

# North Coast Testing Services

## Holistic Hair Mineral Tissue Analysis

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**Client** : Ms Barbara Pavlovich  
**Address** :

TEST		ACTUAL	OPTIMUM	COMMENT
Calcium	Ca	221.7	200 – 600	Acceptable
Magnesium	Mg	22.98	30 – 90	V low
Sodium	Na	466.2	125 – 375	V high
Potassium	K	269.29	50 – 150	V high
Copper	Cu	56.2	12 – 37.5	V high
Zinc	Zn	132.94	80 – 240	Good
Phosphorus	P	137.83	80 – 240	Good
Iron	Fe	8.4	20 – 60	Good
Manganese	Mn	1.03	0.75 – 2.25	Good
Chromium	Cr	BDL	0.45 – 1.35	Deficient
Silicon	Si	30.22	14 – 42	Acceptable
Sulphur	S	32500	15000-45000	Normal
Barium	Ba	BDL	<0.05	Below Detectable Limit
Cadmium	Cd	2.9	<0.4	Fertility alert
Lead	Pb	6.3	<6	Fertility alert
Aluminium	Al	28.40	<10	High
Nickel	Ni	5.6		Fertility alert
Cobalt	Co	BDL	0.01 – 0.03	Below Detectable Limit
Boron	B	0.69	0.2 – 5.0	Good
Strontium	Sr	1.09	0.3 – 5.0	Normal
Vanadium	V	BDL	0.2 – 1.4	Below Detectable Limit
Arsenic	As	BDL	0.17	Below Detectable Limit
Mercury	Hg	0.22	<0.1	Fertility alert

*Note : units are ppm = mg/kg BDL = Below detection limit*

### **Background history:**

Barbara is a 28 yo female who wants a toxic metals evaluation as part of her **pre-conception preparation**. Barbara has been employed in various industrial processing plants ranging from battery manufacture to electroplating. No medical history was submitted.

<b>Significant Ratio</b>		<b>Actual</b>	<b>Ideal</b>	<b>Comment</b>
Calcium / phosphorus	Ca/P	1.61	2.5 - 2.7:1.0	Low
Sodium / potassium	Na/K	1.73	2.4 - 2.6:1.0	Low
Calcium / potassium	Ca/K	0.82	3.9 - 4.2:1.0	Extremely low
Zinc / copper	Zn/Cu	2.37	7.9 - 8.1:1.0	V low
Sodium / magnesium	Na/Mg	20.29	4.1 - 4.2:1.0	Extremely high
Calcium / magnesium	Ca/Mg	9.65	6.7 - 7.1:1.0	High
Iron / copper	Fe/Cu	0.15	2.5:1.0	Low
Aluminium / iron	Al/Fe	3.38	1.28:1.0	High
Iron / manganese	Fe/Mn	8.19	32.7:1.0	V low
<b>Toxic Ratio</b>				
Calcium / lead	Ca/Pb	35.2	0 or >66.7	Fertility alert
Iron / lead	Fe/Pb	1.3	0 or >6.7	Fertility alert
Zinc / cadmium	Zn/Cd	45.8	0 or > 250	Fertility alert
Sulphur / cadmium	S/Cd	11206.9	0 or >4000	Good
Sulphur / lead	S/Pb	5158.7	0 or >5000	Good
Sulphur / copper	S/Cu	578.3	1138+	Low

Note: < = less than > = greater than

#### Ratio Summary

Ratio	Ratio	Actual	Ideal	Comment
Calcium/Phosphorus	Metabolic	1.61	2.6	Fast metabolism type 1
Sodium/Potassium	Stress	1.73	2.5	Overactive Adrenal activity
Calcium/Potassium	Thyroid	0.82	4.0	High thyroid activity
Zinc/copper	Allergy	3.57	8.0	Allergic response
Sodium/Magnesium	Adrenal	20.29	4.1	Adrenal burnout
Calcium/Magnesium	Blood sugar	9.65	7.0	Blood sugar imbalance
Iron/copper	Infection	0.23	2.5	V low

*Based upon analysis and mineral content of your hair one or more of the following conditions and symptoms may be either present or likely to occur if these imbalances, toxicities and/or deficiencies are not corrected or addressed;*

<i>Trend</i>	<i>Action</i>
<i>Copper toxicity</i>	<i>Increase zinc and Vitamin C intake</i>
<i>Anaemia</i>	<i>Iron</i>
<i>Blood sugar regulation</i>	<i>GTF Chromium, manganese, iron</i>
<i>Lowered immune system</i>	<i>Raise sod/potassium ratio (see below)</i>
<i>Arthritic tendencies</i>	<i>Adjust zinc/copper ratio</i>
<i>Magnesium deficiency</i>	<i>Magnesium supplementation</i>
<i>Heavy metals present</i>	<i>Chelation therapy</i>

<b>Copper Overload</b>	Report DATA
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<i>Indicators</i>	<i>Actual</i>	<i>Range</i>	
Copper	<b>56.20</b>	Less than 10 or greater than 35	<b>+</b>
Potassium	<b>269.29</b>	Less than 30	
Calcium	<b>221.7</b>	Greater than 1000	
Zinc/Copper Ratio	<b>2.37</b>	Less than 6 or greater than 12	<b>+</b>
Sodium/Potassium Ratio	<b>1.73</b>	Less than 2.5	<b>+</b>
Calcium/Potassium Ratio	<b>0.82</b>	Greater than 12	
Mercury	<b>0.22</b>	Greater than 0.1	<b>+</b>
Copper Overload Assessment		<b>Positive</b>	

*Positive results, (+), for several of these indicators confirm that you have copper overload in your system even if your hair copper burden may be acceptable or even low. This is because copper is the only nutrient that preferentially accumulates in other soft tissue organs in the body prior to accumulating in the hair.*

#### *Toxic Metals & Pollutants*

<i>Toxic Metal Presentation (if any)</i>	<i>Rating</i>	<i>Risk Potential</i>
Barium	<b>BDL</b>	<i>NIL</i>
Cadmium	<b>2.900</b>	<i>HIGHL</i>
Lead	<b>6.3</b>	<i>HIGH</i>
Aluminium	<b>28.00</b>	<i>HIGH</i>
Nickel	<b>0.41</b>	<i>NIL</i>
Arsenic	<b>0.034</b>	<i>NIL</i>
Mercury	<b>0.2</b>	<i>MODERATE</i>

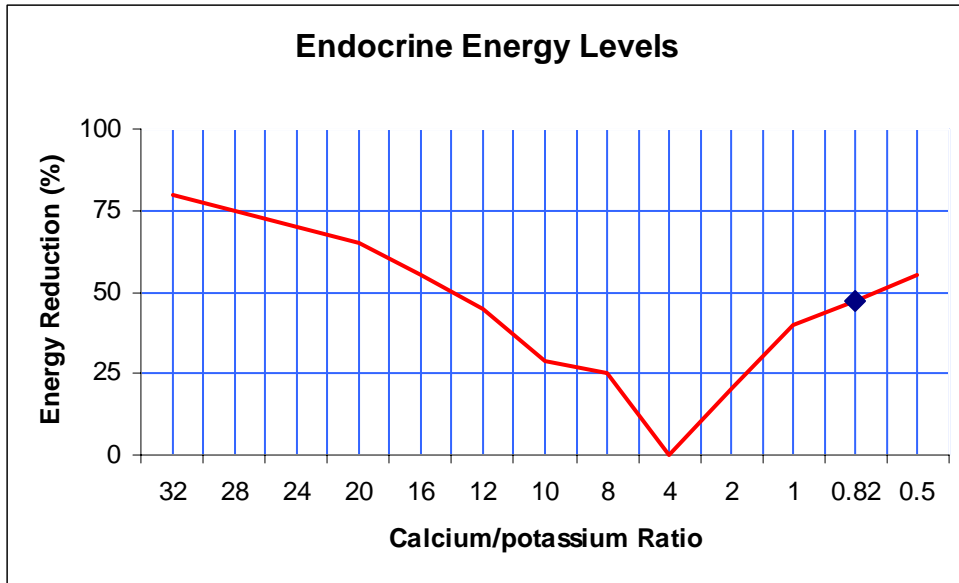
*BDL = below detection limit*

The fact that you are a slow oxidiser/metaboliser with inappropriate ratios and heavy metal presentation (lead) means that you may not be generating sufficient biochemical energy.

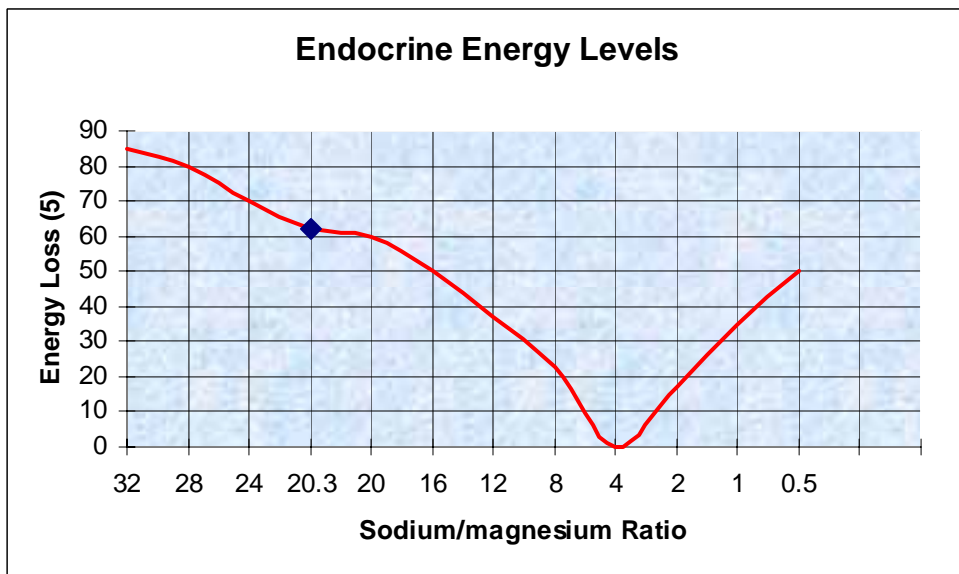
#### *Endocrine & Energy Assessment Profile*

<i>Ratio</i>		<i>Rating</i>	<i>Action</i>	<i>Energy Loss &amp; comments</i>
Sodium/magnesium	Na/Mg	V high	20.29	62%
Calcium/potassium	Ca/K	V low	0.82	47%
Zinc/Copper	Zn/Cu	V low	2.37	<i>Pro-oxidant dominant</i>

#### *Energy Loss due to Thyroid Imbalance*



*Energy Loss due to Adrenal Imbalance*



*The above graphs highlights the effect of endocrine hormone balance and reveals the effect of metabolic imbalance upon energy levels. This arises due to blocking of the energy pathways. Here the endocrine ratios indicate an energy loss of between 47 - 62% depending upon which gland is dominant at any particular time.. When the thyroid (and adrenal) ratios are not normal, the efficiency of energy production in the body decreases. It is like an engine that is turning too slow or too fast (as in your case) - power output declines*

***Stress Profile: Exhaustion stage***

Based upon the ratios controlling the activity of the endocrine or stress glands, your biochemical pattern reveals that you are in the exhaustion stage of stress for a fast oxidiser. This means that you have or are experiencing significant chronic stress and is reflected in your system biochemically.

This can be result of stress from many probable causes whether they be emotional, vocational, physical or environmental. This will, if not corrected, induce many chronic diseases esp inflammatory diseases, toxic metals accumulate etc. Often allergies and fatigue are present.

***Nutrient minerals:***

These are the minerals which are essential for the efficient functioning of the body’s biological processes. These include reproduction, muscular activity, endocrine systems and all metabolic processes.

***Toxic minerals:***

These are “heavy metals” which by virtue of their chemical nature impose toxic effects due to their accumulation. These impose significant restrictions on bodily functions and are detrimental to general health. They interfere with biochemical reactions and processes within the body.

***Significant ratios:***

When the ratios of nutrient minerals to each other are outside the optimum range they can have a significant negative effect on biological functioning and metabolic efficiency in the body. They highlight the fact that mineral interactions may be adversely affecting the body’s metabolic activity.

***Toxic ratios:***

People with elevated levels of toxic minerals do not necessarily exhibit these symptoms, but this ratio will indicate if these minerals will lower metabolic utilization.

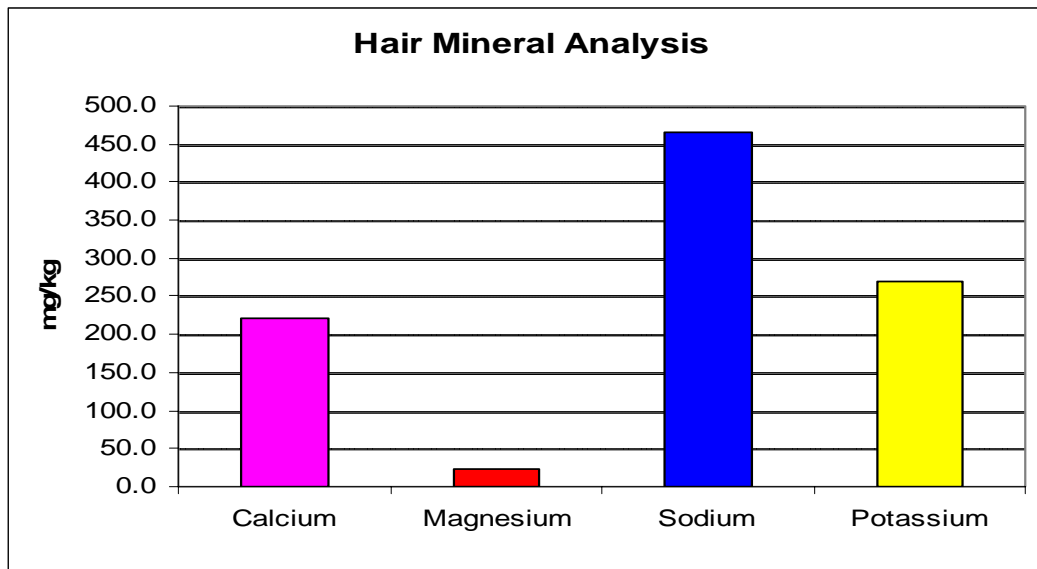
Two options are desirable, either very high ratios or a value of “0”. The higher the toxic ratios the better it is for your health as the high ratio confirms that the specific toxic metal does not cause any metabolic interference with essential nutrients. A toxic ratio of “0.00” is ideal as it indicates the absence of a particular toxic or heavy metal; a very high ratio is just as good as it indicates very little toxic metals.

Toxic Ratio	Symbol	Actual Value	Ideal Value	Comment
Calcium / lead	Ca/Pb	<b>35.2</b>	<b>0 or 84.0+</b>	<b>Significant metabolic interference</b>
Magnesium/Lead	Mg/Pb	<b>3.7</b>	<b>0 or 12.0+</b>	<b>Significant metabolic interference</b>
Copper/lead	Cu/Pb	<b>8.9</b>	<b>0 or 5.0+</b>	<b>No metabolic interference</b>
<b>Zinc/lead</b>	<b>Zn/Pb</b>	<b>16.0</b>	<b>0 or 40+</b>	<b>Significant metabolic</b>

				<b>interference</b>
Iron / lead	Fe/Pb	<b>1.3</b>	<b>0 or 6.7+</b>	<b>Significant metabolic interference</b>
Sulphur/ lead	S/Pb	<b>5158.7</b>	<b>0 or 5000+</b>	<b>No metabolic interference</b>
Zinc / cadmium	Zn/Cd	<b>34.8</b>	<b>0.0 or 400+</b>	<b>Significant metabolic interference</b>
<b>Iron/mercury</b>	<b>Fe/Hg</b>	<b>38.2</b>	<b>0 or 25+</b>	<b>Good, no metabolic interference</b>

*You have a significant problem with lead and can be a serious risk to your well being. It is not only high in absolute terms but it is imparting a significant metabolic interference on the major nutrients preventing their efficient utilisation in your body. It is also blocking your energy pathways and as such you are not generating sufficient biochemical energy .*

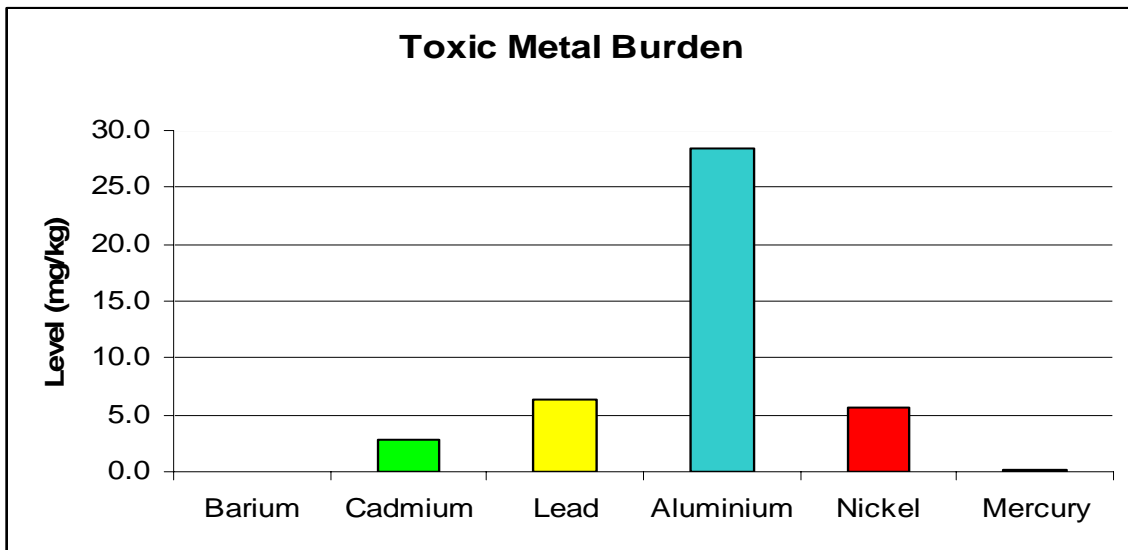
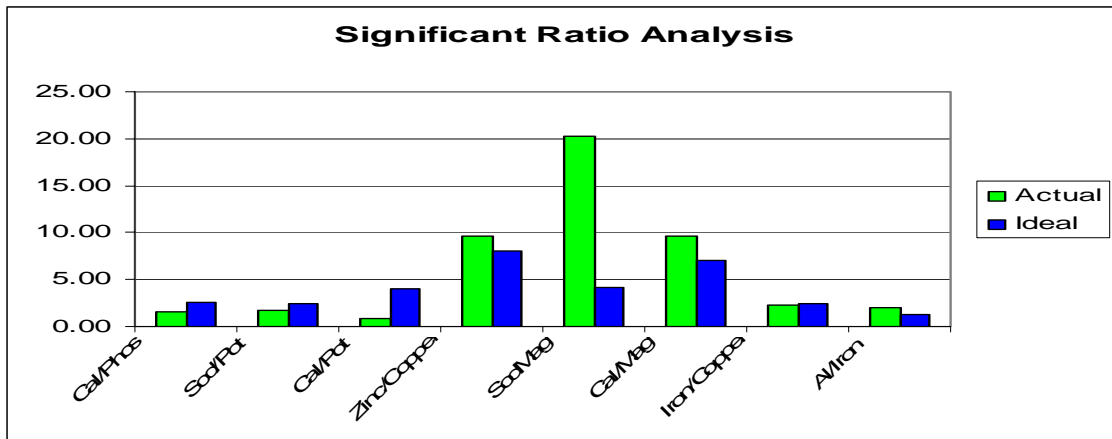
**Major electrolytes:**



**Significant ratio analysis**

The ratios which were low-very low are the: calcium/phosphorus (Ca/P), sodium/potassium (Na/K), calcium/potassium (Ca/K), iron/manganese (Fe/Mn), and iron/copper (Fe/Cu).

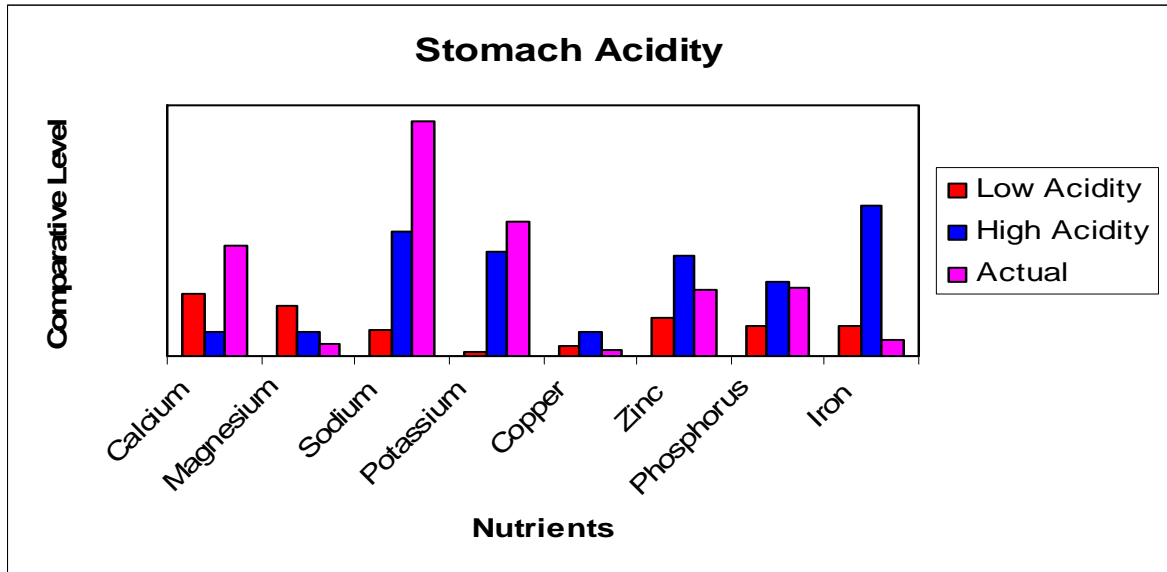
The high or elevated ratios are: calcium/magnesium (Ca/Mg) sodium/magnesium (Na/Mg) aluminium/iron (Al/Fe) and zinc/copper (Zn/Cu).



The levels of toxic metals are substantial and present a significant risk esp if you are seriously preparing for conception. The levels of nickel, mercury, lead and cadmium will cause serious health issues for the future foetus and yourself. Such high risks can result in deformities and autism unless these issues are addressed prior to conception using quality therapies.

The higher the toxic ratios the better it is for your health. A toxic ratio of “0.00” is ideal as it indicates the absence of a particular toxic or heavy metal.

A very high nutrient/toxic metal ratio is good as it confirms that there is no metabolic interference by the particular toxic metal on the nutrient specified.



**Metabolic typing: fast type 1**

This graph shows the level of stomach acidity or different digestive patterns the "low acidity" profile below to the slow metabolisers and the "high acidity" profile is typical of the fast metaboliser. To fully categorize your metabolic typing, several ratios which control the activity of both the thyroid and adrenal glands have to be calculated and then assessed.

Based upon the data presented, there are indications of an inefficient digestion process.

The calcium/phosphorus (Ca/P) ratio is used to categorise metabolic typing, ie whether fast or slow. When this ratio is high, it indicates a slow metaboliser, and a low ratio suggests a fast metaboliser. To determine your class within your metabolic type a combinations of ratios are used. As a result, you are a category 1 fast metaboliser. See following

Metabolic Type	Class	Thyroid Activity	Adrenal Activity
Slow	1	Decreased	Decreased
Slow	2	Decreased	Increased
Slow	3	Increased	Decreased
Slow	4	Increased	Increased
<b>Fast</b>	<b>1</b>	<b>Increased</b>	<b>Increased</b>
Fast	2	Decreased	Increased
Fast	3	Increased	Decreased
Fast	4	Decreased	Decreased

REMARKS:

*There is a strong fertility warning here Barbara. The heavy metals such as, cadmium, lead, aluminium and mercury were present and must be addressed in order to optimise pre-conception health and hygiene.*

*Failure to remove these heavy metals will have serious implications for both yourself and the unborn child, such as autism and learning difficulties, ADD and poor physical and intellectual development.*

These heavy metals will result in a significant reduction in metabolic utilisation of essential nutrients, creating relative deficiencies and /or bio-unavailability of specific nutrients.

Accordingly this is reflected in the low toxic ratios indicating a substantial health problem with lead, cadmium and mercury.

It will imperative for you to undergo chelation therapy to reduce the toxic metal burden prior to conception.

To reduce aluminium values, there are two avenues to pursue, namely

the use of phosphorus due to its chelating effect on aluminium and vitamin E therapy/supplementation

The calcium was acceptable but tending towards the low side of acceptability. Low values if not corrected can be associated with insomnia, fatigue, muscle aches, headaches, palpitations nervousness and irritability and pains and sometimes increased frequency of urination.

The magnesium was very low, and, if not corrected, can lead to persistent or frequent muscle cramps and fast, irregular heart beat (arrhythmia), unstable blood sugar, unrefreshed sleep, shortness of breath, unstable blood pressure .

A history of constipation is usually associated with this metabolic profile. Such a low magnesium profile and associated symptoms are generally indicated where the subject has had a history of intestinal disorders such as celiac disease.

Low calcium and magnesium levels in Fast oxidizer enhances muscle and nerve reactivity causing a tendency for nervous irritability and anxiety states.

When calcium and magnesium are both low, the likelihood of cardiac stress is increased. *This is specially so when magnesium is less than 30.*

The sodium was very high; it can be an indicator of kidney dysfunction and greater aldosterone activity. Sodium retention as recorded can be caused by kidney dysfunction &/or zinc deficiency.

Magnesium deficiency as recorded can also impair normal healing and regeneration of joint surfaces. Many fast oxidizers are in an inflammatory state, ie high in sodium, that can increase the tendency for joint pain.

Fast oxidizer with excessive hydrochloric acid are prone to ulcers, esp if sodium/potassium ratio is low.

Low sodium/potassium ratio indicates protein breakdown which does include stomach lining. It is significant to note that such a low ratio is an indicator of chronic stress.

A low sodium/potassium ratio is a prime indicator for cardiac stress. When calcium & magnesium are both low, as in this case, the likelihood of cardiac stress is increased considerably.

A blood sugar disturbance is indicated is observed by the low sodium/potassium ratio esp combined with the determined levels of iron and copper. If not corrected it can lead to a diabetic trend. The sodium/potassium ratio, being an indicator of blood sugar disturbance, relates less to diet but more to the effects of stress on energy production

The potassium values were very high confirming excessive thyroid activity, and quite often heart palpitations or irregular beating are associated with such high potassium levels.

The chromium content was very low and as a result you may experience problems with elevated insulin levels, impaired glucose tolerance and unstable blood sugar level. Chromium deficiencies if left can lead to significant problems and raised insulin levels. The relationship of chromium and thyroid activity could be explained by chromium's effect upon insulin sensitivity. Reducing insulin levels would result in improved thyroid hormone activity.

It is essential that you take chromium supplementation such as GTF Chromium (GTF = Glucose Tolerance Factor) or Chromium Picolinate.

If the low values of chromium are not addressed and increased it will pre-dispose you to a diabetic trend: however if good supplementation is used you may avert such low energy output

There is an extremely high probability that if the chromium is not addressed soon you will experience gestational diabetes.

Manganese is very good.

Zinc was adequate. However the level of phosphorus can make this zinc unavailable to your body creating a *relative* deficiency.

The high zinc/copper ratio also indicates thyroid overactivity and a bio-unavailability of copper. This is further confirmed by the high potassium levels.

Copper values are high and there is the classic symptoms of "hidden copper toxicity" as indicated by the high zinc/copper ratio, mercury and high potassium values together with the low sodium/potassium ratio. This is usually associated with headaches, esp with a low sodium/potassium ratio.

As a result of this hidden copper toxicity, you will be experiencing classic PMS symptoms and to reduce these symptoms such as uterine pain, cramps and associated problems it is advisable to take magnesium supplements. As copper is essential for iron utilisation in the body, either a high or a low level will result in the inability of red blood cells to incorporate iron, resulting in anaemia.

The phosphorus was adequate.

The sulphur was within the desired ranges.

The dominant pattern or mineral balance in your hair sample indicates that you are a “fast metaboliser” type 1.

To increase the strength of bones and to improve wound healing and repair of connective tissues & cartilage, adequate levels of manganese, magnesium, copper and silicon are essential.

Silicon values were acceptable. Good silicon values are essential to good cardiac health.

You may experience palpitations, particularly during menopause, due to low levels of calcium, magnesium or copper.

***Significant Ratio analysis:***

***Calcium/phosphorus (Ca/P):***

<b><i>Actual</i></b>	<b><i>1.61:1</i></b>	<b><i>Fast metabolizer</i></b>
<b><i>Ideal</i></b>	<b><i>2.5 – 2.7:1</i></b>	

This ratio categorizes the body oxidation rate or metabolic type. Parasympathetic dominance. The pancreas, parathyroid, adrenal cortex and posterior pituitary glands retaining more calcium in body relative to phosphorus.

This ratio confirms that your metabolic typing is fast type 1.

***Sodium/potassium (Na/K):***

<b><i>Actual</i></b>	<b><i>1.73:1</i></b>	<b><i>Low, tends toward</i></b>
<b><i>Ideal</i></b>	<b><i>2.4 – 2.6:1</i></b>	<b><i>fatigue</i></b>

Used to assess immune systems, kidney and adrenal symptoms. A low Na/K ratio is associated with a compromised immune system, lowered energy level, fatigue, liver/kidney stress, bloating and carbohydrate intolerance.

It can be an indicator for a degree of impairment of circulation through kidneys.

***Calcium/potassium (Ca/K):***      ***thyroid ratio***

**Actual**      **0.82:1**                      **Low, tends toward**  
**Ideal**      **3.9 – 4.2:1**                      **hyperthyroidism**

This ratio is very useful in assessing thyroid activity. Any Ca/K imbalance may have following symptoms: fatigue, depression. *Low Ca/K ratio* indicates a trend toward hyperthyroidism (overactive thyroid activity) resulting in energy loss. Also indicates copper imbalance, even though copper may be in therapeutic range.

**Zinc/copper**                      **(Zn/Cu): allergy ratio**  
**Actual**      **9.65:1**                      **High tends toward**  
**Ideal**      **7.9 – 8.1:1**                      **hyperthyroidism (strong activity)**

An indicator of thyroid activity and allergies.

*Incorrect ratio often have some of following symptoms:*

Allergies, (due to high histamine response) Increased histamines;  
Pre-menstrual syndrome. Decreased HD lipoprotein, increased LD lipoprotein, resulting in hardening of arteries. Possible trend towards increased serum cholesterol or increase in atherosclerosis (filling of arteries with fatty plaque). Imbalance leads to ligament + structural abnormalities. May indicate liver not functioning correctly.

Use Vitamin E supplementation; Vitamin E has evidence of reducing oxidation of LDL (a cause of arteriosclerosis) and protects against heart disease

**Sodium/magnesium (Na/Mg): the adrenal ratio**  
**Actual**      **20.. 95:1**                      **V high tends toward hyperadrenia**  
**Ideal**      **4.1 – 4.2:1**                      **( strong adrenal activity )**

Assesses adrenal gland activity. When this ratio is high, ie greater than 4.17:1, you experience adrenal overactivity. Symptoms may include irritability, high blood pressure and high blood sugar.

**Calcium/magnesium (Ca/Mg): blood sugar ratio**  
**Actual**      **9.65:1**                      **High**  
**Ideal**      **6.7 – 7.2:1**

Used to assess blood sugar levels in body. When this ratio is outside the referenced range, sugar imbalance is often present. When mineral deficiency persist over a protracted period, diabetes usually develops. This is usually indicated by a decreased sodium/ potassium ratio, a strong glucose intolerance indicator.

Symptoms associated with such imbalance are fatigue, muscle weakness and lapse of concentration.

Stress of any kind can affect the Ca/Mg ratio. This is most likely due to its affect on the adrenal glands and glucose metabolism. Stress can increase blood sugar through the action of cortisol, leading to reduced sugar tolerance. Nutritional depletion from stress, and sustained excessive cortisol and insulin secretion can cause increased insulin resistance.

*Iron/copper* (Fe/Cu):  
**Actual** 2.24:1 **Marginal**  
**Ideal** 2.5:1

This ratio assesses muscle tissue and blood/oxygen flow from tissues to lungs.

*Aluminium/iron* (Al/Fe)  
**Actual** 2.05:1 **High**  
**Ideal** 1.28:1

Iron and Aluminium are both extremely toxic in large quantities and when in balance, with an Al/Fe reference value of 1.28:1.0, they both bind each other and are safe. Your level indicates that aluminium, in relation to iron, is high and will be free to accumulate in the blood.

*Iron/Manganese* (Fe/Mn)  
**Actual** 30.09:1 **Marg low**  
**Ideal** 32.7:1

This is an indication of the red blood cells' ability to carry oxygen. When this ratio exceeds 36.0:1.0 problems with red blood cells arise reducing oxygen carrying capacity of red blood cells by 35%.

Also anaemia can be present.

### ***Concluding Remarks***

You have a fast metabolism with strong thyroid and adrenal activities with indicators of blood sugar imbalance and food allergies and digestive dysfunction.

To improve one's health their body chemistry must be corrected, getting to the root of the problem, rather than a band-aid approach with medication alone. The following information, supplementation and suggestions are for your perusal.

Suggestions:

Barbara you must increase magnesium and chromium.

The supplementation of zinc and manganese will improve health.

As you and your partner are planning and preparing for conception you must incorporate various therapies designed to remove the toxic metals in your system, such as EDTA therapy or any of the commercially available options. See attached.

*Failure to remove these toxic heavy metals will have significant and adverse effects on the health of the foetus and in early childhood development.*

*You must take measures to eliminate the lead as recorded as this has serious health implications esp later in life. When you take into consideration the fact that you have a strong pro-oxidant (free radical generation) characteristics as well then it is essential to start this programme with the afore-said anti-oxidants.*

Dietary considerations:

You need less carbohydrates, must have more fats and oils to achieve optimum health.

The reasons for this are:

- fats/oils slow down the metabolic rate and provide calories
- fats are digested slowly
- provide continuous supply of energy to stabilize blood sugar

Fast oxidizer with low Sodium/potassium ratio usually require less fats and oils in the diet

Fast oxidizer are better on dairy products, butter and other high-fat foods and more meat.

*Fast oxidizers* need more fats and oils in their diets, and are adversely affected by carbohydrates, particularly simple carbohydrates. They also require more calcium, magnesium, copper, zinc and vitamins A and D. Equally important for these individuals are to avoid excessive B-complex vitamins or vitamin C, which lowers copper and speeds up the oxidation rate

*Barbara, I suggest that you take the analysis to a naturopath or a progressive thinking medical practitioner for further nutritional advice based upon the data obtained from your hair sample.*

It would be advisable to have a re-test in 6-8 months time to monitor and check the body's chemistry.

### **Removal of lead & other heavy metals:**

By taking the place of the nutritional mineral in enzymes, heavy metals cause those enzymes to become inactive. In turn, higher dietary levels of nutritional minerals, such as **vitamins B, C and E** help prevent heavy metal toxicity, as well as help eliminate them from the body.

### **Nutritional factors that combat heavy metal toxicity:**

1. A high potency multiple vitamin and Moorlife mineral supplement
2. Minerals such as calcium & magnesium, zinc, iron, copper, and chromium

3. Vitamin C and B-complex vitamins
4. Sulfur-containing amino acids (methionine, cysteine, and taurine)
5. High sulfur containing foods like garlic, onions, cabbage, whey protein, and eggs
6. Water-soluble fibers such as guar gum, oat bran, pectin, and psyllium seed 18-30

There are stronger measures for severe cases. For many years, treatment with EDTA (ethylene-diaminetetraacetic acid) or DMSA has been considered the best measure for severe toxicity. This compound is very similar to some of the naturally-occurring sulfur-containing compounds found in garlic and onions.

DMSA and other sulfur-containing compounds are able to bind to the heavy metal and convert it from a fat-soluble compound to a water-soluble compound, which the body can flush through the urine.

Fat-soluble compounds are excreted primarily by bile; however, roughly 95% of what is excreted in the bile is reabsorbed from the gastrointestinal tract.

*For lead removal the standard dosages of one of the following will help:*

<b>EDTA</b>	take as per directions
<b>DMSA -</b>	100 - 200 mg three times daily on an empty stomach, or
<b>N-acetylcysteine</b>	500 mg three times daily on an empty stomach, or
<b>MSM -</b>	250 mg three times daily on an empty stomach.

Treatment for one month is usually sufficient. No significant side effects have been reported at recommended levels.

These sulfur-containing compounds may work very similar to DMSA in helping rid the body of heavy metals. Whey protein (25-30 grams per day) can also be helpful because of its high content of sulfur-containing amino acids.

### **FURTHER RECOMMENDATIONS FOR REDUCING HEAVY METALS IN BODY**

Increase the consumption of sulfur-containing foods:

- Garlic
- Onions
- Cabbage
- Whey protein 25-30 gm/day
- Eggs

Eat a high-fiber diet

Take a high-potency multiple vitamin and mineral formula

Take 3-5 grams of a water-soluble fiber such as psyllium seed husks at night

**Notes on lead:**

Anaemia due to lack of heme is frequently observed in lead toxicity. Daniel though you have good levels of iron in your system the iron/lead ratio binds it up creating an induced deficiency. Lead is also an electrophile that avidly bonds with the sulfhydryl group of cysteine in proteins.

Thus, proteins in all tissues exposed to lead will have lead bound to them. Keratin in hair contains a high fraction of cysteine relative to other amino acids and avidly binds lead; hair tissue mineral analysis for lead is a good marker for exposure

Symptoms associated with excessive lead burden

<b>Early Signs</b>	<b>Moderate Exposure</b>	<b>Chronic Exposure</b>
<b>Fatigue</b>	<b>Immune suppression</b>	<b>Anorexia</b>
<b>Anaemia</b>	<b>Nephrosis</b>	<b>Muscle weakness</b>
<b>Abdominal discomfort</b>	<b>Cancer</b>	<b>Peripheral neuropathies</b>
<b>Vertigo</b>	<b>Stillbirths</b>	<b>Long term memory deficits</b>
<b>Headaches</b>	<b>Dental decay</b>	<b>Psychomotor dysfunction</b>
<b>Joint Pains</b>	<b>Arthritis</b>	<b>Emotional instability</b>
<b>Memory impairment</b>	<b>Hypertension</b>	<b>Hostility</b>

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