



InterClinical Laboratories

Newsletter

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**Hair Tissue
Mineral Analysis**

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**Research and
Development**

Clinical Updates for the Health Professional

Lead and Pregnancy

We are often asked about starting rebalancing programs during pregnancy. Some are concerned that heavy metal mobilisation may occur during metabolic rebalancing. However, the fact is, even if therapeutic rebalancing is not undertaken, if heavy metals are present within the mother they can still be mobilised during pregnancy. These reports describe instances of lead mobilisation in two mothers who had on-going and previous lead exposure. The first case involved an ongoing lead exposure in an expectant mother who was found to be anaemic during her twenty-third week of gestation. Blood lead was slightly elevated at 31 mcg/dl (upper limit 25 mcg/dl). The mothers lead level was 75-85 mcg/dl after the baby was delivered by Caesarean section and the infants blood lead level was elevated as well. The source of the lead was from fifteen year old bullet fragments located in her lumbar region.

Another case involved a mother who had been exposed to lead seven years prior to conception. During pregnancy her blood lead level increased to 81 mcg/dl. The increase in lead was due to increased bone resorption during pregnancy.

Raymond, LW, et al. Maternal-fetal lead poisoning from a 15-year-old bullet. J.Matern.Fetal Neonat.Med 11,1, 2002.
Riess, ML, et al. Lead poisoning in an adult:Lead mobilization by pregnancy? J.Gen.Intern.Med. 22,8, 2007.

Comment: Lead and other heavy metals within the body can be present due to previous exposure, sometimes years previously. It is essential for those who want to become pregnant to be screened for the possibility of toxicities. If found to be elevated, it would be warranted to rebalance the chemistry in order to not only improve their health in general but to mobilise and excrete heavy metals prior to conception. However, from the present studies if heavy metals are found during pregnancy it would be wise to implement therapy in order for them to be excreted and reduce their exposure to the foetus.

Magnesium and Prevention of Cerebral Palsy

Magnesium's neuro-protective effect was demonstrated by the use of magnesium sulfate before preterm birth for the prevention of cerebral palsy. Rouse, et al demonstrated that magnesium significantly reduced the rate of mild, moderate and severe cerebral palsy.

Rouse, DJ, et al. A randomized, controlled trial of magnesium sulfate for the prevention of cerebral palsy. N.E.J.M. 359, 2008.

Fertility and Pregnancy: Focus on Zinc Supplementation

Zinc is necessary for the functioning of over 200 different enzymes, so it facilitates a large number of critical activities in the body. With the prevalence of zinc deficiency conservatively estimated at 20% worldwide, it is crucial to optimise zinc intake for reproductive health and positive pregnancy outcomes. Among the population groups at increased risk of zinc deficiency are pregnant and lactating women, as well as infants.

Essential for DNA and RNA synthesis, zinc has many roles in reproduction, embryo and foetal development, as well as infant growth. Zinc is crucial for cell division, normal production of the egg, and viable sperm count, motility and morphology. Deficiency can lead to infertility – or to problems once conception has occurred, including spontaneous abortion, chromosomal abnormalities and delayed development. Research also suggests foetal zinc deficiency contributes to the pathogenesis of metabolic diseases in adultsⁱ. It has been estimated that 82% of pregnant women worldwide are likely to have inadequate zinc intakes.ⁱⁱ

Clinical studies indicate maternal zinc supplementation has a positive effect on neonatal immune status, early neonatal morbidity and infant infections. There is also evidence that zinc supplementation may prevent against congenital malformations (cleft lip/palate)ⁱⁱⁱ. Cochrane review findings indicated zinc supplementation resulted in a significant reduction in cases of preterm birth.^{iv} Recent experimental research has also found zinc supplementation during pregnancy may counteract damage from early alcohol exposure^v.

Furthermore, zinc has been found to be essential for normal brain development, particularly concerning the hippocampal function. Low maternal intakes of zinc during pregnancy and lactation have been found to be associated with less focused attention in neonates and decreased motor functions at six months of age. Supplementation with zinc resulted in improved motor development and more playfulness in low birth weight infants, and increased vigorous and functional activity in infants and toddlers^{vi}.

NB: Zinc supplementation to improve pregnancy outcome should be carried out under the guidance of health practitioners. Zinc competes with other essential nutrients such as copper, and nutritional requirements need to be considered on an individual basis. HTMA is an excellent indicator of the body's zinc and other essential mineral status.

ⁱ Wolfgang M Et Sandstead H,

2008..Possible roles of zinc nutriture in the fetal origins of disease. *Exp Gerontol.* 43(5):378-81.

ⁱⁱ Higdon J. *An Evidence-Based Approach to Vitamins and Minerals*. NY,Thieme Medical Publishers, 2003

ⁱⁱⁱ Shah et al, 2006. Zinc deficiency in pregnancy and fetal outcome.*Nutr Rev.* 64 (1):15-30

^{iv} Mahomed K et al. Zinc supplementation for improving pregnancy and infant outcome. *Cochrane Database of Systematic Reviews* 2007, Issue 2. Art. No.: CD000230. DOI: 10.1002/14651858.CD000230.pub3.

^v Alcohol Exposure. *ScienceDaily*. Rtrvd 04/09 from

<http://www.sciencedaily.com/releases/2009/02/090202174452.htm>

^{vi} Bhatnagara S & Tanejaa S, 2001. Zinc and cognitive development. *Brit.Jnl Nutrition* 85(Suppl 2):139S-145

Hair Mineral Patterns in Patients with Schizophrenia

This study was performed to determine the trace element concentration in the hair of schizophrenic patients and the relationship between trace element levels and nutritional status and socio-economic factors. Thirty patients and thirty controls were used. The findings revealed that in schizophrenic patients, hair concentrations of zinc and calcium were significantly decreased and the concentration of copper and cadmium were significantly increased, compared to controls. Imbalances in the optimum levels of trace elements may adversely affect the biological process and are associated with many disease processes.

Rahman, A. et al. Zinc, Manganese, Calcium, Copper and Cadmium Level in Scalp Hair Samples of Schizophrenic Patients. *Biol.Trace Elem. Res.* 127,2, 2009.

Hair Tissue Levels of Heavy Metals and Calcium Pump Activity

The calcium pump is an important regulator of calcium within cells and in the extra cellular space. Calcium regulation can be disrupted by environmental factors such as toxins that include heavy metals. This study discussed the effects of mercury and lead exposure on erythrocyte calcium pump activity in women at delivery and in their newborns. Lead and mercury levels were analyzed in 81 hair and blood samples obtained at delivery. Calcium pump activity was measured in red cells cord blood and maternal erythrocyte plasma membranes. Results found that hair mercury and lead negatively correlated with calcium pump activity in maternal and cord blood erythrocytes.

Huel, G, et al. Hair mercury negatively correlates with calcium pump activity in human term newborns and their mothers at delivery. *Environ. Hlth. Perspect.* 116,2, 2008.

Comment: Markedly elevated hair calcium levels may be associated with abnormal regulation of the calcium pump, especially if heavy metals are present. Abnormal functioning of the calcium pump can lead to a number of health conditions including diabetes, cardiovascular disease, thyroid disorders, etc. Dysregulation of the calcium pump can also be caused by internal factors such as endocrine disturbances as well as nutritional imbalances, which can be viewed in HTMA studies.

Hair Mineral Levels in Patients with Diabetes Mellitus

Hair, blood and urine minerals levels were analysed in diabetic patients and compared to levels found in a non-diabetic control group. Results showed that the mean levels of zinc, manganese, and chromium were significantly lower in the blood and

scalp hair of the patients diagnosed with diabetes compared to normal controls. Further, the urinary levels were higher in the diabetic group. Higher levels of copper and iron were found in the blood and scalp hair of the diabetic group as well. This study concluded, "Impaired trace-element metabolism may have a role in the pathogenesis and progression of type-2 diabetes mellitus."

Kazi, TS, et al. Copper, Chromium, Manganese, Iron, Nickel and Zinc Levels in Biological Samples of Diabetes Mellitus Patients. *Biol.Trace Elem.Res.* 122,1. 2008

Comment: Actually it has been known for decades that alterations in micro and macro nutrient status is associated with the development of type-II diabetes. Over the years, studies have showed that deficiencies and excesses of certain nutrients have been correlated with the presence of diabetic complications. But, there is confusion concerning the nutritional requirements of patients with diabetes, as many studies are contradictory in different population groups studied. The confusion is understandable since diabetes is typically not viewed from a metabolic standpoint. Diabetes has been classified under the two main categories, type-I and type-II. However, many variations exist under each category in which causation can be completely different. From hair tissue mineral (HTMA) studies we have recognized over six different mineral patterns associated with the development of type-II diabetes.

Therefore, specific and targeted nutritional therapy based upon HTMA of individuals may not only reduce and even reverse the progression of complications from diabetes, but may also serve to prevent development.

The value of HTMA in showing individual metabolic nutritional requirements of patients with diabetes and other disease states has not been fully appreciated. Perhaps this is due to the inability to properly interpret HTMA laboratory results particularly in relation to other tests as well as recognizing the neuro-endocrine influence on nutritional balance. For example in the study cited above, when tissue mineral levels are low in the HTMA results, it represents a lower tissue level, which may be due to excessive losses due to individual metabolic characteristics rather than reduced intake. Therefore, it would be expected to find the inverse relationship in the urinary excretion studies. Among patients with impaired glucose tolerance, diet and exercise interventions for a period of six years lowered the cumulative incidence of diabetes at 20 years and delayed onset of the disease.

Chromium and Blood Pressure Control

When one thinks about blood pressure we often think about the nutritional impact of elevated cholesterol and sodium and/or deficiencies of calcium and magnesium, etc. But, the mineral chromium can also have significant impact. Nutritional specialist H.G. Preuss at Georgetown University in Washington along with other researchers studied the effects of chromium supplements on animals predisposed to the human counterpart of the metabolic syndrome. They found that not only did chromium help with blood sugar control, but the animals receiving the supplement had consistently lower blood pressure than the control group and lived nineteen percent longer. Chromium supplementation resulted in a reduction of blood vessel constriction by lowering the hormone angiotensin II.

Keeping Metabolic Syndrome at Bay. Sci.News. 173. 2008.

Comment: Elevated blood pressure and poor glucose control is associated with the metabolic syndrome as well as with diabetes and the development of cardiovascular disease (CVD) in general. Chromium has a close relationship to insulin and is known to be related to atherosclerosis and hypercholesterolemia. Chromium status should always be evaluated in individuals with the above conditions and in many other health conditions as well.

Low Salt Intake and Oxalate Kidney Stones

Oxalates are commonly found in foods and are usually eliminated through the intestines. When oxalates in conjunction with other chemicals cannot be eliminated through this normal excretory route they are eliminated via the kidneys, which can result in stones developing.

Normally, dietary oxalates are exchanged for chloride in the intestine via a specific protein and then simply excreted. For this oxalate-attaching protein to work it needs sufficient amounts of chloride. However, when there is insufficient chloride available, oxalates are retained by the intestine, absorbed and then excreted through the kidneys. Of course the main source of chloride in our diet is from sodium chloride. When sodium chloride is markedly restricted in the diet or if there is poor absorption or retention due to adrenal insufficiency, a predisposition may exist for the development of calcium oxalate kidney stones.

Kidney Stones. J.A.M.A.299,13. 2008

Comment: The most common sources of oxalic acid in foods are found in plants such as rhubarb, buckwheat, spinach, chard, beets, nuts, berries chocolate, parsley and berries. Some species of aspergillus moulds can produce oxalic acid as well as the metabolism of ethylene glycol.

Oxalic acid can combine with the minerals calcium, magnesium and iron forming crystals. Of these, the most common are calcium oxalates, which can deposit in tissues other than the kidneys, such as the intestines.

Fast Metabolic Rate and Obesity

Recently *Flaa, et al.* published their findings of an eighteen year follow-up study in which they assessed the relationship between sympathoadrenal activity in individuals with increased body mass index (BMI). Based upon arterial hormone testing they found that "the epinephrine response to mental stress is a negative predictor of future BMI, waist circumference, and triceps skinfold thickness. To determine sympathoadrenal activity, the researchers measured arterial catecholamines.

Flaa, A., et.al. Does sympathoadrenal activity predict changes in body fat? An 18-year follow-up study. Am.J.Clin.Nutr.87,6. 2008.

Comment: InterClinical Laboratories understands the difficulty in comprehending how individuals who are classified as Fast Metabolic Types from HTMA studies can be overweight. As we have discussed in the past, individuals with "Metabolic Syndrome" are frequently overweight. The question that often arises is, does the Fast Metabolic rate occur first which contributes to weight gain and metabolic syndrome, or does the weight gain contribute to the Fast Metabolic rate. We certainly contend that the Fast Metabolic rate contributes to the overweight condition as well as the accompanying metabolic syndrome and other complications such as diabetes and cardiovascular disease.

For further information see:

InterClinical Laboratories Newsletter 12: 4, Aug-Sep 2008, Metabolic Syndrome X- As Defined Through Hair Tissue Mineral Analysis (HTMA) Patterns.
(Available to view on line at www.interclinical.com)

Viruses and Mental Illness

It has been suspected that childhood infections may contribute to the future development of mental illness. Recent studies have shown evidence for this connection. Investigators found that youngsters in Sweden who were exposed to viral infections that affected the central nervous system displayed psychotic illness, including schizophrenia, by the ages of 17 to 29. Infections that showed this link included mumps and cytomegalovirus that revealed strong links. The studies concluded "evidence that certain infections during childhood and adulthood may be risk factors for schizophrenia."

Bower, B. Sickness and Schizophrenia. Psychotic ills tied to previous infections. Science News. 173. 2008.

Comment: The relationship between infections and later mental illness has been suspected for some time. Just how this relationship develops is still speculative. However, HTMA studies may help to somewhat explain this relationship, as there is a neuro-endocrine-metabolic response of the body to viral and bacterial infections.

More specifically, bacterial infections tend to develop more often in individuals with a sympathetic metabolic pattern inconjunction with a low tissue copper status, along with other mineral imbalances that also increase bacterial susceptibility. Bacterial infections tend to lower tissue copper as well as enhance the humoral immune response. On the other hand, virus susceptibility is more prominent in parasympathetic metabolic patterns in conjunction with increased tissue copper levels. Viruses tend to produce a cellular immune response as well as increase tissue copper retention. As tissue copper levels rise particularly in the brain due to chronic viral activity, emotional manifestations can occur much later following the viral episode. Actually, copper deficiency and excess can both contribute to different mental effects. Copper deficiency along with other mineral and nutritional imbalances produced by chronic bacterial infection could contribute to manic depression, anxiety, and aggressive behaviour while excess copper can contribute to schizophrenia, chronic fatigue, depression, fatigue and withdrawal.

Copper Deficiency and Neurological Disturbance caused by Denture Cream use

Induced copper deficiency has been reported in a number of patients using denture cream. Symptoms ranged from neurological disorders causing ataxia, sensory loss, paresthesia, myeloneuropathy, and anemia. The patients wore dentures and used denture adhesive for many years. The patient's serum zinc levels were elevated with low copper levels. Their denture cream came under suspicion as a source of zinc when no other source of high zinc intake could be identified. Analysis of the denture creams revealed zinc concentrations from 17,000 to 34,000 mcg. With discontinuation of the creams the serum zinc levels returned to normal. Copper supplementation resulted in neurological improvements.

Spain, RI, et al. When Metals Compete: A Case of Copper-Deficiency Myeloneuropathy and Anemia. Nat.Clin. Pract.Neurol. 5,2, 2009. Nations, SP, et al. Denture Cream: An Unusual Source of Excess Zinc, Leading to Hypocupremia and Neurological Disease. Neurol. 71,9 2008.

Infertility and Developmental Disorders

Practitioner Seminar Series 2009

Comprehensive one day practitioner seminar with real case histories presented and discussed

CPE points approved: 7
CPD points applied for.



Zac Bobrov has been involved in environmental and nutritional medicine for over twenty years. He is one of Australia's leading specialists in the field of tissue mineral analysis and is the Technical Director for InterClinicalLaboratories. Zac is an engaging speaker with expert knowledge of natural medicine in practice.



Tracey Yeend is a Registered Nurse, Registered Midwife and Naturopath with 23 years of experience in Obstetric, Reproductive and Women's Health. She runs a busy private practice in Stirling, SA and has assisted many couples to achieve successful pregnancy outcomes utilising HTMA.

SEMINAR OUTLINE

Hair tissue mineral analysis (HTMA) and nutritional medicine in clinical practice
The role of HTMA in unexplained infertility

Using HTMA in pre-conception care strategies

Toxic Kids and Gentle Chelation

Nutritional management of childhood health problems utilising HTMA

Autism Spectrum Disorders: Managing Heavy Metal Exposure

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| MELBOURNE | Sunday 2 August | Karstens QC Conference Centre |
| ADELAIDE | Sunday 9 August | Adelaide Meridien Hotel |
| PERTH | Sunday 16 August | Seasons of Perth |
| SYDNEY | Sunday 23 August | Medina Grand Harbourside |
| BRISBANE | Sunday 30 August | Diana Plaza Hotel Brisbane |

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- Zinc

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