	41.8
S.D.	8.4	8.6
t	1.343	
P	>0.100	
minimum	15	21
maximum	66	65
range	51	44

*approximate

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Each subject completed a Dietronics dietary analysis form. This technique is based upon significant observations in Israel[2] and England[3] which suggest that the most practical method for deriving data is by means of a food-frequency questionnaire. Dietronics dietary analysis consists of a simple questionnaire completed by the subject in a matter of a few minutes. The form is submitted for computer analysis, and a printout is returned showing the daily intake of the major foodstuffs and the most common vitamins and minerals. By this method, it is possible to ascertain the daily individual amino acid consumption. For purposes of this report, only tryptophane will be considered. Table II summarizes the findings initially and one year later.

Each subject also completed the Cornell Word Form-2 (abbreviated CWF-2). This questionnaire[4] is a modification of the ordinary type of individually-administered word association technique in that it is a forced choice method. The subject is presented with a list of stimulus words, each followed by two other (response) words. The subject is asked to choose the one he or she thinks relates better with the stimulus word. The CWF-2 has been devised as an instrument to make quickly a descriptive sketch of the individual's attitude, feeling states, and emotions or bodily reactions for clinical interpretation. It has been devised to do so in a manner not readily discernible to the subject in order to enhance the degree of objectivity. The results are summarized (Table III).

Table II

first and second examinations
daily tryptophane consumption

daily tryptophane intake [mgm.]	first examination	second examination
<500	4 [3.4%]	2 [1.7%]
500-999	42 [35.6%]	27 [22.9%]
1000-1499	50 [42.4%]	60 [50.8%]
1500-1999	17 [14.4%]	23 [19.5%]
2000+	5 [4.2%]	6 [5.1%]
total	118 [100.0%]	118 [100.0%]
mean	1160	1238
S.D.	399	384
t	2.238	
P	<0.050*	
minimum	365	264
maximum	2414	2426
range	2049	2162

*statistically significant difference of the means

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Table III

first and second psychologic examination
[CWF-2 scores]

CWF-2 scores	first examination	second examination
0	26 [22.0%]	45 [38.1%]
1-2	54 [45.8%]	55 [46.6%]
3-4	21 [17.8%]	11 [9.3%]
5-6	11 [9.3%]	4 [3.4%]
7-8	5 [4.2%]	2 [1.7%]
9-10	1 [0.8%]	1 [0.8%]
total	118 [100.0%]*	118 [100.0%]*
mean	2.1	1.4
S.D.	2.1	1.8
t	3.626	
P	<0.001**	
minimum	0	0
maximum	9	10
range	9	10

*approximate

**statistically significant difference of the means

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Results

Question One: Table II summarizes the daily tryptophane intake for the entire sample initially and at the end of the one-year experimental period. Several points deserve special attention. First, for the entire group, there is considerable variation ranging from a low initially of 365 to a high of 2414 mgm tryptophane intake per day. Thus, there is an almost seven-fold range. Second, it will be noted in Table II that the group, overall, increased the daily tryptophane intake from 1160 to 1238 mgm per day. This is an overall mean rise of approximately 7 percent.

Question Two: According to the Food and Nutrition Board of the National Research Council, the Recommended Dietary Allowance (RDA)[5] for tryptophane is 500 mgm per day for both the reference man and woman. On this basis, approximately 3.4 percent of the group at the initial examination and 1.7 percent at the subsequent examination are consuming suboptimal amounts of tryptophane. Additionally, on this basis, about 60 percent initially and 75 percent at the final period are consuming double the recommended dietary allowance.

Questions Three and Four: Mention was made earlier that each subject, at the initial visit, completed a food-frequency questionnaire and a psychometric test. The results were presented in a group session underlining the relationship between diet, and especially tryptophane, and mental state. One year later, each participant completed the same questionnaires. Thus, it was possible to analyze the changes in psychic state in terms of changes in diet. For purposes of this report, consideration will only be given to the alterations in psychic scores in terms of modification of tryptophane consumption. However, it should be emphasized that some subjects changed their diets in other ways. Figure 1 pictorially portrays the alterations in psychologic socres (on the right) in terms of the changes in tryptophane intake (on the left). Specifically, Group I includes 66 subjects who chose to increase tryptophane consumption during the experimental year. It will be noted (Figure 1) that the initial mean intake (stippled column) was 1001 mgm tryptophane per day. This average rose to 1331 mgm daily. Figure 1 also shows that the psychologic scores (as judged by the CWF-2) declined from 2.5 to 1.4. **Thus, in the face of a statistically significant rise in tryptophane consumption, there is a statistically significant decline in psychic score suggesting improvement.**

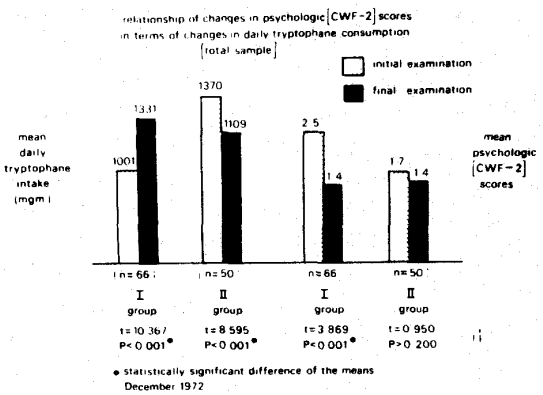

Figure 1. The relationship of changes in psychologic (Cornell Word Form-2, abbreviated CWF-2) scores in terms of changes in daily tryptophane consumption. In the group characterized by an increase in tryptophane during the experimental year (Group I on the left) there is a significant decline in psychic score (on the right). In contrast, Group II characterized by a reduction in tryptophane intake (on the left) is associated with the group with no mental improvement (on the right).

In contrast, Figure 1 portrays Group II representing those subjects who, for whatever reason, chose to **decrease** daily tryptophane intake. Figure 1 shows, on a mean basis, only a slight decline in psychologic scores. **Hence, the evidence seems clear that, following a reduction in tryptophane intake, there is no significant improvement in mental state.**

Discussion

It must be granted that the sample is unusual in that it is composed almost exclusively of members of the health professions and their wives. From a qualitative standpoint, the men consume greater amounts of tryptophane[1] and display better psychologic scores[1]. The most apparent

quantitative observation previously reported[1] is the fact that there is a statistically significant relationship between psychologic state (as judged by the CWF-2) and diet (as determined by tryptophane consumption). These data are significant for several reasons.

Question Five: First, it is interesting that the relationships between psychologic state and tryptophane intake in this experiment parallel the earlier reported relationship between protein-nicotinic acid consumption and psychologic responses[6, 7]. This, in a circumstantial manner, interrelates psychic health with protein, niacin, and tryptophane. Second, these relationships suggest that either pellagra can exist in a subclinical form or that protein-tryptophane-niacin correlate with non-pellagrous psychic disorders. Third, the observations reported here question the current Recommended Daily Allowance for tryptophane (500 mgm per day). It may be too low[8] with regard to psychic balance. This seems tenable since those subjects consuming even **twice** the RDA (1000 mgm per day) improved psychologically with an increase in tryptophane intake. Finally, the limited evidence presented here adds credence to the case for megavitamin therapy[8, 9].

Details regarding the method for dietary analysis may be obtained from the Hanson Research Corporation, Post Office Box 35, Northridge, California 91324.

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