INTRODUCTION TO HAIR TISSUE MINERAL ANALYSIS (HTMA)

Hair is used for mineral testing because of its very nature. Hair is formed from clusters of specialized cells that make up the hair follicle. During the growth phase, the hair is exposed to the internal environment, such as blood, lymph, and extra-cellular fluids. As the hair continues to grow and reaches the skin's surface, its outer layers harden, locking in the metabolic products accumulated during the formation period. This biological process provides a blueprint and lasting record of mineral status and nutritional and metabolic activity during this time.

The precise analytical method of determining the levels of minerals in the hair is a highly sophisticated technique. However, when performed to exacting standards and interpreted correctly, it may be used as a screening aid for determining mineral deficiencies, excesses, and imbalances. HTMA provides you and your health care professional with an economical and sensitive indicator of the long-term effects of diet, stress, toxic metal exposure, and their impact on your mineral balance, which is difficult to obtain through other clinical tests.

It is important for the attending healthcare professional to determine your mineral status as minerals are absolutely critical for life and abundant health. They are involved in and are necessary for cellular metabolism, structural support, nerve conduction, muscular activity, immune functions, anti-oxidant and endocrine activity, enzyme functions, water and acid/alkaline balance, and even DNA function.

Many factors can affect mineral nutrition, such as; food preparation, dietary habits, genetic and metabolic disorders, disease, medications, stress, environmental factors, and exposure to heavy metals. Rarely does a single nutrient deficiency exist in a person today. Multiple nutritional imbalances, however, are quite common, contributing to an increased incidence of adverse health conditions. It is estimated that mild and sub-clinical nutritional imbalances are up to ten times more common than nutritional deficiency alone.

The laboratory test results and the following comprehensive report should not be construed as diagnostic. This analysis is provided only as an additional source of information to the attending doctor.

Test results were obtained by a licensed clinical laboratory adhering to analytical procedures that comply with governmental protocol and standards established by Trace Elements, Inc. U.S.A. The interpretive data based upon these results is defined by research conducted by David L. Watts, Ph.D.

UNDERSTANDING THE GRAPHICS

NUTRITIONAL ELEMENTS

This section of the cover page graphically displays the test results for each reported nutritional element and how they compare to the established population reference range. Values above or below the reference range indicate a deviation from "normal." The more significant the variation, the greater the possibility of a deficiency or excess.

TOXIC ELEMENTS

The toxic elements section displays the results for each reported toxic element. It is preferable that all levels be as low as possible and within the lower white section. Any test result that falls within the upper dark red areas should be considered statistically significant but not necessarily clinically significant. Further investigation is then warranted to determine the possibility of actual clinical

significance.

ADDITIONAL ELEMENTS
This section displays the results of additional elements for which there is limited documentation. These elements may be necessary for biochemical function and may adversely affect biochemical function. Further study will help to reveal their role, interrelationships, and eventually their proper therapeutic application or treatment.

SIGNIFICANT RATIOS
The significant ratios section displays the important nutritional mineral relationships. This section consists of calculated values based on the respective elements. Mineral relationships (balance) are as meaningful, if not more so than the individual mineral levels. The ratios reflect the critical balance that must be constantly maintained between the minerals in the body.

TOXIC RATIOS
This section displays the relationships between critical nutritional elements and toxic metals. Each toxic metal ratio result should be in the white area of the graph, and the higher, the better. Toxic ratios that fall within the darker red area may indicate an interference of that toxic metal upon the utilization of the nutritional element.

ADDITIONAL RATIOS
The additional ratios section provides calculated results on some additional mineral relationships. At this time, there is limited research and documentation regarding these ratios.

METABOLIC TYPE

This section of the report will discuss the metabolic profile based on research by Dr. D. L. Watts. Each classification is established by evaluating the tissue mineral results and determining the degree to which the minerals may be associated with a stimulating and/or inhibiting effect upon the main "energy-producing" endocrine glands. These glands regulate nutrient absorption, excretion, metabolic utilization, and incorporation into the body's tissues: the skin, organs, bone, hair, and nails. How efficiently each nutrient is utilized depends mainly upon the proper functioning of the endocrine glands.

FAST METABOLISM (TYPE #4)

** Sympathetic Dominance
** Tendency Toward Decreased Thyroid Function (decreased secretion of hormones)
** Tendency Toward Decreased Adrenal Activity (decreased secretion of hormones)

The current tissue mineral pattern is indicative of a fast metabolic rate (Fast Metabolism, Type #4). Even though the metabolic rate is considered fast, this patient may be experiencing adrenal and thyroid insufficiency. This pattern is characteristic of a "stress burnout" syndrome. Stress burnout is often associated with chronic or prolonged stress. Apparently, the stress has been present for an extended period of time, and eventually, the thyroid and adrenal glands can no longer maintain sufficient energy production to keep up with stress demands. This pattern can result in periodic fatigue and depression.

It should be noted that stress is a normal part of life and serves a useful purpose when it is controlled. However, chronic uncontrolled stress will eventually contribute to various vitamin and mineral imbalances, and the ability to maintain adequate energy levels and optimum health will decrease.

NUTRIENT MINERAL LEVELS AND OTHER ELEMENTS

This section of the report may discuss those nutritional mineral levels that reveal moderate or significant deviations from normal. The light blue and light green areas of each graph section represent the reference interval for each element based on a statistical analysis of apparently healthy individuals. The following section, however, is based upon clinical data; therefore, an element that is moderately outside the reference interval may not be commented on unless determined to be clinically significant.

NOTE:
For those elements whose levels are within the normal range, it should be noted that nutritional status is also dependent upon their critical balance with other essential nutrients. Therefore, if applicable, a discussion regarding their involvement in metabolism may be found in this report's ratio section(s).

CALCIUM (Ca)
The tissue calcium level is below the normal level. This is not uncommon for this age and fast metabolism (Type #4). However, if this profile worsens or continues for an extended period of time, a tendency toward experiencing one or more of the following symptoms will increase:

Mood Swings
Depression
Osteoporosis
Insomnia
Dental Problems

SOME FACTORS THAT MAY CONTRIBUTE TO A LOW TISSUE CALCIUM LEVEL

* Hypoparathyroid Activity
* High Phosphorus Intake and Retention
* Copper Deficiency
* Toxic Metal Accumulation
* Vitamin D Deficiency
* Magnesium Deficiency
* Inadequate Calcium Intake
* Poor Absorption
* Stress

COPPER (Cu)
Your copper profile is indicative of excess copper in the tissues. This element will have an antagonistic effect on the functions of other essential elements. In particular, copper has a direct antagonistic effect on zinc activity within the body. Excess accumulation of copper may produce signs of zinc deficiency, even though zinc intake may be adequate or even if the tissue zinc level is within the normal range.

MANGANESE (Mn) AND BLOOD SUGAR REGULATION
Manganese is an essential element that, in combination with certain vitamins and minerals is required for many biochemical reactions, including carbohydrate metabolism and energy production. Manganese deficiency is frequently related to such manifestations as low blood sugar levels, ligamentous problems, and reproductive dysfunction.

NICKEL (Ni)

High nickel found in the hair is not uncommon. Its sources are high in our environment and include:

- Ceramics
- Hydrogenated Oils
- Rubber Products
- Electroplating
- Metal Prosthesis
- Dyes
- Dental Alloys
- Plastics
- Fungicides
- Fuel Additives
- Tobacco
- Paint and Wallpaper pigments
- Insecticides

FOOD SOURCES OF NICKEL

- Tea
- Legumes
- Cocoa
- Hydrogenated Fats
- Whole Grains
- Oysters
- Margarine

Other sources of nickel include herbal preparations, particularly peppermint and chickweed. These herbs should be discontinued or reduced significantly if currently being taken.

Note: Nickel contributes to more instances of dermatitis than any other metal, and in excess has also been reported to be related to renal disturbance.

NUTRIENT MINERAL RATIOS

This section of the report will discuss those nutritional mineral ratios that reveal moderate or significant deviation from normal.

Continuing research indicates that metabolic dysfunction occurs not necessarily as a result of a deficiency or excess of a particular mineral level but more frequently from an abnormal balance (ratio) between the minerals. Due to this complex interrelationship between the minerals, it is extremely important that imbalances be determined. Once these imbalances are identified, corrective therapy may then be used to help re-establish a more normal biochemical balance.

NOTE: The "Nutritional Graphic" developed by researchers at Trace Elements, and presented on the cover of this report shows the antagonistic relationships between the significant nutrients, including the elements (arrows indicate antagonistic effect upon absorption and retention).

HIGH CALCIUM/POTASSIUM (Ca/K) RATIO

High calcium relative to potassium will frequently indicate a trend toward hypothyroidism (underactive thyroid). The mineral calcium antagonizes the retention of potassium within the cell. Since potassium is necessary for sufficient quantity to sensitize the tissues to the effects of thyroid hormones, a high Ca/K ratio would suggest reduced thyroid function and/or cellular response to thyroxine. If this imbalance has been present for an extended period of time, the following symptoms associated with low thyroid function may occur.

- Fatigue
- Dry Skin
- Constipation
- Depression
- Over-weight Tendencies
- Cold Sensitivity

TOXIC METAL LEVELS

Hair is used as one of the tissues of choice by the Environmental Protection Agency in determining toxic metal exposure. A 1980 report from the E.P.A. stated that human hair could be effectively used for biological monitoring of the highest-priority toxic metals. This report confirmed the findings of other studies, which concluded that human hair might be a more appropriate tissue than blood or urine for studying community exposure to some trace metals.

A heavy metal may be elevated in this HTMA, yet no known environmental exposure can be ascertained. This is not unusual, as exposure may have originated years earlier. Additionally, research has found that heavy metals can be inherited by the fetus during pregnancy. Heavy metals can be found in the body for years following the initial exposure and will remain in body tissues until removal is initiated. For example, the half-life of cadmium in some tissues will range from ten to thirty years.

CADMIUM (Cd)

Your cadmium level is elevated when compared to the population in general, which is indicative of acute exposure or chronic exposure to this toxic element, representing an unnecessary risk. Cadmium is a toxic metal that interferes with the absorption and function of several minerals, such as; zinc, iron, copper, and manganese. Cadmium has an affinity to accumulate mainly in the kidneys but will also deposit in the liver and bones if excessive. Some sources of cadmium are:

- Tobacco
- Burning Plastics
- Superphosphate Fertilizers
- Electronics Industry
- Zinc Smelters
- Galvanized Water Pipes
- Auto Exhaust

METABOLIC DYSFUNCTIONS AND CADMIUM

Chronic or long-term exposure to cadmium has been related to kidney disturbance, abnormal bone changes, emphysema, pneumonitis, liver disturbance, anemia, and discoloration or yellowing of the dental enamel. However, these abnormalities may occur only after several years of exposure to cadmium.

IMPORTANT NOTE:

ELIMINATION OF CADMIUM FROM THE BODY CAN OFTEN PRODUCE SYMPTOMS SIMILAR TO FLU SYMPTOMS.

TOXIC METAL RETENTION AND NUTRITIONAL STATUS:

Every individual is constantly being exposed to sources of heavy metals. However, the main factor contributing to the absorption and retention of these metals in the body is influenced by one's own nutritional status. For instance, a lack of nutrients that will combat the accumulation of lead will then allow tissue lead level's to rise. This accumulation can occur even if lead exposure is minimal. Therefore, improving your nutritional status can help in reducing the toxic metal burden as well as reducing the adverse effects that toxic metal accumulation can produce in the body.

IMPORTANT NOTE ON TOXIC METAL ELIMINATION:

As toxic metals are mobilized from storage tissues for removal from the body, the patient may experience an exacerbation of his/her present symptoms or new symptoms associated with a particular mineral. If this occurs or the symptoms become too uncomfortable, discontinue supplementation for three days, during which symptoms should be relieved. Then resume the

program at one-third of the recommended dosage, usually the PM portion, gradually build up to twice per day and return to the full program. This may be done over a one to two-week period. If symptoms again arise, have the patient continue on only the PM portion for one week before increasing.

NOTE:
At this time, further confirmation of toxic metal exposure using a blood test may or may not reveal an elevated level. This is due to the protective response of the body, in which following a toxic metal exposure, the element is sequestered from the blood and stored in various other tissues. Therefore, if the exposure is not ongoing or chronic, elevated blood levels may not be present.

TOXIC METAL RATIOS

ALL CURRENT TOXIC METAL RATIOS ARE WITHIN THE ACCEPTABLE RANGE

DIETARY SUGGESTIONS

The following dietary suggestions are defined by several factors: the individual's mineral levels, ratios, and metabolic type, as well as the nutrient value of each food, including protein, carbohydrate, fat, and vitamin and mineral content. Based upon these determinations, it may be suggested that foods be avoided or increased temporarily in the diet to aid in improving your biochemistry.

GENERAL DIETARY GUIDELINES FOR THE FAST METABOLIZER

* INCREASE INTAKE OF HIGH PURINE PROTEIN FOODS...high purine protein sources include the liver, kidney, and heart. Other good sources include sardines, tuna, clams, crab, lobster, and oysters. Unless notified otherwise, high purine and moderate purine protein intake should constitute approximately 33% of total daily caloric intake.

* INCREASE INTAKE OF MILK AND MILK PRODUCTS...such as cheese, yogurt, cream, and butter (unsalted). Increase intake of nuts and seeds such as almonds, walnuts, peanuts, peanut butter, and sunflower seeds. Foods high in fat, unless notified otherwise, should constitute approximately 33% of total daily caloric intake.

* REDUCE CARBOHYDRATE INTAKE...including unrefined carbohydrates. Sources such as cereals, whole grains, and whole grain products are contraindicated for frequent consumption until the next evaluation. Carbohydrate intake in the form of unrefined carbohydrates should be approximately 33% of the total daily caloric intake.

* AVOID ALL SUGARS AND REFINED CARBOHYDRATES...this includes white and brown sugar, honey, candy, soda pop, cake, pastries, alcohol, and white bread.

FOOD ALLERGIES

Certain foods can produce a maladaptive or "allergic-like" reaction, commonly called "food allergies" in some individuals. Consumption of foods that one is sensitive to can bring about reactions ranging from drowsiness to hyperactivity in children, itching and rashes, headaches, high blood pressure and arthritic pain.

Sensitivity to foods can develop due to biochemical (nutritional) imbalances, which stress, pollution, and medications can aggravate. Nutritional imbalance can further be contributed to by restricting food variety, such as eating only a small group of foods on a daily basis. Often a person will develop a craving for the food they are most sensitive to and may eat the same food or food group more than once a day.

The following section may contain foods that are recommended to avoid. These foods should be considered potential "allergy foods" or foods that impede a rapid and effective response. Therefore, consumption of these foods should be avoided entirely for four days. After which, they should not be eaten more frequently than once every three days during the course of therapy.

FOOD ALLERGIES RELATED TO COPPER

Individuals with excessive tissue copper accumulation will often crave foods high in copper. The following foods, which are high in copper relative to zinc, should be avoided until the next evaluation:

- Chocolate
- Haddock
- Bran Flakes
- Peanut Butter
- Shrimp
- Trout
- Liver
- Walnuts
- Pecans
- Avocado
- Grapes
- Bakers Yeast

REACTIONS ASSOCIATED WITH COPPER FOOD ALLERGIES

Excess intake of high-copper foods has been associated with several physical and emotional reactions. Physical reactions may include; frontal headaches, skin rashes, joint stiffness, constipation, insomnia causing morning fatigue, bloating, water retention, and cold sensitivity. Emotional reactions may include depression, crying spells, fearfulness, anxiety, irritability, anger, aggressive behavior, and withdrawal.

FOODS THAT STIMULATE HISTAMINES

Consumption of the following foods can stimulate histamine release in certain metabolic types and may contribute to respiratory-type allergy reactions. Therefore, these foods are to be avoided until the next evaluation or until notified otherwise by the attending healthcare professional.

- Beet Greens
- Apples
- Spinach
- Eggplant
- Sweet Potatoes
- Blueberries
- Pecans
- Wheat Germ
- Cocoa
- Parsley
- Beets
- Rhubarb
- Chocolate
- Black Tea
- Strawberries
- Peanuts
- Green Beans
- Chard
- Concord Grapes
- Collards
- Blackberries

THE FOLLOWING FOODS MAY BE INCREASED IN THE DIET UNTIL THE NEXT EVALUATION

- Mozzarella Cheese
- Milk
- Kale
- Monterey Cheese
- Turnip Greens
- Mustard Greens
- Yogurt
- Cream

Almonds
Swiss Cheese
Buttermilk

AMINO ACIDS THAT IMPROVE CALCIUM ABSORPTION

Calcium absorption is greatly enhanced when the diet is high in the amino acids lysine, arginine, and histadine. These proteins also help to reduce the acidity of the tissues. Both effects are favorable for the fast metabolizer; therefore, the addition of any of the following foods to the diet is recommended at this time:

Ham
Lamb
Cottage Cheese
Spare Ribs
Lentils
Rump roast
Vegetable Stew
Canadian bacon
Peanuts
Chuck Roast

SPECIAL NOTE:

This report contains only a limited number of foods to avoid or increase the diet. FOR THOSE FOODS NOT SPECIFICALLY INCLUDED IN THIS SECTION, CONTINUED CONSUMPTION ON A MODERATE BASIS IS ACCEPTABLE UNLESS RECOMMENDED OTHERWISE BY THE ATTENDING HEALTHCARE PROFESSIONAL. Under some circumstances, dietary recommendations may list the same food item in the "TO EAT" and the "TO AVOID" categories simultaneously. In these rare cases, always follow the avoid recommendation.

CONCLUSION

This report can provide a unique insight into nutritional biochemistry. The recommendations contained within are specifically designed according to metabolic type, mineral status, age, and sex. Additional guidance may be based on other supporting clinical data as determined by the attending healthcare professional.

OBJECTIVE OF THE PROGRAM:

This program aims to re-establish a normal balance of body chemistry through individually designed dietary and supplement suggestions. Properly followed, this may then enhance the ability of the body to more efficiently utilize the nutrients that are consumed, resulting in improved energy production and health.

REMOVAL OF HEAVY METALS:

Re-establishing a homeostatic balance or equilibrium of body chemistry will enhance the body's ability to remove heavy metals naturally. The elimination of a heavy metal involves an intricate process of attachment of the metal to proteins, removal from storage areas, and transport to the eliminative organs for excretion. Improvement in one's nutritional balance will improve the capability of the body to perform these tasks and eliminate toxins more efficiently.

However, the mobilization and elimination of metals may cause temporary discomfort. For example, if an excess accumulation of iron or lead contributes to arthritic symptoms, a temporary flare-up of the condition may occur from time to time. This discomfort can be expected until the removal of the excess metal is complete.