



# InterClinical Laboratories Practitioner Newsletter

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## Assessing the body's mineral stores...

In this newsletter, Dr. David Watts provides insight into the biopsy of hair tissue. Hair Tissue Mineral Analysis (HTMA) is a representation of total tissue concentrations including extracellular mineral levels, approximation of intracellular concentration and their relative relationships. As the analysis of circulating minerals cannot readily be used to assess nutritional status unless a severe deficit exists, HTMA can be used to assess the body's mineral status. See the article below for details.

A big "thank you!" to all who logged in for our two-part nutritional medicine webinar series *Understanding Metabolic Typing – Are you treating the Tortoise or the Hare?* It couldn't have been such a success without your enthusiastic contribution!

Part One, presented by our technical director Zac Bobrov, broke down the science that underpins the identification and categorisation of metabolic types and demystified this often

misunderstood yet extremely useful section of the HTMA report. Naturopath and expert HTMA interpreter Janine Castle presented Part Two, providing practical information about the interaction between patient, practitioner, HTMA and the utilisation of metabolic typing in the clinic. If you missed out, never fear! Both webinar's are available for purchase in the 'practitioner only' section of our website to view at your leisure.

Make sure to book in early for part three and four of our exciting 2015 webinar series featuring Dr Brad McEwen Phd in August, and our nutritional lecturer, Gary Moller in October. Please see the accompanying flyer for more information. We wish you a happy and healthy winter and hope to see you at our next webinar!

**Yours in good health**

The team at InterClinical Laboratories

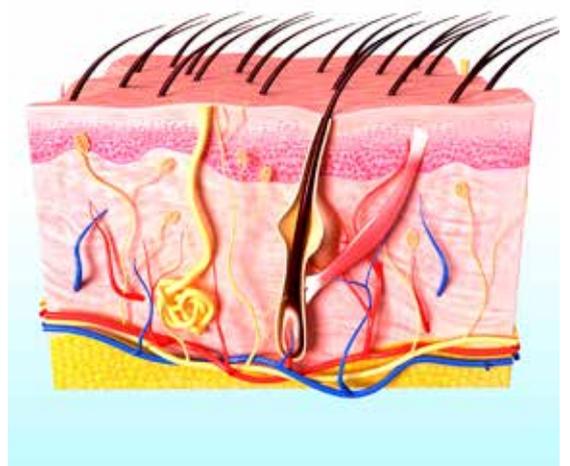
## HTMA – A Tissue Biopsy

by Dr D. L. Watts (Trace Elements Inc. and InterClinical Laboratories)

Recently a client called to ask a question about what the HTMA reveals. Basically, the question was, does the HTMA test represent the status of the intracellular elements or the extracellular elements? I answered the question by saying that the HTMA is a tissue biopsy and therefore, the mineral results are actually a representation of total tissue concentrations. However, I realise that this might need further explanation, and I am sure other practitioners may also benefit from a more comprehensive answer.

### Formation of the hair shaft

To begin, I should probably start with a brief review of how the hair is formed and the minerals are sequestered in and onto the hair shaft. The development of the hair follicle begins at about the twentieth week of gestation. Hair growth and location of hair formation is influenced by genetics, sex, age, race and hormones. It is also affected by illness, medications, nutritional



status, environmental toxins and even the immune system. Hair formation begins at the base of the hair follicle in the area known as the papilla. There is a blood supply to the papilla that provides nutrients to the matrix cells surrounding the papilla. The matrix is derived from stem cells, and contains several types of cells that are the most dynamic and active cells in the body, and are responsible for the formation and growth of hair. Via the

Hair Tissue Mineral  
Analysis Pathology

Nutritional, Herbal and  
Natural Medicines

Practitioner Education

Research and  
Development

*Continued overleaf*

papilla, the cells that make up the matrix receive a blood supply that provides nutrients to these cells and carries waste products away. These continually dividing cells form the medulla, cortex and cuticle of the hair shaft. As production continues, ultimately the hair shaft formed from the matrix cells is pushed upward from below the skin and grows above the dermis. Constituents that were present in the circulating blood, during development of the hair are contained and preserved in the hair shaft itself, providing a record of those events.

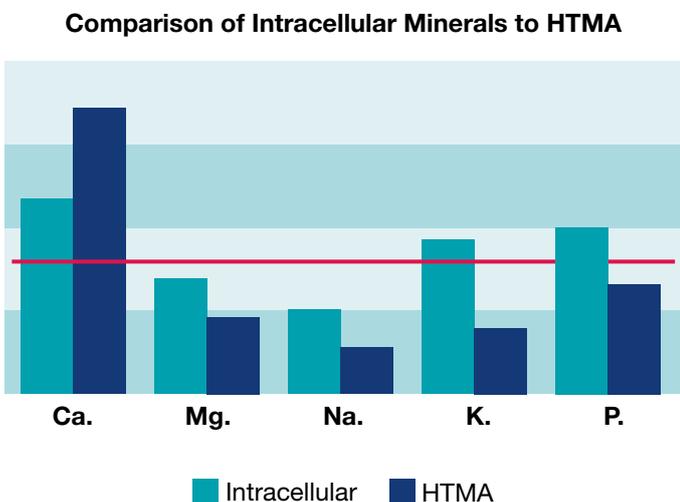
Therefore, in answer to the question, does the concentrations of minerals in the hair shaft represent intracellular or extracellular minerals, we can say that in the strictest sense that it does represent intracellular minerals incorporated into the constantly dividing matrix cells that ultimately form the hair shaft.

However, in a broader sense that hair shaft itself is also exposed to lymph, extracellular fluids, sebaceous glands, sweat glands and surrounding tissue of the dermis and epidermis. The hair shaft may also contain constituents or minerals from these sources as well. So, in the broadest sense the minerals incorporated into and onto the hair shaft in total contain both intracellular and extracellular minerals. Therefore, the hair test can be considered a representation of the tissue mineral levels that are present from all these sources.

### Comparison Study of Intracellular Mineral Results and HTMA Results.

Many years ago Trace Elements Inc. (TEI) independently compared hair tissue mineral samples with intracellular mineral specimens obtained from the analysis of buccal cells. Epithelial buccal cells contain nuclear and cytoplasmic constituents and were typically analysed by a reference laboratory specialising in intracellular mineral testing using proprietary procedures and electron-scanning microscopy.

This small study involved doctors who collected both the hair specimens and buccal specimens from a number of patients, submitting the hair specimens to TEI and the buccal specimens to the independent lab. The results of these tests are shown in the graphic below and which will also require further explanation.



The report from the buccal cell testing include the following elements, calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), phosphorus (P) and chloride (Cl) as well as the ratios between Ca/Mg, P/Ca, K/Mg, K/Ca, K/Na and P/Mg. The results were extrapolated and depicted in a graphic form for comparison of the intracellular mineral levels and ratios to HTMA mineral ratios. As you will note, the graphic only displays the mineral levels and ratios. For ease of comparison, the actual test results are not included from either test for two reasons, first, the units of measurement differ between the two tests, and secondly, the extreme concentration differences found with each test method. The light blue bar graph shows the intracellular buccal cell mineral results, while the dark blue graph shows the HTMA mineral results of the very same individual. The red line indicates the median test results.

#### Interpretation:

Visually the levels of minerals compared to the mean are shown for both test results based upon the respective reference intervals. More importantly, the ratios between the minerals from both of the analysis can also be viewed. As noted previously, some mineral ratios of the intracellular (IC) buccal test are inversely interpreted or compared to HTMA ratios, due to concentration differences in the two types of specimens.

Buccal Cell Mineral Ratios	HTMA Mineral Ratios	Correlation (+/-)
Mg/Ca – Low	Ca/Mg – High	+
P/Ca – Low	Ca/P – High	+
K/Mg – High	K/Mg – High	+
K/Ca – Low	Ca/K – High	+
K/Na – High	Na/K – Low	+
P/Mg - High	P/Mg - High	+

Further explanation of some of the IC mineral ratios compared with HTMA ratios, Mg/Ca: Calcium is considered largely an extracellular (EC) element, although it is also found intracellularly in smaller quantities. Magnesium is considered largely an intracellular (IC) element and is found in relatively high concentrations within cells but is also present EC as well. Therefore, the IC ratio is the comparison of the higher concentration of magnesium to lower concentrations of calcium normally found or expected within cells. The IC magnesium is low relative to the amount of calcium in this patient. In other words, excessive calcium has accumulated within the cell. The HTMA depicts the ratio determination of Ca/Mg, which is high in this patient. This indicates a relative magnesium deficit allowing an increase in the cellular concentration of calcium to develop. Both test results show a low magnesium level and both show a relative high concentration of calcium to magnesium. A

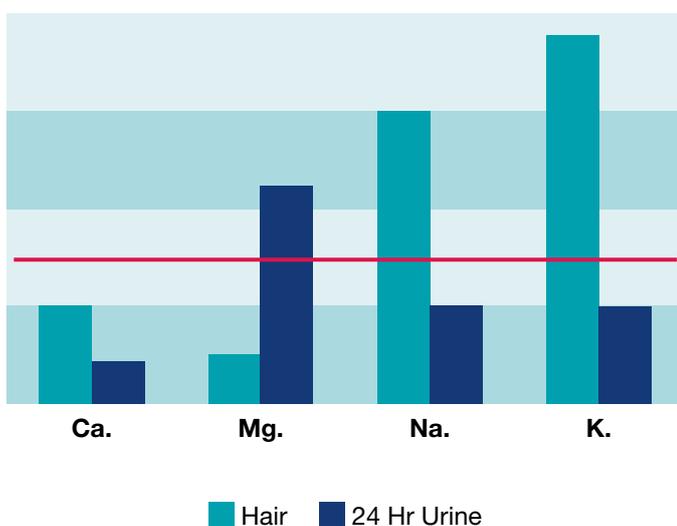
number of the IC results are therefore, inversely correlated with HTMA findings. Comparison of several IC to HTMA minerals tests confirms a correlation of minerals found in both types of samples. More importantly both tests reveal the relative mineral concentrations that can lead to significant health consequence and that can be readily assessed in a non-invasive manner and used to provide a specific and targeted nutritional therapeutic approach.

## HTMA and 24-Hour Urine Excretion Studies

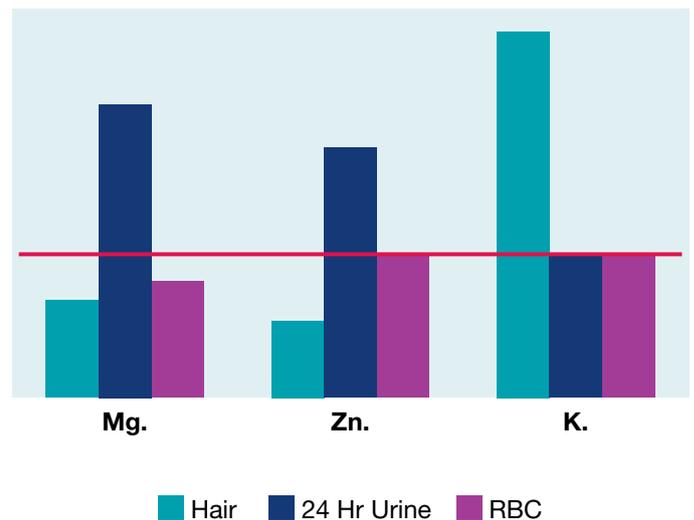
At TEI we have also compared other analytical tools with the HMTA test in order to discern what information is provided by each test medium. However, we no longer provide these tests at our laboratory as we now specialise in and continue to develop the HTMA exclusively. One of these past tests can be seen in the graphic below, which shows a 24-hour urine compared with HTMA. Again, quantitative results are not presented but are simply graphed, based upon the median of each test results for ease of comparison. Both the hair tissue samples and twenty-four hour urine collections were obtained from the same individuals and submitted for analysis by their doctors.

The light blue bars in this graphic reveals the HTMA findings while the dark blue bars show the 24-hour urine mineral excretion results. This particular patient is classified as sympathetic dominant. This HTMA pattern as described in much of our literature indicates increased adrenal and thyroid activity as indicated by low Ca/P, low Ca/K and elevated Na/Mg ratios. Adrenal, thyroid and other hormones affect the retention and excretion of sodium and potassium and other elements. This chart graphically reflects the correlation of adrenal dominance on the retention and excretion of sodium and potassium in particular. We can see the increased tissue or body retention of sodium and potassium in the HTMA.

Conversely, we can see that the 24-hour urinary excretion of sodium and potassium correspond to the influence of adrenal activity due to their reduced excretion. Also, urinary excretion of magnesium is increased and reflected in reduced retention in the HTMA findings.



The following graph is showing the relationship of certain nutritional minerals (magnesium, zinc and potassium) found in the urine, red blood cells (RBC) and HTMA. Magnesium is showing a low HTMA tissue concentration which correlates with high urinary excretion and the slightly low magnesium blood level that was observed. The results of zinc are similar in that urinary excretion is increased reflecting a loss resulting in reduced tissue zinc concentrations, while the RBC level is relatively normal. Potassium is elevated in the HTMA indicating retention, while urine and RBC levels are within a normal range.



### Discussion:

Mineral concentrations in these various tissues are regulated and influenced by a number of factors, including diet, endocrine, physiological, developmental, and pathological conditions. If the dietary intake of nutrients is insufficient it will be reflected in some test mediums, but not all. The homeostatic regulation of minerals that are in circulation are tightly controlled for obvious reasons and their levels can be independent of dietary intake. Therefore, the analysis of circulating minerals cannot readily be used to assess nutritional status of minerals unless a severe deficit exists. The source of minerals in circulation other than their presence under normal physiological control and function cannot readily be determined since minerals are constantly being transported to and from storage sites, trans-located or, are being transported to eliminative organs.

Therefore, with proper specimen collection, analysis and careful interpretation, the HMTA can be readily used to assess the mineral status of the body.

Not only does the HTMA reveal the extracellular mineral levels, but can also provide an approximation of the intracellular mineral concentrations and their relative relationships.

MONDAY 31 AUGUST 2015  
7:00PM

## The Nutritional Medicine Management & Detoxification of Lipophilic Heavy Metals

Dr Bradley McEwen PhD



### From this webinar you will:

- Greatly expand the scope and understanding of the effects that lipophilic heavy metals such as mercury and arsenic, have on health
- Develop skills and confidence in the identification of heavy metal toxicity
- Develop skills and confidence in the nutritional medicine management of lipid based heavy metals
- In addition, learn strategies on how to improve clinical outcomes in patients with multiple conditions. Successful case studies will be presented.

### DR BRADLEY MCEWEN PHD



Dr Bradley McEwen PhD is a naturopath, nutritionist, herbalist, lecturer and researcher with over 16 years clinical experience. He has lectured in nutritional medicine and the health sciences for 11 years and presents seminars and at conferences both nationally and internationally. He has numerous original research and review articles published in peer-reviewed journals. He has a passion for teaching and research.

**Register for both seminars and save!**



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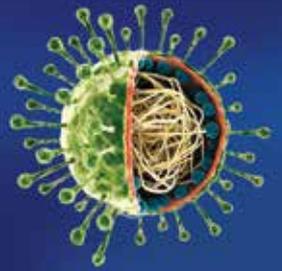
**FOR MORE INFO AND TO REGISTER ONLINE:** please visit: <http://www.interclinical.com.au/events.php/>  
**OR TO BOOK BY PHONE:** InterClinical Laboratories on (02) 9693 2888

MONDAY 12 OCTOBER 2015  
7:00PM

## The Relationship Between Exposure to Epstein Barr Virus & Hair Tissue Mineral Analysis

A focus on EBV, the liver and copper.

Gary Moller



### Things you will learn during this webinar:

- The relationship between liver function and EBV and how this may impact on health
- How to recognise the patterns for EBV and glandular fever on the HTMA
- How to recognise patterns on the HTMA that may indicate that there may be an active, rather than dormant virus
- How to identify other possible causes of ill health and complicating factors, such as a sub-clinical bacterial infection
- How to hunt, suppress and possibly kill the vampire within by employing effective nutritional and lifestyle strategies
- Implications of EBV/glandular fever for exercise and competition, including coping strategies, especially as it relates to young people, such as competitive swimmers

### GARY MOLLER



Like most natural health practitioners today, Gary is a "Health Sleuth", helping people understand and resolve complex and chronic health issues. His principal "CSI" tool is the InterClinical Laboratories HTMA, which Gary regularly incorporates into his clinical practice. Gary is deeply engrossed in preparations to enter a doctoral programme in nutrition to research using the HTMA to help uncover EBV's subtle and lasting consequences for health.

# Does your patient require adrenal support?

**Aden complex is specially formulated to help support optimal adrenal function. Our adrenal formula contains both potassium and sodium, minerals that are required by the adrenals for healthy function. With a rich blend of botanical ingredients, vitamins and minerals, Aden complex utilises the best of nature's ingredients to assist healthy adrenal function.**

The synergistic blend of nutrients and herbs act by supporting healthy adrenal function and neuroendocrine activity. With vitamins B1, B5, B6, C and sodium, potassium, zinc, licorice, ginseng and ginger, this robust formula has always been one of our most popular nutritional support products.

**Trace Nutrients – evidence based nutrients for therapy**

**Always read the label. Use as directed.**

For more information, please contact:



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