



## NEWS UPDATES - FOR THE HEALTHCARE PROFESSIONAL

January - December 2005

### More Mercury in The Environment

Researchers at the University of North Carolina at Asheville concluded that a significant number of women of childbearing age have too much mercury in their systems. Testing of hair samples from 1,500 people of all ages found that 20% had mercury levels above the Environmental Protection Agency (EPA) guidelines for mercury.

The EPA has reported that 846,000 miles of rivers in the United States and 14 million acres of U.S. lakes are tainted with mercury to a level that eating fish from these locations could pose a health hazard, especially for children and women who are pregnant. This translates into one third of the nations lakes and one fourth of the riverways being contaminated with mercury and other pollutants. Contaminated areas include Lake Champlain and Lake Michigan, San Francisco Bay, the Columbia River, Flathead Lake in Montana and Massachusetts' Walden Pond. Watson, T. States Look Harder for Mercury. USA Today. Aug.25, 2004., Weise, E. et al. Mercury in Many Lakes and Rivers. USA Today. Aug.25, 2004, Choi, C. Mercurial Spread. Sci.Amer. Jan. 2005.

Comment: This small study reveals that mercury is ever-present in our environment and further supports other studies that show this as well. In fact, a quick analysis of test results from our own database here at Trace Elements revealed that out of slightly more than 131,000 samples obtained in 2003 and 2004, approximately 14% had mercury levels at or above TEI's upper reference limit for mercury. It should be noted that one of the major sources of environmental airborne mercury is coal-fired power plants.

---

### Protective Effects of High Dietary Potassium: Nutritional and Metabolic Aspects

Since potassium is generally prevalent in foods and severe deficiencies are relatively rare, little attention is paid to nutritional status of potassium in individuals. However, Demigne, et al suggest that the modern or "Westernized" diet has led to a significant decline of potassium intake leading to a large portion of the population having sub-optimal potassium intakes. Potassium is involved in a number of metabolic processes. It has been well established that adequate potassium intake aids in protecting against many health conditions such as hypertension, cardiac dysfunction, stroke, renal damage and kidney stones. Potassium is also important for maintaining acid base balance, sparing of glutamine and control of carbohydrate metabolism. Potassium is involved in maintaining glucose tolerance, and Na/K ATPases. Demigne, C, et al. J.Nutr. 134, 2004.

Comment: HTMA is a useful tool for assessing tissue potassium status. Not only can potassium levels be evaluated, but the important interrelationship of potassium with other elements, those

elements that are synergistic or antagonistic, can also be evaluated. Due to the strict homeostatic mechanism that maintains potassium within certain parameters in the blood, tissue determinations and interrelationships are much more valuable than evaluating potassium alone. Since the majority of people living in the U.S. fall into the Slow Metabolic category, a substantial number of individuals have increased potassium requirements.

---

## **Iron and Diabetes**

Iron, an essential mineral can become destructive in the body when levels are excessive. Iron is a catalyst in the formation of hydroxyl radical that can attack cell membrane lipids, proteins and nucleic acids. This attack on the islets cells of the pancreas can lead to an iron-induced diabetes. A study recently reported by Jiang, et al, found that higher iron stores are associated with increased type 2 diabetes in healthy women independent of known diabetes risk factors. Jiang, R, et al: Body Iron Stores in Relation to Risk of Type 2 Diabetes in Apparently Healthy Women. JAMA, 29,6, 2004

---

## **Magnesium and Blood Pressure**

A double-blind control trial of 91 middle-aged women with mild to moderate hypertension was randomly assigned treatment with magnesium supplementation. The women were not on anti-hypertensive medication. At the end of the study those who had taken magnesium had a reduction of systolic and diastolic pressure compared to the placebo group. Witteman, JC, et al: Reduction of Blood Pressure with Oral Magnesium Supplementation in Women with Mild to Moderate Hypertension. Am.J.Clin.Nutr. 60,1, 1994.

Comment: Magnesium is critical to normal muscle function, especially the heart muscle. However, it does not act alone. Normal muscular contraction and relaxation could not occur if it were not for the cooperative action of magnesium with other elements, such as calcium, phosphorus and potassium. However, this cooperative relationship is lost when the balance between the minerals become disrupted. Again, HTMA is an excellent tool for monitoring these interrelationships as well as providing a guide to specific, targeted nutritional needs of the individual.

---

## **Protein Intake Levels and Bone Health**

Kerstetter, et al stated, “ there are no definitive nutrition intervention studies that show a detrimental effect of a high protein diet on the skeleton and the hypothesis remains unproven.” The authors also stated, “Increasing dietary protein results in an increase in urinary calcium. Despite over 80 years of research, the source of additional urinary calcium remains unclear.” Studies by the authors reported that high protein diets result in hypercalcuria, however serum parathyroid hormone levels did not change. Low protein diets on the other hand induced secondary hyperparathyroidism that was apparently induced by a reduction in intestinal calcium

absorption. Several epidemiological studies have demonstrated reduced bone density with increased rates of bone loss in individuals consuming habitually low protein diets.

Apparently increased urinary calcium associated with high protein intake is due to increased calcium absorption. Kerstetter, JE, et al: Low Protein Intake: The Impact on Calcium and Bone Homeostasis in Humans. J. Of Nutr. 133,3, 2003.

---

### **Magnesium and Type 2 Diabetes Prevention**

The requirement for magnesium is increased in those with diabetes. Researchers have found that oral magnesium supplementation improved insulin sensitivity and metabolic control. Now, numerous studies are suggesting that adequate magnesium intake may actually help in preventing the risk of developing type 2 diabetes. Mitka, M. Researchers Examine Effects of Dietary Magnesium on Type 2 Diabetes Risk. JAMA 291,9 2004.

Comment: This is just one of many studies that show the benefits of magnesium supplementation in patients with diabetes. HTMA studies have shown a significant increase in magnesium requirements in individuals with either type 1 or type 2 diabetes, as well as those with carbohydrate sensitivities and hypoglycemia.

---

### **Instant Tea and Fluoride**

Instant tea is apparently a significant source of fluoride. A woman who presented herself to a clinic for severe bone pain was found to have markedly elevated levels of fluoride in her urine. The source of the fluoride was traced to the fact that she drank 1 to 2 gallons of super-strength instant tea on a daily basis. Upon testing a variety of different brands of regular strength instant teas, all made from fluoride-free water, researchers found a range of fluoride between 1.0 and 6.5 parts per million (ppm). It should be noted that the maximum EPA level allowable in drinking water is 4 ppm. Based upon this small study, it has been suggested that instant tea can be a significant source of fluoride particularly in conjunction with other fluoride sources, such as treated water supplies. Fluoride can increase bone density but it makes them very brittle and subject to fractures. Fluoride also contributes to ligament calcification, bone spurs and even fusion of joints. Instant Tea May Have Too Much Fluoride, Study Says. [www.usatoday.com/news/health/2005-01-26-tes-fluoride\\_x.htm](http://www.usatoday.com/news/health/2005-01-26-tes-fluoride_x.htm)

Comment: Fluoride is also a thyroid antagonist and intake should be limited in those with thyroid insufficiency.

---

### **Iron Deficiency and Attention Deficit Hyperactivity Disorder (ADHD)**

A test for iron status was conducted on fifty-three children with ADHD and twenty-seven controls in an age group of four to fourteen years. Test results found that ferritin levels were lower in children with ADHD than in controls. As iron deficiency is known to produce abnormal

dopaminergic neurotransmission, a deficiency may possibly contribute to the development of ADHD. Iron Deficiency in Children With Attention-Deficit/Hyperactive Disorder. JAMA Abstracts. 293,5,2005.

---

## **B Vitamins and Osteoporosis**

There is evidence that hyperhomocysteinemia may play a role in the development of osteoporosis. Two studies have found an association between elevated homocysteine levels and an increased risk of bone fractures. A deficiency of B vitamins that are involved in the metabolism and clearance of homocysteine may play a protective role in preventing osteoporotic fracture risk. Cashman, KD. Homocysteine and Osteoporotic Fracture Risk: A Potential Role for B Vitamins. Nutr. Rev. 63,1, 2005.

Comment: Elevated homocysteine is found in the Fast Metabolic Types. This pattern also presents with low hair tissue calcium and magnesium levels relative to sodium and potassium. Vitamins B2 and B12 both aid in calcium retention due to their effects of lowering tissue potassium. It is also known that high homocysteine levels increase the loss of magnesium from the body, which is improved with a reduction of circulating homocysteine.

---

## **Saturated Fats Reduce Progression of Coronary Atherosclerosis in Postmenopausal Women**

It has been generally recommended that a reduction in calories from fats, especially saturated fat, be initiated to prevent the progression of atherosclerosis. However, studies regarding the importance of limiting saturated fat intake on atherosclerosis progression have been conflicting. A recent study including over 200 postmenopausal women with cardiac heart disease found that a relatively low fat intake with a greater percentage of saturated fat intake was associated with less progression, whereas increased carbohydrate intake was associated with a greater progression of coronary atherosclerosis. Mozaffarian, D, et al. Dietary Fats, Carbohydrate, and Progression of Coronary Atherosclerosis in Postmenopausal Women. Am.J.Clin.Nutr. 80,5,2004.

---

## **Estrogen and Gallbladder Disease**

For many years it has been thought that estrogen therapy promoted gallstone formation however, this theory was generally based upon observational studies. Recent results from a randomized, double-blind, placebo controlled trial was presented. This study included over 20,000 women between the ages of 50 to 79 years. Results of the study concluded that estrogen therapy leads to an increased risk of biliary tract disease in postmenopausal women. The hormone estrogen contributes to gall bladder conditions by affecting the liver, contributing to supersaturation of cholesterol in the bile as well as inhibition of chenodeoxycholic acid secretion, increasing cholic acid content and reducing gallbladder motility. Cirillo, DJ, et.al. Effect of Estrogen Therapy on Gallbladder Disease. JAMA, 293,3,2005

Comment: Estrogens are also known to raise tissue copper levels as seen from HTMA studies. Excess tissue copper indicates the possible presence of biliary conditions as well.

---

### **The Vitamin E Controversy**

A recent nation-wide media release inferred that vitamin E intake could actually be harmful to individuals with cardiovascular disease. However, much of this information was taken completely out of context. A cohort study pooling nine prospective studies that included data on vitamin E, carotenoids, and vitamin C involving 293,172 subjects was recently reported in *The American Journal of Clinical Nutrition*. The results actually revealed that there was a reduced incidence of major cardiovascular heart disease events with high supplementation of vitamin C, but that the risk reduction with high vitamin E and carotenoid intake was small. Knekt, P, et al. Antioxidant Vitamins and Coronary Heart Disease Risk: A Pooled Analysis of 9 Cohorts. *Am.J.Clin.Nutr.* 80,6,2004.

Comment: This study in no way indicates the potential for harm that could be attributed to the intake of vitamin E. Due to the varied importance of vitamin E, avoidance of this vital antioxidant is certainly not warranted.

---

### **More Mercury Pollution**

Scientists have found that mercury is even more widespread than previously thought. High levels have been found in mountain songbirds in the northeastern United States. Mercury is elevated in the feathers and blood of these birds apparently from environmental contribution from industry using coal-fired power plants. *Poison Spreads*. *New Scientist*. Mar. 2005

---

### **Low Hair Zinc Level and Prostate Cancer**

Hair analysis was performed on a group of healthy subjects and a group with benign prostate hypertrophy (BPH) and those with cancer of the prostate. Results found that zinc was significantly lower in patients with prostate carcinoma compared to those with BPH, and normal controls. *Investigation Of Trace Elements In Hair Of Patients With Prostate Carcinoma, Benign Prostatic Hypertrophy, And Normal Controls*. Ouyang, S, Li, S. Hunan Yi Ke Da Xue Xue Bao. Jun. 25,3, 2000

---

### **Bisphosphonate and Osteonecrosis**

Doctors are finding that patients who have had oral surgery that are not healing properly have been on bisphosphonates therapy. Apparently in some cases the use of these drugs can cause osteonecrosis of the jaw bone and warnings have been suggested that individuals taking an IV form of bisphosphonate for osteoporosis should avoid having dental extractions. About 10

percent of the cases had taken Fosamax orally. A report was published in the Journal of Oral and axillofacial Surgery by Ruggiero, S., et al. Drug Linked To Death Of Jawbone. USA Today. Mar. 2005.

---

### **High Fat Diet Aids Parkinson's Patients**

High fat, ketone producing diets have been used for the control of epilepsy for decades. Now the diet has been found to help patients with Parkinson's disease. A study reported in the journal Neurology in February, found that patients who followed the diet closely as well as those who did not adhere rigidly to it, showed improvements in their Parkinson's condition including muscle control and moods.

Comment: At TEI we have mentioned before that epilepsy is typically seen in patients with sympathetic dominance from their hair mineral profiles and would expect to respond to a high fat diet. Patients with Parkinson's disease also usually are found with a sympathetic hair mineral profile and therefore should also respond favorably to higher fat intakes. Ketone Diet Could Help In Parkinson's. Sci.News. 167, 2005

---

### **Autism and Glutathione Deficits**

Researchers have found a biochemical peculiarity in children with autism. Unusually low concentrations of the antioxidant enzyme glutathione were found in autistic children compared to normal children. Glutathione aids in detoxification of harmful chemicals as well as heavy metals, such as lead and mercury. Researchers concluded that dietary treatments could boost glutathione in children carrying genes that reduce the enzyme. Sci.News 167, 2005

---

### **Zinc And Learning**

A federal study recently found that zinc supplementation increases learning in children. Even though the children in the study were consuming adequate levels of zinc in their diets, the additional zinc supplementation had a significant impact on learning. As stated by the lead researcher, "the recommended intake may need an adjustment." The study found that an additional 20 milligrams of zinc supplementation to the children's diet increased test performance by 12 percent compared to children receiving a smaller dosage or no supplemental zinc intake at all. Sci.News 167, 2005

---

### **Insulin and Aging**

A high insulin level is known to lead to premature aging due to high-insulin related disease, such as type 2 diabetes, heart disease etc. However, in the May issue of the journal Circulation, they found that the increased aging occurs more than just skin deep. Their report concluded that

insulin affected aging at the cellular level as well. Obesity and Insulin Resistance Age cells. Science News. 167, 2005

Comment: Hyper-insulinism is becoming more and more common in individuals in the United States. Hair Tissue Mineral Analysis (HTMA) studies at T.E.I. show not only more adults displaying increased insulin production, but children as well. This is leading to an increased amount of obesity and overweight in children, as well as developing complications from hyperinsulinism. Unabated, this will lead to a healthcare crisis in the next few decades. Data from 2002 estimates that over 18 million people in the U.S. have diabetes, with over 1.3 million new cases diagnosed each year. Type 2 diabetes accounts for up to 95 percent of all cases diagnosed with direct healthcare costs estimated at \$92 billion and indirect costs being \$40 billion. Am. Diabetes Assoc.

---

### **Protein and Bone Health**

A cross-sectional and longitudinal study of over 1000 women with an average age of 75 was conducted to determine the effects of protein intake on bone health. Results found that bone mineral density (BMD) was less in those consuming a lower protein diet (<66 grams/day) compared to those consuming more protein (>87 grams/day). Protein enhances BMD due to its action of increasing the concentration of insulin-like growth factor (IGF). The adult dietary requirement for protein is considered to be 0.8 grams per kilogram. However, based upon these findings this recommendation may need to be adjusted upward to greater than 0.84 grams per kilogram body weight for maintaining bones mass in older women. Protein Consumption Is An Important Predictor of Lower Limb Bone Mass in Elderly Women. Devine,A, et al. Am.J.Clin.Nutr. 81,6, 2005.

Comment: It has been emphasized by many in the past that high protein diets actually contribute to osteoporosis. However, as stated by Kerstetter, et al, “ there are no definitive nutrition intervention studies that show a detrimental effect of a high protein diet on the skeleton and the hypothesis remains unproven.” Several epidemiological studies have demonstrated reduced bone density with increased rates of bone loss in individuals consuming habitually low protein diets. At TEI we find that the majority of individuals who develop osteoporosis are actually lacking in protein. As we have been saying for over 20 years, protein is a vital and important component of the bone matrix and is often an overlooked factor in bone health.

---

### **Dairy Products and Bone Health**

A review of literature to evaluate the effectiveness of dairy products on bone health was reported recently in the journal Pediatrics. Only moderate benefits were found in children and adolescents. The paper concluded that little evidence supports the nutrition guidelines of increasing milk and other dairy products to promote bone mineralization in children and adolescents. Bone Health: It's More Than Calcium Intake. Lanou, AJ, et al. Pediatrics, 115,3, 2005.

---

## **Copper Reduces Side Effects of NSAIDS**

The use of non-steroidal-anti-inflammatory drugs (NSAIDS) is known to block Cox 1 and Cox 2 enzymes and contribute to ulcers. Cox 1 enzymes are present normally to protect the intestinal lining. Researchers have found that adding the mineral copper to the NSAID drug indomethacin prevented the Cox 1 enzyme inhibition. This addition reduced stomach ulcers by 80% with no intestinal ulceration in any subjects. Goodbye Ulcers. New Sci. July, 2005.

Comment: Copper has long been known to prolong and enhance the effect of aspirin as well as reduce the adverse effect of stomach bleeding.

---

## **Fractures Not Prevented By Calcium and Vitamin D Supplements**

A randomized study of over 3,000 women aged 70 years and over with one or more risk factors for hip fracture was carried out over a 24-month period. One group received daily supplementation of 1000 milligrams of calcium and 800 IU of vitamin D per day. At the end of the study there was no significant differences found in the fracture occurrences. Randomised Controlled Trial of Calcium and Supplementation with Cholecalciferol (Vitamin D3) for Prevention of Fractures in Primary Care. Porthous, J, et al. BMJ 330:103, 2005.

Comment: The outcome of this study is to be expected if you understand our research findings and subsequent treatment philosophy. HTMA testing of individuals with osteoporosis finds that approximately 75 percent fall into the Parasympathetic or Slow Metabolic category. This metabolic pattern is not associated with an increased need for calcium or vitamin D, but is associated with a metabolic defect that includes multiple factors that contribute to osteoporosis. On the other hand, approximately 25 percent of patients with a risk of osteoporotic fractures would actually respond favorably to calcium and vitamin D supplements, as well as their co-factors. These are individuals who are found to be Sympathetic dominant, or Fast Metabolic types. Again, we say, treatment of osteoporosis as well as any other health condition should be based upon individual assessments and targeted nutritional therapy rather than being based upon symptoms alone and a generic shotgun approach.

---

## **Zinc Supplementation Reduces Mortality from Pneumonia in Children**

Pneumonia and diarrhea cause increased complications and death rates in children less than five years of age. In developing countries most deaths occur during infancy, less than 2 years of age. Daily supplementation of the mineral zinc has been reported to reduce child mortality and prevent acute respiratory tract infection and diarrhea.

A study by Brooks, et al, reported the effects of supplementing seventy milligrams of zinc orally once a week in a control group of children for 12 months. Ages ranged from 60 days to 12 months. Results found a significant reduction in pneumonia in the treatment group, as well as a gain in height. There were no pneumonia-related deaths in the treatment group compared to 14 deaths in the control group.

Approximately 2 million deaths occurred in children caused by pneumonia globally from 2000 to 2003. Zinc supplementation can have a significant protective effect against pneumonia, suppurative otitis and death rates in children and infants. Brooks, WA, et al. Effect of Weekly Zinc Supplements on Incidence of Pneumonia and Diarrhoea in Children Younger than 2 Years in an Urban, Low-income Population in Bangladesh: Randomised Controlled Trial. Lancet 366, 9490, 2005.

---

### **Lead Poisoning from Contaminated Spices**

An entire family was exposed to high lead intake from cooking spices that were brought from the Republic of Georgia. Another US family who bought spices during a trip to India was also exposed to high lead intake. Analysis of the spices found from 100 to 23,100 milligrams of lead per kilogram. Lead in Spice Mixes Caused Poisonings. Sci.News. 168, 12, 2005.

---

### **Some Body Contaminants on The Decline**

A study released by the CDC, Third National Report on Human Exposures to Environmental Chemicals, reported a decline in the population's exposure to lead and some other harmful chemicals from blood and urine samples collected in 2001 and 2002. Lead exposure in children from 1 to five years old have declined. The average blood mercury levels in women of childbearing age were also reduced, but no significant reduction was found in children.

New chemicals not previously tested such as polycyclic aromatic hydrocarbon, or benzo(a)pyrene and phthalate was found in a majority of people tested. Phthalate, a plasticizer, has been linked to genital abnormalities in boys. The CDC stated that about five percent of the people tested have enough cadmium exposure to injure the kidneys. What's Gotten into Everybody? Survey of bodily contaminants finds encouraging declines and new exposures. Sci.News. 168, 5, 2005

---

### **Hair Trace Element Analysis in Human Ecology Studies**

Abstract: Concentrations of Zn, Cu, Se, Mn, Hg, Fe, Cr, Co, Sb, Sc and Au were determined in hair samples of 17 ethnic and territorial groups from the former USSR. Hair samples (837 males, 965 females) were taken from individuals of non-industrial native populations of unpolluted areas. Geographical, geochemical, racial and nutritional aspects of inter-group variations of trace element concentrations are discussed. The significance of hair analysis as a biological indicator of abnormal intake of trace elements in man is confirmed. Geographical variations of hair trace element concentrations, on the whole, depend on geochemical conditions or nutritional factors. The concentration of elements in hair is highly variable because of local factors, which makes racial or ethnic identification impossible for trace element analysis. Batzevich, et el. Sci Total Environ, 89, 98, vol. 164, 1995

---

## **Emission spectrophotometric analysis of titanium, aluminum, and vanadium levels in the blood, urine, and hair of patients with total hip arthroplasties**

**Abstract:** Emission spectrophotometry was used to measure the levels of titanium, aluminum, and vanadium in the blood, urine, and hair of 30 patients with total hip arthroplasties. The patients were divided into three groups of ten; one group was studied two years after total hip replacement, one at four years, and one at six years. High levels of titanium and aluminum were found in the hair, especially in the group studied after six years of implantation, while the levels of the three ions in the blood and urine were not significant. Tirnchi, V et al. Ital J Orthop Traumatol, 331, 339, vol. 18, 1992.

---

## **Germanium Poisoning: Clinical Symptoms and Renal Damage Caused by Long-term Intake of Geranium**

**Abstract:** We report five patients who have taken inorganic germanium preparations over a prolonged period. In all cases, the renal function deteriorated with no proteinuria or hematuria. Histological examination of the kidney's showed widespread tubular degeneration and interstitial fibrosis with minor glomerular abnormalities. Most patients had gastrointestinal symptoms such as vomiting, anorexia and weight loss; one patient had peripheral neuropathy and myopathy. A considerable amount of germanium was detected in the hair or nails of these patients. These cases clearly show that abuse of inorganic germanium compounds can induce renal damage with various extrarenal manifestations. Obara K, et al. Jpn J Med, 67, 72, vol. 30, 1991.

---

## **Leaching of nickel, chromium, and beryllium ions from base metal alloy in an artificial oral environment**

**Abstract:** The use of base metal alloys in dentistry has gained wide popularity in recent years. However, claims of their safety have not been universally accepted. An artifical oral environment capable of reproducing three-dimensional force-movement cycles of human mastication was used to determine whether nickel, chromium, and beryllium ions were leached from base metal alloy. Twelve pairs of crowns were articulated in the following combinations: metal versus metal, metal versus enamel, metal versus porcelain, and metal versus metal without chewing as a control. In a simulated 1-year period of mastication, the results showed that nickel and beryllium metals were released both by dissolution and occlusal wear. These findings suggest that if these conditions occur in the oral cavity, the stability of base-metal alloys is subject to question. Further studies are needed to determine whether the leaching reported has long-term consequences for patients receiving base metal restorations. Tai Y, et al. J Prosthet Dent, 692, 697, vol. 68, 1992.

---

## **Arsenic Poisoning in King George III**

George III, reigned from 1760 to 1820, and was known to suffer from bouts of madness that often lasted for months. It is suspected that the King suffered from porphyria, a condition that

stems from a defect of metabolism that can contribute to the accumulation of toxic chemicals causing damage to the nervous system. Analysis of King George's hair stored at the Science Museum in London found a concentration of arsenic of 1.7 milligrams percent. Frequently the royal physician would prescribe antimony as an emetic. Arsenic usually coexists with antimony and may have been the source of up to nine milligrams of arsenic intake per day. It is possible that the arsenic precipitated the porphyria attacks or made them more severe. King George III Should Have Sued. Sci.News. 168,6, 2005.

Copyright 2005 Trace Elements, Inc. All Rights Reserved

No part of this document may be used or reproduced in any manner whatsoever without the express written permission of Trace Elements, Incorporated.

**Trace Elements, Inc. 4501 Sunbelt Drive, Addison, Texas 75001 USA**