

Research Abstracts

Vitamin B₁, Vitamin B₂,
Activated B₂, Niacin, Vitamin B₆,
Activated B₆, Vitamin B₅,
Vitamin B₁₂ & Folic Acid

Effect of vitamin B complex on neurotransmission and neurite outgrowth

1. The effect of vitamin B complex (vitamin B₁, B₆ and B₁₂) was studied on nerve conduction velocity in acrylamide-neuropathy rats maintained on refined semisynthetic complete vitamin and vitamin B-deficient diets in vivo and on neurite outgrowth in vitro using cells obtained from dorsal root ganglions of mice. 2. Acrylamide neuropathy was clearer in the group maintained on a refined semisynthetic vitamin B-deficient diet than in those on a refined semisynthetic complete vitamin diet. The neurotoxicity was lowest in the group given vitamin B complex prophylactic-therapeutically, next higher following therapeutic administration and last with no vitamin B complex administration in both groups maintained on a refined semisynthetic vitamin B-deficient diet and a refined semisynthetic complete vitamin diet. 3. The nerve conduction velocity tended to decrease by treatment with acrylamide. The decrement of nerve conduction velocity was partially inhibited by vitamin B complex. No significant difference was found in the groups treated with acrylamide and given vitamin B complex prophylactic-therapeutically and the control (no acrylamide treatment) in the group maintained on a refined semisynthetic vitamin B-deficient diet. 4. The greatest neurite outgrowth was found in the group treated with vitamins B₁, B₆ and B₁₂-enriched medium, followed by the group of vitamin B₁₂-enriched and vitamin B₁-enriched media. All groups treated with a vitamin B-enriched medium had significantly greater ($P < 0.01$) outgrowth than the controls. Fujii A, Matsumoto H, Yamamoto H. *Gen Pharmacol* 1996 Sep;27(6):995-1000.

Modification of degenerative and regenerative processes in peripheral nerves by treatment with B vitamins

Degenerative and regenerative changes in the saphenous nerve of the rabbit following systemic treatment with either a combination of the vitamins B₁, B₆ and B₁₂ or physiological saline solution were investigated. Cold lesion of the nerve (-196 degrees C), which led to an optimal axonotmesis, was used to cause a secondary degeneration. The nerves were removed and investigated by light and electron microscopy after 4, 10 and 21 days. Morphological results show that the number of regenerating axons is higher and that of degenerating axons lower in the group treated with the given doses of vitamins than in the comparable control group. An explanation of the underlying metabolic processes is as yet not possible. Further investigations considering the contribution of the individual vitamins to the enhancement of degenerative and regenerative processes are necessary. Clinical indications of neurotoxicity due to the dose levels used here were not observed. Kienecker EW, Becker KW, Dick P. *Klin Wochenschr* 1990 Jan 19;68(2):146-8.

B complex vitamin patterns in geriatric and young adult inpatients with major depression

This study compared the B complex vitamin status at time of admission of 20 geriatric and 16 young adult non-alcoholic inpatients with major depression. Twenty-eight percent of all subjects were deficient in B₂ (riboflavin), B₆ (pyridoxine), and/or B₁₂ (cobalamin), but none in B₁ (thiamine) or folate. The geriatric sample had significantly higher serum folate levels. Psychotic depressives had lower B₁₂ than did non-psychotic depressives. Poorer blood vitamin status was not associated with higher scores on the Hamilton Depression Rating Scale or lower scores on the Mini-Mental State Examination in either age group. The data support the hypothesis that poorer status in certain B vitamins is present in major depression, but blood measures may not reflect central nervous system vitamin function or severity of affective syndromes as measured by the assays and scales in the present study. Bell IR, Edman JS, Morrow FD, Marby DW, Mirages S, Perrone G, Kayne HL, Cole JO. *J Am Geriatr Soc* 1991 Mar;39(3):252-7.

Effects of a vitamin B complex on functional recovery after nerve injury

Functional recovery after nerve crushing was investigated in the following manner: Under pentobarbital anesthesia the sciatic nerve of the rat was crushed at the level of the hip (proximal crush) or the thigh (distal crush). The recovery processes after the nerve crushing were followed by measuring distances between the first and fifth digits (DBD.1 approximately 5) and between the second and fourth digits (DBD.2 approximately 4) of the hind paw, and by observing changes in "behavior" scored on a scale of 10 according to the degree of behavioral disorder of the hind paw and leg. Results obtained by these

methods showed good reproducibility. The DBD values and the scores for behavior recovered significantly faster after weak nerve crushing than after strong crushing, and after distal rather than after proximal crushing. When a segment of the sciatic nerve was resected, there was no recovery. These results suggest that DBD.1 approximately 5, DBD.2 approximately 4, and the behavior observed in these experiments serve as good indices for evaluating the degree of functional recovery after nerve injury in unanesthetized and unrestrained animals. Effects of a preparation of vitamins B₁, B₆, and B₁₂ (B complex) on these three parameters and on weights of 9 muscles of the hind leg were also studied. These studies showed that the B complex facilitated functional recovery from nerve injury faster than its components, and that on muscle atrophy the B complex had its most effects on the soleus. It was also shown that B₁ and B₁₂ by themselves had significant facilitating effects on the functional recovery. Hasegawa K, Mikuni N, Sakai Y. *Nippon Yakurigaku Zasshi* 1978 Sep;74(6):721-34.

Vitamin status and intake as primary determinants of homocysteinemia in an elderly population

OBJECTIVE--To describe the distribution of plasma homocysteine concentrations in an elderly population and to analyze the relationship between homocysteine level and intake of vitamins and serum levels of vitamins that serve as coenzymes in homocysteine metabolism. DESIGN--Cross-sectional analysis of homocysteine levels and vitamin blood levels and intake in elderly participants in the Framingham Study. SETTING--Population-based cohort in Framingham, Mass. PARTICIPANTS--A total of 1160 adult survivors, aged 67 to 96 years, from the original Framingham Heart Study cohort. MAIN OUTCOME MEASURES--Plasma homocysteine concentration correlated with plasma folate, vitamin B₁₂, pyridoxal-5'-phosphate (PLP), and oral intakes of these vitamins, and the contribution of these vitamins to the prevalence of elevated homocysteine in the population. When subjects were grouped by deciles of plasma folate, mean homocysteine was significantly higher in the lowest two folate deciles (15.6 and 13.7 $\mu\text{mol/L}$, respectively) than in the highest decile (11.0 $\mu\text{mol/L}$). Homocysteine demonstrated weaker, inverse associations with plasma vitamin B₁₂ and PLP. Similar inverse associations were demonstrated between homocysteine and intakes of folate and vitamin B₆, but not vitamin B₁₂. CONCLUSIONS--These results indicate a strong association between homocysteine concentration and folate, vitamin B₁₂, and vitamin B₆ status, as well as age. Selhub J; Jacques PF; Wilson PW; Rush D; Rosenberg IH; *JAMA* 1993 Dec 8;270(22):2693-8.