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Journal ABSTRACTS

Blood Pressure

IMPACT OF HIGH-NORMAL BLOOD PRESSURE ON THE RISK OF CARDIOVASCULAR DISEASE.

BACKGROUND: Information is limited regarding the absolute and relative risk of cardiovascular disease in persons with high-normal blood pressure (systolic pressure of 130 to 139 mm Hg, diastolic pressure of 85 to 89 mm Hg, or both). **METHODS:** We investigated the association between blood-pressure category at base line and the incidence of cardiovascular disease on follow-up among 6,859 participants in the Framingham Heart Study who were initially free of hypertension and cardiovascular disease. **RESULTS:** A stepwise increase in cardiovascular event rates was noted in persons with higher baseline blood-pressure categories. The 10-year cumulative incidence of cardiovascular disease in subjects 35 to 64 years of age who had high-normal blood pressure was 4% (95% confidence interval, 2 to 5%) for women and 8% (95% confidence interval, 6 to 10%) for men; in older subjects (those 65 to 90 years old), the incidence was 18% (95% confidence interval, 12 to 23%) for women and 25% (95% confidence interval, 17 to 34%) for men. As compared with optimal blood pressure, high-normal blood pressure was associated with a risk-factor-adjusted hazard ratio for cardiovascular disease of 2.5 (95% confidence interval, 1.6 to 4.1) in women and 1.6 (95% confidence interval, 1.1 to 2.2) in men. **CONCLUSIONS:** High-normal blood pressure is associated with an increased risk of cardiovascular disease. Our findings emphasize the need to determine whether lowering high-normal blood pressure can reduce the risk of cardiovascular disease.

N Engl J Med. 2001 Nov 1;345(18):1291-7

FEASIBILITY OF TREATING PREHYPERTENSION WITH AN ANGIOTENSIN-RECEPTOR BLOCKER.

BACKGROUND: Prehypertension is considered a precursor of stage 1 hypertension and a predictor of excessive cardiovascular risk. We investigated whether pharmacologic treatment of prehypertension prevents or postpones stage 1 hypertension. **METHODS:** Participants with repeated measurements of systolic pressure of 130 to 139 mm Hg and diastolic pressure of 89 mm Hg or lower, or systolic pressure of 139 mm Hg or lower and diastolic pressure of 85 to 89 mm Hg, were randomly assigned to receive two years of candesartan (Atacand, AstraZeneca) or placebo, followed by two years of placebo for all. When a participant reached the study end point of stage 1 hypertension, treatment with antihypertensive agents was initiated. Both the candesartan group and the placebo group were instructed to make changes in lifestyle to reduce blood pressure throughout the trial. **RESULTS:** A total of 409 participants were randomly assigned to candesartan, and 400 to placebo. Data on 772 participants (391 in the candesartan group and 381 in the placebo group; mean age, 48.5 years; 59.6% men) were available for analysis. During the first two years, hypertension developed in 154 participants in the placebo group and 53 of those in the candesartan group (relative risk reduction, 66.3%; $P < 0.001$). After four years, hypertension had developed in 240 participants in the placebo group and 208 of those in the candesartan group (relative risk reduction, 15.6%; $P < 0.007$). Serious adverse events occurred in 3.5% of the participants assigned to candesartan and 5.9% of those receiving placebo. **CONCLUSIONS:** Over a period of four years, stage 1 hypertension developed in nearly two thirds of patients with untreated prehypertension (the placebo group). Treatment of prehypertension with candesartan appeared to be well tolerated and reduced the risk of incident hypertension during the study period. Thus, treatment of prehypertension appears to be feasible.

N Engl J Med. 2006 Apr 20;354(16):1685-97

POMEGRANATE JUICE CONSUMPTION INHIBITS SERUM ANGIOTENSIN CONVERTING ENZYME ACTIVITY AND REDUCES SYSTOLIC BLOOD PRESSURE.

Consumption of pomegranate juice which is rich in tannins, possess anti-atherosclerotic properties which could be related to its potent anti-oxidative characteristics. As some antioxidants were recently shown to reduce blood pressure, we studied the effect of pomegranate juice consumption (50 ml, 1.5mmol of total polyphenols per day, for 2 weeks) by hypertensive patients on their blood pressure and on serum angiotensin converting enzyme (ACE) activity. A 36% decrement in serum ACE activity and a 5% reduction in systolic blood pressure were noted. Similar dose-dependent inhibitory effect (31%) of pomegranate juice on serum ACE activity was observed also in vitro. As reduction in serum ACE activity, even with no decrement in blood pressure, was previously shown to attenuate atherosclerosis, pomegranate juice can offer a wide protection against cardiovascular diseases

which could be related to its inhibitory effect on oxidative stress and on serum ACE activity.

Atherosclerosis. 2001 Sep;158(1):195-8

ANTIOXIDANTS FOR HYPERTENSION

Increasing evidence implicates reactive oxygen species in the pathogenesis of hypertension and its cardiovascular complications. By altering the balance in the endothelium between vasoconstrictors such as thromboxane and isoprostanes and vasodilators such as nitric oxide, reactive oxygen species contribute to endothelium-dependent contractions and increased vascular resistance. Antioxidants can restore endothelial function and decrease blood pressure in several models of hypertension and in some, but not all, studies of humans with essential hypertension. The potential of antioxidant therapy for hypertension is considerable.

Curr Opin Nephrol Hypertens. 1998 Sep;7(5):531-8

BLOOD PRESSURE USUALLY CONSIDERED NORMAL IS ASSOCIATED WITH AN ELEVATED RISK OF CARDIOVASCULAR DISEASE.

PURPOSE: Research on the risk of cardiovascular disease among individuals with prehypertension (blood pressure 120/80 to 139/89 mm Hg) is incomplete. Additional information among individuals with a high risk of cardiovascular disease complications may help to focus current and future efforts. **SUBJECTS AND METHODS:** We performed a prospective cohort analysis among 8,960 middle-aged adults in the Atherosclerosis Risk in Communities (ARIC) study. The exposure variables were blood pressure levels: high normal blood pressure, systolic blood pressure 130-139 mm Hg or diastolic blood pressure 85-89 mm Hg; and normal blood pressure, systolic blood pressure 120-129 mm Hg or diastolic blood pressure 80-84 mm Hg. The outcome was incident cardiovascular disease defined as fatal/nonfatal coronary heart disease, cardiac procedure, silent myocardial infarction, or ischemic stroke. Subgroup analysis was performed among blacks, diabetics, individuals aged 55-64 years, individuals with renal insufficiency, and among individuals with varying levels of low-density lipoprotein (LDL) cholesterol and body mass index (BMI). **RESULTS:** Compared with optimal blood pressure (systolic blood pressure <120 mm Hg and diastolic blood pressure <80 mm Hg), the relative risk (RR) of cardiovascular disease for high normal blood pressure was 2.33 (95% confidence interval [CI], 1.85-2.92), and RR for normal blood pressure was 1.81 (1.47-2.22); among blacks: RR for high normal blood pressure was 3.29 (95% CI, 1.68-6.45); among diabetics: RR for high normal blood pressure 4.10 (95% CI, 2.26-7.46); age 55-64 years: RR for high normal blood pressure 2.41 (95% CI, 1.75-3.30) among individuals with renal insufficiency: RR for high normal blood pressure was 1.90 (95% CI, 1.34-2.70); among individuals with BMI >30 kg/m²: RR for high normal blood pressure was 3.56 (95% CI, 1.99-6.35); and among individuals with LDL >160 mg/dL, RR for high normal blood pressure was 1.85 (95% CI, 1.26-2.72). **CONCLUSIONS:** Individuals with prehypertensive levels of blood pressure have an increased risk of developing cardiovascular disease relative to those with optimal levels. The association is pronounced among blacks, among individuals with diabetes mellitus, and among those with high BMI.

Am J Med. 2006 Feb;119(2):133-41

ANTIOXIDANT ACTIVITY OF POMEGRANATE JUICE AND ITS RELATIONSHIP WITH PHENOLIC COMPOSITION AND PROCESSING.

The antioxidant activity of pomegranate juices was evaluated by four different methods (ABTS, DPPH, DMPD, and FRAP) and compared to those of red wine and a green tea infusion. Commercial pomegranate juices showed an antioxidant activity (18-20 TEAC) three times higher than those of red wine and green tea (6-8 TEAC). The activity was higher in commercial juices extracted from whole pomegranates than in experimental juices obtained from the arils only (12-14 TEAC). HPLC-DAD and HPLC-MS analyses of the juices revealed that commercial juices contained the pomegranate tannin punicalagin (1500-1900 mg/L) while only traces of this compound were detected in the experimental juice obtained from arils in the laboratory. This shows that pomegranate industrial processing extracts some of the hydrolyzable tannins present in the fruit rind. This could account for the higher antioxidant activity of commercial juices compared to the experimental ones. In addition, anthocyanins, ellagic acid derivatives, and hydrolyzable tannins were detected and quantified in the pomegranate juices.

J Agric Food Chem. 2000 Oct;48(10):4581-9

LOW PLASMA COENZYME Q10 LEVELS AS AN INDEPENDENT PROGNOSTIC FACTOR FOR MELANOMA PROGRESSION

BACKGROUND: Abnormally low plasma levels of coenzyme Q10 (CoQ10) have been found in patients with cancer of the breast, lung, or pancreas. **OBJECTIVE:** A prospective study of patients with melanoma was conducted to assess the usefulness of CoQ10 plasma levels in predicting the risk of metastasis and the duration of the metastasis-free interval. **METHODS:** Between January 1997 and August 2004, plasma CoQ10 levels were measured with high-performance liquid chromatography in 117 consecutive melanoma patients without clinical or instrumental evidence of metastasis according to American Joint Committee on Cancer criteria and in 125 matched volunteers without clinically suspect pigmented lesions. Patients taking CoQ10 or cholesterol-lowering medications and those with a diagnosis of diabetes mellitus were excluded from the study. Multiple statistical methods were used to evaluate differences between patients and control subjects and between patients who did (32.5%) and did not (67.5%) develop metastases during follow-up. **RESULTS:** CoQ10 levels were significantly lower in patients than in control subjects (t test: $P < .0001$) and in patients who developed metastases than in the metastasis-free subgroup (t test: $P < .0001$). Logistic regression analysis indicated that plasma CoQ10 levels were a significant predictor of metastasis ($P = .0013$). The odds ratio for metastatic disease in patients with CoQ10 levels that were less than 0.6 mg/L (the low-end value of the range measured in a normal population) was 7.9, and the metastasis-free interval was almost double in patients with CoQ10 levels 0.6 mg/L or higher (Kaplan-Meier analysis: $P < .001$). **LIMITATIONS:** A study with a larger sample, which is currently being recruited, and a longer follow-up will doubtlessly increase the statistical power and enable survival statistics to be obtained. **CONCLUSIONS:** Analysis of our findings suggests that baseline plasma CoQ10 levels are a powerful and independent prognostic factor that can be used to estimate the risk for melanoma progression.

J Am Acad Dermatol. 2006 Feb;54(2):234-41

COENZYME Q DIFFERENTIALLY MODULATES PHOSPHOLIPID HYDROPEROXIDE GLUTATHIONE PEROXIDASE GENE EXPRESSION AND FREE RADICALS PRODUCTION IN MALIGNANT AND NON-MALIGNANT PROSTATE CELLS.

The aim of this study was to investigate the role of coenzyme Q on the mRNA abundance of PHGPx and the reactive oxygen species (ROS) production in two different cell lines from human prostate, a line of non cancer cells (PNT2) and a line of cancer cells (PC3). Results showed that malignant cells markedly differ in their response to coenzyme Q compared to non-malignant cells, with no changes in PHGPx expression and greater ROS production. Furthermore coenzyme Q supplementation significantly lowered cell growth of the PC3 cancer line without affecting the PNT2. If these results are confirmed with additional experiments, it could represent a novel and interesting approach on the biomedical use of coenzyme Q10 in cancer therapy.

Biofactors. 2003;18(1-4):265-70

SKELETAL MYOPATHY ASSOCIATED WITH NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITOR THERAPY: POTENTIAL BENEFIT OF COENZYME Q10 THERAPY.

Zidovudine (ZDV) has been associated with 'ragged-red' fibre myopathy, due to its effects on myocyte mitochondria. Usually this is reversible with cessation of ZDV. We report a 52-year-old man, who in 1985 developed ragged-red fibre myopathy 14 years after diagnosis of HIV infection while on effective ZDV-based combination antiretroviral therapy (ART). He was treated with the mitochondrial anti-oxidant coenzyme Q10 and made an excellent recovery, without change of ARTs. This suggests a novel therapy for further investigation targeted at ZDV induced myopathy, potentially allowing continuation of antiviral treatments including ZDV.

Int J STD AIDS. 2005 Dec;16(12):827-9

SAFETY ASSESSMENT OF COENZYME Q10 (KANEKA Q10) IN HEALTHY SUBJECTS: A DOUBLE-BLIND, RANDOMIZED, PLACEBO-CONTROLLED TRIAL.

The safety profile of Coenzyme Q10 (Kaneka Q10) at high doses for healthy subjects was assessed in a double-blind, randomized, placebo-controlled study. Kaneka Q10 in capsule form was taken for 4 weeks at doses of 300, 600, and 900 mg/day

by a total of eighty-eight adult volunteers. No serious adverse events were observed in any group. Adverse events were reported in 16 volunteers with placebo, in 12 volunteers with the 300 mg dose, in 20 volunteers with the 600 mg dose and in 16 volunteers with the 900 mg dose. The most commonly reported events included common cold symptoms and gastrointestinal effects such as abdominal pain and soft feces. These events exhibited no dose-dependency and were judged to have no relationship to Kaneka Q10. Changes observed in hematology, blood biochemistry, and urinalysis were not dose-related and were judged not to be clinically significant. The plasma CoQ10 concentration after 8-month withdrawal was almost the same as that before administration. These findings showed that Kaneka Q10 was well-tolerated and safe for healthy adults at intake of up to 900 mg/day.

Regul Toxicol Pharmacol. 2006 Apr;44(3):212-8

RANDOMIZED, DOUBLE-BLIND PLACEBO-CONTROLLED TRIAL OF COENZYME Q10 IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION.

The effects of oral treatment with coenzyme Q10 (120 mg/d) were compared for 28 days in 73 (intervention group A) and 71 (placebo group B) patients with acute myocardial infarction (AMI). After treatment, angina pectoris (9.5 vs. 28.1), total arrhythmias (9.5% vs. 25.3%), and poor left ventricular function (8.2% vs. 22.5%) were significantly ($P < 0.05$) reduced in the coenzyme Q group than placebo group. Total cardiac events, including cardiac deaths and nonfatal infarction, were also significantly reduced in the coenzyme Q10 group compared with the placebo group (15.0% vs. 30.9%, $P < 0.02$). The extent of cardiac disease, elevation in cardiac enzymes, and oxidative stress at entry to the study were comparable between the two groups. Lipid peroxides, diene conjugates, and malondialdehyde, which are indicators of oxidative stress, showed a greater reduction in the treatment group than in the placebo group. The antioxidants vitamin A, E, and C and beta-carotene, which were lower initially after AMI, increased more in the coenzyme Q10 group than in the placebo group. These findings suggest that coenzyme Q10 can provide rapid protective effects in patients with AMI if administered within 3 days of the onset of symptoms. More studies in a larger number of patients and long-term follow-up are needed to confirm our results.

Cardiovasc Drugs Ther. 1998 Sep;12(4):347-53

USEFULNESS OF COENZYME Q10 IN CLINICAL CARDIOLOGY: A LONG-TERM STUDY.

Over an eight year period (1985-1993), we treated 424 patients with various forms of cardiovascular disease by adding coenzyme Q10 (CoQ10) to their medical regimens. Doses of CoQ10 ranged from 75 to 600 mg/day by mouth (average 242 mg). Treatment was primarily guided by the patient's clinical response. In many instances, CoQ10 levels were employed with the aim of producing a whole blood level greater than or equal to 2.10 micrograms/ml (average 2.92 micrograms/ml, $n = 297$). Patients were followed for an average of 17.8 months, with a total accumulation of 632 patient years. Eleven patients were omitted from this study: 10 due to non-compliance and one who experienced nausea. Eighteen deaths occurred during the study period with 10 attributable to cardiac causes. Patients were divided into six diagnostic categories: ischemic cardiomyopathy (ICM), dilated cardiomyopathy (DCM), primary diastolic dysfunction (PDD), hypertension (HTN), mitral valve prolapse (MVP) and valvular heart disease (VHD). For the entire group and for each diagnostic category, we evaluated clinical response according to the New York Heart Association (NYHA) functional scale, and found significant improvement. Of 424 patients, 58% improved by one NYHA class, 28% by two classes and 1.2% by three classes. A statistically significant improvement in myocardial function was documented using the following echocardiographic parameters: left ventricular wall thickness, mitral valve inflow slope and fractional shortening. Before treatment with CoQ10, most patients were taking from one to five cardiac medications. During this study, overall medication requirements dropped considerably: 43% stopped between one and three drugs. Only 6% of the patients required the addition of one drug. No apparent side effects from CoQ10 treatment were noted other than a single case of transient nausea. In conclusion, CoQ10 is a safe and effective adjunctive treatment for a broad range of cardiovascular diseases, producing gratifying clinical responses while easing the medical and financial burden of multidrug therapy.

Mol Aspects Med. 1994;15 Suppl:s165-75

EFFECTS OF COENZYME Q10 IN EARLY PARKINSON DISEASE: EVIDENCE OF SLOWING OF THE FUNCTIONAL DECLINE.

BACKGROUND: Parkinson disease (PD) is a degenerative neurological disorder for which no treatment has been shown to slow the progression. **OBJECTIVE:** To determine whether a range of dosages of coenzyme Q10 is safe and well tolerated and could slow the functional decline in PD. **DESIGN:** Multicenter, randomized, parallel-group, placebo-controlled, double-blind, dosage-ranging trial. **SETTING:** Academic movement disorders clinics. **PATIENTS:** Eighty subjects with early PD who did not require treatment for their disability. **INTERVENTIONS:** Random assignment to placebo or coenzyme Q10 at dosages of 300, 600, or 1200 mg/d. **MAIN OUTCOME MEASURE:** The subjects underwent evaluation with the Unified Parkinson Disease Rating Scale (UPDRS) at the screening, baseline, and 1-, 4-, 8-, 12-, and 16-month visits. They were followed up for 16 months or until disability requiring treatment with levodopa had developed. The primary response variable was the change in the total score on the UPDRS from baseline to the last visit. **RESULTS:** The adjusted mean total UPDRS changes were +11.99 for the placebo

group, +8.81 for the 300-mg/d group, +10.82 for the 600-mg/d group, and +6.69 for the 1200-mg/d group. The P value for the primary analysis, a test for a linear trend between the dosage and the mean change in the total UPDRS score, was .09, which met our prespecified criteria for a positive trend for the trial. A prespecified, secondary analysis was the comparison of each treatment group with the placebo group, and the difference between the 1200-mg/d and placebo groups was significant ($P = .04$).
CONCLUSIONS: Coenzyme Q10 was safe and well tolerated at dosages of up to 1200 mg/d. Less disability developed in subjects assigned to coenzyme Q10 than in those assigned to placebo, and the benefit was greatest in subjects receiving the highest dosage. Coenzyme Q10 appears to slow the progressive deterioration of function in PD, but these results need to be confirmed in a larger study.

Arch Neurol. 2002 Oct;59(10):1541-50

Boron

EFFECT OF DIETARY BORON ON MINERAL, ESTROGEN, AND TESTOSTERONE METABOLISM IN POSTMENOPAUSAL WOMEN.

A study was done to examine the effects of aluminum, magnesium, and boron on major mineral metabolism in postmenopausal women. This communication describes some of the effects of dietary boron on 12 women between the ages of 48 and 82 housed in a metabolic unit. A boron supplement of 3 mg/day markedly affected several indices of mineral metabolism of seven women consuming a low-magnesium diet and five women consuming a diet adequate in magnesium; the women had consumed a conventional diet supplying about 0.25 mg boron/day for 119 days. Boron supplementation markedly reduced the urinary excretion of calcium and magnesium; the depression seemed more marked when dietary magnesium was low. Boron supplementation depressed the urinary excretion of phosphorus by the low- magnesium, but not by the adequate-magnesium, women. Boron supplementation markedly elevated the serum concentrations of 17 beta-estradiol and testosterone; the elevation seemed more marked when dietary magnesium was low. Neither high dietary aluminum (1000 mg/day) nor an interaction between boron and aluminum affected the variables presented. The findings suggest that supplementation of a low-boron diet with an amount of boron commonly found in diets high in fruits and vegetables induces changes in postmenopausal women consistent with the prevention of calcium loss and bone demineralization.

FASEB J. 1987 Nov;1(5):394-7

DIET, NUTRITION, AND BONE HEALTH.

Nutrition is an important "modifiable" factor in the development and maintenance of bone mass and in the prevention of osteoporosis. The improvement of calcium intake in prepuberal age translates to gain in bone mass and, with genetic factor, to achievement of Peak Bone Mass (PBM), the higher level of bone mass reached at the completion of physiological growth. Individuals with higher PBM achieved in early adulthood will be at lower risk for developing osteoporosis later in life. Achieved the PBM, it is important maintain the bone mass gained and reduce the loss. This is possible adopting a correct behaviour eating associated to regular physical activity and correct life style. The diet is nutritionally balanced with caloric intake adequate to requirement of individual. This is moderate in protein (1 g/kg/die), normal in fat and the carbohydrates provide 55-60% of the caloric intake. A moderate intake of proteins is associated with normal calcium metabolism and presumably does'nt alter bone turnover. An adequate intake of alkali-rich foods may help promote a favorable effect of dietary protein on the skeleton. Lactose intolerance may determinate calcium malabsorption or may decrease calcium intake by elimination of milk and dairy products. Omega-3 fatty acids may "down-regulate" pro-inflammatory cytokines and protect against bone loss by decreasing osteoclast activation and bone reabsorption. The diet is characterized by food containing high amount of calcium, potassium, magnesium and low amount of sodium. If it is impossible to reach the requirement with only diet, it is need the supplement of calcium and vitamin D. Other vitamins (Vit. A, C, E, K) and mineral (phosphorus, fluoride, iron, zinc, copper and boron) are required for normal bone metabolism, thus it is need adequate intake of these dietary components. It is advisable reduce ethanol, caffeine, fibers, phytic and ossalic acid intake. The efficacy of phytoestrogens is actually under investigation. Some drugs may interfere with calcium and other nutrients and produce an unfavourable effect on bone health.

Clin Ter. 2005 Jan-Apr;156(1-2):47-56

DELAY OF NATURAL BONE LOSS BY HIGHER INTAKES OF SPECIFIC MINERALS AND VITAMINS.

For early prevention or inhibition of postmenopausal and age-related bone loss, nutritional interventions might be a first choice. For some vitamins and minerals an important role in bone metabolism is known or suggested. Calcium and vitamin D support bone mineral density and are basic components in most preventive strategies. Magnesium is involved in a number of activities supporting bone strength, preservation, and remodeling. Fluorine and strontium have bone-forming effects. However, high amounts of both elements may reduce bone strength. Boron is especially effective in case of vitamin D, magnesium, and potassium deficiency. Vitamin K is essential for the activation of osteocalcin. Vitamin C is an important stimulus for osteoblast-derived proteins. Increasing the recommended amounts (US RDA 1989), adequate intakes (US DRI 1997), or assumed normal intakes of mentioned food components may lead to a considerable reduction or even prevention of bone loss, especially in late postmenopausal women and the elderly.

Crit Rev Food Sci Nutr. 2001 May;41(4):225-49

EFFECT OF BORON ON VITAMIN D- DEFICIENT RATS.

The effects of different levels of dietary boron were determined in vitamin D deficient rats. Vitamin D deficient diets containing either 0.158 ppm or 2.72 ppm of boron were fed to rats for 11 w, and calcium, magnesium, and phosphorus apparent absorption and balance were measured in the twelfth week. Higher apparent absorption and balance values for calcium and phosphorus were observed in the rats with higher dietary boron, but very few differences were seen in body wt, organ wt, and bone parameters. Balance measurements represented the present status of the rats after 12 w on the diets, but other measurements represented an accumulation over the lifetime of the rat, including a suckling period with ample vitamin D and boron. The data demonstrated that when rats are vitamin D deficient, as indicated by hypocalcemia, the level of boron in the diet affects mineral balance.

Biol Trace Elem Res. 1991 Mar;28(3):243-55

NATURAL TREATMENTS FOR OSTEOARTHRITIS.

Osteoarthritis (OA) is the most common form of joint disease. Although OA was previously thought to be a progressive, degenerative disorder, it is now known that spontaneous arrest or reversal of the disease can occur. Conventional medications are often effective for symptom relief, but they can also cause significant side effects and do not slow the progression of the disease. Several natural substances have been shown to be at least as effective as nonsteroidal anti-inflammatory drugs at relieving the symptoms of OA, and preliminary evidence suggests some of these compounds may exert a favorable influence on the course of the disease.

Altern Med Rev. 1999 Oct;4(5):330-41

ELEMENTAL ANALYSIS OF FEMORAL BONE FROM PATIENTS WITH FRACTURED NECK OF FEMUR OR OSTEOARTHRITIS

The elemental composition of bone has been determined by inductively coupled atomic emission and mass spectrometry to test the hypothesis that changes in major or minor elemental concentrations may contribute to the risk of fracture. Femoral bone was obtained from patients at operation for the treatment of fracture and compared with that of patients with osteoarthritis and a necropsy control group. The data suggest that there are no major differences in bone elemental composition in patients with fractures compared with the control group. Bone adjacent to joints with osteoarthritis tends to be less mineralized (per unit trabecular bone volume) than control bone and bone from fracture patients, and has significantly lower concentrations of boron, lead and, zinc. These observations may reflect the more rapid turnover of bone close to the arthritic joint.

Bone. 1996 Feb;18(2):151-7

THE IMPORTANCE OF BORON NUTRITION FOR BRAIN AND PSYCHOLOGICAL FUNCTION.

Boron (B) nutriture has been related to bone, mineral and lipid metabolism, energy utilization, and immune function. As evidence accumulates that B is essential for humans, it is important to consider possible relationships between B nutriture and brain and psychological function. Five studies conducted in our laboratory are reviewed. Assessments of brain electrical activity in both animals and humans found that B deprivation results in decreased brain electrical activity similar to that observed in nonspecific malnutrition. Assessments of cognitive and psychomotor function in humans found that B deprivation results in poorer performance on tasks of motor speed and dexterity, attention, and short-term memory. However, little support was found for anecdotal reports that supplementation with physiologic amounts of B helps alleviate the somatic and psychological symptoms of menopause. Parallels between nutritional and toxicological effects of B on brain and psychological function are presented, and possible biological mechanisms for dietary effects are reviewed. Findings support the hypothesis that B nutriture is important for brain and psychological function in humans.

Biol Trace Elem Res. 1998 Winter;66(1-3):299-317

DIETARY BORON, BRAIN FUNCTION, AND COGNITIVE PERFORMANCE.

Although the trace element boron has yet to be recognized as an essential nutrient for humans, recent data from animal and human studies suggest that boron may be important for mineral metabolism and membrane function. To investigate further the functional role of boron, brain electrophysiology and cognitive performance were assessed in response to dietary manipulation of boron (approximately 0.25 versus approximately 3.25 mg boron/2000 kcal/day) in three studies with healthy older men and women. Within-subject designs were used to assess functional responses in all studies. Spectral analysis of electroencephalographic data showed effects of dietary boron in two of the three studies. When the low boron intake was compared to the high intake, there was a significant ($p < 0.05$) increase in the proportion of low-frequency activity, and a decrease in the proportion of higher-frequency activity, an effect often observed in response to general malnutrition and heavy

metal toxicity. Performance (e.g., response time) on various cognitive and psychomotor tasks also showed an effect of dietary boron. When contrasted with the high boron intake, low dietary boron resulted in significantly poorer performance ($p < 0.05$) on tasks emphasizing manual dexterity (studies II and III); eye-hand coordination (study II); attention (all studies); perception (study III); encoding and short-term memory (all studies); and long-term memory (study I). Collectively, the data from these three studies indicate that boron may play a role in human brain function and cognitive performance, and provide additional evidence that boron is an essential nutrient for humans.

Environ Health Perspect. 1994 Nov;102 Suppl 7:65-72

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