EFFECT OF SIMULTANEOUS ADMINISTRATION OF VITAMINS B_1 AND B_6 ON METABOLISM OF THESE VITAMINS AND NICOTINIC ACID IN PATIENTS WITH NEUROSES

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It has previously been shown that if vitamin B_1 (thiamine) and vitamin B_6 (pyridoxin) are given in equal doses to patients with various diseases of the nervous system, the metabolism of one of these vitamins (thiamine) and of nicotinic acid is adversely affected [3, 5].

The object of the present investigation was to discover the most rational ratio between the doses of thiamine and pyridoxin for their simultaneous administration to patients with neuroses.

EXPERIMENTAL METHOD

A mixture of thiamine and pyridoxin was injected intramuscularly in various proportions into 22 patients with neuroses daily for 20 days.

The thiamine metabolism was estimated from the cocarboxylase concentration in the fasting blood [6], the pyridoxin metabolism from the activity of glutamateoxaloacetate (GOT) and glytamate-pyruvate (GPT) transaminases [4], and the nicotinic acid metabolism from the concentration of pyridine-nucleotides in the blood [4].

When choosing the dose of pyridoxin, guidance was taken from a published report that the most assimilable dose is 5 mg (doses of pyridoxin from 0.5-50 mg were compared) [7], for choosing the dose of thiamine, data for the excess of thiamine over pyridoxin in human tissues were used [10]. In this was a mixture of vitamins containing 5 mg pyridoxin and 10 mg thiamine was selected. For comparison a mixture containing thiamine and pyridoxin in the opposite proportion—10 mg pyridoxin and 5 mg thiamine—was tested*.

Contents of Thiamine, Pyridoxin, and Nicotinic Acids in the Blood following Administration of Thiamine and Pyridoxin in Various Proportions

Index	6 mg B_1 + 10 mg B_6					10 mg B_1 + 5 mg B_6				
	Before treatment		After treatment	t	P	Before treatment		After treatment	t	P
	n	$M \pm m$	$M \pm m$			n	$M \pm m$	$M \pm m$		
Cocarboxylase (in μg%)	12	2,46±0,63	0,92±0,23	2,2	<0,02	9	2,56±0,41	7,15±0,70	5	<0,01
GOT activity (in King's units)	13	41,0±3,34	13,0±1,10	8	<0,01	7	24,0±2,18	34,0±3,83	2,28	<0,03
GPT activity (in King's units)	13	35,0±4,31	55,0±4,21	3	<0,01	7	32,0±4,13	39,0±4,58	1,1	>0,05
Pyridine-nucleotides (in mg%)	13	2,95±0,14	2,78±0,07	1	>0,05	8	2,55±0,09	2,96±0,12	2,7	<0,02

*Ampules with the mixtures of vitamins were obtained from the Leningrad Vitamin Preparation Factory.

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No adverse clinical manifestations were observed following administration of the vitamin mixtures.

EXPERIMENTAL RESULTS

Injection of thiamine and pyridoxin in the ratio 1:2 (5 mg thiamine and 10 mg pyridoxin) caused the blood cocarboxylase level to fall below normal, decreased the GOT activity, and increased the GPT activity. The action of this mixture on nicotinic acid metabolism was slight—the blood level of pyridine-nucleotides fell slightly but the change was not statistically significant (see table).

After administration of thiamine and pyridoxin in the ratio 2:1 (10 mg thiamine and 5 mg pyridoxin), the cocarboxylase concentration was almost doubled, the increase being statistically significant. The pyridoxin metabolism was improved and the blood level of pyridine-nucleotides raised.

No anologous investigations could be found in the literature, but the results for the nicotinic acid metabolism were not unexpected. Both injected vitamins participate in the metabolism of trypotophan [8, 9], a source of endogenous nicotinic acid [1, 2].

The results of this investigation showed that vitamins of the B group are in constant interaction, and prolonged leading with some of them, disregarding the optimal proportions between the various members of the group, may sometimes lead to adverse changes in their metabolism.

During the combined administration of thiamine and pyridoxin, optimal assimilation takes place if the dose of thiamine is higher than that of pyridoxin. In this case the ratio between the doses of the vitamins given reflects the quantitative level of the interaction between thiamine and pyridoxin in human tissues [10].

LITERATURE CITED

1. A. E. Braunshtein, Doklady Akad. Nauk SSSR, 65, No. 5, 715 (1949).
2. E. V. Goryachenkova, in the book: Advances in Biological Chemistry [in Russian], 2, 97, Moscow (1954).
3. S. A. Dmitrieva, A. M. Petrun'kina, and L. I. Silina, Transactions of the I. P. Pavlov Institute of Physiology [in Russian], 7, 552, Moscow—Leningrad (1958).
4. A. M. Petrun'kina, Practical Biochemistry [in Russian], Leningrad (1961).
5. A. M. Petrun'kina, A. S. Bezuglaya, L. N. Bulovskaya, et al., in the book: Abstracts of Sectional Proceedings, 5th International Biochemical Congress, Sections 1-13 [in Russian], 519, Moscow (1962).
6. L. A. Stroganova and N. A. Kryukova, Lab. Delo, No. 1, 26 (1962).
7. G. Boxer, M. Pruss, and R. Goohart, J. Nutr., 63, 623 (1957).
8. F. M. Chiancone, Acta Vitamin, Milano, 16, 49 (1962).
9. C. E. Dalgliesh, J. Biochem., 52, 3 (1952).
10. R. J. Williams, in the book: Biochemistry and Physiology of Vitamins [Russian translation], Collection 2, 132, Moscow (1950).