

## NEWS UPDATES - FOR THE HEALTHCARE PROFESSIONAL

January - December 2007

### **Mercury Spread by Wildfires**

Mercury is ever present in the environment and accumulates in topsoil. When wildfires occur, it tends to burn off topsoil allowing this mercury to be released into the atmosphere. The airborne metal can then travel for miles, exposing humans and animals in its path. Additionally, with the loss of soil stabilizing plants, researchers note increased runoff in lakes and streams raising the mercury content of exposed vegetation and fish. *Harder, B. Woods to Waters. Wildfires Amplify Mercury Contamination in Fish. Sci. News, 170, 24, 2006.*

Comment: Often, tests of individuals may show an elevated mercury level yet they may not have had a known exposure. It can be difficult at times to determine a source of such findings. The above mentioned study reveals how a person or group can unknowingly be exposed to a heavy metal, such as mercury, that may show up in a HTMA screen that otherwise may go undetected. To determine types of pollutants that may be present in your own county, you can go to [www.traceelements.com/links.html](http://www.traceelements.com/links.html) and scroll down to: Scorecard, The Pollution Information Site.

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### **Diabetes and the Nervous System**

Canadian scientists found proof that diabetes can be triggered by the body's nervous system. For most researchers/scientists/people, Type 1 diabetes has been thought to be related strictly to an autoimmune response. However, animal studies revealed that counteracting the effects of neurons in the pancreas produced remarkable changes overnight allowing the islets to begin producing insulin normally. Dr. Salter stated "Mice with diabetes suddenly didn't have diabetes anymore." The researchers also found a strong similarity between type 1 and type 2 diabetes, which were thought to be entirely different. Recognition of the link between the nervous system and various disease processes may eventually lead to the treatment and elimination of many other neuropathic related diseases. *www.Canada.com. Dec. 2006.*

Comment: Through viewing HTMA studies we have always emphasized not only a neurological link in many disease processes such as diabetes, but also an endocrine link. This neuro-endocrine link is involved in most all diseases and HTMA studies can help in revealing the underlying metabolic and nutritional disturbances associated with many health conditions. *Metabolic Manifestation of Disease, Sympathetic-Parasympathetic. TEI Newsletter Vol. 3, 3, 1989*

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## Multiple Sclerosis and Vitamin D

Studies have shown that elevated circulating levels of vitamin D may be associated with a reduction in the risk of developing multiple sclerosis (MS). The relationship is based upon the global distribution of MS occurrence with increasing latitude north and south of the equator. The assumption is that latitudes of 42 degrees or more results in seasonal variation of vitamin D status. Specifically a reduction in vitamin D status would be due to less UV-B rays being available during winter months. *Munger, KL, et al. Serum 25-Hydroxyvitamin D Levels and Risk of Multiple Sclerosis. JAMA, 296, 23, 2006.*

Comment: The mechanism of the potential benefit for vitamin D and its' role in reducing the risk for development of MS can be explained though HTMA studies. Vitamin D has immunomodulatory effects and specifically acts on the mineral calcium. Typically we see that MS occurs most often in the Fast Metabolic Types who have low tissue calcium, magnesium and copper in conjunction with elevated sodium and potassium along with relative phosphorus dominance. This HTMA pattern is associated with a humoral immune dominance and an increase in the vitamin D requirements. Increasing vitamin D intake for an individual with this HTMA pattern would have a number of beneficial effects. First, vitamin D enhances calcium absorption and retention. This would bring about a reduction in elevated sodium and potassium levels, thereby reducing the excessive humoral immune response. Vitamin D would also act as a copper-sparing nutrient, the mineral necessary for normal myelin formation. Vitamin D would therefore also enhance associated antioxidant activity most notably superoxide dismutase (SOD). Of course there are many other mechanisms involved that are too numerous to mention in this brief description. HTMA studies have revealed other health conditions that would also respond to vitamin D therapy such as Parkinson's disease, ALS, Type I Diabetes, metabolic syndrome, etc. More information can be found in our educational materials including: *Multiple Sclerosis, True or False. TEI Newsletter, 6, 1, 1993., The Immune System and Hair Tissue Mineral Patterns. Nutritional, Neuro-Endocrine Immunology. TEI Newsletter, 7, 1, 1994., Autoimmune Disease and Women. TEI Newsletter, 14, 1, 2002.*)

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## Insulin and Alzheimer's

Insulin is not only involved in regulating blood glucose and fat storage but it also aids normal brain function, particularly memory. Researchers have found that a disruption in normal insulin regulation can predispose individuals to neurodegenerative disorders, especially Alzheimer disease. Normally insulin enhances memory and cognitive functions. However, an abnormally high insulin level is associated with inflammation in the brain and triggers the accumulation of beta-amyloid in brain tissue, a hallmark of Alzheimer disease. *Friedrich, MJ. Insulin Effects Weigh Heavy on the Brain. JAMA, 296, 14, 2006.*

Comment: Glucose control is important for preventing and treating diabetes, cardiovascular disease and maintaining normal weight. Now evidence is pointing to the importance of glucose control in preventing memory disturbances.

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## **Hyper-Parathyroidism (HPTH) in Breast Cancer Patients**

Advanced breast cancer is usually associated with hypercalcemia due to osteolytic metastases of cancer. However, the frequency of hypercalcemia due to HPTH in breast cancer without metastases is unknown. A study was carried out in a group of women who were treated for breast cancer compared to a non-breast cancer control group. Serum calcium and PTH were measured in both groups. Seven percent of the breast cancer patients had elevated serum PTH and calcium levels while none of the patients had evidence of metastases. Results revealed that there was an increase in the frequency of parathyroid adenomas in the breast cancer patients and in those with no evidence of HPTH, the serum PTH and calcium levels were significantly higher than in the control group. This study suggests that HPTH should be considered a cause of hypercalcemia in patients with non-aggressive breast cancer and that PTH should be assessed in all breast cancer patients with increased serum calcium, especially in those showing no evidence of metastases. *Fierabracci, P, et al. Increased Prevalence of Primary Hyperparathyroidism in Treated Breast Cancer. J. Endocrin. Invest. 34, 5, 2001.*

Comment: Our HTMA statistics show over eighty percent of breast cancers occur in women with a Slow Metabolic Type mineral pattern. The Slow Metabolic Type is associated with parathyroid dominance. HTMA studies, therefore explain the findings of the above report, in that a sub-clinical HPTH condition may be present in patients with breast cancer. This further explains the increase in serum calcium and PTH in the presence of non-osteolytic metastases. HTMA patterns also help to explain the soft tissue calcification within breast tissue of many women with the presence as well the absence of breast cancer.

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## **Depression Responds to Thyroid Support**

It is estimated that over forty percent of patients diagnosed with a major depressive disorder do not respond to antidepressant medications. A study using lithium therapy and triiodothyronine (T3) treatment was carried out on 142 patients with non-psychotic major depressive disorder who were unresponsive to psychotropic medications. Lithium therapy was associated with frequent side effects. However, T3 treatment was associated with fewer side effects. The study suggests that T3 treatment had advantages over lithium for treatment of patients with depression who did not respond in trials that included antidepressant medications. *Nierenberg, AA, et al. A Comparison of Lithium and T(3) Augmentation Following Two Failed Medication Treatments for Depression: a STAR\*D Report. Am.J.Psychiatry. 163, 9, 2006.*

Comment: One adverse effect of lithium therapy is thyroid suppression. Most HTMA studies of individuals suffering from clinical depression have revealed a Slow Metabolic Type mineral pattern. The Slow Metabolic pattern is associated with low thyroid expression; therefore, it would be expected that patients would respond more favorably to thyroid support than from lithium therapy. More information on the effects of minerals, thyroid activity and psychological disorders may be found in: *Watts, DL. Trace Elements and Neuropsychological Problems as Reflected in Tissue Mineral Analysis Patterns. J.Orthomol.Med. 5, 3, 1990., Watts, DL. The Nutritional Relationships of the Thyroid. J. Orthomol. Med. 4, 3, 1989.*

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## **Iron Deficiency and Reduced Thyroid Activity**

Iron deficiency has long been associated with hypothyroidism as well as with the prevalence of goiter. It has been found that Iranian children are at high risk for both iron deficiency and goiter and that iron deficiency can nullify the effect of iodine supplementation. A study of school children in different provinces found that goiter rates were higher in children with ferritin levels less than or equal to 10 mg/dl. Elevated T3 and decreased T3 uptake was present in those with lower serum ferritin levels.

Studies have confirmed hair mineral concentrations can show evidence of mineral deficiency and excess and can be of value in assessing the development of thyroid disorders. An increase in susceptibility to thyroid disease was found in individuals residing in areas of predominately carbonate rocks. Azizi, F. *et al.* *The Relation Between Serum Ferritin and Goiter, Urinary Iodine and Thyroid Hormone Concentration.* *Int. J. Vitam.Res.* 72, 5, 2002., Farkhutdinova, LM, *et al.* *Hair Trace Elements in Patients with Goiter.* *Klin. Lab. Diag.* 8, 2006.

Comment: Since iodine can suppress thyroid activity, it would be wise to assess iron status prior to implementing iodine therapy in patients with hypothyroidism. Other minerals such as zinc, selenium, copper and calcium can also affect thyroid function and should also be assessed before resorting to iodine therapy. Since calcium is a thyroid suppressant it would stand to reason that more thyroid disorders would be found in people living in areas containing high concentrations of carbonated rock. Elevated copper areas would also be a factor in contributing to thyroid disturbances. For further information on minerals affecting the thyroid: Watts, DL. *Hair Trace Elements and Hypothyroidism.* *TEI Newslet.* 12, 1, 2000., Watts, DL. *The Nutritional Relationships of the Thyroid.* *J. Orthomol. Med.* 4, 3, 1989., Watts, DL. *The Nutritional Relationships of Iron.* *J. Orthomol. Med.* 3, 3, 1988., Watts, DL. *Trace Elements and Other Essential Nutrients.* TEI, 1995.

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## **Mercurial Effects Upon the Thyroid and Glucose Transport**

Mercury is a neurotoxin and perinatal exposure can lead to impairment in neurological development. Normal thyroid function is also necessary for normal neurological development and this fact has therefore led investigators to explore the relationship between mercury and the thyroid. Their studies involving animals has revealed low dose exposure to mercury induces changes in brain deiodinase activities in neonates.

Other research has shown that mercury can also affect glucose transport in adipocytes. The studies found that via a series of enzymatic mechanisms, mercury can contribute to insulin resistance and can therefore, be a factor in pathologies associated with glucose homeostasis. Mori, K, *et al.* *Effects of Perinatal Exposure to Low Doses of Cadmium or Methylmercury on Thyroid Hormone Metabolism in Metallothionein-Deficient Mouse Neonates.* *Toxicol.* 228, 1, 2006., Barnes, DM, *et al.* *Effects of Mercuric Chloride on Glucose Transport in 3T3-L1Adipocytes.* *Toxicol in Vitro.* 19, 2 2005.

Comment: It is very common to find elevated mercury in patients diagnosed with hypothyroidism. HTMA studies usually reveal a Slow Metabolic mineral pattern in patients with high mercury exposure. It is well known that mercury can cross the placental barrier and

accumulate in the fetus. This study shows that not only can mercury directly affect neurological tissues, but even low exposure to mercury can affect thyroid expression, which could in turn adversely affect neurological development. HTMA studies would indicate that mercury accumulation could lead to abnormal thyroid function in the adult, as well as affect blood sugar regulation.

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### **Selenium and Thyroiditis**

A study was performed to investigate the effects of selenium therapy on autoimmune thyroiditis. Various levels of selenium dosages were used in different groups of affected individuals compared to controls. L-selenomethionine therapy was found to significantly reduce thyroid peroxidase antibody concentrations in patients with autoimmune thyroiditis compared to the placebo group. The study also found that the amount of selenium required for this effect was 200 micrograms per day and the effects reduced over time. *Turker, O. et al. Selenium Treatment in Autoimmune Thyroiditis: 9-Month Follow-up with Variable Doses. J.Endocrinol. 190, 1, 2006.*

Comment: The fact that the effect of selenium reducing thyroid peroxidase in patients with autoimmune thyroiditis (AIT) indicates a multicausal etiology. AIT as with other disease conditions involves multiple mechanisms involving nutritional, endocrine, neurological and environmental factors that must be addressed for long-term improvements.

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### **Lead, Still a Problem for Children and Adults in the U.S.**

There has always been a health concern for children who have been exposed to lead. Even though many sources of lead exposure have been eliminated it is still ever present in the environment and is estimated to affect over 300,000 children whose blood lead levels are above the recommended levels of 10 ug/dL. The CDC has stated that there is no safe threshold for blood lead levels in children, so the actual number of children affected may be well above the estimated 300,000 figure. It is estimated that up to thirty percent of the special education caseloads in some urban areas are associated with lead exposure in children due to its effect of contributing to learning disabilities and behavioral problems.

The recommended blood lead threshold in adults has been established at less than 25 ug/dL. In 2004 the CDC reported results from a surveillance program including data from 37 states that almost 10,000 cases of adults with levels at or above 25 ug/dL were found. However, recent research is showing that health risks in adults may be present at levels well below the established threshold. According to the NHANES III, adults may be at risk with blood lead levels of 2 ug/dL. *Downer, K. Lead Poisoning. Is Point-of-Care Testing the Answer? Clin.Lab.News. 33, 1, 2007.*

Comment: Lead screening is still extremely important. HTMA can aid professionals in screening for lead exposure in children and adults and can be employed in individuals who may have had environmental, occupational or simple exposure from hobbies, paint, etc. Unfortunately, heavy metal exposure and accumulation can occur from unlikely sources. For example, Weidenhamer, et al, reported test results of the lead content of imported costume jewelry following the death of

a child due to lead poisoning after a jewelry charm was swallowed. Subsequent tests of 139 jewelry items revealed that almost half of the items were heavily laden with lead, containing eighty percent lead by weight. Sources of lead has also been found in imported candy and candy wrappers and ceramic and plastic dinnerware. *Weidenhamer, JD, et al. Widespread Contamination of Imported Low-Cost Jewelry in the U.S. Chemosphere. Doc. 11, 2006., Fourtes, L, et al. Lead Contamination of Imported Candy Wrappers. Vet.Hum.Toxicol. 42, 1, 2000., Sheets, RE. Acid Extraction of Lead and Cadmium from Newly-Purchased Ceramic and Melamine Dinnerware. Sci.Tot.Environ. 234, 1, 1999.,*

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## **Cardiovascular Disease and Soft Water**

Since the 1950's, studies have shown the relationship between water hardness and the epidemiological relationship to cardiovascular disease. As recently as last year, Tubek reported studies in Poland that confirmed these earlier findings. The researcher discusses how minerals contained in water such as calcium, magnesium, copper, zinc, manganese, etc. are important factors in helping to prevent cardiovascular disease risks and elements such as cadmium, lead, silver, mercury, and thallium are contributory or harmful. He also found that cobalt and zinc seem to have a dual role and can be beneficial or harmful depending upon several different factors. *Role of Trace Elements in Primary Arterial Hypertension. Tubek, S. Biol.Trace Elem.Res. 114, 2006.*

Comment: At TEI we have emphasized the beneficial and detrimental role of hard and soft water depending on their effects upon metabolic types for over 20 years. Even though only about seven percent of the trace elements consumed by humans are from water sources, the simple application of applying the mineral pattern found in water to individual patients can have a significant impact upon not only their overall health condition, but their progress and response to therapy as well. *Water and Health. TEI Newsletter, 3,4, 1986.*

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## **Selenium and HIV**

A nine month study was conducted on over two-hundred HIV-1-seropositive patients. Selenium supplementation was evaluated by a double-blind, randomized, placebo-control trial. They found that with daily selenium supplementation there was suppression in the progression of HIV-1 viral burden and improvement of CD4 count. They concluded that the study supports the use of selenium supplementation and is a safe adjunctive therapy in HIV disease. *Suppression of Human Immunodeficiency Virus Type 1 Viral Load with Selenium Supplementaion: A randomized Controlled Trial. Hurwitz, BE, et al. Arch. of Intern.Med. 167, 2007.*

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## **Nutrients and Huntington's Disease**

Huntington's is a progressive neurodegenerative disorder that leads to incoordination, chorea and dystonia and cognitive decline. There has been little advance in the medical treatment of this condition. However, experimental studies have shown that coenzyme Q10 has proven effective

in animal models of Huntington's disease. It is believed that CoQ10 enhances mitochondrial function and may show benefits in human trials. There has been federal funding for the study of high doses of CoQ10 in clinical trials of patients afflicted with this disease. *Huntington's Disease. Walker, FO. Lancet. 369, 2007.*

Comment: HTMA studies of patients with neurodegenerative disease have shown a significantly higher correlation with those individuals displaying a sympathetic neuroendocrine pattern. Typically CoQ10 requirements are increased in this pattern. Even though the mitochondrial improvements associated with CoQ10 supplementation is important, there are many other factors involved with these conditions. They include calcium and magnesium deficiency, copper deficiency and imbalances between copper and other minerals and co-factors as well as the presence of heavy metals. These other factors must also be assessed and addressed in any neurological condition, otherwise CoQ10 supplementation would only provide symptomatic treatment.

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### **Iron Deficiency and ADHD**

A study was performed to evaluate the iron status of children with ADHD compared to a matched control group. Serum ferritin was evaluated and found to be low in eighty-four percent of the children with ADHD compared to only eighteen percent in the control group. The ferritin level was associated with severity of ADHD. Those with lower levels had more symptoms of ADHD. *Iron Deficiency in Children with Attention-Deficit/Hyperactive Disorder. Konofal, E, et al. Archives of Pediatrics and Adolescent Med. 158. 2004.*

Comment: Iron is involved in dopaminergic neurotransmission. However, it should be noted that neurotransmitter imbalances can also be contributed to by excess iron, as well as imbalances of iron relative to other minerals which are involved in regulating neurotransmission. Thus the importance of evaluating the mineral interrelationships, i.e. ratios, not just the mineral level alone. Additionally, heavy metals may also be a contributor and which should also be investigated.

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### **Hair Analysis for Monitoring Therapy in Acrodermatitis Enteropathica**

This paper reports on the use of hair analysis to monitor zinc and copper status in patients with Acrodermatitis enteropathica (AE) over a period of thirty years. The patients were treated with oral zinc supplementation beginning in 1975. Zinc therapy resulted in remission of signs and symptoms of AE within the first month. The researchers stated that hair analysis is not only an effective tool for determining zinc status and response to therapy, but can also be utilized to identify potential heterozygous carriers of AE who may have subclinical zinc deficiency. Three generations of family members 40 in all, who were also tested since 1975 demonstrated the utility of hair analysis to identify potential heterozygous carriers of AE. Hair analysis is proven useful for determining zinc status over a longer time span and compared to serum zinc studies is less prone to short term fluctuations. *Acrodermatitis Enteropathica. Zinc Therapy and Possible Identification of a Carrier State Through Multiple Hair Zinc Analysis over Three Decades. Jamall, IS, et al. Biol. Trace Elem.Res. 114, 2006.*

## **High Protein Intake Aids Weight Loss and Metabolic Effects**

A study that included the Atkins Diet was recently reported in the Journal of the American Medical Association. Once again the high protein, low carbohydrate eating habits produced the greatest weight loss compared to the other diets, (Zone, Ornish, LEARN). Favorable metabolic effects were greater in the group following the high protein, low carbohydrate intake as well. Metabolic effects included improvements in lipid levels as well as reduction in blood pressure. The authors concluded, "Concerns about adverse metabolic effects of the Atkins diet were not substantiated within the twelve month study period." *Comparison of the Atkins, Zone, Ornish, and LEARN Diets for Change in Weight and Related Risk Factors Among Overweight Premenopausal Women. Gardner, CD, et.al. JAMA 297, 9, 2007.*

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## **Excess Folic Acid May harm the Nervous System**

Even though folic acid is good for brain health supplementation without sufficient amounts of B12 may impair cognition. Researchers have found that excess intake of folic acid can mask signs of vitamin B12 deficiency which could cause neurological damage. Groups of people who had the highest levels of folic acid showed signs of cognitive impairment compared to those with lower levels. Also, anemia that can be caused by a vitamin B12 deficiency was over three times more common in the group with high folic acid levels. It was found that in groups with normal vitamin B12 levels folic acid was apparently protective against cognitive impairment. *Folic Acid Dilemma. One Vitamin May Impair Cognition if Another is Lacking. Harder, B. Sci.News, 171,2007.*

Comment: Similar to mineral interrelationships, there is also a synergistic and antagonistic relationship shared by vitamins. Assessment of vitamin relationships should be determined in individuals to reduce the potential adverse effects of excess supplementation. Even though HTMA studies do not test for vitamins, the vitamin- mineral synergistic and antagonistic relationships can be assessed through mineral patterns. As an example, folic acid has a raising effect on sodium while B12 (cynaocobalamin) lowers potassium. Therefore, folic acid and vitamin B12 is indicated by low HTMA sodium to potassium ratio and elevated potassium to cobalt ratio, particularly in the Fast Metabolic type. High folic acid supplementation alone in this situation would further raise not only sodium levels but potassium levels as well, exacerbating or increasing the requirement for B12.

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## **Mononucleosis and Multiple Sclerosis**

Infectious mononucleosis due to the Epstein-Barr virus has been found to be associated with an increased risk for the development of multiple sclerosis (MS). A thirty-five year study of over twenty-five thousand Danish patients with mononucleosis consisted of following these individuals and monitoring for the occurrence of MS. The study found that the risk for developing MS increased in individuals with a previous history of mononucleosis and the risk persists for a least thirty years after the infection. The long-term risk was found regardless of age, gender or severity of the infectious episode. *Multiple Sclerosis After Infectious Mononucleosis. Nielsen, TR, et. al. Arch. of Neurol. 64, 2007*

Comment: In the past, we have described the development of MS following viral episodes in relation to HTMA mineral patterns and the resulting autoimmune reaction. Based upon the HTMA studies, MS contributed to by the body's response to a viral condition is characteristically different from HTMA patterns of patients who have developed MS unrelated to a virus. For further information see, *Multiple Sclerosis, True or False. Watts, D. TEI Newsletter, 1,6, 1993.*

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### **Thyroid Function Improves with Adrenal Support**

We have often written about the endocrines, particularly their antagonistic and synergistic relationships. As you may know, through our research and HTMA studies, we have been able to classify the individual endocrines into Sympathetic and Parasympathetic categories. It is apparent from these HTMA studies that a synergistic relationship exists between the adrenal and thyroid glands. Typically when thyroid function is decreased, adrenal function follows suit. Conversely, when thyroid function is elevated adrenal activity is also increased. Unfortunately, we often see individuals who have been on long-term thyroid replacement therapy with little evidence of their effectiveness. This lack of appropriate response may be explained by this thyroid-adrenal relationship.

A number of cases have been reported of individuals having signs of hypothyroidism with elevated TSH, and low free thyroxine concentration in conjunction with adrenal insufficiency. Adrenal hormone support resulted in normalization of thyroid function without any type of thyroid support. *Abdullatif, HD, et al. Reversible Subclinical Hypothyroidism in the Presence of Adrenal Insufficiency. Endocrin.Pract. 12,5, 2006. Candrina, R, et al. Addison's Disease and Corticosteroid-Reversible Hypothyroidism. Endocrinol.Invest. 10,5,1987.*

Comment: This finding supports our conclusions from HTMA studies of the thyroid-adrenal relationship. Often, thyroid support alone does not aid in improving metabolic activity unless adrenal support is initiated. Many individuals who have been diagnosed and treated for hypothyroidism may in fact be suffering from adrenal insufficiency and therefore, thyroid replacement therapy may often be unwarranted.

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### **Increased Release of Toxins Into The Environment**

In 2005 approximately four billion pounds of chemicals were released by industry in the United States. According to the EPA, chemical releases have increased by 117 million pounds over just this past year. Lead compounds alone amounted to about 469 million pounds, while mercury was approximately 4.4 million pounds. *Sci.News. 171, 2007.*

Comment: These statistics very much emphasize the importance of continuing to screen for heavy metals in all U.S. residents. Hair tissue mineral analysis remains the most easily obtainable, accurate and economical form of heavy metal screening.

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## **Aluminum Induced Cholestasis Reduced By Vitamin E**

Aluminum is known to reduce bile secretions by impairing hepatocellular transporters. Investigations on animals were carried out to determine if the aluminum-induced reduction in bile flow was related to oxidative stress. It was found that aluminum increased lipid peroxidation by fifty percent, reduced liver glutathione by forty-three percent, catalase by eighty-three percent and glutathione peroxidase activity by fifty percent. Vitamin E supplementation reduced these adverse effects significantly, as well as increased bile flow and contributed to an increase in aluminum removal. *Gonzalez, MA, et al. Involvement of Oxidative Stress in the Impairment in Biliary Secretory Function Induced by Intraperitoneal Administration of Aluminum to Rats. Biol.Trace Elem.Res. 116, 2007.*

Comment: Vitamin E Plus is a hypoallergenic source of natural vitamin E with selenium amino acid chelate added as a synergist. Trace Nutrients provides vitamin E in a dry form that is more easily utilized than the oil-form by many individuals with fat absorption problems. Further Vitamin E plus is in a succinate form. Vitamin E succinate has been shown to have greater biological effects compared to other forms such as gamma and alpha tocopherol. Vitamin E succinate possesses anti-tumor, anti-angiogenesis and anti-androgen effects and has been shown to be effective in treatment of various types of cancer including breast, gastric and prostate. *Malafa, MP, et al. Vitamin E succinate promotes breast cancer dormancy. J. Sur.Res. 93,1, 2000. Shanker, M, et al. Vitamin E succinate in combination with mds-7 results in enhanced human ovarian tumor killing through modulation of extrinsic and intrinsic apoptotic pathways. Cancer let. 254,2,2007. Crispen, PL, et al. Vitamin E succinate inhibits NF-kappaB and prevents the development of a metastatic phenotype in prostate cancer cells: implications for chemoprevention. Prostate, 67,6, 2007. Wang, XF, et al. A peptide conjugate of vitamin E succinate targets breast cancer cells with high ErbB2 expression. Cancer Res. 67,7, 2007.*

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## **Folic Acid Deficiency and Strokes**

Studies have shown that folic acid supplementation can reduce the risk of stroke by as much as twenty-four percent. The U.S. and Canada began fortifying grain products with folic acid in 1998. Since that time, stroke incidence has decreased significantly compared to countries where folic acid fortification has not been implemented. *Wang, X, et al. Efficacy of Folic Acid Supplementation in Stroke Prevention: A Meta-Analysis. Lancet. Vol. 369, 2007.*

Comment: Folic acid aids in the reduction of elevated homocysteine, a known risk factor for cardiovascular disease and may therefore, be beneficial for the prevention of strokes. Of course, other factors lead to elevated homocysteine and cardiovascular risks as well, such as deficiencies of vitamin B6, B12, magnesium, copper, etc. Therefore, the status of these nutrients should also be assessed.

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## **Hair Chromium Levels in the Elderly With type 2 Diabetes and Controls**

Hair chromium levels were analyzed in a healthy elderly population and an age-matched control group with type 2 diabetes. Lower chromium levels were observed in the diabetic group. Also,

the average hair chromium values showed a slight decrease with age in the control group. This is thought to be a result of age-related factors that may reduce insulin sensitivity and produce chromium deficiency. *Stupar, J, et al. Longitudinal hair chromium profiles of elderly subjects with normal glucose tolerance and type 2 diabetes mellitus. Metabolism. 56,1,2007.*

Also, Huang and colleagues collected hair samples from healthy individuals and those with diabetes. A hybrid algorithm applied to the mineral results was found to be a good symptom index that could recognize individuals with type 2 diabetes. Huang, H, et al. Hybrid progressive algorithm to recognize type II diabetic based on hair mineral contents. *Conf. Proc. IEEE, Eng. Med. Biol. Soc. 5, 2005.*

Comment: Chromium is necessary for insulin sensitivity and it's loss from the body can be caused by hyperinsulinism as well as elevated glucose levels. Needless to say, chromium is only one part of the glucose tolerance factor (GTF). Trace Nutrients GT-Formula provides not only chromium in the preferred form of an amino acid chelate, but this product also contains the other known glucose tolerance factors as well; niacin, glycine, glutamic acid and cysteine.

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### **Uric Acid and the Metabolic Syndrome**

The concentration of uric acid in the serum is associated with a number of components of the metabolic syndrome. Increasing concentrations of uric acid was associated with increased concentrations of insulin levels. Apparently, high uric acid levels are inversely related to the renal clearance of uric acid due to insulin resistance, or due to high fructose intake in children. Fructose increases serum uric acid, which reduces endothelial function, as well as impairs oxidative phosphorylation. *Study links uric acid and metabolic syndrome. Clin. Lab. News. Jul.2007.*

Comment: Elevated serum uric acid can be related to an imbalance in the normal tissue pH. Elevated uric acid is also closely associated with copper deficiency. Fructose is antagonistic to the mineral copper and high fructose intake can exacerbate a deficiency when copper status is marginal. A low copper and/or elevated zinc/copper or elevated iron/copper ratio found on the HTMA can indicate the potential for elevated uric acid and the contraindication of fructose intake. Factors that may further lower an individuals copper status are high intakes of vitamin C, A, niacin, zinc, iron, and molybdenum.

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### **Mercury and Heart Disease**

Numerous studies over the last decade have shown the potential of the harmful effects of mercury on cardiovascular disease (CVD). A study following a group of men over a period of thirteen years found that for each microgram of mercury found in the hair the risk of acute coronary events increased by an average of eleven percent, and CVD death by ten percent. The mechanism for increased susceptibility is associated with the interaction of mercury and selenium, reducing the free radical scavenging effects of glutathione enzymes. Selenium protects the body from adverse affects of mercury. When mercury enters the body it is bound by selenium forming a mercury selenide complex. However, in those cases of high exposure to mercury,

selenium will be required in greater amount in order to bind the mercury. As a result, selenium bioavailability will be reduced, thereby allowing increased free radical activity, which can promote cardiovascular disease, cancer and other related health conditions. *Virtanen, JK, et al. Mercury as a risk factor for cardiovascular disease. J..Nutri.Biochem. 18, 2007.*

Comment: Mercury is well known to be a neurotoxin and is implicated in a number of adverse health conditions. However, other heavy metals and nutrient mineral imbalances are also associated with disease, particularly CVD and CHD. Assessment of mercury for anyone with CVD or CHD is warranted, however, one should not overlook the overall mineral status that can be determined from hair mineral patterns and the implications of imbalances singularly or in combination that can contribute to the development and progression of CVD, CHD and other health conditions.

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