

Basic Ratios and Their Meaning.

Introduction:

Balance in all phases of life is critically important to maintain health and this principle applies to mineral levels in hair analysis.

What is a mineral ratio?

A pure number consisting of one mineral level divided by a second mineral level. Mineral ratios are often more important in determining nutritional deficiencies and excesses than mineral levels alone, although both are important and should be considered together. The understanding of mineral ratios is extremely exciting and much more revealing than analyzing mineral levels alone.

The Importance Of Ratios:

- **Ratios** are often more important than levels.
- Ratios represent **homeostatic balances**.
- Ratios are indicative of disease **trends**. These are not diagnostic but are research **associations**.
- Ratios are frequently **predictive** of future metabolic dysfunctions or hidden metabolic dysfunctions.
- Ratios can be used to **chart progress**. However, one must consider all the important ratios, as well as mineral levels, symptoms and signs.
- Frequently, one or more ratios will look worse on a retest. This doesn't necessarily mean that the patient's health status is worse.
- The following ratios are the most important for evaluation purposes:

The Basic Mineral Ratios:

1) Calcium/Magnesium (Ca/Mg) Ratio:

- Referred to as the **blood-sugar ratio**.
- Normal ratio is 6.67:1
- Calcium is required for the release of insulin from the pancreas.
- Magnesium inhibits insulin secretion.
- Magnesium is necessary to keep calcium in solution.

Trends Associated with the Calcium/Magnesium (Cal/Mag) Ratio:

Ratio:	Trend:
12+	Severe glucose (sugar) and simple carbohydrate sensitivity.
8.50 – 12	Imbalanced glucose metabolism.
6.67 – 8.49	Within optimal limits.
6.67	IDEAL
4.51 - 6.67	Within optimal limits.
3.33 - 4.50	Imbalanced glucose metabolism.
Below 3.3	Severe glucose (sugar) and simple carbohydrate sensitivity.

Also, a very high (greater than 16.0) or very low calcium/magnesium ratio (less than 2.0) is associated with mental or emotional disturbances.

Factors which may Modify the Interpretation of the Ratio:

- Calcium or magnesium loss will raise the levels temporarily.
- Cortisone therapy will lower calcium levels.
- Cortisone therapy will raise both sodium and potassium levels.
- Lead and cadmium toxicity will displace calcium.

2) Calcium/Potassium (Ca/K) Ratio:

- Called the **thyroid** ratio because calcium and potassium play a vital role in regulating thyroid activity.
- Does not always correlate with blood thyroid tests because hair analysis is a tissue test. Often blood tests will be normal but hair analysis will indicate an impaired thyroid function. Sometimes symptoms of hypothyroidism may be evident, but the hair test will show a hyperactive thyroid ratio. For nutritional correction, it is prudent to follow the hair analysis indication.
- The thyroid gland is one of the major glands which regulate metabolic rate in the body. A hyperactive thyroid is associated with fast metabolism.
- 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 - power output declines.

Ideal Calcium/Potassium Ratio is 4:1:

- A calcium/potassium ratio of less than 4:1 is indicative of increased thyroid activity.
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- 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 - power output declines.

Trends Associated with the Calcium/Potassium (Ca/K) Ratio:

Ratio:	Trend:
32+	Severe low thyroid activity 75%+ energy loss.
16 – 32	Sluggish thyroid 50-75% energy loss.
8 – 16	Moderate sluggish thyroid 25-50% energy loss.
4 – 7.99	Mild sluggish thyroid activity 10-25% energy loss.
4	IDEAL - 100% energy.
2 – 4	Mild fast thyroid activity 10-25% energy loss.
1 – 2	Moderate fast thyroid activity 25-50% energy loss.
Below 1	Excessive thyroid activity 50% or more energy loss.

Symptoms of Reduced Thyroid Activity Include:

- Tendency to gain weight.
- Cold hands and feet - tendency to feel cold.
- Lack of sweating.
- Fatigue.
- Dry skin and dry hair.
- Tendency towards constipation.

Symptoms of Overactive Thyroid Activity Include:

- Excessive sweating.
- Hyperactivity, irritability.
- Nervousness.
- Oily hair and skin.
- Occasional tendency towards frequent bowel movements or diarrhea during times of stress.

3) Sodium/Magnesium (Na/Mg) Ratio:

- Referred to as the **adrenal ratio** because sodium levels are directly associated with adrenal gland function. Aldosterone, a mineral corticoid adrenal hormone, regulates retention of sodium in the body. In general, the higher the sodium level, the higher the aldosterone level.
- The sodium/magnesium ratio is also a measure of energy output, because the adrenal glands are a major regulator (along with the thyroid gland) of the rate of metabolism.

Ideal Sodium/Magnesium Ratio is 4.17:1:

- The sodium/magnesium ratio is a tissue reading and will often not match blood tests for adrenal hormones. Usually the blood tests will be normal, but the tissue mineral test will show abnormal adrenal function.
- Symptoms, however, usually correlate well with the hair analysis.

Trends Associated with the Sodium/Magnesium (Na/Mg) Ratio:

Ratio:	Trend:
16+	Extremely overactive adrenals 50% or more energy loss.
8 – 16	Moderate excessive adrenals 25-50% energy loss.
4.17 – 7.99	Mild excessive adrenal activity 10-25% energy loss.
4.17	IDEAL 100% energy.
2 - 4.17	Mild sluggish adrenal activity 10-25% energy loss.
1 – 2	Moderate sluggish adrenals 25-50% energy loss.
Below 1	Adrenal Insufficiency 50% or more energy loss.

Factors which may Modify the Interpretation of the Ratio:

- Sodium levels can be elevated by cadmium, mercury, copper, iron and nickel. An excess of these minerals will raise the sodium level temporarily, although adrenal function may actually be low. Look at every chart for the presence of these metals when evaluating the adrenal ratio.
- Magnesium and sodium are rarely lost through the hair, causing a "false" reading.

Symptoms of Underactive Adrenal Glands Include:

- Fatigue or diminished stamina.
- Depression.
- Hypoglycemia.
- Weight fluctuations.
- Poor digestion - diminished ability to tolerate fats and meat protein.
- Allergies.

Symptoms of Overactive Adrenal Glands Include:

- Tendency to inflammation and inflammatory reactions.
- Increased stamina and drive.
- Aggressiveness, impulsiveness.
- Hypertension.
- Diabetes.
- Type A personality.

4) Sodium/Potassium (Na/K) Ratio:

- Referred to as the **life-death ratio** because it is so critical.
- Related to the sodium pump mechanism, and the electrical potential of cells which is regulated by sodium and potassium levels.
- Sodium is normally extracellular, while potassium is normally intracellular. If the ratio of these minerals is unbalanced, it indicates important physiological malfunctions within the cells.
- The sodium/potassium ratio is intimately related to kidney, liver and adrenal gland function, and an imbalanced sodium/potassium ratio is associated with heart, kidney, liver, and immune deficiency diseases.
- The sodium/potassium ratio is intimately linked to adrenal gland function, and the balance between aldosterone (mineralocorticoid) and cortisone (glucocorticoid) secretion.

Trends Associated with Sodium/Potassium (Na/K) Ratio:

Ratio:	Trend:
6.+	Severe elevation - inflammation and adrenal imbalance. High ratio can also be associated with asthma, allergies, kidney and liver problems. A high sodium/potassium ratio is considered preferable to a low sodium/potassium ratio.
4.5 – 6	Moderate elevation - tendency towards inflammation.
2.5 – 4.49	Mild elevation - good adrenal function.
2.5	IDEAL
2 - 2.5	Mild inversion - beginning of adrenal exhaustion
1 – 2	Moderate inversion - kidney and liver dysfunction, allergies, arthritis, adrenal exhaustion, digestive problems, deficiency of hydrochloric acid.
Below 1	Severe inversion - tendency towards heart problems, arthritis, kidney and liver disorders.

Factors which may Modify the Interpretation of the Ratio:

- Mercury or cadmium toxicity, or an elimination of these metals can affect the sodium/potassium ratio.
- Sometimes a sodium/potassium ratio will be worse on a retest, but the patient feels better. This is because some other mineral or mineral ratio on the chart has improved, such as the elimination of cadmium or copper, or normalization of another ratio. The elimination of a heavy toxic metal is the most common cause of a sodium/potassium inversion, on a retest chart.
- Occasionally a sodium or potassium loss can occur.

5) Zinc/Copper (Zn/Cu) Ratio:

- The mineral Zinc and copper are influenced by several physiological factors, as well as hormonal factors, including estrogen, progesterone and testosterone.
- Using the zinc/copper ratio is a much more effective method of evaluating zinc and copper readings than considering either copper or zinc levels alone.

Trends Associated with the Zinc/Copper Ratio:

Ratio:	Trend:
16+	Severe copper deficiency or bio-unavailability of copper.
8+ - 16	Copper deficiency or unavailability.
8	IDEAL
4.51 - 7.99	Possible copper toxicity.
2 - 4.50	Copper toxicity.
Below 2	Severe copper toxicity – excessive breakdown, emotional instability, zinc deficiency problems such as impotence, slow healing, loss of taste, smell, appetite, and hair loss.

- A high zinc/copper ratio is indicative of a zinc dominance.

Symptoms often associated with a high zinc/copper ratio may include:
Atherosclerosis, female problems, hypercholesterolemia, skin problems.

- A low zinc/copper ratio is indicative of a copper dominance and a possible copper toxicity.

Symptoms often associated with a low zinc/copper ratio may include:
Allergies, asthma, headaches, immune deficiency, female problems, infections, insomnia, liver problems, skin problems (acne, eczema, hives, psoriasis, skin rashes), behaviour problems, psychological problems, emotional instability.

Factors which may Modify the Interpretation of the Ratio:

- A zinc loss can artificially raise the zinc level.
- A copper level less than 1.0 often indicates a hidden copper toxicity.
- Cadmium toxicity can elevate the zinc reading.

6) Calcium/Phosphorus (Ca/P) Ratio:

-Metabolic Rate (Parasympathetic/Sympathetic)

7) Iron/Copper (Fe/Cu) Ratio:

-The relationship between iron and copper are also important for many reasons. They are involved in cellular respiration and electron transport.

Oxidation Types:

The oxidation rate is the rate at which food is burned in the body. The oxidation rate is closely related to the metabolic rate, a term referring to the general rate of chemical reaction or metabolism in the body.

Fast Oxidation:

-The condition in which there is too rapid a release of energy in the biochemical pathway.

Slow Oxidation:

- Slower than normal release of energy in the biochemical pathway.

Mixed Oxidation:

- A transition or unstable state in which one of the glands, thyroid or adrenal, is overactive and the other underactive, causing an unstable release of energy.