InterClinical Laboratories Newsletter

VOLUME 13 NUMBER 1
MARCH 2009

HTMA in cases of infertility and preconception care

Lyndal Brodie BA Dip Nut

InterClinical Laboratories Pty Limited
ABN 89 076 386 475

PO Box 6474
Alexandria NSW 2015
Australia

Unit 6, 10 Bradford Street
Alexandria NSW 2015

Telephone
(02) 9693 2888

Facsimile
(02) 9693 1888

lab@interclinical.com.au

www.interclinical.com

Why use Hair Tissue Mineral Analysis in preconception care?

Maternal and paternal nutritional status is crucial in starting a healthy pregnancy. Ideally both parents should be replete in essential nutrients prior to conception, for the best chance of producing strong sperm and ova, hence creating optimum conditions for the foetus.

Assessment of levels of essential and toxic minerals in prospective parents with InterClinical Laboratories Hair Tissue Mineral Analysis (HTMA) provides information that can be an integral part of preconception health care programmes. Patterns shown in the test are indicative of an individual's nutritional mineral status, toxic metal body burden and endocrine activity.

Fertility problems are common, affecting one in six couples. They affect over three million Australians[1] and are associated with long term health issues. Certain disorders contributing to fertility can be modified with diet and lifestyle changes, and a positive pregnancy outcome can be achieved. Research has shown infertility due to ovulatory disorders, miscarriage, premature birth, and low birth weight can be eliminated by dietary intervention, including nutritional supplementation.[2,3] In many cases, preconception care for both prospective parents is a viable alternative to fertility treatments that bear a huge cost and risk of side effects.[4]

Mineral and Hormonal Balance

The neuro-endocrine system is one of the major influences on reproductive health and the mineral composition of the body. Minerals are necessary for endocrine function; they are required co-factors for enzymes involved in the manufacture and activation of hormones. Hormones affect mineral absorption, retention, excretion and metabolic utilisation. Because of this hormonal influence, and the synergistic/antagonist relationships minerals have with each other, HTMA is an excellent way of assessing endocrine function as it relates to individual nutritional needs.

For example, one parameter indicating decreased thyroid activity may be an elevation of calcium in relation to potassium and phosphorous. Sub-clinical hypothyroidism, not detectable with standard blood tests, can interfere with ovulation and impair fertility. Zinc, vitamin E and vitamin A are necessary in sufficient quantities for manufacture of thyroid hormone, along with other co-factors copper and selenium. Deficiency of any of these decreases the amount of active thyroid hormone produced. The endocrines and mineral content of the body may subsequently be affected by appropriate nutritional therapy.

Many minerals that are present in the earth's ecosystem have no known benefit for human physiology. Elements that are present in the body, but not recognised as necessary for cellular function, disturb the function of essential biological molecules,

Continued on next page

Complimentary Quick Reference Chart – Periodic Table of Elements and Major Nutritional Relationships

With this issue, InterClinical Laboratories has created a special Periodic Table of Elements, outlining major nutritional relationships for essential and toxic minerals. On the reverse side, we have compiled a quick reference list of conditions associated with absolute and relative mineral deficiencies. This practical reference can support your utilisation of HTMA in assessing patients' individual health needs.

Accurate HTMA data continues to be one of the best indicators of mineral status, i.e. deficiencies and toxicities, as stored in the body's tissues. HTMA also provides information on vitamin deficiencies (by association), malabsorption and toxic metal burdens.

We hope you find these special quick reference charts useful in your practice or as an educational resource.

Kind regards, **Zac Bobrov, Technical Director**

such as proteins, enzymes and DNA. Hormonal function is disrupted by toxic heavy metals as they displace essential minerals necessary for hormone synthesis and conversion.

Toxic Metals

Toxic metals, such as lead, mercury, cadmium and arsenic create problems with sperm, ova, hormone production and foetal development. Sterility, abortion, miscarriage, prematurity, stillbirth, infant deaths, low birth weight, perinatal death and many types of malformation have all been demonstrated to be attributable to nutritional mineral deficiencies and excessive levels of toxic metals.[5,6]

Endemic in the human environment, toxic metals accumulate in the human body over a lifetime, including prenatal life. For this reason, it is ideal to use HTMA to identify the body burden prior to conception, and is of utmost importance where there are problems in fertility. Adequate treatment for prospective parents may be implemented through diet and lifestyle changes, together with nutritional supplementation.

Reproductive Health Problems

A growing body of research shows a significant negative effect of toxic metals on fertility and outcome of pregnancy, even when they are present at relatively low concentrations in the body. For instance, even slight exposures to lead and cadmium may significantly reduce sperm quality, where there is no conclusive evidence of impairment of male reproductive endocrine function (ie. hormonal levels within normal parameters).[7] Other studies show moderate occupational exposure to lead can reduce the fertility of male workers and increase spontaneous abortion (miscarriage) in wives of the workers[8] Mercury exposure has been shown to result in lowered sperm counts, defective sperm cells, and lowered testosterone levels in males[9].

This highlights the significance of testing for toxic elements in the father. Spermatogenesis takes up to 116 days. As most causes of male infertility reflect an abnormal sperm count or quality, minimal exposure to toxins is ideal at this time.

In women, significant correlations have been established between different heavy metals and reproductive health problems, such as uterine fibroids, miscarriages, and hormonal disorders. Research indicates reduction of an increased heavy metal body burden improves the spontaneous conception chances of infertile women.[10]

One outcome of the disruption toxic metals produce in essential biological functions is hormonal imbalance. In simple terms, hormones, like minerals, have synergistic and antagonistic relationships. For example, in healthy, fertile women, progesterone serves as a counterpoint to oestrogen. Hormonal balance is critical to monthly ovulation, development of ova and preparation of the uterus for implantation and foetal growth. Conditions associated with hormonal imbalance include lack of ovulation, amenorrhea, problems with the ovulatory phase and problems maintaining a pregnancy.

Research concludes heavy metals impact negatively on ovarian as well as on pituitary function. In women suffering from repeated miscarriages, heavy metal burdens correlate with irregular parameters for progesterone, oestradiol, prolactin and thyroid stimulating hormone. It is postulated the heavy metals cause hormonal and immunological changes that prevent a viable pregnancy.[11]

Risk to Foetus

As well as impairing the reproductive system of both parents, heavy metals are also disastrous for development and health of the rapidly growing foetus. The foetus gets significant exposure to toxins, including heavy metals, from maternal blood via the umbilical cord. Foetal levels of toxic metals are typically higher than that of maternal blood.[12]

Impact on the developing brain is of particular concern. The foetal brain begins growing in the fourth week of pregnancy at a rate of over 4,000 cells per second.[13] However, the porous blood brain barrier, which protects the adult brain from toxins, does not develop fully until the middle of the first year of life.[14] This insufficiency in natural defence allows heavy metals into the foetal brain, with a potential to cause serious disruption to the intricate brain growth process. A range of adverse outcomes, from severe mental retardation to more subtle changes in nervous system function can result, depending on timing and dose.[15]

Research has shown the toxic effects of prenatal exposure to mercury on the brain can be permanent. Children exposed in utero to low levels of methylmercury show subtle deficits in several measures of brain function and cognitive performance.[16]

In the three months following conception, the mass of the embryo increases over 20 million times. This is the time when cells differentiate and organs are being formed. Toxic metals can interfere with the intricate process in which a few embryonic cells grow into a person. At high levels this can interfere with pregnancy or cause birth defects.

It is important to remember all systems of the body are affected by toxic metals. Taking measures to assess their presence and treat if necessary is fundamental for general health, as well the health of our unborn children for generations to come. A person's immune and endocrine function and ability to reproduce can be linked to the very earliest of exposures, possibly even paternal or maternal exposures prior to conception.[17]

Nutritional Detoxification

Correcting mineral imbalances can take at least a few months of nutritional therapy. Treatment involving mobilisation and elimination of toxic metals may cause temporary discomfort. These are further reasons to utilise HTMA prior to conception.

Nutritional agents that help with heavy metal toxicity include vitamin C, vitamin E, beta-carotene, algae such as *Dunaliella salina*, and antioxidant minerals such as selenium and zinc. Amino acids and complexes containing sulfhydryl groups such as cysteine, methionine and S-adenosyl methionine (SAME) help chelate heavy metals out of the body.

Research has shown consumption of *Dunaliella salina* has the ability to significantly reduce hair levels of toxic metals and markedly increases serum carotenoid levels over a fourteen week period in humans.[18] Whole dried *Dunaliella salina* contains particularly high levels of beta-carotene, alpha-carotene, mixed carotenoids, chlorophyll and essential minerals. As well as being useful in detoxification, it is a natural source of essential nutrients, safe to use during preconception care and throughout pregnancy.

Being replete in essential minerals, which function as antioxidants and antagonists to toxic metals, is vital for protection against damage from heavy metal toxicity.

Essential Minerals

An abundance of research has highlighted the dangers of mineral deficiencies in pregnancy. Mineral and trace element deficiencies are causal factors in sterility, miscarriage, stillbirth, foetal malformation, infant deaths and developmental problems.[19,20]

In couples experience fertility problems, nutrition can be a significant but largely neglected lifestyle factor. Nutrients supply the building blocks for a healthy pregnancy, starting with healthy sperm and ova.
For example: zinc, involved in DNA synthesis, improves all aspects of reproductive health for both sexes. It is involved in normal production of the egg, and essential for a viable sperm count, motility and morphology.

In the three months following conception, the mass of the embryo increases over 20 million times. This is the time when cells differentiate and organs are being formed. The accelerated growth of embryonic cells means the foetus is extremely vulnerable not only from toxins but from damage due to lack of nutrients needed for developing organs and tissues The mother's mineral status is particularly important here, to nourish the foetus, maintain the pregnancy, and be able to breastfeed successfully, especially if further pregnancies are going to follow soon.

Some common ways in which deficiencies of essential minerals affect fertility and pregnancy outcomes are summarised below:

Many human and animal studies have shown low maternal zinc leads to various reproductive problems including infertility, miscarriage, pre-eclampsia, intrauterine growth retardation and an increase in congenital malformations. As zin.c is needed for cell division, it has a critical role in foetal development. In males, a low zinc status has been found to be responsible for a low sperm count, slow sperm motility, malformed sperm and infertility.[21,22]

The interrelationship of zinc with other nutrients is also an issue. Zinc deficiency results in impaired absorption of folic acid. Both are involved in the synthesis of DNA and RNA. Folic acid deficiency in turn is now recognised as the major cause of spina bifida. Zinc deficiency may indicate excess levels of copper.

Too much or too little copper can result in reproductive problems. In utero, copper deficiency in the foetus can result in diminished growth rate, depigmentation, anaemia, fine fragile bones, ataxia, small brain size and perinatal mortality.[23]

Oestrogen is a major factor on copper metabolism. As oestrogen levels rise, so do copper levels, and likewise increased levels of copper cause increased levels of oestrogen. Zinc is likewise associated with progesterone, so a hormonal imbalance is created here, disturbing the ovulatory cycle and affecting fertility.[24] Elevated tissue copper levels occur in many women taking oral contraceptives, and those using copper intrauterine devices.

Copper toxicity leads to deficiencies in zinc and manganese– increasing risk of miscarriages, premature births and malformations. Specifically, manganese deficiency may cause or be associated with foetal bone, heart and nervous system defects, ovarian and testicular degeneration, and lack of sperm.[25]

HTMA is able to provide information on nutrient status for these and other essential minerals not discussed here, such as iron, selenium, chromium and calcium.

The information provided by HTMA presents a guide for a specific and individualised treatment plan for patients to undertake before conception occurs. For couples who want to prepare for pregnancy and conceive in good health, using the HTMA is a tool that can be used to optimise health before starting a pregnancy. Mild endocrine and trace element aberrations can be very difficult to detect, particularly if the patient is not manifesting symptoms. For couples who have experienced difficulty in conceiving, the detailed information provided by the HTMA is a convenient and economic way to identify modifiable risk factors for infertility.

References available on request.

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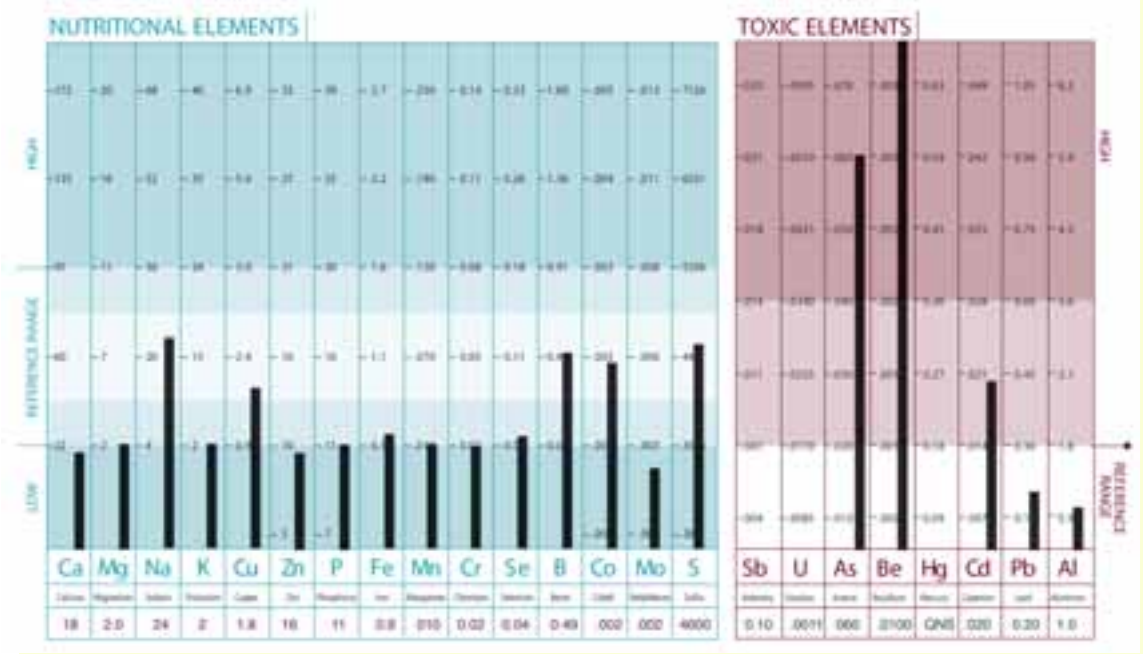
Nutrient and Toxic Element Testing



Hair Tissue Mineral Analysis

HTMA is a non-invasive analytical test that measures the composition of nutrient minerals and toxic elements in the tissues. HTMA provides valuable clinical information not seen through standard blood and urine testing.

Reliable Clinical Data

InterClinical Laboratories provides reliable clinical data reporting on 37 minerals and 27 significant ratios.

Advanced Interpretive Reports

Our comprehensive pathology reports provide detailed patient health analysis, including supplement and diet recommendations to assist the practitioner with therapy.

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