

An Introduction To HAIR TISSUE MINERAL ANALYSIS

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HTMA provides valuable information regarding toxic heavy metals.

HTMA should not be used for final diagnoses.

Blood and urine reflect recent changes, but HTMA reflects long term changes.

Heavy metals may pose serious threats to human health.

Introduction

Hair Tissue Mineral Analysis (HTMA) for toxic heavy metals, nutritional minerals and essential trace elements can provide much valuable and useful information for less cost than is possible through other means of laboratory testing. Due to excessive claims, commercial exploitation and a general ignorance of proper interpretation and utilization, HTMA has received a dubious reputation.

HTMA is only a screening test. *It is not possible for a physician to base any kind of final diagnosis or therapeutic protocol solely on its results.* (Likewise, it is not possible to base a diagnosis or treatment on any other single lab test.) But, due to its unique nature, HTMA may contribute useful and even vital information regarding individual nutritional status.

Blood and urine more accurately reflect recent intake. But, because hair grows slowly (approximately 1 inch every 2 months), the concentrations of elements in hair do not reflect recent intake. This is a unique and useful characteristic HTMA offers over other tests.

Many elements, particularly the toxic metals, are rapidly removed from blood circulation and shunted away to tissue storage sites. Hair levels reflect long-term uptake of metallic elements over a period of months. Most environmental and occupational exposures occur slowly as does the absorption of nutrients. HTMA is recognized as probably the single most reliable diagnostic tool for the long-term uptake of the toxic heavy metals lead, arsenic, cadmium and mercury.

Current research literature suggests that there are only 10 elements, which have been proven to be clinically significant in hair: calcium, magnesium, zinc, copper, chromium, nickel, arsenic, lead, mercury and cadmium. These, alone, are sufficient to warrant consideration of hair tissue analysis in the evaluation of nutritional status.

Reading Your HTMA

The HTMA provided with your Healthexcel Program is comprised of two pages of information. It consists of several graphic representations of the results of the analysis: mineral levels, toxic metal levels, mineral ratios, and toxic ratios.

In viewing a HTMA, there are 3 major areas of interest:

- Toxic metal levels
- Nutrient mineral levels
- Nutrient mineral ratios

Toxic Metal Levels

The first area to consider should always be the graph in the upper right corner of the front page. The presence of toxic metals in your system is highly significant for a complete understanding of your metabolic profile as well as gaining insight into possible reactions to your metabolic balancing program. Ideally, your levels of toxic metals should be non-existent or well within the Reference Range (the white portion at the bottom of the chart).

The *toxic*, or *heavy metals*, as they are also referred to, are believed to be capable of posing serious health problems. The elements included in this group are *aluminum, arsenic, beryllium, cadmium, lead, mercury, and nickel*. At high concentrations, they are believed to interfere with normal biological functioning. Several of these metals (aluminum, beryllium, cadmium, lead, and mercury) have no known biological function. Others (arsenic, copper, iron and nickel) are thought to be essential at low concentrations, but are considered toxic at high levels.

It is believed that the heavy metals may disrupt metabolic function in two basic ways.

- First, they appear to *accumulate* and thereby *disrupt function* in vital organs and glands such as the heart, brain, kidneys, bone, etc.
- Second, they *displace* the *nutritional minerals* from where they should be in the body to provide biological function. (For example, instead of calcium being present in an enzyme reaction, lead or cadmium may be there in its place. The problem is that the toxic metals can't fulfill the same role as the nutritional minerals, thus their presence is thought to disrupt enzyme activity, as well. *Because their impact is at such a foundational level, heavy metals can be causal factors in literally any health problem.*)

Proper nutrient balance may protect against heavy metals.

Most importantly, it is believed that balancing body chemistry and improving health and well-being can't be attained as long as heavy metal toxicity is present.

Interestingly, when present, *biochemical balance and metabolic efficiency appear to be protective against heavy metal accumulation in the body*. So, when toxic metals are found in high concentrations in the body, it is believed to be the result of biochemical *imbalance at the time of exposure*. Conversely, balancing body chemistry appears to result in the chelating or picking-up of the heavy metals out of storage sites in the body for subsequent elimination. Thus, *an elevation of heavy metals on a HTMA after following a nutritional balancing program is to be expected and will likely be the result of elimination rather than accumulation.*

Heavy metal detoxification may cause flare ups of health problems.

As toxic metals are eliminated (detoxified) from the system, there may be a temporary flare-up of any adverse symptoms originally caused by their presence. The *rate* of the elimination of the metals and thus the *intensity* of any associated characteristics of detoxification may be dependent upon, and therefore regulated by, the amount and frequency of ingestion of the recommended supplement program.

Some signs and symptoms which are believed to be related to the presence of heavy metals in high concentrations in the body are:

Aluminum....Alzheimer's Disease, anemia, osteomalacia, aching muscles, osteoporosis, nephritis, hepatic dysfunction, gastric distress, colitis, hyperactivity, psychosis, peptic ulcer, constipation, kidney dysfunction, headache, heartburn.

Arsenic.....Brittle nails, drowsiness, confusion, headache, dermatitis, Raynaud's syndrome, muscular weakness, squamous cell carcinoma (skin), burning hands and feet, goiter, heart failure, hypertension.

Cadmium.....Fatigue, hypertension, iron-deficiency anemia, emphysema, loss of smell, rheumatoid arthritis, decreased pulmonary function, hair loss, osteoporosis, renal hypertension, osteoarthritis, inflammation, hyperlipidemia, cardiovascular disease.

Copper.....Arthritis, scleroderma, eczema, schizophrenia, depression, autism, bitter taste, iron-deficiency anemia, atherosclerosis, neuromuscular dysfunction, liver dysfunction.

Lead.....Dizziness, depressed libido, epilepsy, nephritis, constipation, infertility, dyslexia, impotence, osteoarthritis, insomnia, rheumatoid arthritis, gout, osteoporosis, MS, hyperactivity, encephalitis, menstrual problems, fatigue, irritability, nervousness, anxiety, muscular weakness, impaired adrenal gland function, hypertension.

Mercury.....Hair loss, migraine, blushing, schizophrenia, insomnia, nervousness, dizziness, memory loss, irritability, anxiety, drowsiness, depression, appetite loss, weight loss.

Nickel.....Renal dysfunction, coronary dysfunction, diabetes, pulmonary cancer, dermatitis, anorexia.

*It is important here to be very clear in understanding that what is being said is **not** that “if aluminum is present, one (automatically) has a particular health problem (e.g. osteoporosis, peptic ulcer, etc.).” Rather, all that is being indicated is that enough people who have those problems were also found to have significant concentrations of the said toxic metal in their systems. Thus, there may be a connection, particularly if the concentrations were high and were present over a long period of time.*

Nutrient Mineral Levels

The second area of interest in reviewing your HTMA is the graph at the top left of the front page, which displays the levels of nutrient minerals (the minerals required and used by the body in metabolic processes) found in the hair tissue samples.

In the lower central portion of the graph, there is a horizontal, white bar, indicating an ideal *level* for all the minerals listed. Inside the white bar the ideal mineral *values* are noted. For example, the normal value of calcium is 42; for magnesium the norm is 6, etc. Outside the white bar on either side is a light blue shading, which indicates what might be thought of as a near normal “Reference Range.”

Any mineral levels which are below the norm (white bar) are referred to as being “low;” any above the norm are referred to as “high.” Interestingly, both low levels and high levels on a HTMA are considered “deficiencies.”

The low mineral level is referred to as an “actual deficiency,” meaning that there is a shortage of that mineral in the body.

High mineral levels are *also* considered deficiencies, but of a different sort. A high mineral level is referred to as a “biounavailability,” meaning that there is enough present in the body, but it is not being efficiently utilized by the cells.

Thus, in both cases – actual (low levels) and biounavailable (high levels) – cells may be deprived of full benefit of the nutrient(s).

Nutrient Mineral Ratios

The third major area of interest in viewing a HTMA is provided on the top of the back page of the hair test report and is that of the nutrient mineral *ratios*. Like the nutrient mineral levels chart, there is a normal value listed on the graph in the horizontal white band for each nutrient mineral ratio.

The normal ratios are derived from the relationships of the values of the normal mineral levels. For example, the norm for calcium (CA) is 42, and

Hair mineral levels should neither be too high nor too low.

A HTMA can reflect two different kinds of mineral deficiencies.

Each mineral is influenced by numerous other minerals.

the norm for magnesium (MG) is 6. By dividing 42 by 6, the result of 7 is obtained. Thus, the normal ratio of CA to MG is 7 times the amount of CA to MG. This is also written as follows: the normal CA/MG Ratio = 7:1. If the CA/MG ratio is above 7:1 (e.g., 8.34:1 or 11:1), it is said that the CA/MG ratio is "high." If the CA/MG ratio is below 7:1 (e.g., 3:21:1), it is said that the CA/MG ratio is "low," or "inverted." Ideally, it is preferable for the nutrient ratios to be as close to the ideal as possible.

Mineral ratios are of more interest than mineral levels.

Interpreting Your HTMA

Interpreting a HTMA is an exercise in theoretical research physiology. As already mentioned in the introduction above, there is still some controversy regarding the scope of utility of HTMA in the clinical setting. Part of the problem, which is at the basis of the controversy, is a lack of understanding of how to properly interpret the results of a hair test.

Originally, most who made the attempt did so within the parameters of simple "replacement therapy." If a mineral tested low, that mineral was administered to "replace" the deficiency. Unfortunately, this simplistic and uneducated tact is still thought by many to be the proper usage of HTMA. Nothing could be further from the truth.

Each mineral affects and is affected by a number of other minerals by either raising or lowering their biochemical levels.

The reality is that each mineral affects and is affected by a number of other minerals by either raising or lowering their biochemical levels. *Phosphorus alone, for example, either raises or lowers as many as nine other nutrients.* The potential for complication is obviously high – even more so when the various roles of all the vitamins, amino acids, and foods and their combined effects on the mineral levels are also considered.

Strange as it may seem, it is very often the case that in order to raise a certain mineral level, that mineral is not administered at all. Rather, another mineral whose known effect is to elevate that mineral is given. (For example, a common means of raising potassium is by giving manganese.)

The administration of a mineral known to be already low will result in the further lowering of that mineral.

Actually, *there are even instances whereby the administration of a mineral known to be already low will result in the further lowering of that mineral.* Zinc, in certain circumstances, is a case in point. An important property of zinc is that it lowers sodium levels. So, if zinc is low but sodium is also low, particularly if there is a sodium/potassium inversion (NA lower than the normal ratio in relation to K), and if zinc is given with the expectation of raising zinc levels, the body may actually lower zinc levels further to allow sodium to elevate back into a normal range. This is because the NA/K ratio is so critical to homeostasis. The body will seek to correct that imbalance before it addresses the zinc deficiency. *It is very important to understand this concept, for at some point you may find that some mineral level shows very low on your hair test but no mineral supplement of like kind appears on your supplement program recommendations.*

Although there is currently no orthodox, scientific proof to verify the following, there have been sufficient empirical correlations to at least present this information as theoretical research physiology for your interest and observation in relation to your own test results and your own problems. As previously indicated, analyzing a hair test involves examination of mineral levels and their ratios. And, of the two, *the ratios are most significant.* Of all the possible mineral ratios, there are a few which may be worthy of your attention and observation from one analysis to the next. But, please keep in mind that this information is to be considered theoretical and is based on clinical observation and empirical research.

Calcium/Magnesium (CA/MG)...Ideal value is 7:1

The CA/MG ratio is *believed* to be related to sugar and carbohydrate metabolism and as such it *may* also correlate to energy levels and fluctuations. Less than 3:1 and greater than 12:1 have been observed in severe hypoglycemics and diabetics.

Calcium/Potassium (CA/K)...Ideal value is 4.2:1

The CA/K ratio is *believed* to correlate to the degree of the body's utilization of thyroid hormone. Higher than 4.2:1 *may* suggest a hypothyroid type effect; lower than 4.2:1 *may* suggest a hyperthyroid type effect.

Sodium/Magnesium (NA/MG)...Ideal value is 4:1

The NA/MG ratio is *believed* to correlate to adrenal activity. Higher than 4:1 *may* relate to hyperadrenal activity; lower than 4:1 *may* relate to hypoadrenal activity.

Sodium/Potassium (NA/K)...Ideal value is 2.4:1

The NA/K ratio is *believed* to relate to sugar and carbohydrate metabolism, protein metabolism, immune response and stress tolerance. The NA/K ratio is also *believed* to reflect the status of the general adaptation syndrome, the body's attempts to adapt to stress:

The **alarm** phase is a period of acute stress. At this point the body has a lot of "fight" left and is actively engaged in an attempt to adapt to the stress. This is *believed* to correlate to a high NA/K ratio. The reasoning behind this is that sodium is believed to reflect adrenal medulla activity, which under emergency conditions secretes aldosterone. Aldosterone in turn causes sodium retention.

The **resistance** stage is the period where the acute stress is on the verge of becoming chronic stress. At this point, the body is still fighting the stress, but it is neither winning nor losing; it could go either way. The stress may be resolved or it may become chronic.

During the **exhaustion** phase, *believed* to be represented by a NA/K inversion (the NA/K is less than 2.4 to 1), the adrenals are believed to have begun to burn out and weaken. As the adrenal medulla slows down, sodium falls in relation to potassium. As stress becomes chronic, sodium falls further and goes into an inverted relationship to potassium.

Zinc/Copper (ZN/CU)...Ideal value is 8:1

The ZN/CU ratio is *believed* to be indicative of the degree of copper toxicity.

It is most important to be clear that this information is in no way to be taken as diagnosis. What is being said here is *absolutely NOT* that "if a certain mineral ratio exists, then a particular condition will be the result." Quite the contrary. All that is being said is that after viewing thousands of hair analyses, researchers have observed certain mineral imbalances present in certain conditions. *This does not mean that all those who show certain mineral ratios have that condition or even will have it.* All that can be said is that those particular ratios have been seen present in people who have had that condition.

There are some researchers who, philosophically speaking, feel it may be possible that if certain mineral imbalances were allowed to continue over a long time period, then they might contribute to the development of a certain condition. But, the proof or disproof of such theories must wait for the results of future scientific research. In the meantime, we must be careful not to draw any false or unsubstantiatable conclusions. Thus, this

After viewing thousands of hair analyses, researchers have observed certain mineral imbalances present in certain conditions

Elevation of heavy metals on retests may reflect detoxification of the metals.

Increased metabolic rate is believed to assist the body in elimination of heavy metals.

Heavy metal detoxification can take many months to complete.

Some people may have the capacity to eliminate the metals quickly; for others it may be a very slow process.

material is provided as theoretical physiology and is intended for the purpose of provoking additional thought, interest, observation and research in this interesting area.

Elevation Of Heavy Metals On Retest

One aspect of interpreting a HTMA that is often misunderstood, is that when a retest is performed there is often an elevation in toxic metal levels. There may be:

- A further increase in heavy metal levels that on a previous test already were in the toxic range, or
- The current test may show toxic levels even though the previous test did not.

In either case, such developments may be erroneously judged to mean a further increase in toxicity has occurred and/or that the nutritional balancing program is (therefore) not working. *Without the proper intellectual understanding in these instances, you may actually stop the program out of disappointment, believing that the condition is worsening instead of improving.*

As you begin to follow your program and as your body begins to receive the proper nutritional balance, both your metabolic rate and oxidation rate may increase. This in turn allows your body to begin to remove the toxic metals from the tissue storage sites. Thus, if toxic metals show on your first test, they likely will show as increased levels on your subsequent test(s). Or, if little or no metals showed on your first test but were nonetheless present in your body (locked away in the tissue storage sites), a retest in 2-3 months would likely show heavy metals present even though none were showing previously. Again, this may occur as a result of *improvement* in biochemical balance!

Such a cycle may repeat itself many times until all the toxic metals are removed from your body. At times, toxic metal levels may drop, only to elevate again at a later time. Often these periods are accompanied by parallel patterns in symptomatology. For example, a typical pattern has been seen as follows:

- As the body chemistry improves in nutritional balance, one may feel an improvement in energy and well-being.
- By virtue of the increased levels of balance and energy, heavy metals are eliminated from their storage sites.
- As the toxins are mobilized, a lessening of energy and well-being is experienced.
- As the toxins are cleared from the body, a new level of balance is achieved . . .
. . . which allows for a period of renewed energy and well-being
. . . which again gives rise to a new stage of toxic metal elimination.

This cycle is repeated as often as necessary until the body is free of all the toxic heavy metals. Depending on the amount of heavy metals in your body and the nature of your metabolic individuality, the detoxification of heavy metals may take weeks, months or even years. Some people may have the capacity to eliminate the metals quickly; for others it may be a very slow process.

Past experience has led to the opinion that *regardless of how long it takes, it is imperative that the toxic metals are removed before the body*

Toxic metals must be removed before the body chemistry can achieve an enduring state of balance and well-being

During the program, it is common to see fluctuations in mineral levels and ratios

As the body eliminates heavy metals, their levels will rise on a HTMA.

HTMA is not used for Metabolic Typing.

chemistry can achieve an enduring state of balance and well-being. It is believed that the toxic, heavy metals must be removed and replaced with nutritional minerals in critical enzyme-binding sites. *Prior to that time, one really should not expect to experience an optimum level of lasting energy and health.*

Worsening Of Mineral Levels On Retest

Another situation that often occurs on a retest is that the nutritional mineral levels can appear to worsen, i.e., they are “further away” (either high or low) from the norm than on the previous test. Again, to the uneducated this may be disheartening and be grounds for cessation of the program. As in the previous situation, it is most important to gain the proper understanding of the results of a hair test.

During the period of rebalancing and rebuilding, it is quite usual to see “wild” fluctuations of the mineral levels on the HTMA. This is especially true when there are heavy metals present in the metabolism because there is a direct relationship between the heavy metals and the nutritional minerals.

Remember that one of the primary adverse characteristics of the heavy metals is that they displace the nutritional minerals. Thus, *when the toxic metals are mobilized from the storage sites, they affect the nutritional mineral levels and their balances with each other.*

Thus, the mineral *levels* often do not reflect one's progress. Actually, *if there is movement in the toxic metal levels reflected in the hair test, this alone is sufficient to count as progress.* But, there is another way to gauge one's progress and that is through the viewing of the nutritional mineral *ratios* listed above.

*Even though mineral **levels** on a retest may worsen, very often the mineral **ratios** will have improved.* As a result of the elimination of the toxic metals from the storage sites, the nutritional minerals settle into a better ratio with each other. Unlike mineral *levels*, which can readily rise and fall, the mineral *ratios* remain fairly constant. Deviation in the mineral ratios is believed to be significant and suggestive of changes in metabolic parameters.

HTMA and The Healthexcel Program

*The role of HTMA in the Healthexcel Program is **not** for the determination of the Metabolic Type.* There are three primary reasons for HTMA utilization, any one of which would be sufficient for its adoption:

1. Heavy metal screening and tracking
2. Evaluation of zinc/copper status
3. Means of monitoring change

Heavy Metal Screening And Tracking

By now, the importance of the role heavy metal toxins play in modern concerns of health and disease should be apparent. Very few of us, if any, can avoid their exposure. The evidence of their adverse influences to human physiology and biochemistry continues to grow. It is believed that they can be instrumental in the disruption of biochemical metabolic processes and thus serve as a basis for virtually any disease. Thus, their presence or lack of presence is crucial in any attempt to understand the status of individual biochemical balance.

From the perspective of a nutritional Metabolic Typing program, there is

As the body detoxifies heavy metals, there can be a temporary worsening of symptoms.

Copper and zinc in the hair correlate well with body concentrations.

HTMA works well in tracking biochemical shifts in metabolism while on your program.

another important reason for their status to be known. If they are present in the body, and if the body chemistry as a result of the program begins to balance, and as a result the body begins to detoxify the heavy metals, the resulting adverse symptoms that may temporarily occur may (erroneously) appear to be either a change in the actual Metabolic Type, or an indication of an improper balance in the nutritional program. Actually, the contrary is usually the case. But, without a HTMA to monitor the movement of the heavy metals in the body there is no basis for an accurate evaluation of the situation. On the other hand, with a HTMA, both the Advisor as well as the client have concrete means for understanding the new developments in the client's experience.

Evaluation Of Zinc/Copper Level Status

Research to date has shown that HTMA is an excellent tool for the determination of copper and zinc tissue levels. As a result, many researchers have the opinion that one of the most important reasons to routinely order HTMA is to determine the need or lack of need for copper supplementation. Copper is such an important nutrient for health that copper assessment alone is reason enough to justify use of a HTMA.

Copper in hair has been found to correlate well with copper levels in other organs except in the presence of severe liver disease. If copper levels in hair are low, clinical copper deficiency is "very probable." Elevated copper in hair samples may be due to external environmental contamination, such as the use of copper pipes in home plumbing or from copper toxicity.

Hair zinc concentrations correlate well with zinc status in other body tissues. It is not likely that hair zinc would be low without a zinc deficiency. Interpretations of zinc levels in whole blood, serum and urine all have their difficulties. Hair zinc may well be the single most significant measurement for assessing total body zinc.

HTMA - A Good Means For Monitoring Change

Often it is the case that "seeing is believing." It is one thing to be told that cigarette smoking is hazardous to one's health. It is quite another for a smoker to receive back a HTMA showing high concentrations of cadmium and severe imbalances in the nutritional mineral levels and ratios.

The visual impact of a HTMA can be very helpful in motivating someone to take responsibility for his or her health. And, as mentioned above, during periods of detoxification, it is both a relief and an instrument of motivation to see the reasons for one's experiences in "black and white."

A HTMA also provides another means to monitor progress (or lack of) with the program from one evaluation to the next. It is useful to see changes in mineral levels, which reflect changes in experiences on the program. In addition to experiencing improvement in well-being and the advancement represented by the numerical scores from the survey tabulations, a hair test provides another visual estimation of the current stage of metabolic balance.

As long as hair tissue mineral analysis is *not* used to diagnose any condition or as a means for the determination of the Metabolic Type, but only for the detection of the presence of heavy metals and certain micro-nutrient levels, it has proven to be a most useful addition to the Healthexcel Program.

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