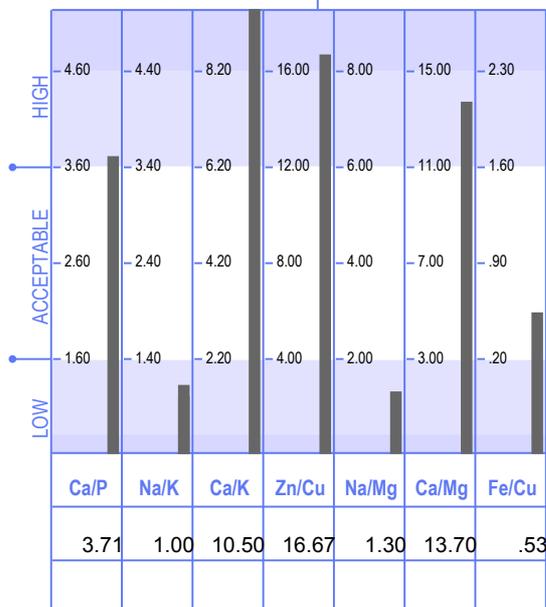
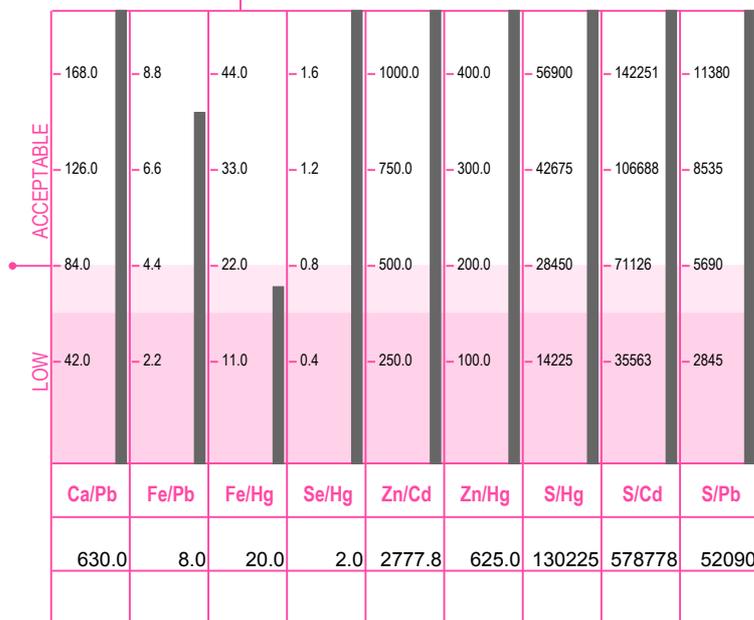




### SIGNIFICANT RATIOS



### TOXIC RATIOS



### ADDITIONAL RATIOS

RATIO	CALCULATED VALUE		EXPECTED
	Current	Previous	
Ca/Sr	572.73		131/1
Cr/V	10.00		13/1
Cu/Mo	214.29		625/1
Fe/Co	800.00		440/1
K/Co	6000.00		2000/1
K/Li	6000.00		2500/1
Mg/B	46.00		40/1
S/Cu	3472.67		1138/1
Se/Tl	160.00		37/1
Se/Sn	8.00		0.67/1
Zn/Sn	2500.00		167/1

### LEVELS

All mineral levels are reported in milligrams percent (milligrams per one-hundred grams of hair). One milligram percent (mg%) is equal to ten parts per million (ppm).

### NUTRITIONAL ELEMENTS

Extensively studied, the nutrient elements have been well defined and are considered essential for many biological functions in the human body. They play key roles in such metabolic processes as muscular activity, endocrine function, reproduction, skeletal integrity and overall development.

### TOXIC ELEMENTS

The toxic elements or "heavy metals" are well-known for their interference upon normal biochemical function. They are commonly found in the environment and therefore are present to some degree, in all biological systems. However, these metals clearly pose a concern for toxicity when accumulation occurs to excess.

### ADDITIONAL ELEMENTS

These elements are considered as possibly essential by the human body. Additional studies are being conducted to better define their requirements and amounts needed.

### RATIOS

A calculated comparison of two elements to each other is called a ratio. To calculate a ratio value, the first mineral level is divided by the second mineral level.

EXAMPLE: A sodium (Na) test level of 24 mg% divided by a potassium (K) level of 10 mg% equals a Na/K ratio of 2.4 to 1.

### SIGNIFICANT RATIOS

If the synergistic relationship (or ratio) between certain minerals in the body is disturbed, studies show that normal biological functions and metabolic activity can be adversely affected. Even at extremely low concentrations, the synergistic and/or antagonistic relationships between minerals still exist, which can indirectly affect metabolism.

### TOXIC RATIOS

It is important to note that individuals with elevated toxic levels may not always exhibit clinical symptoms associated with those particular toxic minerals. However, research has shown that toxic minerals can also produce an antagonistic effect on various essential minerals eventually leading to disturbances in their metabolic utilization.

### ADDITIONAL RATIOS

These ratios are being reported solely for the purpose of gathering research data. This information will then be used to help the attending health-care professional in evaluating their impact upon health.

### REFERENCE RANGES

Generally, reference ranges should be considered as guidelines for comparison with the reported test values. These reference ranges have been statistically established from studying an international population of "healthy" individuals.

Important Note: The reference ranges should not be considered as absolute limits for determining deficiency, toxicity or acceptance.

## 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 surface of the skin its outer layers harden, locking in the metabolic products accumulated during the period of formation. This biological process provides a blueprint and lasting record of mineral status and nutritional metabolic activity that has occurred during this time.

The precise analytical method of determining the levels of minerals in the hair is a highly sophisticated technique: when performed to exacting standards and interpreted correctly, it may be used as a screening aid for determining mineral deficiencies, excesses, and/or 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 effects on your mineral balance that 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, as well as 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. In fact, 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 comprehensive report that follows should not be construed as diagnostic. This analysis is provided only as an additional source of information to the attending healthcare professional.*

*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 of the reported nutritional elements and how they compare to the established population reference range. Values that are above or below the reference range indicate a deviation from "normal". The more significant the deviation, the greater the possibility a deficiency or excess may be present.

### **TOXIC ELEMENTS**

The toxic elements section displays the results for each of the reported toxic elements. 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 as statistically significant, but not necessarily clinically significant. Further investigation may then be 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/or may adversely

effect biochemical function. Further study will help to reveal their function, 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) is as important, 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 the important 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 documentation regarding these ratios. For this reason, these ratios are only provided as an additional source of research information to the attending healthcare professional.

## **METABOLIC TYPE**

---

This section of the report will discuss the metabolic profile, which is based on research conducted 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 tissues of the body: the skin, organs, bone, hair, and nails. How efficiently each nutrient is utilized depends largely upon proper functioning of the endocrine glands.

### **SLOW METABOLISM (TYPE #1)**

- \*\* Parasympathetic Dominant
- \*\* Tendency Toward Decreased Thyroid Function (reduced secretion of hormones)
- \*\* Tendency Toward Decreased Adrenal Function (reduced secretion of hormones)

The mineral pattern reflected in these test results is indicative of a slow metabolic (Type #1) pattern. This particular profile can be related to a number of contributing factors, such as;

\* Diet - Dietary factors such as low protein intake, high carbohydrate intake and eating refined carbohydrates, especially those containing appreciable amounts of sugar have an indirect yet significant effect in suppressing the metabolic rate.

\* Endocrine Function - Low thyroid activity as well as low adrenal gland function will contribute to lowering the metabolic rate.

\* Digestion - Poor absorption and utilization of nutrients found in the foods that are consumed will result in decreased energy production on a cellular level, thereby, affecting metabolism. In turn, a lowered metabolic rate will have an adverse effect upon the digestion process, thereby creating a vicious cycle.

\* Viral Infections - A past occurrence of a severe or chronic viral infection can contribute to a decrease in the metabolic rate, due to the body's neuro-immunological response to infection.

After a prolonged period of time, a diminished metabolic rate, such as indicated in these test results, has been correlated with fatigue, cold hands and feet, easy weight gain and craving for sweets.

It should be noted that even though this patient may not be overweight at this time, she can still have

a lowered metabolic rate, as overweight and underweight tendencies may not always be reflective of metabolism on the cellular level.

## **NUTRIENT MINERAL LEVELS**

---

This section of the report may discuss those nutritional mineral levels that reveal moderate or significant deviations from normal. The light blue area's of each graph section represent the reference range for each element based upon statistical analysis of apparently healthy individuals. The following section, however, is based upon clinical data, therefore an element that is moderately outside the reference range 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. If applicable, discussion regarding their involvement in metabolism may be found in the ratio section(s) of this report.

### **HYDROCHLORIC ACID PRODUCTION AND PROTEIN DIGESTION**

Your mineral profile may be reflective of a deficiency in hydrochloric acid (HCL) production, which can result in inadequate protein digestion. Hydrochloric acid in sufficient amounts is necessary for the complete digestion and utilization of dietary protein. Symptoms, such as, bloating of the stomach, flatulence and constipation may be observed with an HCL deficiency, especially following high protein meals.

### **CHROMIUM (Cr)**

Tissue chromium deficiency is increasingly becoming more common among those people tested in the United States, Canada and Western Europe. This may be due to the excessive consumption of refined carbohydrates and sugar in these areas. Low chromium levels have been implicated in producing a decreased carbohydrate tolerance. Chromium appears to increase the effectiveness of insulin. A deficiency may be a contributing factor to hypoglycemia as well as other blood sugar disturbances. Increasing protein in the diet should aid in improving blood sugar regulation, as well as chromium status.

### **CHROMIUM STATUS FOLLOWING PREGNANCY**

Hair tissue chromium levels will often decrease following pregnancy and breast-feeding. It has been estimated that the time required for hair chromium levels to return to normal in the mother following pregnancy is approximately 4 years.

### **GERMANIUM (Ge)**

Your germanium level of 0.001 mg% is below the established reference range for this trace element. However, deficiency signs and conditions have not yet been documented in humans. Therefore, clinical significance cannot be placed on a low germanium level at this time.

### **VANADIUM (V)**

Vanadium is an essential element in lower life forms and recent research suggests it may be essential in humans. Vanadium is widely available in the food supply, where refining and processing appears to further increase its content. Your vanadium level of 0.001 mg% is below the established reference range for this element. However, deficiency signs and conditions have not yet been documented in humans. Therefore, at this time, clinical significance cannot be placed on a low HTMA vanadium level.

## **NUTRIENT MINERAL RATIOS**

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

Continuing research indicates that metabolic dysfunction occur 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).

**LOW SODIUM/POTASSIUM (Na/K) RATIO**

When sodium is low in relation to potassium, emotional mood swings, including depression have been cited in greater frequency. A low sodium-to-potassium ratio may also be related to phobias, withdrawal, repression and indecision.

**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 in 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      | Depression             |
| Dry Skin     | Over-weight Tendencies |
| Constipation | Cold Sensitivity       |

**HIGH ZINC/COPPER (Zn/Cu) RATIO**

The zinc level is high relative to tissue copper status (see high Zn/Cu ratio). Zinc and copper are intricately related to the hormones progesterone and estrogen, respectively. This mineral imbalance has been correlated with low levels of estrogen relative to progesterone, which is reflective of a hormonal imbalance. If the imbalance is both severe and chronic, it can result in a failure to menstruate (amenorrhea), and/or the following symptoms;

- |                           |           |
|---------------------------|-----------|
| Increased Infections      | Oily Skin |
| Shortened Menstrual Cycle |           |

**LOW SODIUM/MAGNESIUM (Na/Mg) RATIO**

This ratio is below the normal range. The adrenal glands play an essential role in regulating sodium retention and excretion. Studies have also shown that magnesium will affect adrenal cortical activity and response, and reduced adrenal activity results in increased magnesium retention. The sodium-magnesium profile is indicative of reduced adrenal cortical function. The following associated symptoms may be observed:

- |                        |                    |
|------------------------|--------------------|
| Fatigue                | Constipation       |
| Dry Skin               | Lowered Resistance |
| Allergies (Ecological) | Low Blood Pressure |

**MINERAL METABOLISM AND VITAMIN B6**

A deficiency of, or increased requirement for vitamin B6 (pyridoxine) leads to alterations in the metabolism, utilization and balance between calcium and magnesium. Calcium retention will increase and the excretion of magnesium will also increase when vitamin B6 is lacking. Therefore, an increased need for vitamin B6 may be indicated by your current HTMA pattern.

## TOXIC METAL LEVELS

---

Hair is used as one of the tissue's of choice by the Environmental Protection Agency in determining toxic metal exposure. A 1980 report from the E.P.A. stated that human hair can 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 may 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 and yet no known environmental exposure can be ascertained at this time. 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 original 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.

### ALUMINUM (Al)

The aluminum level is within the cautionary range. Since aluminum is omnipresent in soils and waters, virtually all foods contain measurable amounts of natural aluminum. However, a much larger amount of aluminum compounds are typically ingested in the form of intentional additives, such as; preservatives, coloring agents, leavening agents, etc. Other sources include processed cheeses, spices, pickles and baked goods.

### SOME ADDITIONAL SOURCES OF ALUMINUM

Antacids (most)	Treated Water
Salt (some)	Baking Powder (some)
Aluminum Cookware	Antiperspirants (some)
Buffered Aspirin (some)	Aluminum Cans
White Flour (some)	Vaccines (many)

### AVOID

- \* Antacids containing aluminum as hydroxide. This is a major source of ingested aluminum.
- \* Cooking acidic foods in aluminum cookware and storage in aluminum foil.
- \* Inhaling antiperspirant spray, especially those containing aluminum chlorohydrate.

### NOTE:

At this time, further confirmation of heavy metal toxicity 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 levels in the blood may not be present. It is recommended that another analysis be performed in at least one year to monitor any changes in toxic metal accumulation.

## TOXIC METAL RATIOS

---

Every person is exposed to toxic metals to some degree. The retention of these toxic metals, however, is dependent upon the individual's susceptibility. The balance of the protective nutrient minerals within the body in relation to the heavy metals can frequently be the determining factor to this susceptibility. As an example, the accumulation of lead will have a more detrimental effect upon body chemistry when sufficient levels of calcium and iron are not available. By examining the toxic metal levels in relation to the protective minerals, the extent to which the heavy metals may be involved in abnormal chemistry can frequently be seen.

## 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 to aid in the improvement of your biochemistry.

### SLOW METABOLISM

Dietary habits may contribute to slow metabolism. Low protein, high carbohydrate, high fat intake and the consumption of refined sugars and dairy products have an excessive slowing-down effect upon metabolism and energy production.

### GENERAL DIETARY GUIDELINES FOR THE SLOW METABOLIZER

- \* EAT A HIGH PROTEIN FOOD AT EACH MEAL...Lean protein is recommended and which should constitute at least 40% of the total caloric value of each meal. Recommended sources are fish, fowl and lean beef. Other good sources of protein include bean and grain combinations and eggs. Increased protein intake is necessary in order to increase the metabolic rate and energy production.
- \* INCREASE FREQUENCY OF MEALS...while decreasing the total caloric intake for each meal. This is suggested in order to sustain the level of nutrients necessary for energy production, and decrease blood sugar fluctuations.
- \* EAT A MODERATE AMOUNT OF UNREFINED CARBOHYDRATES...Carbohydrate intake should not exceed 40% of total daily caloric intake. Excellent sources of unrefined carbohydrates include whole grain products, legumes and root vegetables.
- \* AVOID ALL SUGARS AND REFINED CARBOHYDRATES...This includes white and brown sugar, honey, candy, soda pop, cake, pastries, alcohol and white bread.
- \* AVOID HIGH PURINE PROTEIN...Sources of high purine protein include: liver, kidney, heart, sardines, mackerel and salmon.
- \* REDUCE OR AVOID MILK AND MILK PRODUCTS...Due to elevated fat content and high levels of calcium, milk and milk products including "low-fat" milk should be reduced to no more than once every three to four days.
- \* REDUCE INTAKE OF FATS AND OILS...Fats and oil include fried foods, cream, butter, salad dressings, mayonnaise, etc... Fat intake should not exceed 20% of the total daily caloric intake.
- \* REDUCE FRUIT JUICE INTAKE...until the next evaluation. This includes orange juice, apple juice, grape juice and grapefruit juice. Note: Vegetable juices are acceptable.
- \* AVOID CALCIUM AND/OR VITAMIN D SUPPLEMENTS...unless recommended by physician.

### AVOID DIETARY FATS AND OILS UNLESS NOTIFIED OTHERWISE BY ATTENDING DOCTOR

The handling of fats is difficult during a reduced metabolic state, and can contribute to a further reduction in the metabolic rate. It is suggested that all sources of high dietary fat and oil be avoided until the next evaluation.

Salad Dressings	Cheese (most)
Cream	Butter
Hazelnuts	Walnuts
Margarine	Pork
Coconut Oil	Milk
Salami	Peanut Butter
Pork	Sausages

- |                   |                      |
|-------------------|----------------------|
| Corn Chips        | Almonds              |
| Bacon             | Knockwurst           |
| Duck              | Goose                |
| Avocado           | Liverwurst           |
| Cocoa Powder      | Peanuts              |
| Sardines (canned) | Tuna (canned in oil) |
| Avocado Oil       | Tamarind             |
| Groundnut         |                      |

**VITAMIN B-1 AND THYROID HORMONE**

The following foods high in Vitamin B-1 may be increased in the diet until the next evaluation. Vitamin B-1 has been associated with increasing the effectiveness of thyroid hormone (thyroxine) upon metabolism.

- |                |             |
|----------------|-------------|
| Wheat Germ     | Rice Bran   |
| Pinto Beans    | Lobster     |
| Pike (broiled) | Brazil Nuts |

**METHIONINE RICH FOODS**

The following foods are a rich source of the essential amino acid methionine, which supplies sulfur to the cells for the activation of enzymes, and energy metabolism. Sulfur is also involved in detoxification processes. Toxic substances are combined with sulfur, converted to a nontoxic form and then excreted. The following foods may be consumed liberally during course of therapy:

- |               |             |
|---------------|-------------|
| Bass          | Mackerel    |
| Trout         | Swordfish   |
| Cod           | Turkey      |
| Tuna          | Sirloin     |
| Pumpkin Seeds | Round Steak |

The above list of foods are also high in glutamic and aspartic acid. These amino acid proteins help to improve tissue alkalinity.

**SPECIAL NOTE:**

This report contains only a limited number of foods to avoid or to increase in the diet. FOR THOSE FOODS NOT SPECIFICALLY INCLUDED IN THIS SECTION, CONTINUED CONSUMPTION ON A MODERATE BASIS IS ACCEPTABLE UNLESS RECOMMENDED OTHERWISE BY YOUR DOCTOR. Under some circumstances, dietary recommendations may list the same food item in the "TO EAT" and the "TO AVOID" categories at the same time. 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 recommendations may be based upon other supporting clinical data as determined by the attending health-care professional.

**OBJECTIVE OF THE PROGRAM:**

The purpose of this program is 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 easily.

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

THE FOLLOWING RECOMMENDATIONS SHOULD BE TAKEN ONLY WITH MEALS IN ORDER TO INCREASE ABSORPTION AND TO AVOID STOMACH DISCOMFORT.

RECOMMENDATION	AM	NOON	PM
PARA-PACK (Metabolic Support)	1	1	2
ADRENAL COMPLEX (Glandular Support)	2	2	2
MIN-PLEX B (Magnesium + Chromium + B6)	2	2	2
HCL V-PLUS (Digestive Support)	2	2	2
VITAMIN E PLUS	1	1	1

---

THESE RECOMMENDATIONS MAY NOT INCLUDE MINERALS WHICH APPEAR BELOW NORMAL OR IN TURN MAY RECOMMEND MINERALS WHICH APPEAR ABOVE NORMAL ON THE HTMA GRAPH. THIS IS NOT AN OVERSIGHT. SPECIFIC MINERALS WILL INTERACT WITH OTHER MINERALS TO RAISE OR LOWER TISSUE MINERAL LEVELS, AND THIS PROGRAM IS DESIGNED TO BALANCE THE PATIENT'S MINERAL LEVELS THROUGH THESE INTERACTIONS.

---



---

THESE RECOMMENDATIONS SHOULD NOT BE TAKEN OVER A PROLONGED PERIOD OF TIME WITHOUT OBTAINING A RE-EVALUATION. THIS IS NECESSARY IN ORDER TO MONITOR PROGRESS AND MAKE THE NECESSARY CHANGES IN THE NUTRITIONAL RECOMMENDATIONS AS REQUIRED.

---



---

SPECIAL NOTE: NUTRITIONAL SUPPLEMENTS DO NOT TAKE THE PLACE OF A GOOD DIET. THEY ARE BUT AN ADDITIONAL SOURCE OF NUTRIENTS, AND THEREFORE, MUST NOT BE SUBSTITUTED FOR A BALANCED DIET.

---