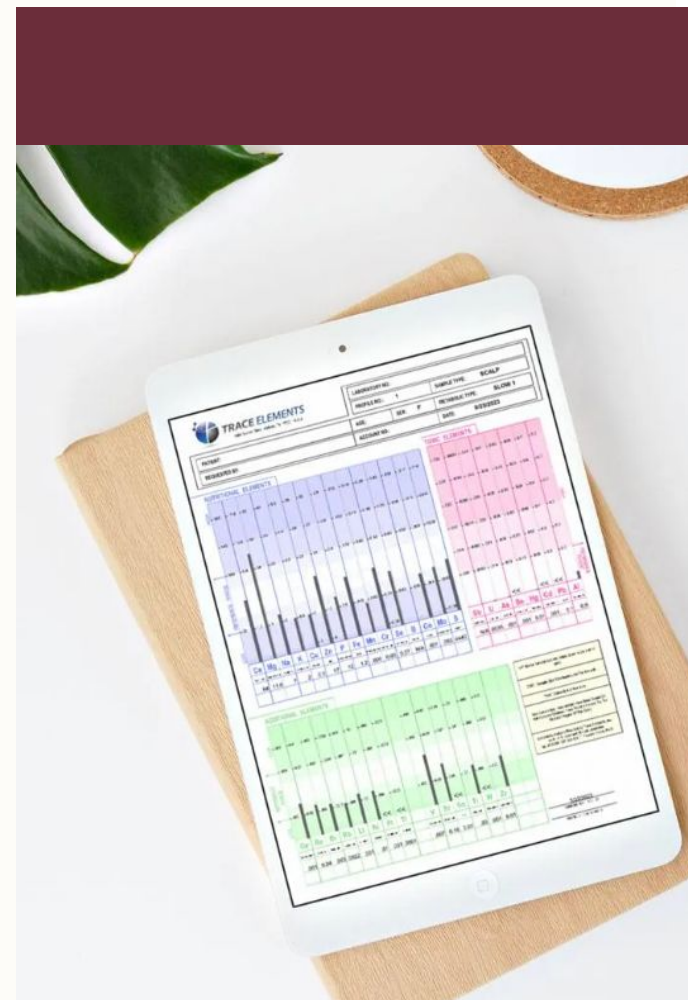


The Power of HTMA

A Foundational Guide to Physical and Emotional Health for the National Chiropractors Association

Sophie Shepherd, FDNP

FOUNDER OF SHE TALKS HEALTH



Sophie's Story

Before HTMA: stumbling around in the dark

Health challenges since age 16: IBS, anxiety,
depression, hair loss, chronic fatigue, brain fog,
Hashimoto's, ruptured ovarian cysts
Felt completely powerless over my own body

HEALTH COMPOUNDED EXPONENTIALLY in the
last 5 years because of one tool: HTMA

One simple, cost-effective test that changed
everything for my health AND my practice

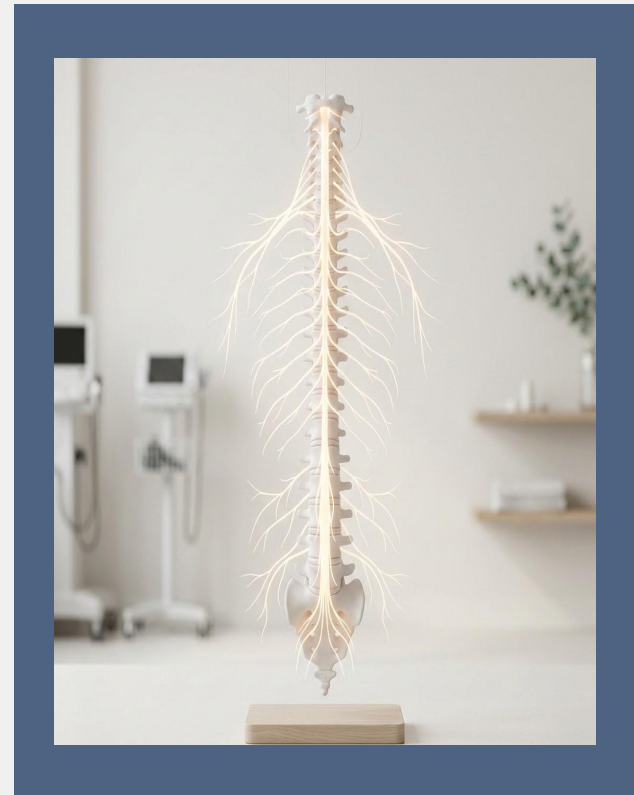


Mind-Body Connection

You understand the mind-body connection better than almost anyone in clinical practice.

Your entire work is built on the relationship between the spine, the nervous system, and the rest of the body.

You already know that what is happening in the brain is happening in the body — that the body is not a collection of isolated parts. It is **one connected system**.





Sophie Shepherd

- Founder of SHE Talks Health
- Creator of the SHE Talks Health Podcast
- 9 Years as a Functional Diagnostic Nutrition Practitioner
- Focused on women's thyroid, hormone & gut health
- Helping women with Hashimoto's, thyroid issues, and mystery symptoms like fatigue, bloating, anxiety, and brain fog find easy and sustainable ways to finally feel like themselves again.
- Combining functional lab testing and emotional wellness tools.

Lisa Pitel-Killah

- Board Certified Holistic Health Practitioner, FDN-P, ICIM, ISOM, hTMAP
- Holistic Carnivore & Equine Nutritionist
- Founder and CEO of Vykon Supplements including Vykon Customs
- Founder of the Clinical HTMA Academy
- Creator and host of The HTMA View Show
- Co-founder and co-host of the HTMA Virtual Summit
- Creator of the Human Optimization Podcast



Our Time Today

Introduction to HTMA

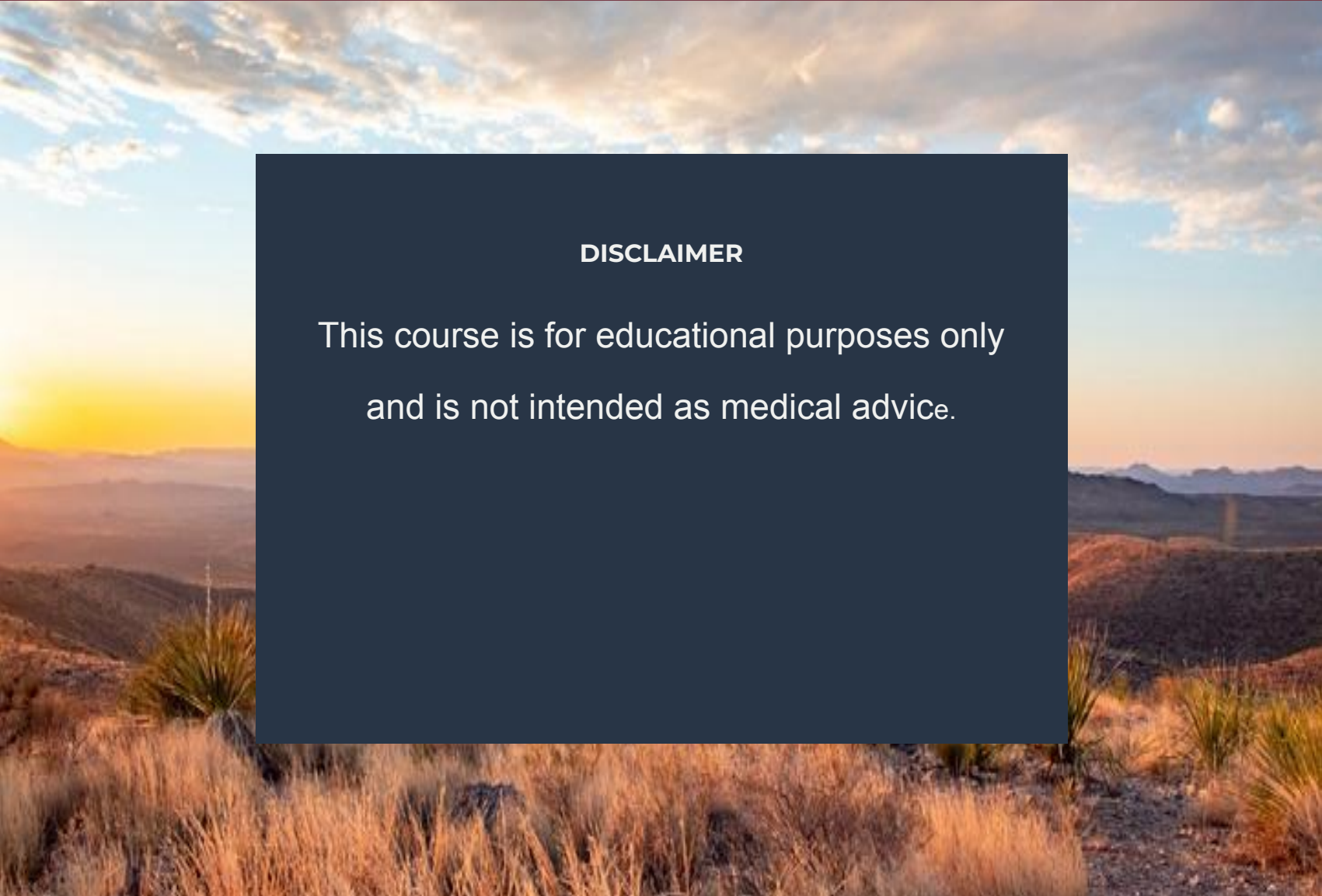
Macro Minerals & Oxidation Types

Significant Ratios

Heavy Metals & Emotions (lead & bones)

Copper Dysregulation: The Bone, Mood,
Hormone, and Neurological Connection

The Calcium Shell: Soft Tissue Calcification

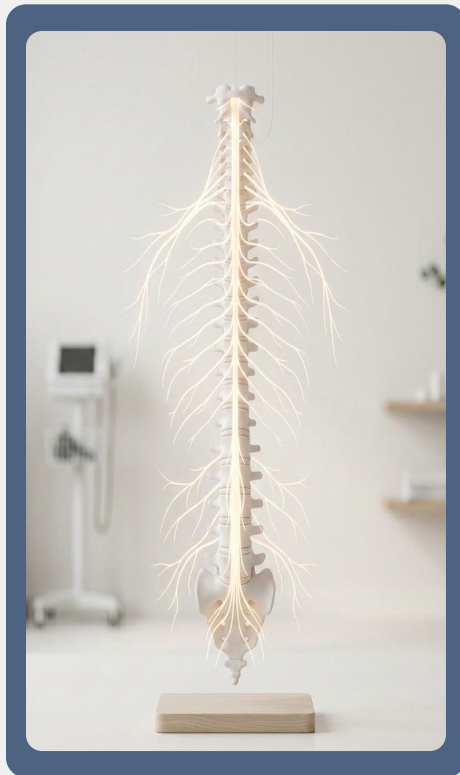
A desert landscape at sunset with a dark blue text box in the center. The background shows a vast desert with dry grass, yucca plants, and distant mountains under a sky with scattered clouds. The sun is low on the horizon, casting a warm glow.

DISCLAIMER

This course is for educational purposes only
and is not intended as medical advice.

What if your Patients' Adjustments aren't holding because of a mineral problem?

HTMA can help you understand why your patients:



01 Adjustment Laxity

Cannot hold spinal adjustments due to mineral-driven ligament and tendon laxity.

02 Muscle Tension

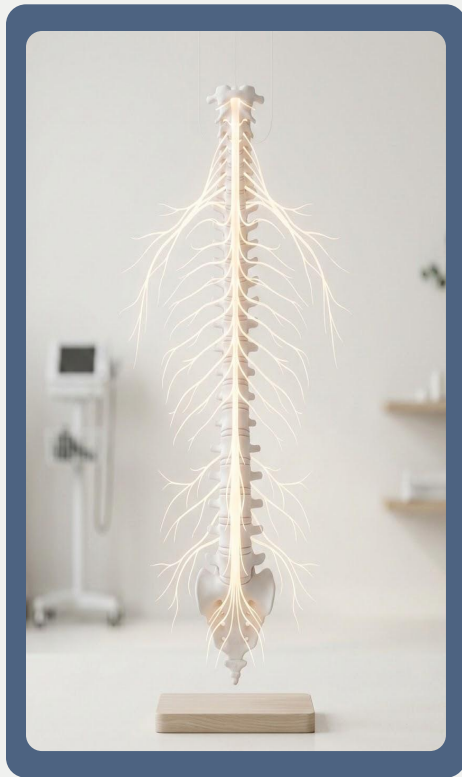
Have chronic muscle tension, spasm, and pain that does not resolve with treatment alone.

03 Joint Stiffness

Experience joint stiffness, calcification, and bone spurs from soft tissue calcium deposits.

What if your Patients' Adjustments aren't holding because of a mineral problem?

HTMA can help you understand why your patients:



04 Slow Recovery

Feel exhausted, crash after exercise, and recover slowly between sessions.

05 Neurological Issues

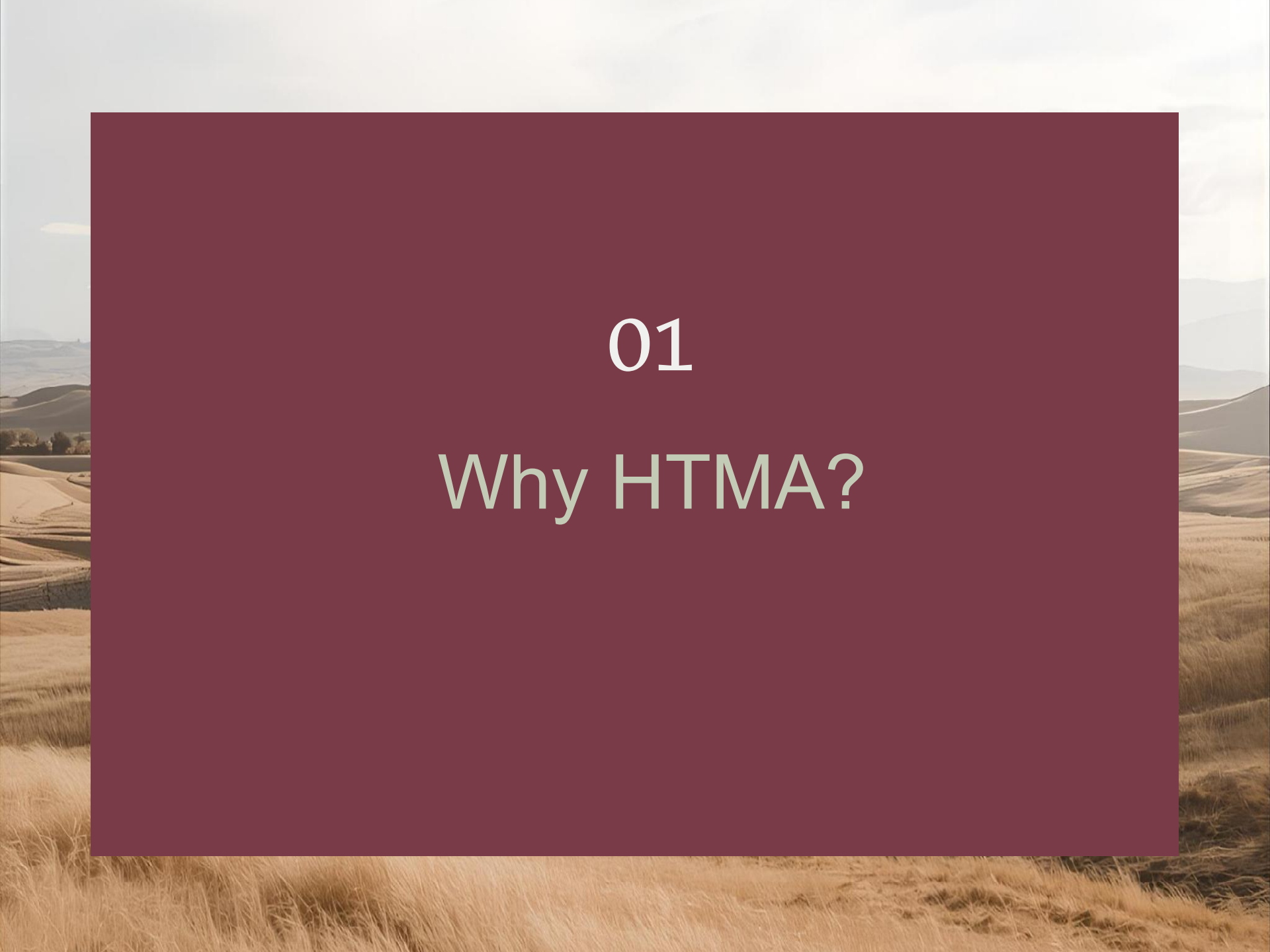
Neurological symptoms including tingling, weakness, and numbness with no clear cause.

06 Bone Loss

Present with bone loss or osteoporosis even while taking calcium supplements.



GROUP SHARE

The background of the slide is a photograph of rolling hills under a cloudy sky. A large, solid maroon rectangle is centered on the page, serving as a backdrop for the text.

01

Why HTMA?

Why HTMA? Why Now?

- Nearly 1 in 2 Americans experiences significant daily stress (Gallup 2024)
- 80%+ of adults report physical & emotional effects from prolonged stress (APA)
- Chronic stress burns through magnesium, potassium & sodium faster than the body can replace them
- Our soil is depleted. Our food supply has changed.
- Diet alone cannot restore what modern life takes out.



Minerals Are the Spark Plugs

- Required for millions of enzyme reactions in the body
- Their availability determines how well the human body runs
- When they are out of balance - we are out of balance

Quick clinical examples:

- Copper: low copper = direct driver of fatigue
- Zinc, Potassium, Sodium: required for stomach acid
- Calcium: bone density & healthy teeth
- Magnesium: required for 300+ enzymatic processes



Why Blanket Supplementation Falls Short

Minerals do not work in isolation — they work in RELATIONSHIP .

Supplementing one without understanding the full picture drives other essential nutrients out of balance.

You cannot guess your way to mineral balance. You need data first.

Copper & Zinc

Another pair of direct biological competitors that require precise balancing.

Sodium & Potassium

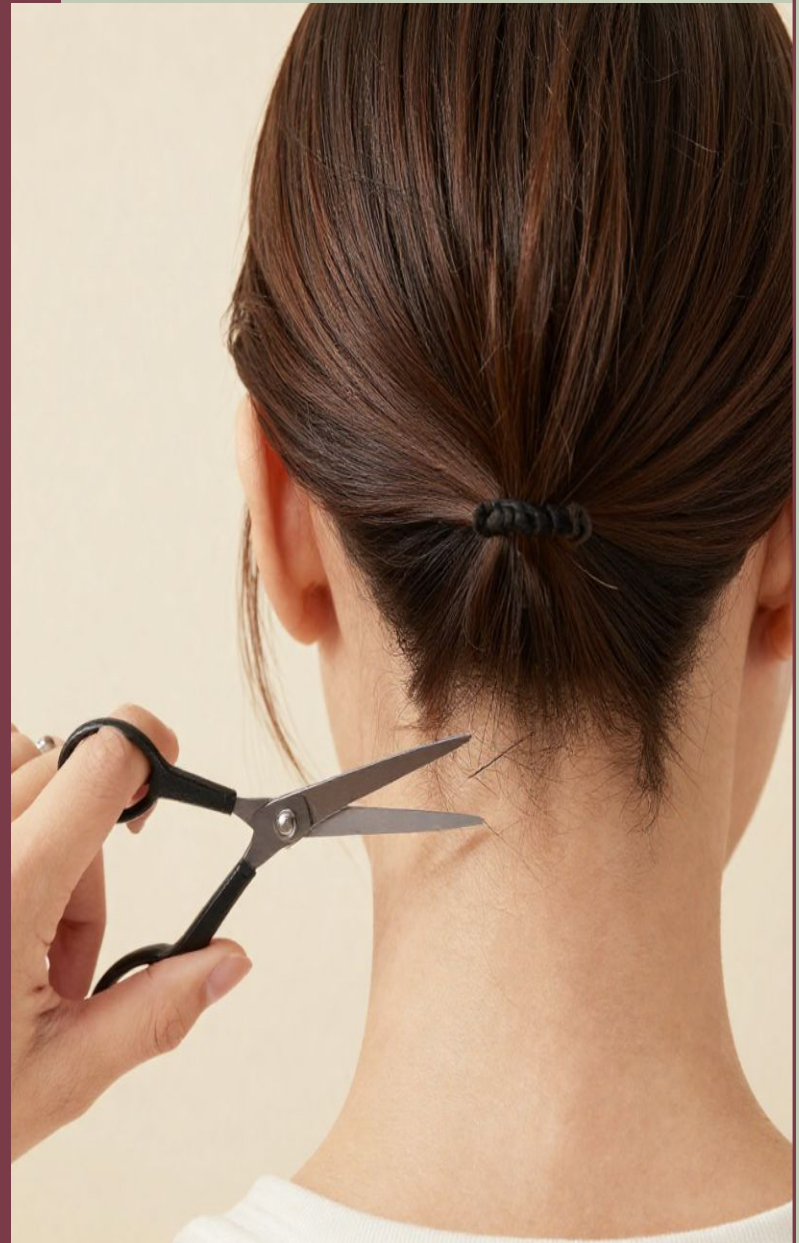
These elements work closely in tandem to regulate cellular function.

Blind Supplementation Danger

Taking synthetic iron or Vitamin D without checking status can drive further imbalances.

WHAT HTMA IS AND HOW IT WORKS

- Sent to a lab to measure the body's mineral content
- Hair = a window into intracellular mineral status
- We see what is happening INSIDE THE CELL - not just in circulation
- 1.5 inches of hair collected from the crown
- approximately 3 to 4 months of mineral history



BLOODWORK & URINE:

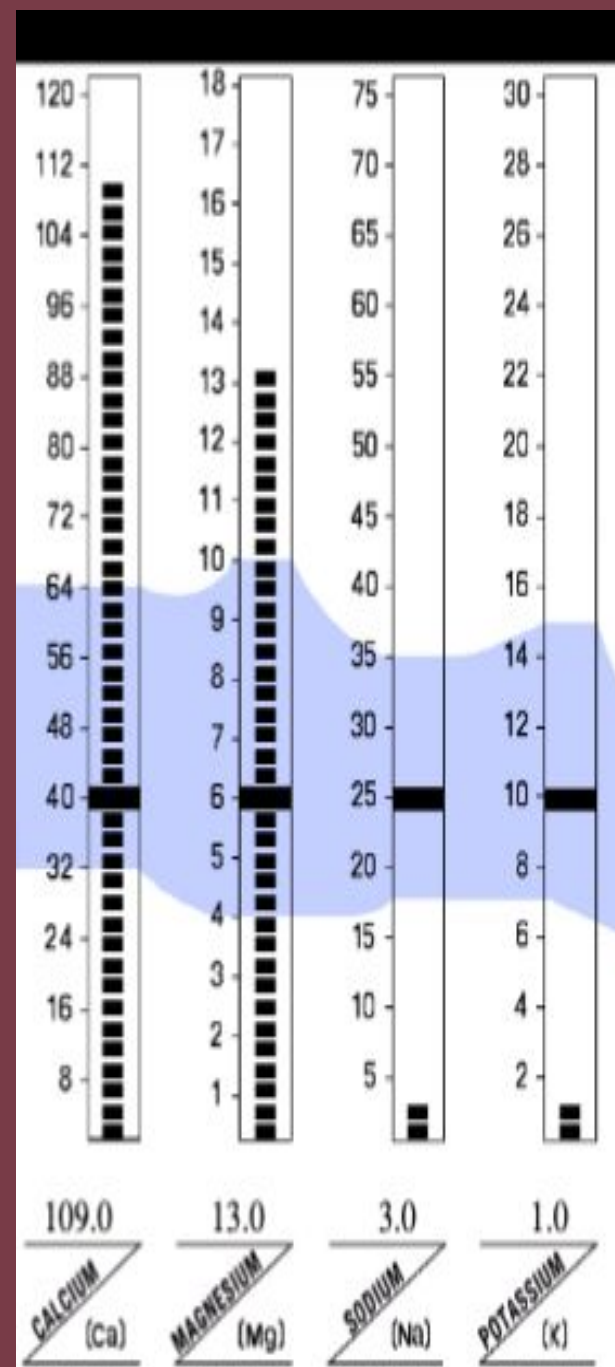
- A snapshot of a moving target/ moment in time
- Can look normal even when tissue is depleted

HTMA - A BLUEPRINT FOR HEALTH

- A 3-4 month average of what has been happening inside the cell
- Reads PATTERNS not single data points
- Patterns are where the clinical information lives
- HTMA is not a replacement for bloodwork. It is a complement to it.



Sodium	138.00	Normal
Potassium	4.30	Normal
Chloride	103.00	Normal





01

MACRO MINERALS

The Macro-Mineral "Big Four"

Driving Metabolism and Nervous System State



Ca

Calcium

THE SEDATIVE

Regulates structural integrity, blood sugar, and muscle contraction.



Mg

Magnesium

THE RELAXANT

Essential for over 300 enzymatic reactions. Supports relaxation and insulin sensitivity.



Na

Sodium

THE VITALIZER

Drives adrenal output and blood pressure. Primary marker for the "Alarm Phase" of stress.



K

Potassium

THE SENSITIZER

Required for thyroid hormone sensitivity at the cell. Critical for vitality and energy production.

CALCIUM

The Sedative & Primary Structural Element

Key Functions

- Primary structural element - 99% should be in bones & teeth
- Controls the nervous system & maintains pH balance
- *Required for muscle contraction*
- Inhibitory effect on thyroid & insulin release



CALCIUM

The Sedative & Primary Structural Element

Ideal on HTMA: 42

Deficiency: histamine, allergies, anxiety, insomnia, adrenal hyperactivity, hyperthyroid, depression

Excess (most common): muscle aches, memory loss, depression, fatigue, constipation, kidney stones, emotional numbness, joint stiffness

** If calcium is above 42 on the panel - it is precipitating out of bone into soft tissue. Presents as: Spine Immobility*

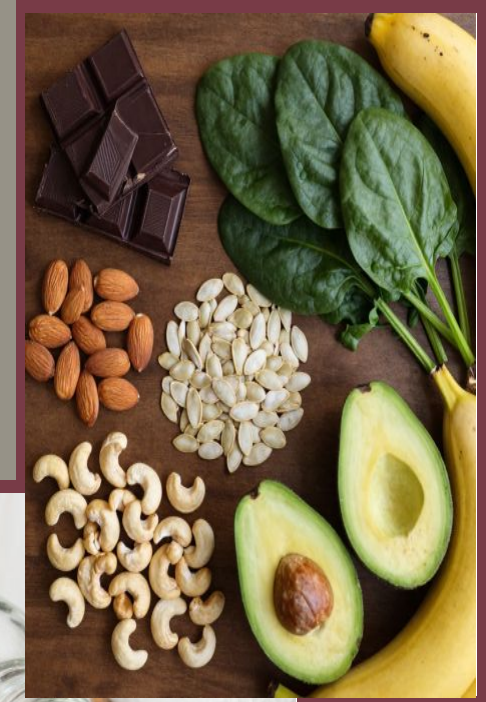


MAGNESIUM

The Relaxant & Anti-Stress Mineral

Key Functions

- Required for 300+ enzymatic processes
- The body's #1 anti-stress mineral - depleted by stress & anxiety
- 99% intracellular - blood levels tell you almost nothing
- Key to energy production, blood sugar regulation & muscle relaxation
- Calcium contracts muscle - Magnesium releases it



MAGNESIUM

The Relaxant & Anti-Stress Mineral

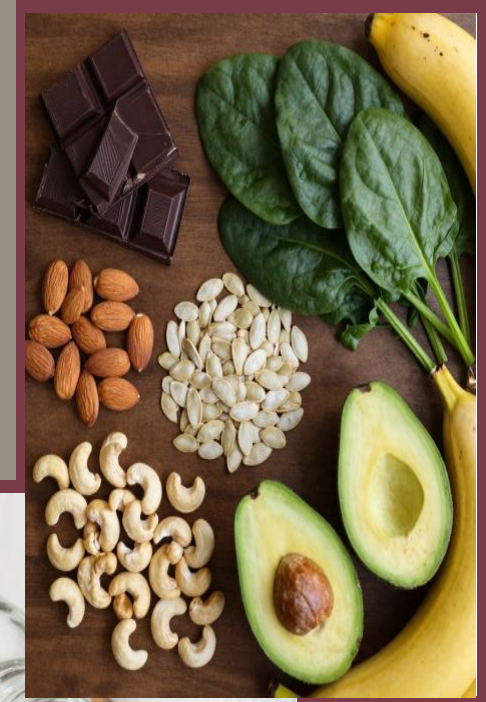
Ideal on HTMA: 6

Deficiency: osteoporosis, depression, anxiety, adrenal & thyroid dysfunction

High Mg on HTMA: usually a loss pattern, burning through magnesium from stress

BEST FORMS: Glycinate, Malate, Threonate (BBB), Transdermal

Dosing: up to 5x body weight in lbs in mg daily

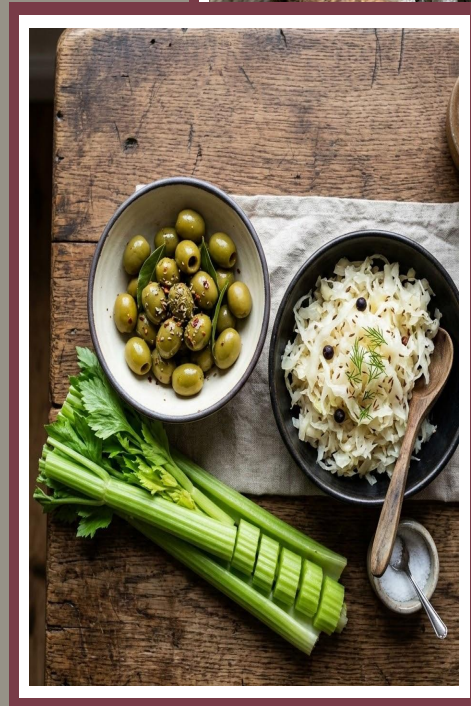


SODIUM

Human Battery & Adrenal Regulator

Key Functions

- Primary solvent mineral - keeps calcium & magnesium in solution
- Regulated by adrenals via aldosterone
- Higher sodium = faster adrenal function
- Primary mineral in the stress response
- Influences stomach acid - chronic low HCl is very often a sodium issue



SODIUM

The Human Battery & Adrenal Regulator

Ideal on HTMA: 24

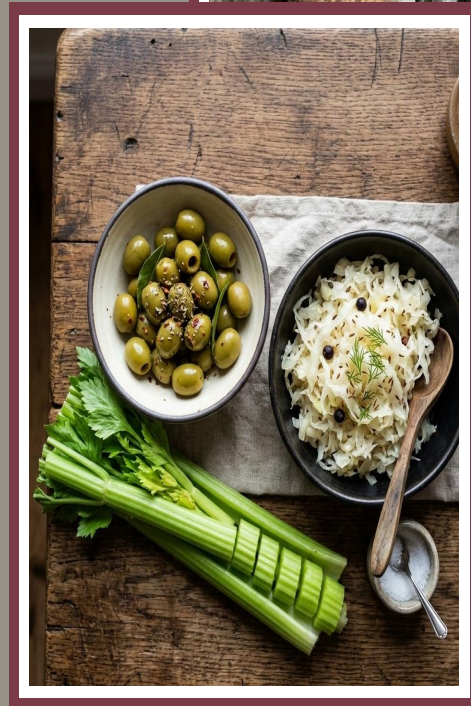
Deficiency: allergies, low blood pressure, poor digestion, fatigue, exercise intolerance, dizziness, bloat

Excess (driven by inflammation):

edema, high blood pressure, irritability, anxiety - fight or flight

BEST FORM: Unrefined Celtic sea salt

AVOID: Table salt, Himalayan salt

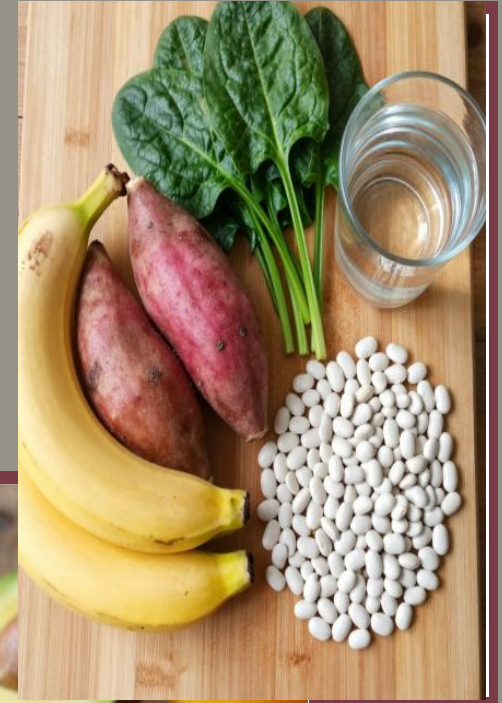


POTASSIUM

The Primary Solvent & Thyroid Sensitizer

Key Functions

- Primary solvent mineral - 99% intracellular
- Sensitizes the cell to thyroid hormone
- Low potassium = poorly utilized thyroid hormone & hypothyroid symptoms
- Involved in nerve conduction of the heart
- High blood levels often indicate cellular loss



POTASSIUM

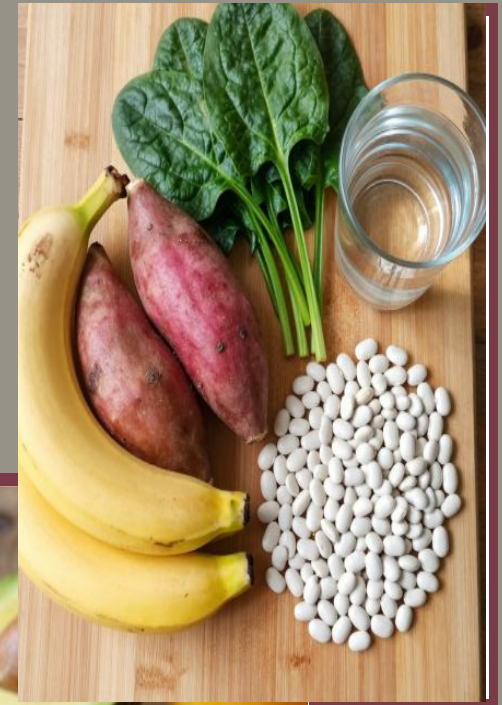
The Primary Solvent & Thyroid Sensitizer

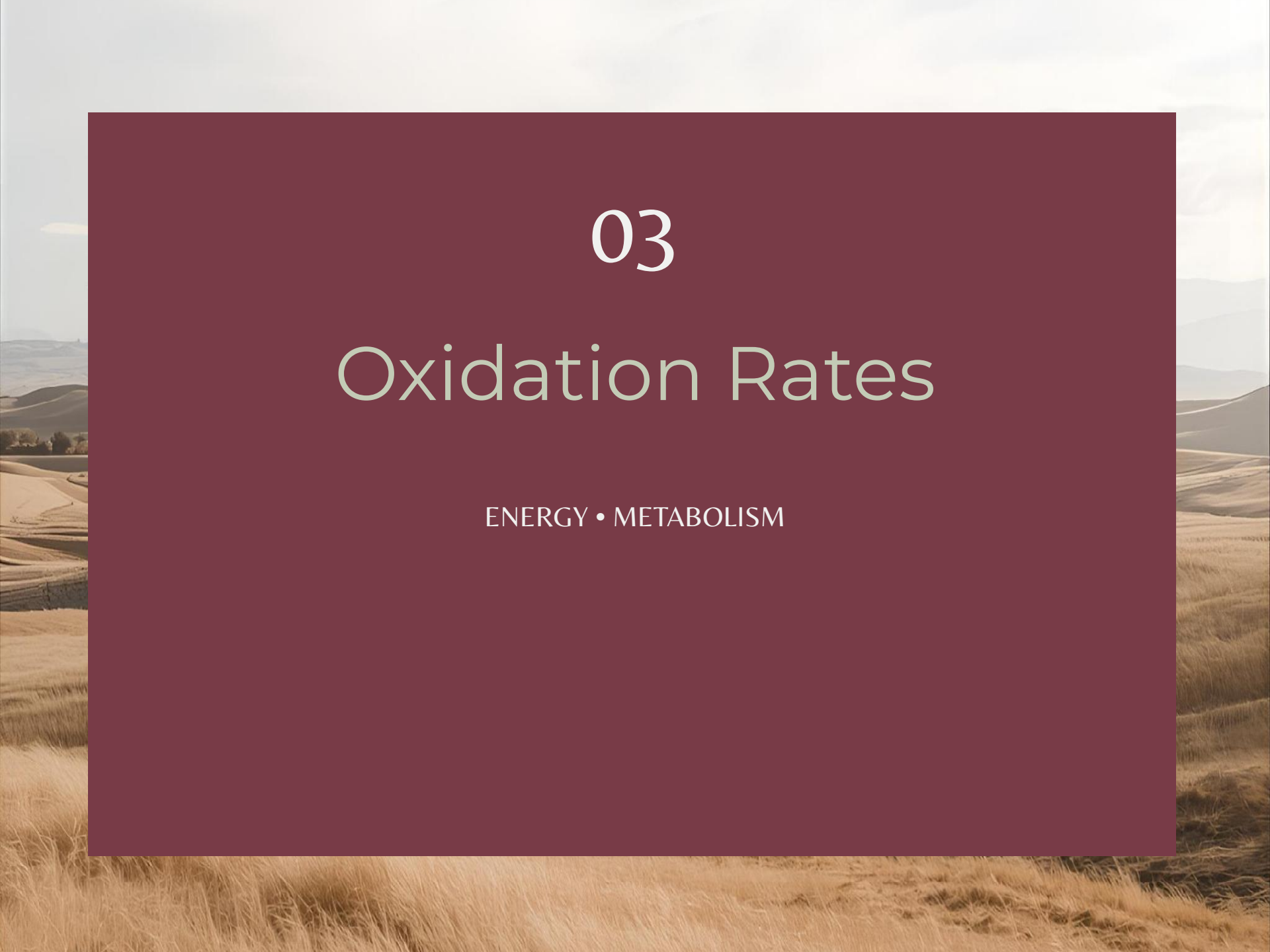
Ideal on HTMA: 10

Deficiency: fatigue, irregular heartbeats, constipation, **muscle weakness/cramps**, depression, high blood sugar

Excess: depression, high blood sugar, **muscle spasms**

BEST FORMS: Food first, glycinate, gluconate, (300-1000mg supplement)



The background of the slide is a photograph of a landscape. It features rolling hills in the distance under a cloudy sky. In the foreground, there is a field of tall, golden-brown grass. A large, solid maroon rectangle is overlaid on the image, containing the text.

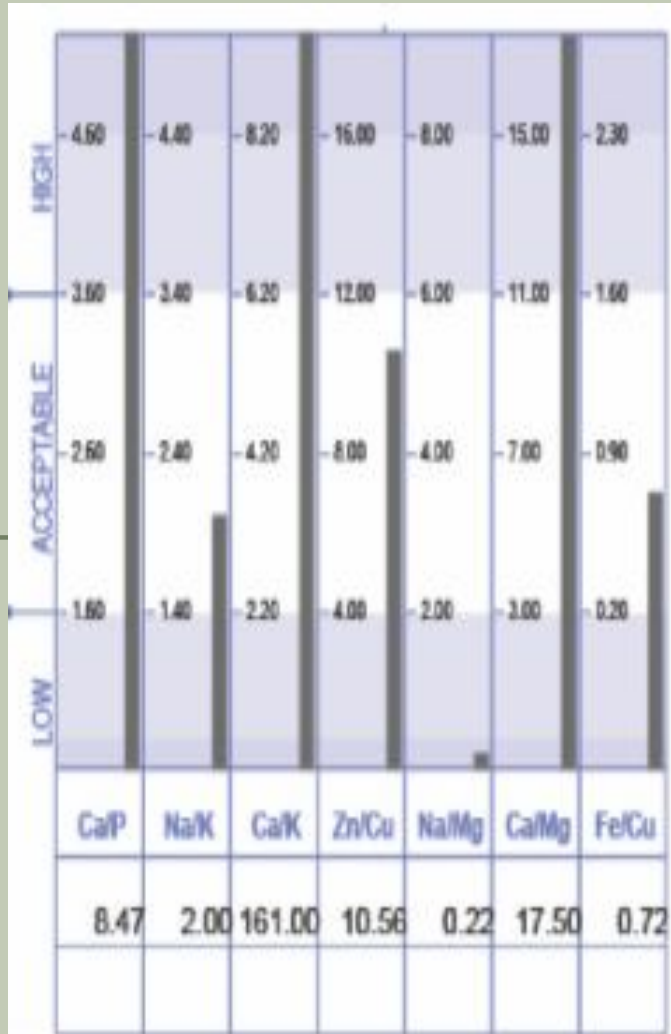
03

Oxidation Rates

ENERGY • METABOLISM

The Oxidation Rate

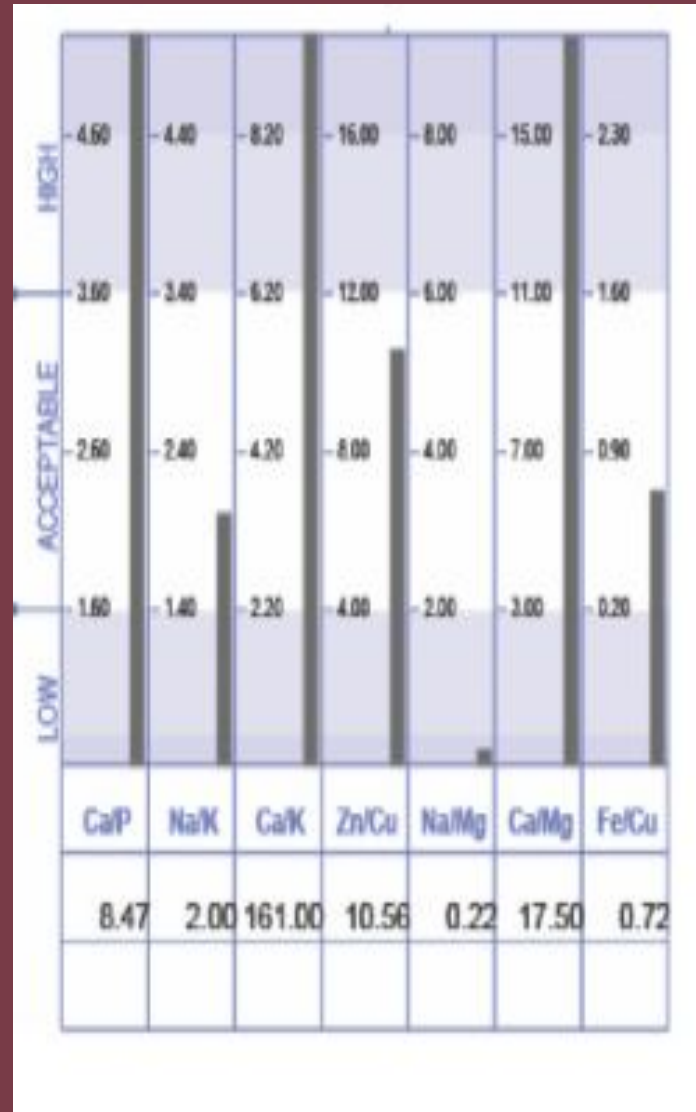
- Also called metabolic type - the speed of an individual's metabolism
- Determined by the Calcium to Phosphorus ratio (Ca/P)
- Above 2.6 = SLOW oxidation (slow metabolism)
- Below 2.6 = FAST oxidation (fast metabolism)
- The higher the ratio, the slower. The lower, the faster.
- The goal is always balance.



SPECIAL NOTE: 40 years ago the oxidation rate split 50/50 fast vs slow TODAY: 80-90% of people are in slow oxidation.

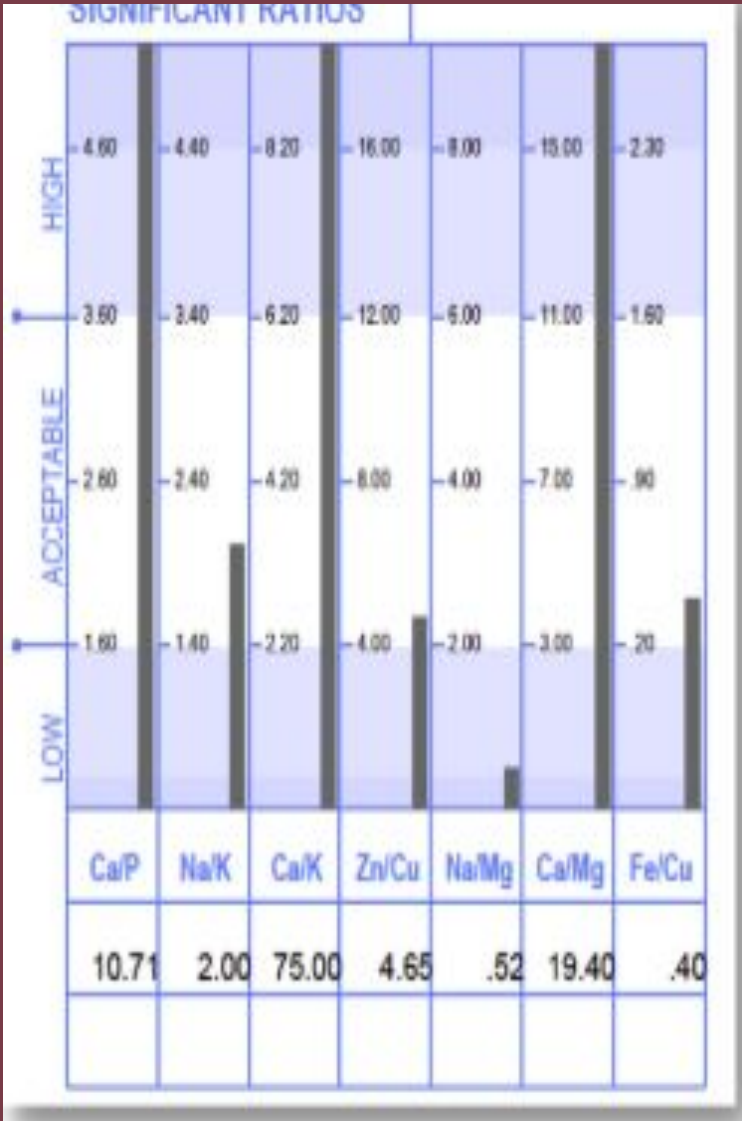
Slow Oxidation - Ca/P >2.6

- Over 2.6 = Slow Oxidation
- Calcium is controlled by parasympathetic CNS
- Phosphorus is controlled by sympathetic
- Considered “Parasympathetic Dominant” but not always in a good way. More sedative/reduced Metabolism
- High calcium & magnesium with low sodium & potassium
- Slower adrenal & thyroid activity
- Less aldosterone = sodium not retained well
- Without adequate solvents, **calcium precipitates into soft tissue (joints, muscles, brain, organs)** and magnesium will be lost from the cell



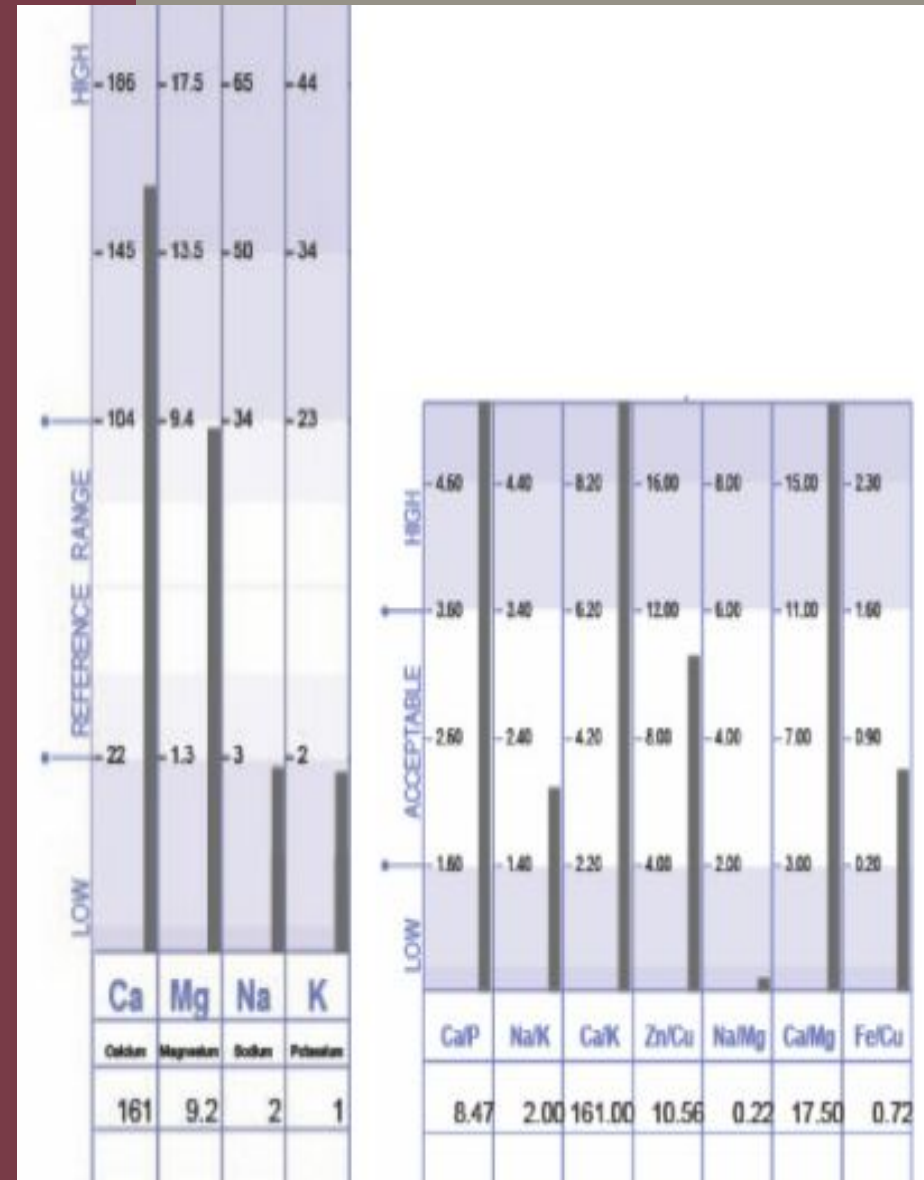
Presentation of a Classic S.O.

- **SYMPTOMS:** Fatigue, sugar cravings, apathy, depression, constipation, dry skin, cold sensitivity, joint pain, Type II insomnia (falls asleep but cannot stay asleep), low blood pressure, ruminating thoughts, social withdrawal, osteoarthritis, osteoporosis, weight in the hips thighs
- **ASSOCIATED CONDITIONS:** Fibromyalgia (81% of 2000 fibro patients were slow oxidizers), premature graying
- **DETOX WARNING:** Slow oxidizers are poor eliminators. No aggressive detox. Mineral balance comes first.



Causes of a Slow Ox

- Chronic emotional stress
- Low protein diets
- Excessive supplementation: calcium, Vitamin D
- Toxic metal burden & environmental chemicals
- Copper toxicity
- Iodine deficiency
- Chronic infections
- Certain medications: blood pressure drugs, sedatives, tranquilizers, sleeping pills, pain medication



CASE STUDY

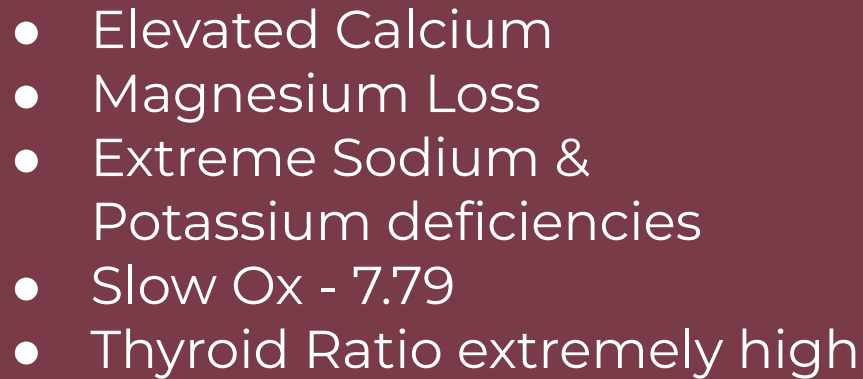
22 YR OLD, FEMALE, SLOW OXIDIZER

**CLINICAL CORRELATION: HER MAIN COMPLAINTS
ARE A CLASSIC SLOW OXIDIZER**

SUGAR CRAVINGS, LOW BLOOD SUGAR, CONSTIPATION, THYROID SYMPTOMS.
DRY SKIN, BRAIN FOG, JOINT PAIN, WEIGHT IN THE HIPS AND THIGHS.
POSTURAL HYPOTENSION, COLD SENSITIVITY, SOCIAL WITHDRAWAL, FATIGUE

CLINICAL CORRELATION: MAGNESIUM LOSS
PMS, HYPOTHYROIDISM, ANXIETY, HYPERACTIVITY

CLINICAL CORRELATION: LOW SODIUM
BLOAT, FATIGUE, LOW STOMACH ACID



SIGNIFICANT MINERAL RATIOS									
MINERAL RATIO	IDEAL RATIO	CURRENT RATIO	% OF IDEAL	PREVIOUS RATIO	LOW		IDEAL	HIGH	
CA/MG	667	8.38	126		○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○		
CA/K	4.00	109.00	2725		○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○
NA/MG	4.17	0.23	6		○				
NA/K	250	3.00	120		○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○		
ZN/CU	8.00	15.88	199		○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○
CA/P	250	7.79	312		○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○

Patient Journey: Protocol 1

Bringing in the right minerals and vitamins alongside mindset & stopping multivitamin & Calcium supplement

In this case the protocol included:

1-2 tsp of sea salt daily

Rewired Stress with Subconscious mindset work

Included a custom compounded supplement with:

magnesium, potassium, vitamin C, boron, B vitamins, MK-7, NAC, Vitamin A, Sodium

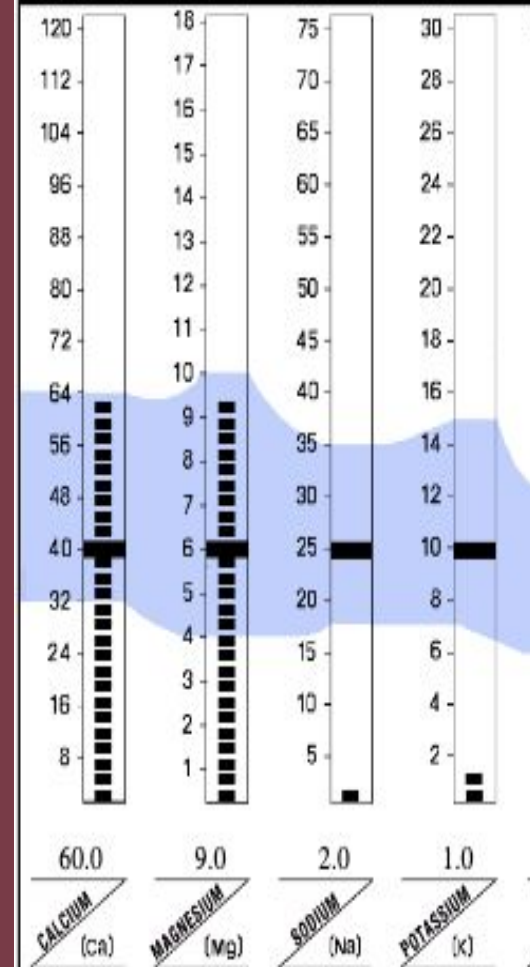
Kelp Capsules & Adrenal Adaptogens & Potassium Broth

RETEST

Calcium Dropped from 109 → 60 (almost perfect!)

Magnesium Loss greatly reduced (13 → 9)

**Thyroid Ratio (how well thyroid hormone gets into cell)
improved from 109 → 60**

[illegible]

SYMPTOM UPDATE

All period pain - GONE & (no longer had to leave work)

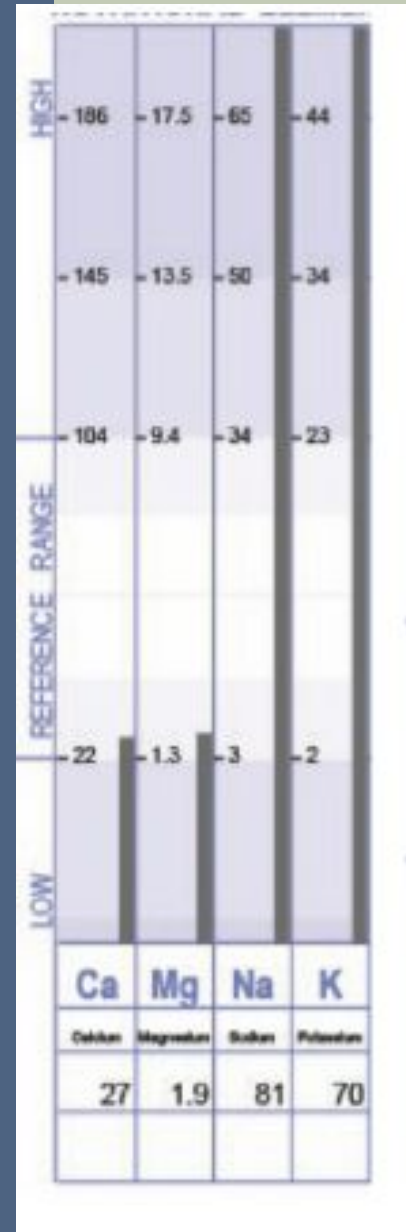
Thyroid Medication cut in half & antibodies dropped by 50 %

Mood Stabilized & Energy returned

Gut Issues - Gone, Lost 30 lbs

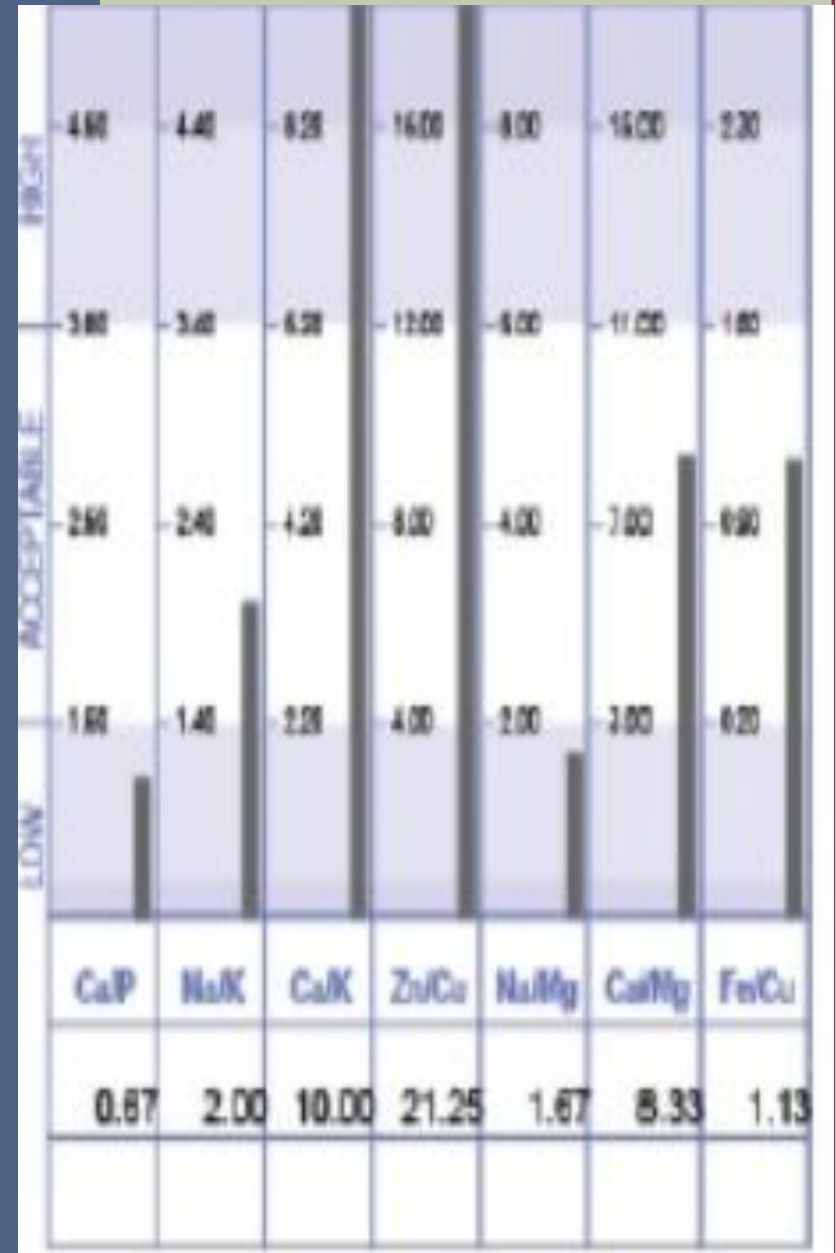
Fast Oxidation <2.6

- Fast Ox Ca/P <2.6
- Sympathetic Dominance - Fight/Flight
- Overly stimulated, running through life
- Increased Metabolism
- TYPICAL HTMA PATTERN: High sodium & potassium with low calcium & magnesium
- Faster adrenal & thyroid activity
- Excessive aldosterone = excessive sodium retention
- Too much sodium & potassium over-dissolves and burns through calcium & magnesium



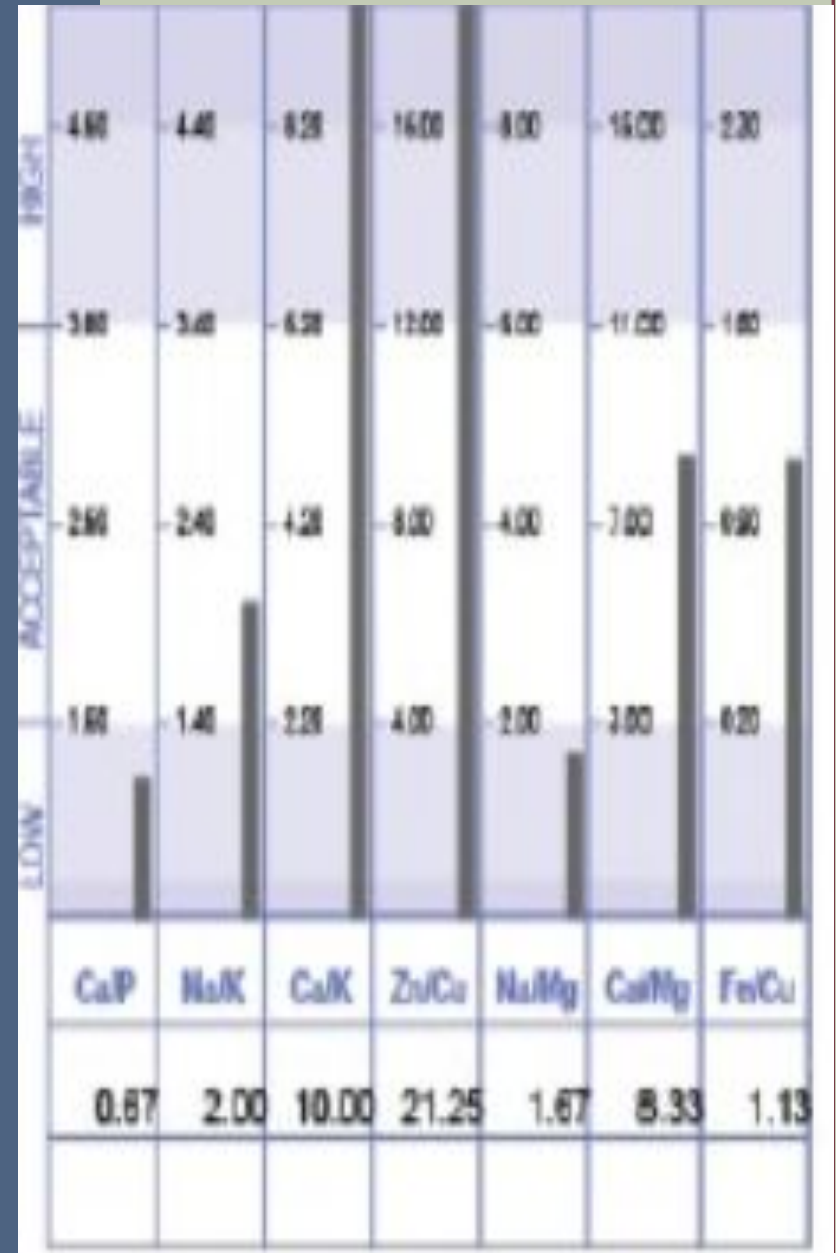
Fast Oxidation

- SYMPTOMS: Wired, anxious, irritable, Type A, loose stools, oily skin, racing mind, high blood pressure, belly weight gain, short tempered, prone to panic attacks, water retention
- ASSOCIATED CONDITIONS: ADD/ADHD (especially in children), cardiovascular risk
- Note: Only 10-20% of people are fast oxidizers today



Fast Oxidation:Causes

- Typically we are born FO - life stage
- Chronic emotional stress
- Low Fat & protein diets, excessive caffeine
- Excessive supplementation: Vitamin C, E, B complex, Ginseng, maca, thyroid & adrenal glandulars (speeding up the body)
- Prescriptions: thyroid medication, antidepressants, amphetamines, cortisone
- Pesticides & toxic metals
- Certain street drugs like cocaine, crack, crystal meth, and ecstasy.



Patient Journey: 50 Year Old Male

Main complaints:

Lack of stamina
Attention Deficit
Hyperactivity



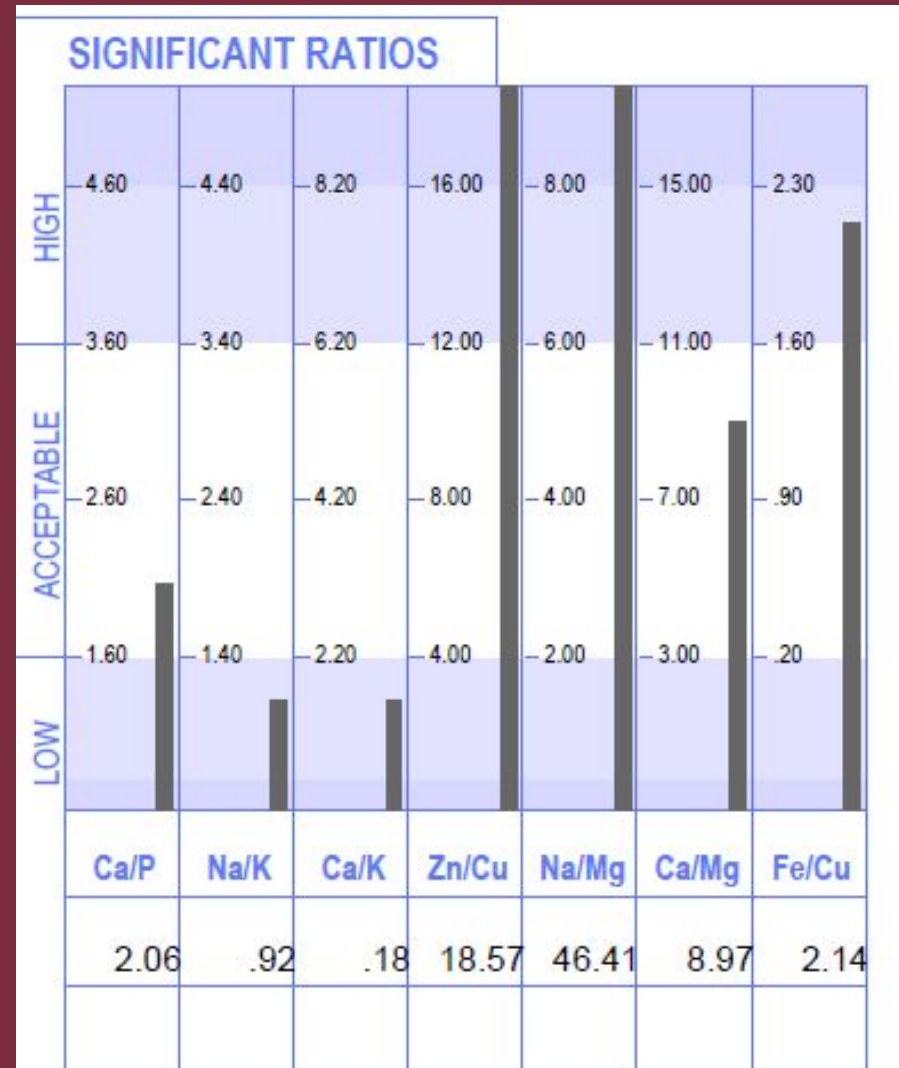
Patient Journey: 50 Year Old Male

- Ca and Mg low
- Na elevated = inflammation, irritability, hyperactivity
- Potassium elevation, could mean intracellular deficiency, need blood labs to confirm
- Copper low (common in true fast ox cases)
- Could be mobilizing metals



Patient Journey: 50 Year Old Male

- Na/K inverted - exhaustive stage of stress, even though thyroid expression and adrenals are overactive
- Hormone imbalance
- Extremely elevated Na/Mg = heightened fight or flight energy, but lack of stamina
- Elevated Fe/Cu could mean bacterial infection



Patient Journey: Protocol 1

Bringing in the right minerals and vitamins alongside herbal support can be helpful.

In this case the protocol included:

All things that support fast oxidation including:
Calcium, magnesium, l-lysine, zinc, copper, boron, B vitamins, MK-7, choline, milk thistle, enzymes, taurine.

Symptom Update

Lack of stamina

Reported much better

Attention Deficit

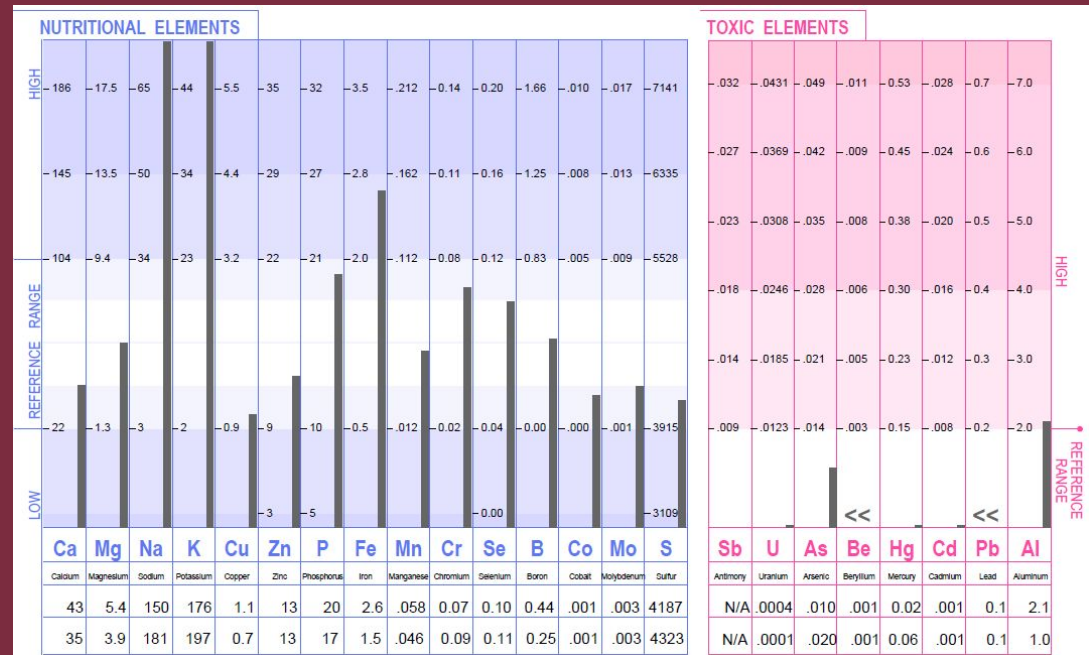
Also moving in a positive direction

Hyperactivity

More calm

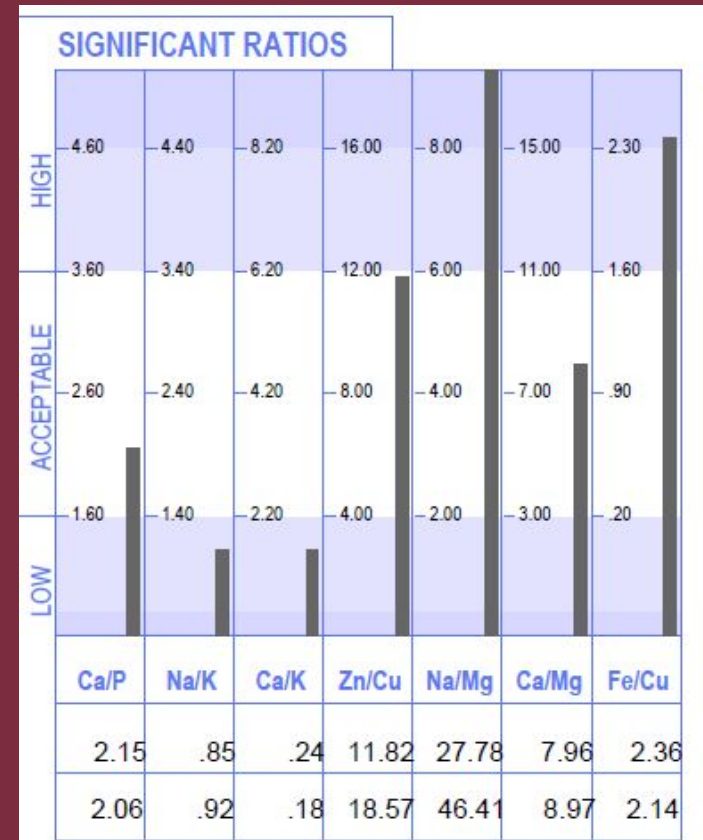
Patient Journey: 50 Year Old Male

- Ca and Mg better
- Na elevated = slowly dropping
- Potassium lowering slightly
- Copper better
- Fe, Mn, Cr being affected by the release of Al



Patient Journey: 50 Year Old Male

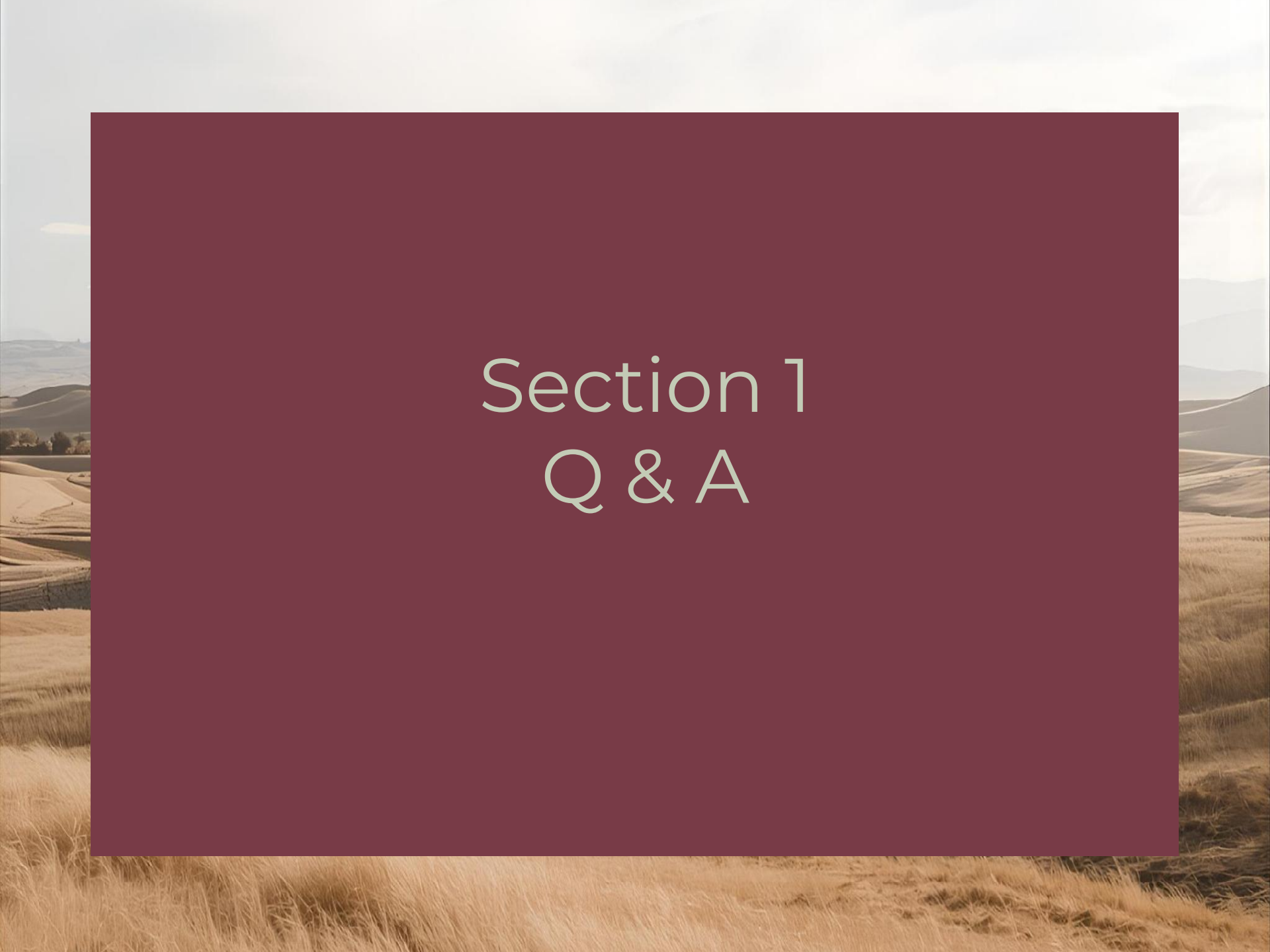
- Na/K still inverted - exhaustive stage of stress
- Hormone imbalance improving
- Extremely elevated Na/Mg = getting better
- Elevated Fe/Cu could mean bacterial infection - warrants more testing



Key Takeaways & Reflection

- Minerals are the spark plugs - they govern virtually every biochemical process
- Chronic stress + depleted soil = a mineral depleted patient population
- Blanket supplementation without data makes things worse
- HTMA measures mineral status at the tissue level over 3-4 months
- The four macro minerals & Oxidation Rate are the foundation of all mineral balancing
- 80-90% of people today are in slow oxidation - and your patients reflect this
- Targeted Mineral Balancing can Improve Muscle tension & Help calcium Stay in the bones supporting chiropractic adjustments



The background of the slide is a photograph of rolling hills under a cloudy sky. A large, solid maroon rectangle is centered on the page, serving as a backdrop for the text.

Section 1

Q & A

Vitality Ratio / Stress Ratio

Cellular Battery: Indicates the electrical potential of the cell membrane.

The Stress Ratio

2.4

Na / K

Low Ratio < 2.4

Depletion Marker

Signals limited energy to process stress.

Symptoms

Immune issues, run down, fatigue, sugar cravings, allergies, chronic infections, Low HCL.

Emotions

Hostile, resentful, frustration, lack of awareness & how they feel.

High Ratio > 2.4

Inflammation Marker

High ratios reflect acute stress and inflammatory response.

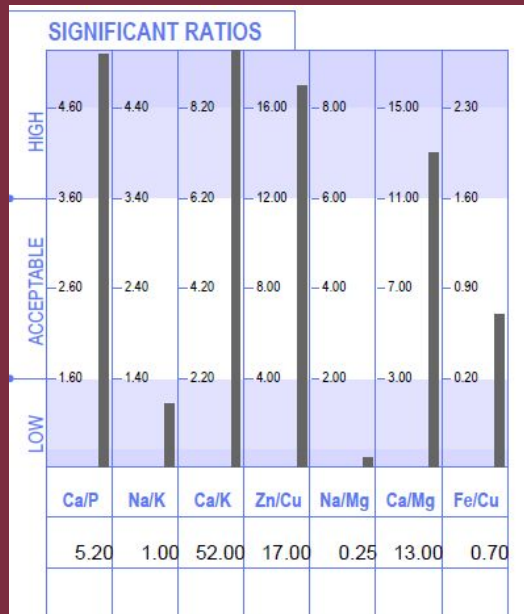
Symptoms

Water retention, edema, High BP, Kidney, Liver stress, *Estrogen dominant.*

Emotions

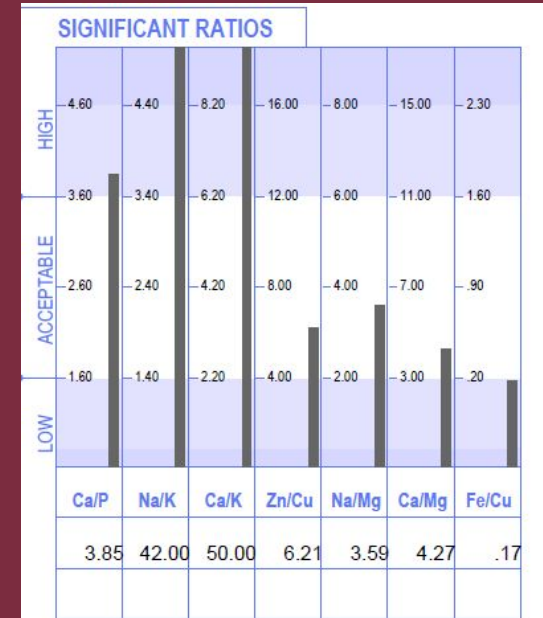
PMS, Snappy, Aggressive, Irritable, highly emotional

Vitality / Stress Ratio



LOW: Lowered immunity, poor response to stress - struggling with brain fog and constant sickness. High stress with 3 kids.

HIGH: Easily irritated, bit aggressive, quick to judge and needs to watch responses with others. Athlete with copper issues.



The Thyroid Ratio (Ca/K)

Why "Normal" Thyroid Labs Don't Equal Optimal Function at the Cell



High Ratio > 4.2

Symptom Presentation:
underactive thyroid can be cold
hands and feet, fatigue, weight
gain, muscle cramps and
weakness, depression,
hypoglycemia, chronic stress, low
blood pressure, Copper Toxicity,
and constipation among others.

The Cellular Gatekeeper

Potassium lets thyroid hormone enter cells; Calcium blocks thyroid uptake into cell

The "Calcium Shell" Effect

Excess calcium relative to potassium can block cellular energy production.

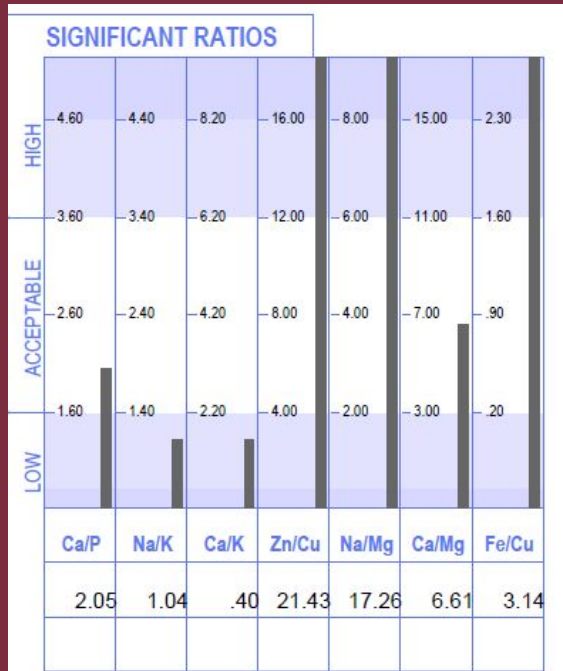
Clinical Reality

Patients with high Ca/K ratios may feel hypothyroid despite normal blood labs

Low Ratio <4.2

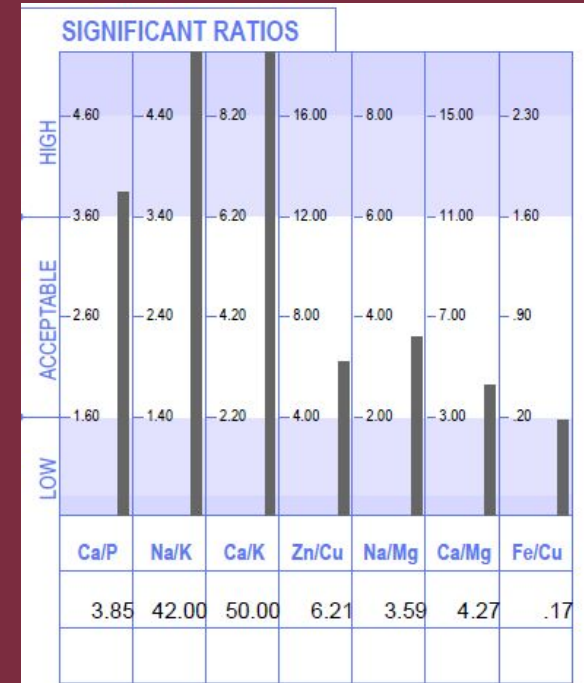
Symptom Presentation: overactive thyroid can be nervousness, hyperactivity, anxiety, irritability, aggressiveness, mood swings, tiredness, sensitivity to heat, diarrhea, and muscle tightness and cramps.

Thyroid Ratio



LOW: Hyperactive tendencies, high stress, sweats easily, and feels as though he runs “hot” internally. This can be driven by high Na.

HIGH: This particular case the individual was on thyroid medication and blood labs were not showing optimal dosage was yet achieved.



The Adrenal Ratio (Na/Mg)

Mapping Burnout and Survival Mode

Alarm Phase of Stress

RATIO > 4.0

Acute stress response. High sodium relative to magnesium indicates excessive adrenal stimulation and often high cortisol output.

Manifestations

- "Tired but Wired," anxiety, & racing thoughts
- Tendency toward inflammation
- Aggressive, reactive, type A, impulsive
- Possible hypertension or high blood sugar
- Possible cause: Metal exposure

4.0

Na / Mg

Exhaustion

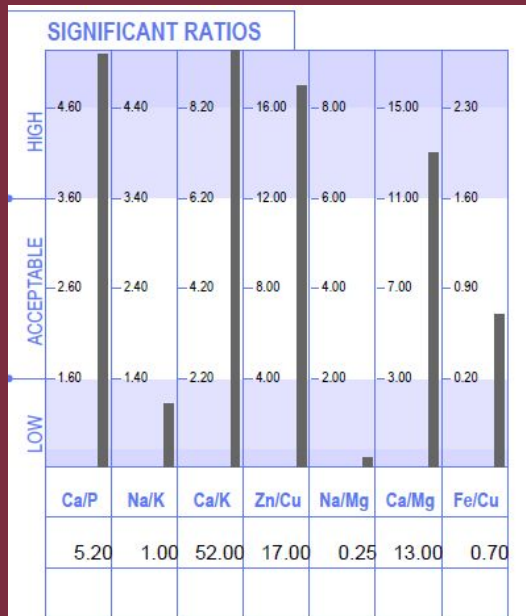
RATIO < 4.0

Adrenal burnout. The body can no longer maintain sodium levels, leading to a collapse in cellular vitality and resilience.

Manifestations

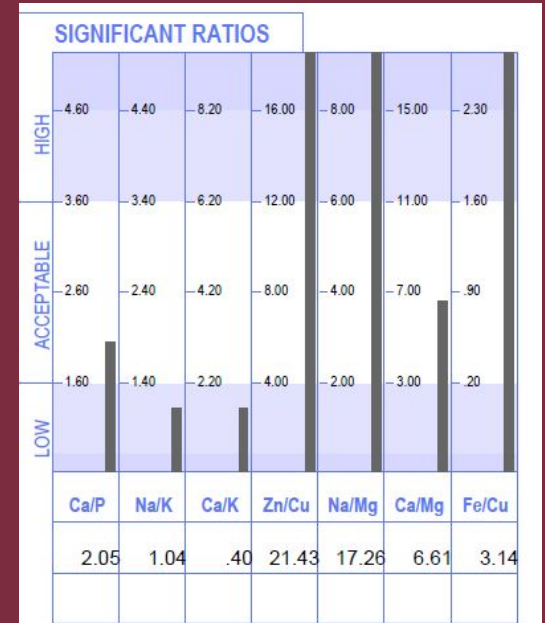
- Chronic overwhelm, apathy, & "frozen" nervous system
- Low stamina, low blood sugar, & weight flux
- Exhausted no matter how much sleep
- Trouble digesting fat/protein
- Slow oxidizer pattern more common

Adrenal Ratio



LOW: Lowered immunity, poor response to stress - struggling with brain fog and constant sickness. High stress with 3 kids.

HIGH: Hyperactive tendencies, high stress, sweats easily, and feels as though he runs "hot" internally. This can be driven by high Na.



The Blood Sugar Ratio

The “Carbohydrate” Ratio (Ca/Mg)

Insulin Sensitivity: Reveals how effectively the body regulates glucose at the cellular level.

Low Ratios

RATIO < 7

Typically manifests as high blood sugar and loose bowels.

Physiological Mechanism

- *Calcium is responsible for releasing insulin.*
- *Magnesium has an inhibitory effect on insulin, slowing its release down.*



High Ratios

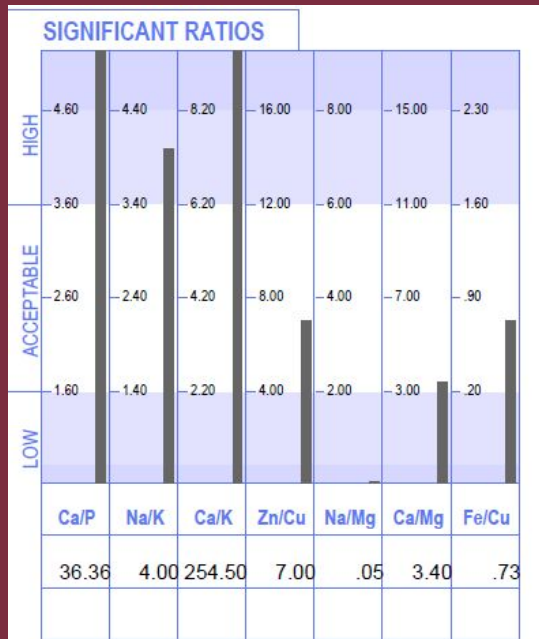
RATIO > 7

Often linked to carbohydrate cravings, systemic inflammation, **muscle pain**, and constipation.

Emotional Impact

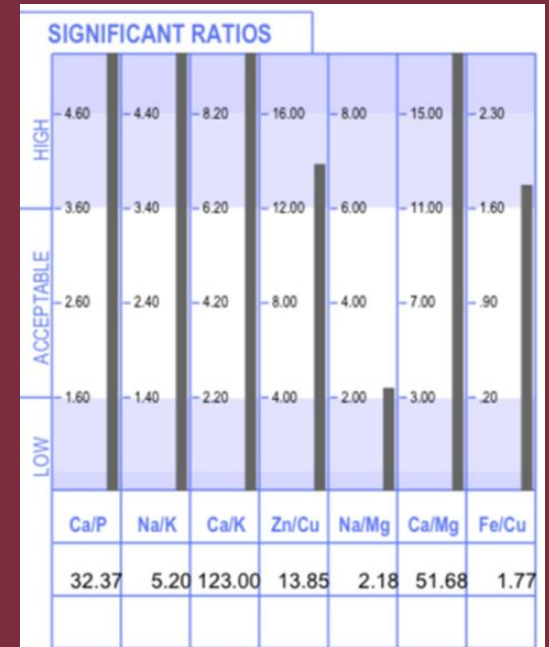
- *Ratio imbalances can produce sudden anxiety or irritability.*

Blood Sugar Ratio



LOW: Diet was quite poor, energy low and blood sugar unstable. Constant cravings and lack of control.

HIGH: This particular case presented with a roller coaster of blood sugar crashes when consuming carbohydrates. Focus on protein and healthy fats.



HTMA & Heavy Metals:



Mechanisms of Toxicity

Pathways of Impact



Enzyme Inhibition

Heavy metals bind to active sites on enzymes, displacing essential cofactors and disrupting metabolic pathways.



Mineral Displacement

Toxic metals "mimic" essential minerals, occupying receptor sites without performing biological functions



Oxidative Stress

Metals trigger reactive oxygen species (ROS), damaging DNA, proteins, and cell membranes.

Mechanisms of Toxicity & Interpretation

HTMA Interpretation



Absolute Levels vs. Ratios

While high levels indicate toxicity, ratios and mineral patterns often reveal "hidden" burdens.



The "Poor Eliminator"

Very low levels may indicate a body that lacks the vitality to mobilize and excrete toxins.

Clinical Pearl

Detox is a process of "peeling the onion" as vitality and mineral reserves increase over time.

Aluminum: The Silent Neurotoxin

COMMON ELEVATED METAL ON HTMA

Technical Toxicity

- **Glutathione Impediment**

Directly inhibits glutathione activity, the body's master antioxidant

- **Mineral Antagonism/Strategies**

Calcium, Magnesium, Zinc, Vitamin C

- **Common Sources**

Foil, cookware, antacids, deodorant, and processed foods

CNS & Emotional

Cognitive/Developmental Links

- Linked to Alzheimer's, Parkinson's Dementia. Autism, Learning Disabilities in Children

- **Emotional Symptoms**

Manifests as profound brain fog, memory loss, and mental fatigue

- **Other:**

Headaches, colds, heartburn, aversion to meat, reduced sweating, cavities, fatigue.

Lead: Structural & Neurological Threat

🦴 Structural Burden

■ Calcium Replacement

Lead replaces calcium in the bone matrix, Possibly leading to long-term osteoporosis.

CLINICAL STRATEGY

Addressing calcium issues is vital for success. Lead can take up to 15 years to clear from bone. Magnesium & EDTA can be helpful

Found in: lead pipes, batteries, pesticides, paints, inks, root veg, ceramic glazes, hair dyes, cig smoke

Lead: Structural & Neurological Threat

Neurological Impact

- **Brain Accumulation**

Crosses the blood-brain barrier, damaging the CNS

- **Behavioral Issues**

Linked to learning difficulties, seizures, irritability and Pica.

Other:

Inhibits copper dependent enzymes needed for neurotransmitters, impairs kidneys. Displaces calcium, zinc, Copper, Iron, Manganese

Cadmium: Stress & Metabolic Imbalance

Exposure

Lifestyle

Cigarettes, marijuana, second-hand smoke, and auto exhaust, air pollution

Dietary

Shellfish, processed foods and crops grown in phosphate fertilizers.

Metabolism

↔ Zinc Antagonist

Competes with Zinc at receptor sites. Zinc deficiency is the primary factor for accumulation.

Impact

Structural

Cavities from alterations to Calcium & Vitamin D

Contributes to arthritis and osteoporosis.

Emotional/CNS

Associated with hyperactivity in the CNS, learning disorders

Cadmium: Strategies to reduce

Minerals/Binders

Zinc, Vitamin C, B1, ALA, Potassium, Zeolite, EDTA
Vit E, Magnesium, Carnitine, CoQ10, Tyrosine, Milk Thistle,

Lifestyle

Avoid Zinc Depleting Behaviours: alcohol, vegan diet, chronic stress, excessive caffeine

Mercury: Mood & Immune Dysfunction

The Master Mimic

Molecular Mimicry

Mercury can mimic other minerals, bypassing cellular defenses.

Primary Sources

Dental amalgams, tattoos, large predatory fish like tuna, and certain vaccines, fungicides, pesticides.

Mental Impact

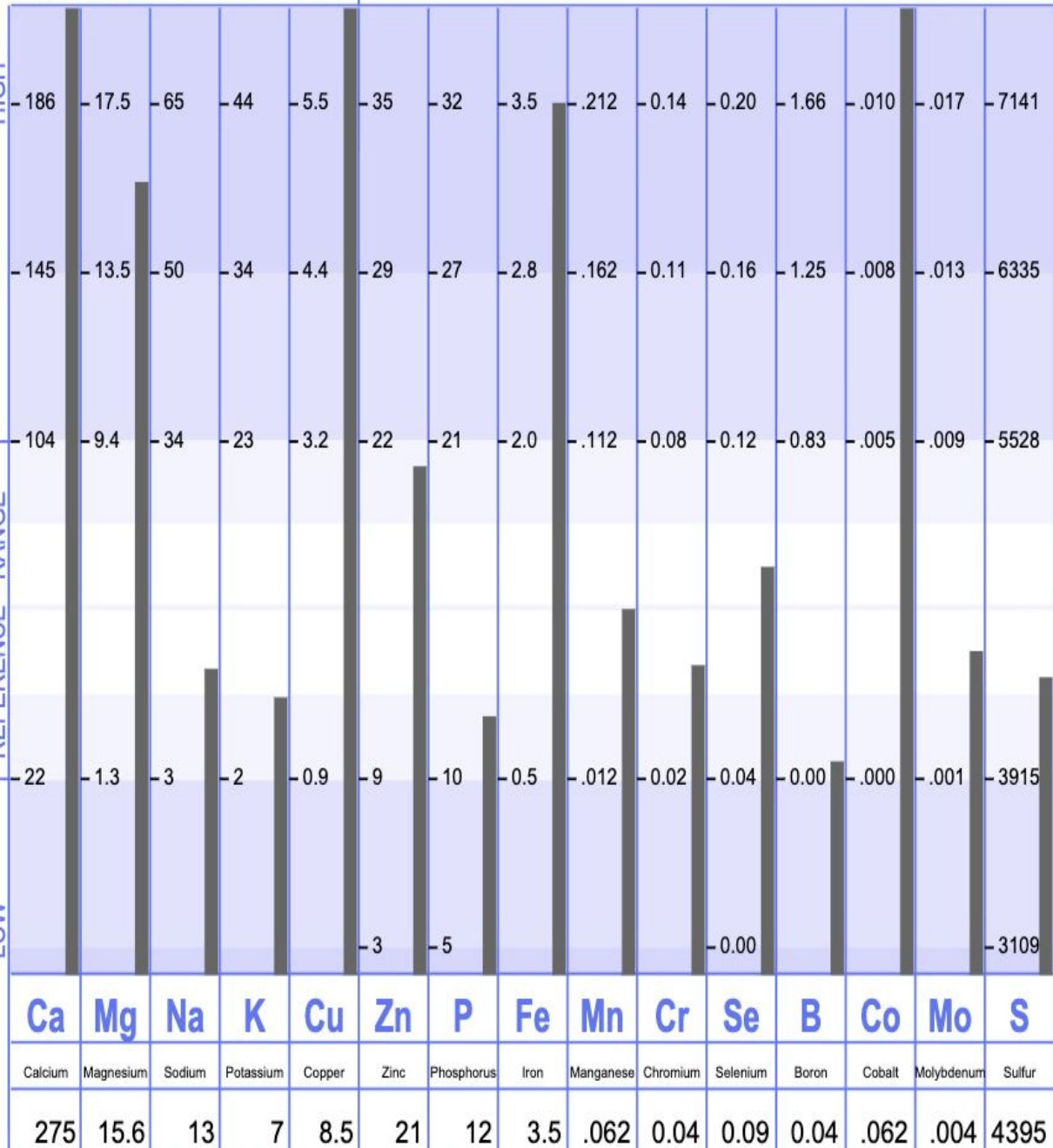
Emotional Impact

Associated with mental illness, fatigue, anxiety, insomnia and depression.

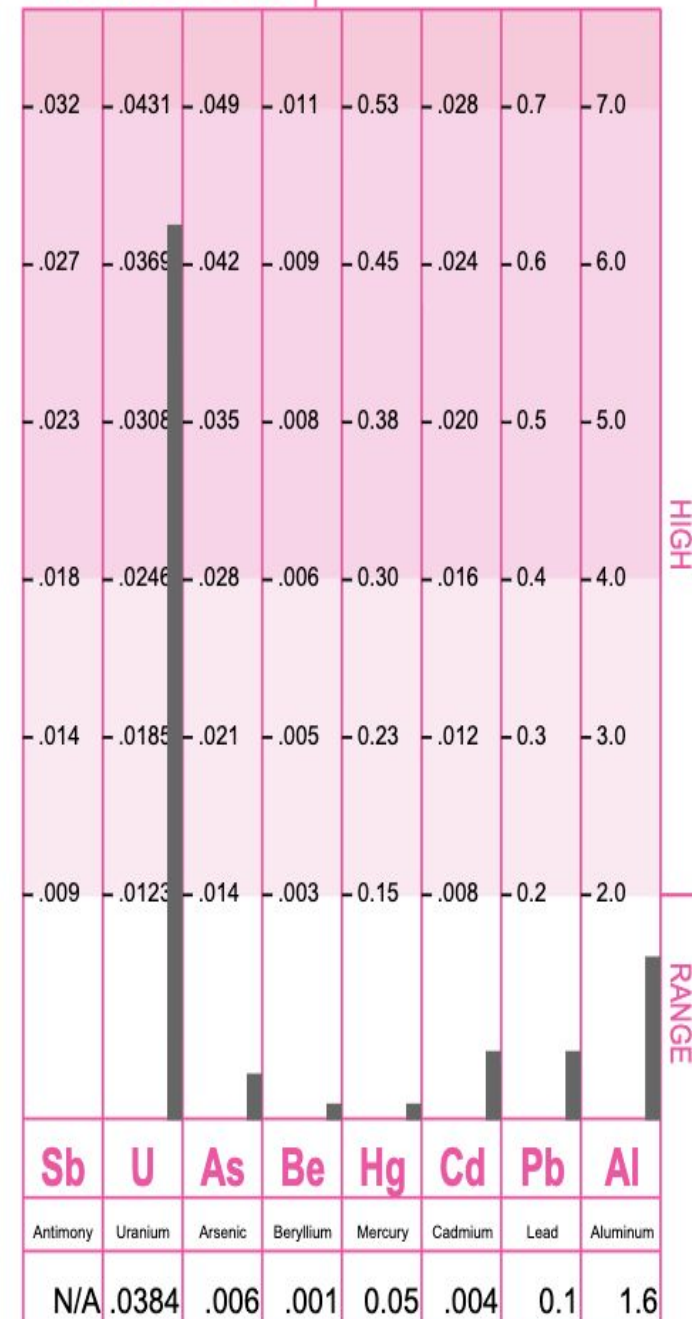
Strategies

Watch for exposure, Selenium, Zinc, Potassium, Magnesium, ALA, Carnitine, CoQ10, Allicin, Glutathione Support

NUTRITIONAL ELEMENTS



TOXIC ELEMENTS



Arsenic: Irritability & Systemic Impact

Environmental

Contaminated well water and industrial runoff.

Dietary

Rice, seafood, and certain poultry.

Dermatological

Hyperkeratosis and pigment changes.

Immune

Suppresses T-cell activity and cellular

Chronic

Diffuse or spotted hyperpigmentation, skin cancer on palms, soles and abdomen, warts, lung and bladder cancer, ringing in the ears

Emotional Profile

Marked irritability and mood swings.

Strategies

✓Selenium, ALA, B12, B9, TMG, Potassium, Magnesium, Zeolite

Uranium: Radioactive & Renal Threat

Sources & Renal

● Exposure

Found in groundwater, wells, and phosphate fertilizers.

Most common: Radon Gas

● Kidney/Skin

Potent nephrotoxin; accumulates in renal tubules, disrupting filtration

Dermal irritation is also possible

Strategies

● Regionally

Filter water or distilled esp from private wells - Pure Effects

● Food

Wash skin of all root vegetables & peel

Home

Test Radon & add ventilation

Less Common Metals: Part 1



Barium

Primary Impact

Interferes with Ca metabolism; lowers K

Symptoms: Stomach pain, Nausea, vomiting, diarrhea, Weakened heart muscle (Cardiomyopathy)

Bismuth

Exposure:

Pepto-Bismol, Stomach acid Blockers, Cosmetics, Diaper rash remedies

Symptoms: neurological issues, PCOS, Childhood development issues



Nickel

Strategies

Sauna, Magnesium, Zinc, Iron

Depression, lung issues, cancer, stunted growth



Strontium

Primary Impact

Displaces calcium; primarily targets the bone matrix.

Muscle & bone weakness, weakened ligaments, muscle spasm, rickets

Emerging Metal Considerations

High Toxicity & CNS		Industrial Exposure	
Thallium	Highly toxic. Linked to neuropathy, psychosis, and depression.	Platinum	Sources: Chemo, auto. Causes severe allergies and respiratory distress.
		Titanium	Sources: Implants, cosmetics. Triggers systemic inflammation.
Tin	Sources: Canned foods, grains, toothpaste, amalgams. . High levels cause neurological issues and fatigue. Loss of vision, hearing, loss of sensation in hands & feet	Silver	Argyria. High levels linked to seizures and kidney damage.

Practical Detoxification Strategies

PHASE 01

Foundation



Drainage

Optimize liver, kidney,
and bowel function
Before mobilizing metals

PHASE 02

Repletion



Minerals

Replenish essential
minerals. (Zn, Ca,
Mg) to displace
toxic

PHASE 03

Mobilization



Binders

Introduce targeted binders
based on specific
metal burdens

Clinical Pearl: Building the body's vitality and mineral reserves is the most critical step for a safe and effective detox.

Patient Journey: 1 Year Old Female

Main complaints:

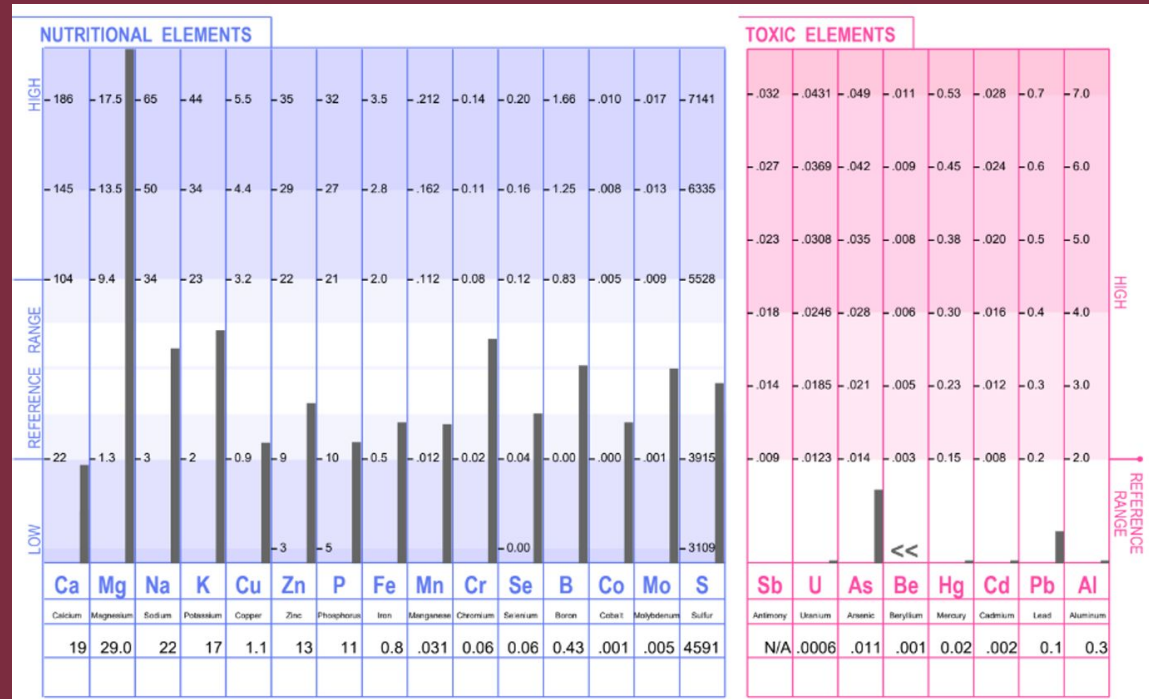
Skin issues

Freezing under stress



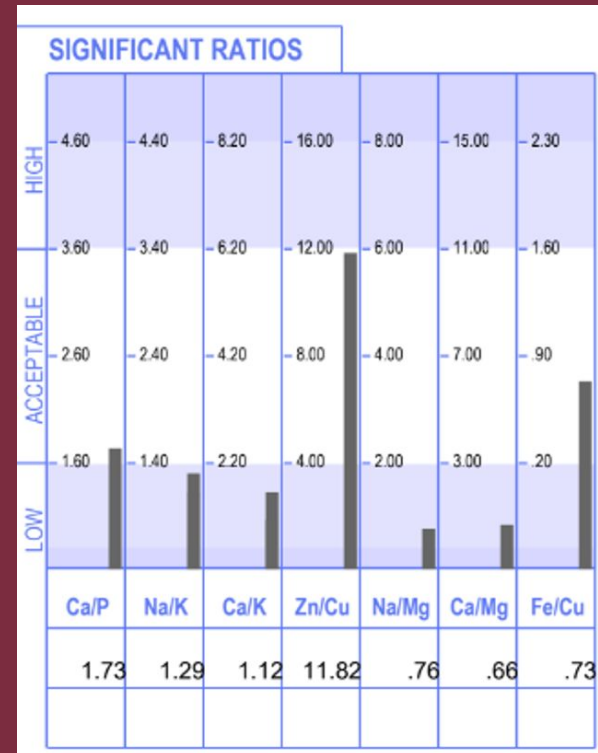
Patient Journey: 1 Year Old Female

- Na/K inversion means the sodium-potassium pumps are not working properly
- It also means chronic, exhausted stage of stress
- Babies tend to have lower calcium levels, important to support especially if there is Pb present



Patient Journey: 1 Year Old Female

- Na/Mg is extremely low however, the magnesium is in a loss pattern, this ratio needs to be adjusted
- Ratios are dynamic and loss patterns should be taken into account WHILE correlating with symptoms



Patient Journey: Protocol 1

In this case the protocol included:

All support needed for fast oxidation including: calcium, magnesium, TMG, zinc, selenium, boron, B vitamins, taurine, NAC, MK-7, choline, milk thistle, enzymes, and L-lysine.

Additional Support:

Binder for toxin removal

Calcium food support

Epsom salt baths

Symptom Update

Skin Issues

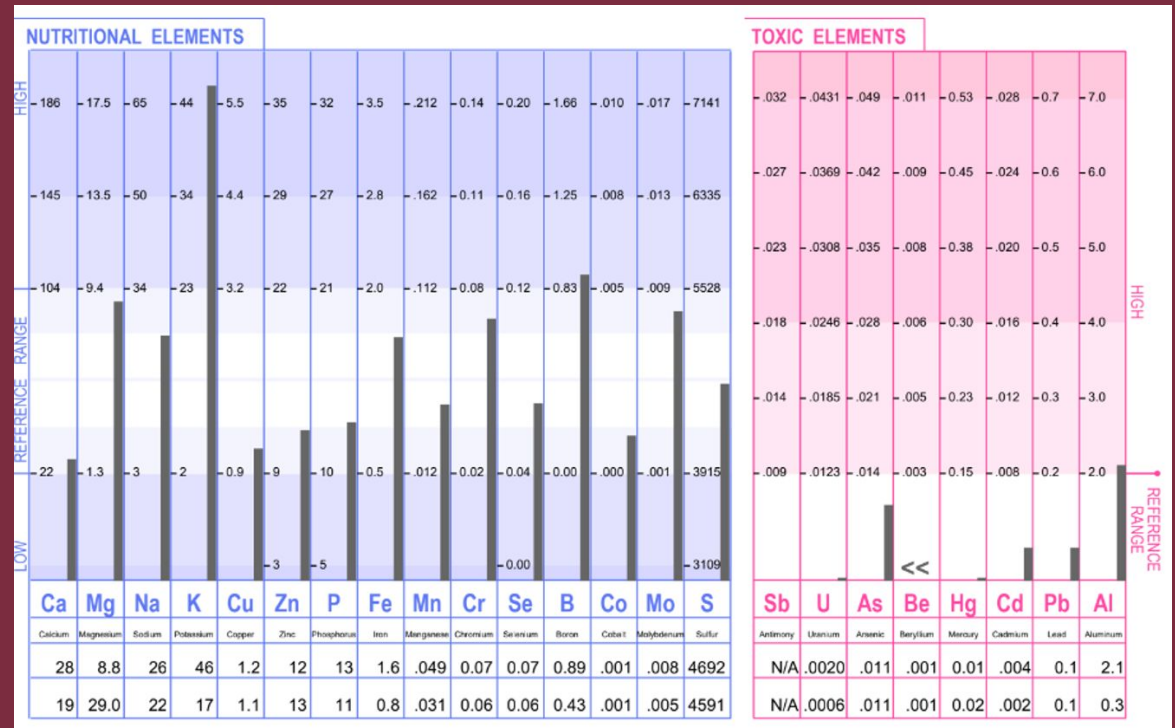
Reported much better

Freezing Under Stress

Also moving in a positive direction

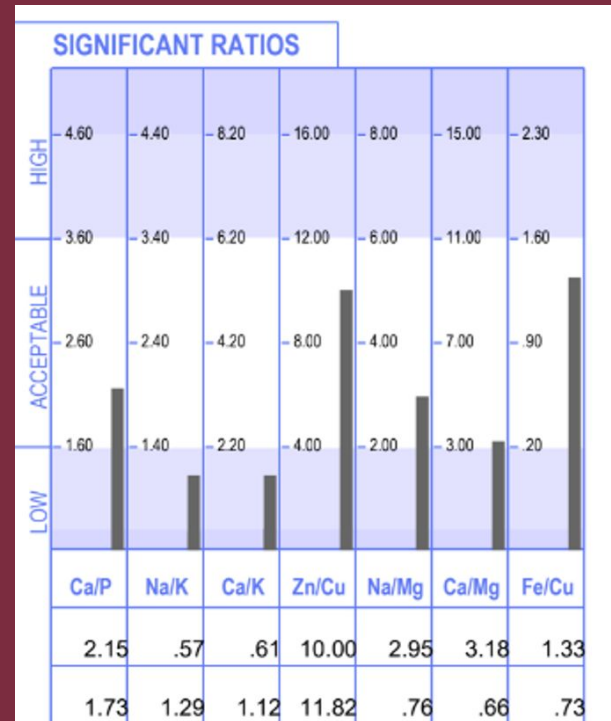
Patient Journey: 1 Year Old Female

- As the pattern is supported shifts take place
- Metals are moving as well



Patient Journey: 1 Year Old Female

- Stress is still there, Na/K depleting further (adjust for potassium loss, if applicable)
- Na/Mg starting to balance and increase
- Ca/P more balanced, when this is really low you need to ask WHY the body is so deep in sympathetic dominance



Patient Journey: Protocol 2

This protocol is similar to the first with just a few updates.

In this case the protocol included:

All of the fast oxidation supports including: calcium, magnesium, TMG, zinc, selenium, boron, B vitamins, taurine, NAC, MK-7, choline, dandelion root, enzymes, l-lysine and humic:fulvic acid.

Additions this round included:

Potassium support

Zeolite clinoptilolite to bind toxins

Symptom Update

Skin Issues

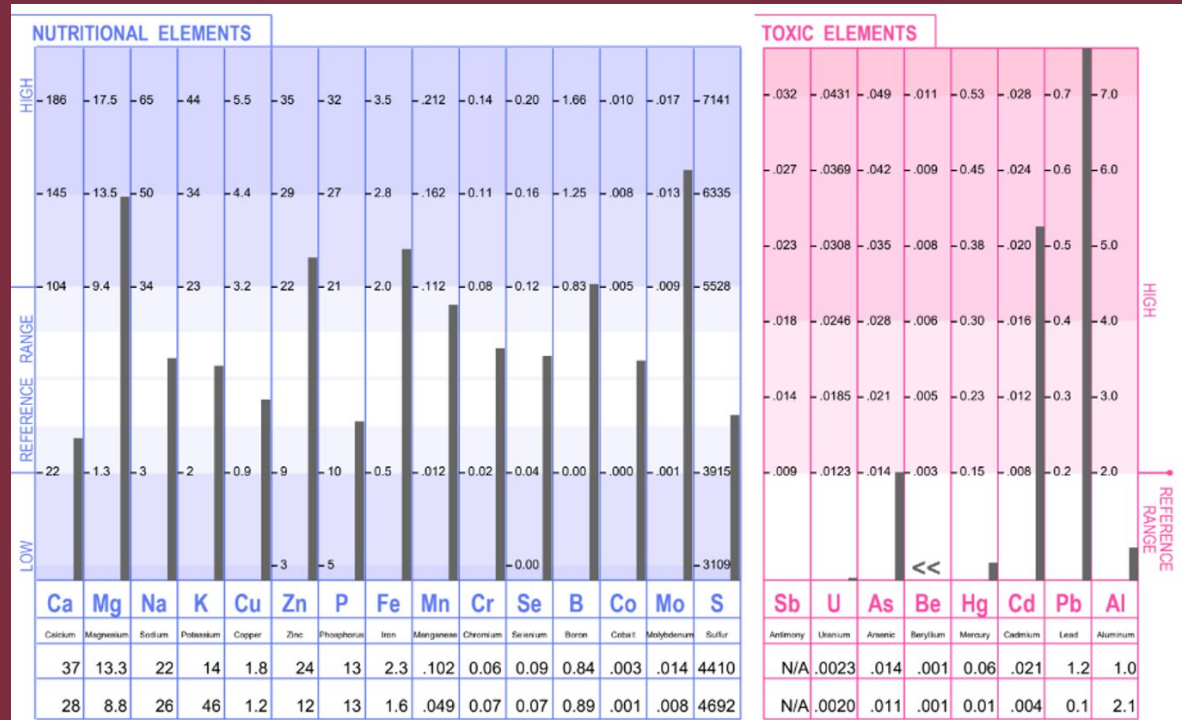
Completely cleared up

Freezing Under Stress

Not happening anymore

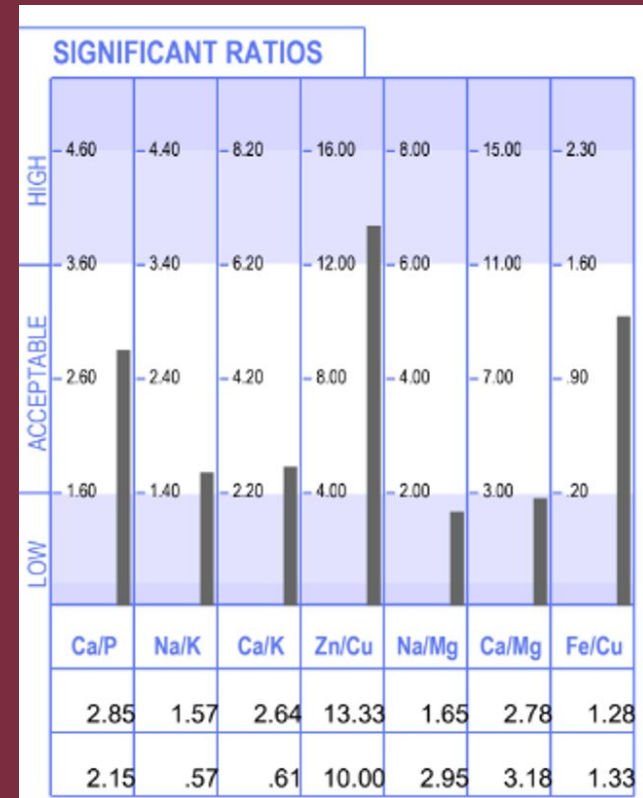
Patient Journey: 1 Year Old Female

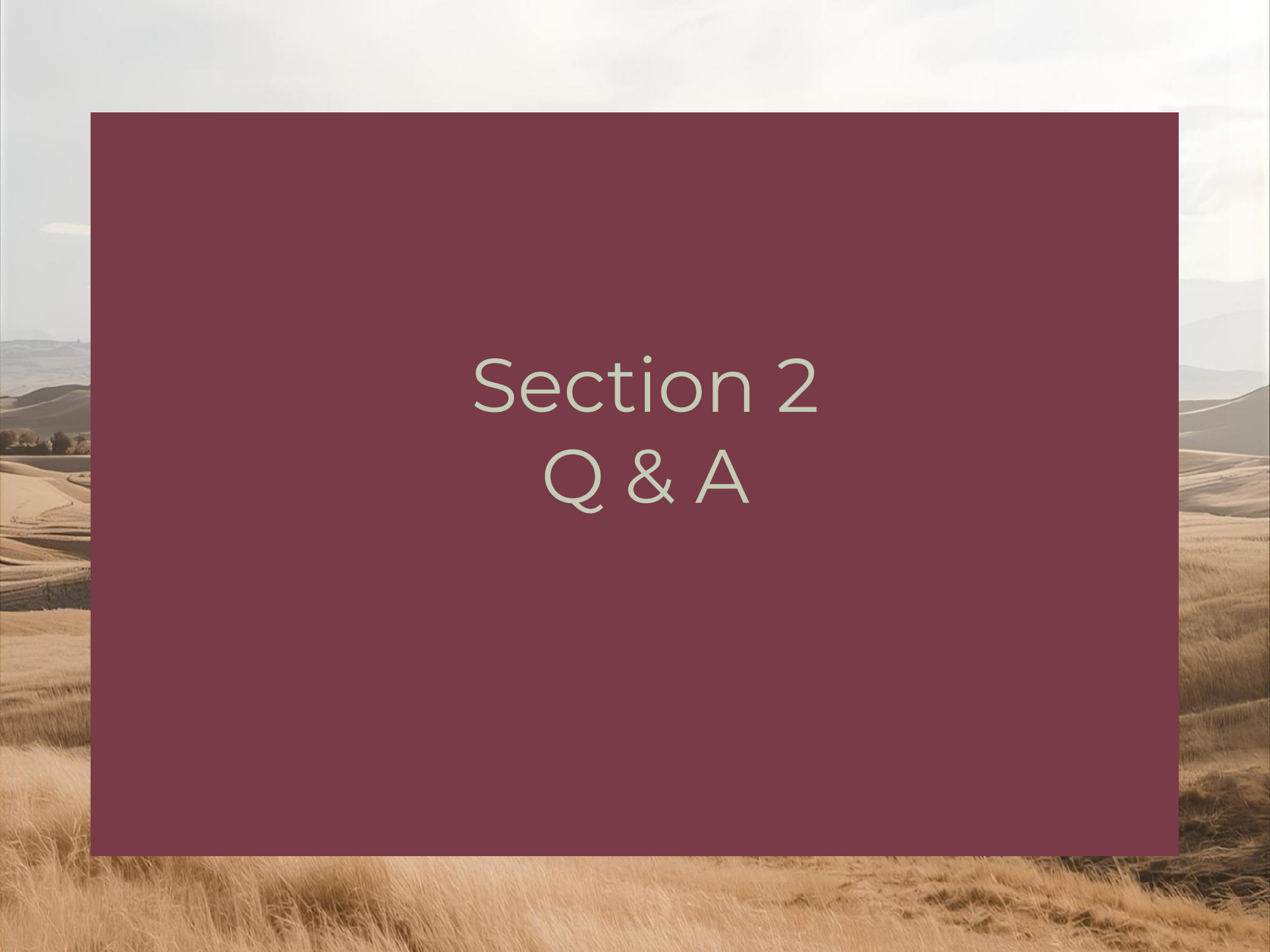
- METALS are MOVING
- Heavy metals and wreak havoc on the system and with the right support the body is able to be a better eliminator to rid itself of toxic elements



Patient Journey: 1 Year Old Female

- The Ca/P is very balanced
- Na/K much better
- Ca/K moving in the right direction
- Na/Mg lowering due to detoxification
- Ca/Mg will be the same as above



The background of the slide is a photograph of rolling hills under a cloudy sky. A large, solid maroon rectangle is centered on the page, serving as a backdrop for the text.

Section 2

Q & A

Copper

Understanding the Impact of Copper Imbalance on Health

Review of Copper Functions

Essential for Energy and Structural Integrity



Energy Production

Crucial for the electron transport chain and ATP synthesis.



Immune & Neuro

Supports neurotransmitter activity and immune health.



Structural Health

Synthesis of collagen, elastin, and hemoglobin.



Antimicrobial

Natural antifungal, anti-mold, and antibacterial properties.

HTMA Target: Optimal hair level is 2.0

Copper & Bone Health

What your patients are missing

What Copper Actually Does

- Cross-links collagen and elastin to hold calcium and harden bone.
- Without available copper, the bone matrix cannot form correctly regardless of calcium intake.
- Low copper drops SOD, causing free radicals to accumulate and accelerate bone loss.

What This Could Mean in Practice

- Ligament and tendon laxity could be a mineral/copper problem
- Deficiency can contribute to limb weakness, numbness, and gait issues.

The Clinical Takeaway

Bone quality is not just about calcium. It is about the collagen scaffolding that holds calcium in place. And copper builds that scaffolding.

What is Copper Dysregulation?

The Paradox of Simultaneous “Toxicity” and “Deficiency”



Stored & Unusable

A buildup of biounavailable copper in tissues that causes dysfunction.



Unbound State

Copper is not attached to the transport protein **ceruloplasmin**.



The Conflict

The body is toxic in stored copper but deficient in usable copper.



Primary Storage

Copper primarily accumulates in the **liver** and **brain**.

"When copper is unbound, it is both toxic and unusable."

Copper “Personality”



"Tired but Wired"

Copper dysregulation is a hidden driver of anxiety.

Emotional Profile

Anxiety, racing thoughts, ADD/ADHD, PMS, Panic.

Neurotransmitter Link

Copper drives the conversion of Dopamine to Norepinephrine; excess leads to hyper-arousal.

The Estrogen Connection

Estrogen and Copper rise together; postpartum and menopause are high-risk periods.

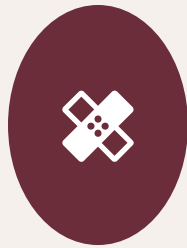
Symptoms of Copper Issues

Physical Health Indicators



Fatigue & Burnout

Profound cellular energy depletion and chronic exhaustion.



Rashes & Hives

Histamine release and allergic skin reactions from dysregulation.



Estrogen Dominance

Imbalance caused by the close synergistic copper-estrogen link.



Slow Oxidation

Metabolic slowing down accompanied by thyroid function decline.

Common Causes of Copper Excess

Hormonal, Environmental, and Lifestyle Factors

Hormonal Factors

- Copper IUDs
- Hormonal Birth Control
- Synthetic Estrogen (HRT)
- Estrogen/Copper Loop

Environmental Factors

- Copper Pipes & Cookware
- Xenoestrogens (Plastics)
- Public Swimming Pools
- High Copper Diets (Vegan)

Estrogen and Copper have a synergistic relationship: each raises the other.

Ceruloplasmin

The Transport Protein

- / Accounts for 95% of copper transport in the body.
- / Produced in the liver with vital support from the adrenals.
- / Requires strong adrenal function for adequate production.

FAILURE POINT: Weak adrenals lead to low ceruloplasmin and copper buildup.

Bile Excretion

The Exit Route

- / The primary route for copper to leave the body.
- / Requires robust gallbladder and liver function.
- / Estrogen dominance can thicken bile and slow excretion.

FAILURE POINT: Poor bile flow traps copper in the liver and brain.

Copper Dump Syndrome

The Danger of Forcing Detox Too Quickly

What is a "Dump"?

- ⚠ Occurs when copper is pushed out before the body is ready.
- ☠ Copper floods the blood and is redeposited in tissues.

Common Triggers

- ✓ High dose Zinc or Manganese
- ✓ Vitamin C (>3000mg)
- ✓ Excessive stress or cardio

Acute Symptoms

- 💓 Panic attacks & Heart palpitations
- 😡 Extreme irritability & Aggression
- 🌙 Insomnia (Wired but tired)
- ☁ Suicidal thoughts & Emotional outbursts
- ⚙ Acne breakouts, hives, or rashes

CRITICAL: Do not move copper until the body is ready. Education is the best prevention for client retention.

Progression of Copper Build-Up

From Initial Compensation to Brain Accumulation

1. Compensation

Healthy adrenals and liver initially manage the load.

2. Weakening

Copper over-stimulates adrenals until they fatigue.

3. Mineral Shifts

Potassium drops, sodium fluctuates, calcium rises.

4. Saturation

Liver saturates, bile thickens, excretion slows.

5. Brain Impact

Excess copper enters the brain, triggering anxiety.

The Macro-Mineral "Big Four"

Driving Metabolism and Nervous System State



Calcium

THE SEDATIVE

Regulates structural integrity, blood sugar, and muscle contraction.



Magnesium

THE RELAXANT

Essential for over 3000 enzymatic reactions. Supports relaxation and insulin sensitivity.



Sodium

THE VITALIZER

Drives adrenal output and blood pressure. Primary marker for the "Alarm Phase" of stress.



Potassium

THE SENSITIZER

Required for thyroid hormone sensitivity at the cell. Critical for vitality and energy production.

Copper drives shifts in the "Big Four" minerals, impacting metabolism and nervous system state.

Mop-Up vs. Detox Protocol

Strategic Supplementation for Copper Management

Copper Mop-Up

Goal: Bind excess "floating" copper to stabilize the client.

 Zeolite (4-6 weeks max)

 Ox Bile & Taurine

 Low-dose Zinc (<15mg)

 Digestive Bitters

Copper Detox

Goal: Actively nudge copper out of tissue storage.

 Manganese (cautiously)

 Higher Zinc (20-30mg)

 Infrared Sauna Therapy

 High Protein Diet

"Slow elimination of copper is always better than going too quickly."

The Four Protocol Types

Tailoring the Approach to the Client's State



#1 Hidden Copper Support

Executed when dysregulation is suspected but not yet actively excreting on HTMA.



#3 Copper Detox

Active removal for Fast Oxidizers or retesting Slow Oxidizers who are feeling stronger.



#2 Copper Masking

Used on first tests for Slow/Four Lows clients with elevated copper to bind "floating" excess.



#4 Copper Dump Syndrome

Emergency measures for when copper has been pushed too quickly and symptoms are acute.

RULE: We never address copper until the body tells us it is ready.

Patient Journey: 27 Year Old Female

Main complaints:

Anxiety

Fatigue

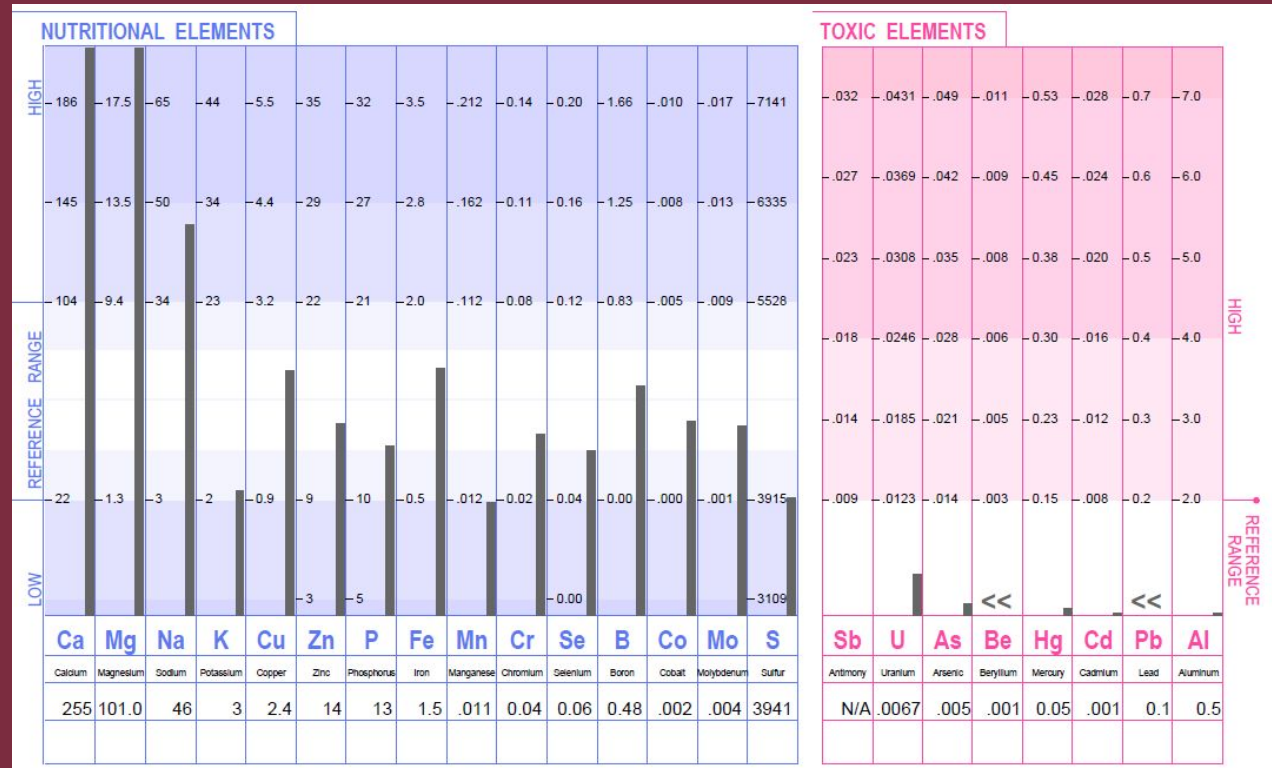
Brain fog

Depression



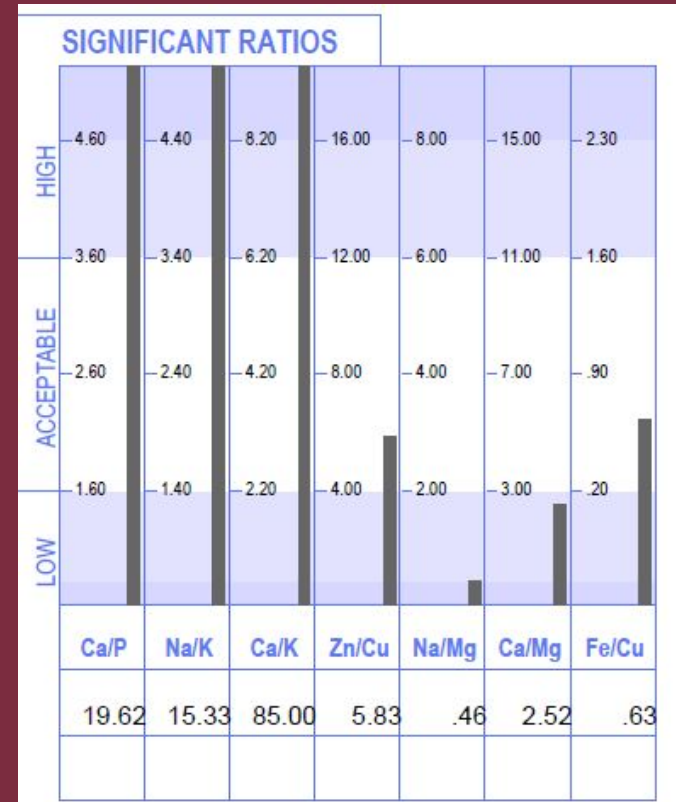
Patient Journey: 27 Year Old Female

- Ca Shell
- Extreme Mg loss
- Na slightly elevated
- K loss
- CuTx
- Some metals showing



Patient Journey: 27 Year Old Female

- Parasympathetic dominance
- Heightened stress ratio
- Thyroid expression sluggish
- Estrogen dominance
- Depleted adrenal function
- Dysregulated blood sugar



Patient Journey: Protocol 1

Bringing in the right minerals and vitamins alongside herbal support.

In this case the protocol included:

All support for slow oxidation including: potassium, magnesium, B vitamins, choline, MK-7, Vitamin C, Vitamin A, Vitamin E, zinc, manganese, selenium, boron, milk thistle, NAC, ALA, enzymes.

Additional Recommendations:

Chanca Piedra
Adrenal glandular
Zeolite Clinoptilolite
Probiotic
Iodine

Symptom Update

Anxiety

Much improved

Fatigue

Moving in a positive direction

Brain fog

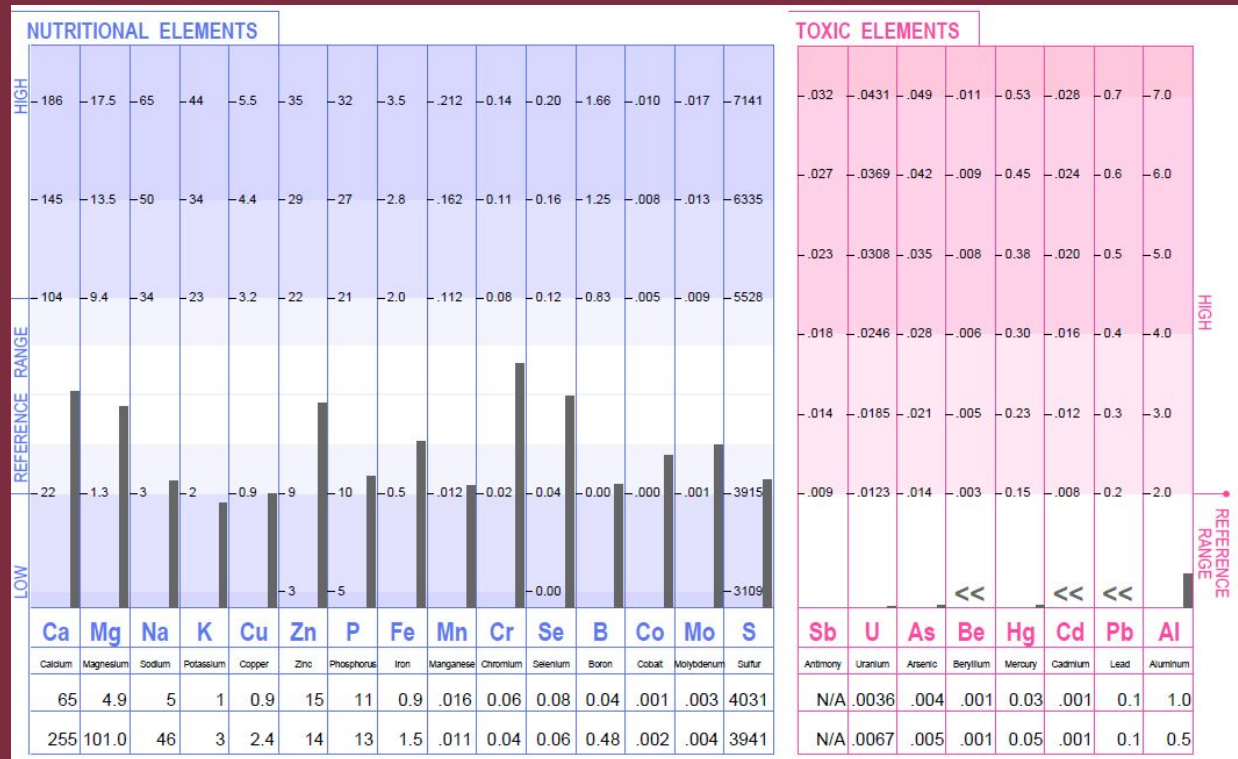
More clear thinking

Depression

Much better, happier and balanced

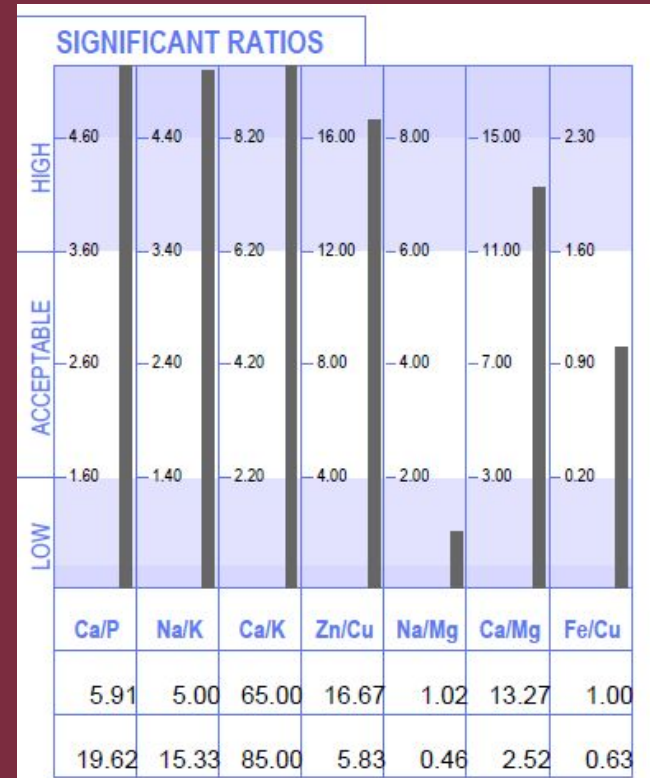
Patient Journey: 27 Year Old Female

- Calcification reduction tremendous
- Mg lowering into a more balanced position
- Na and K lowering from the stress of copper detox
- Copper movement noted



Patient Journey: 27 Year Old Female

- Body starting to balance
- Stress response lowering
- Thyroid ratio slowly getting better
- Hormone ratio correction
- Adrenal ratio building
- Blood sugar ratio correction
- Infection ratio balancing



The Calcium Shell Pattern



Understanding Soft Tissue Calcification

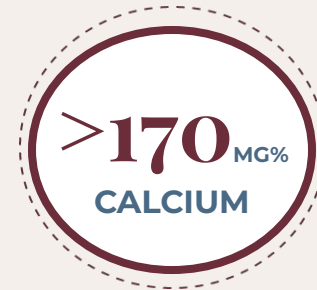
The "Calcium Shell"

A Physiological Wall Against Emotional Pain

BIOCHEMISTRY GOVERNS THE CAPACITY FOR EMOTIONAL WORK

THE DEFINITION

- A defensive physiological state where the body "**hardens**" itself against chronic stress or trauma.
- Characterized by extremely high tissue Calcium levels, often **exceeding 100 mg%**.



THE PROTECTIVE LOCK

What Causes the Calcium Shell?

-  **Copper** toxicity & dysregulation
-  **Iodine** deficiency
-  Emotional **trauma** & chronic stress
-  Excessive **calcium** supplementation
- Hard **drinking water**
- Hypothyroidism** & Hashimoto's
-  **EMF** exposure

Physical Symptoms

Manifestations of Soft Tissue Calcification

 Joint and muscle pain, cramps, spasms, or twitches

 Arthritis
Osteoporosis
bone spurs

 Arteriosclerosis (calcification of arteries)

 Kidney stones

 Fibromyalgia and Chronic Fatigue Syndrome

Hypothyroid symptom presentation

 Poor dental health and tooth decay

Migraines and headaches

Emotional Aspects of the Shell



Disconnected & Apathetic



Emotional Numbness



Psychological Withdrawal



Depression & Brain Fog



Out of Touch with Reality

Note: Anxiety, irritability, and racing mind may occur if copper toxicity is driving this pattern.

The Calcium Supplement Myth

The Common Reasoning

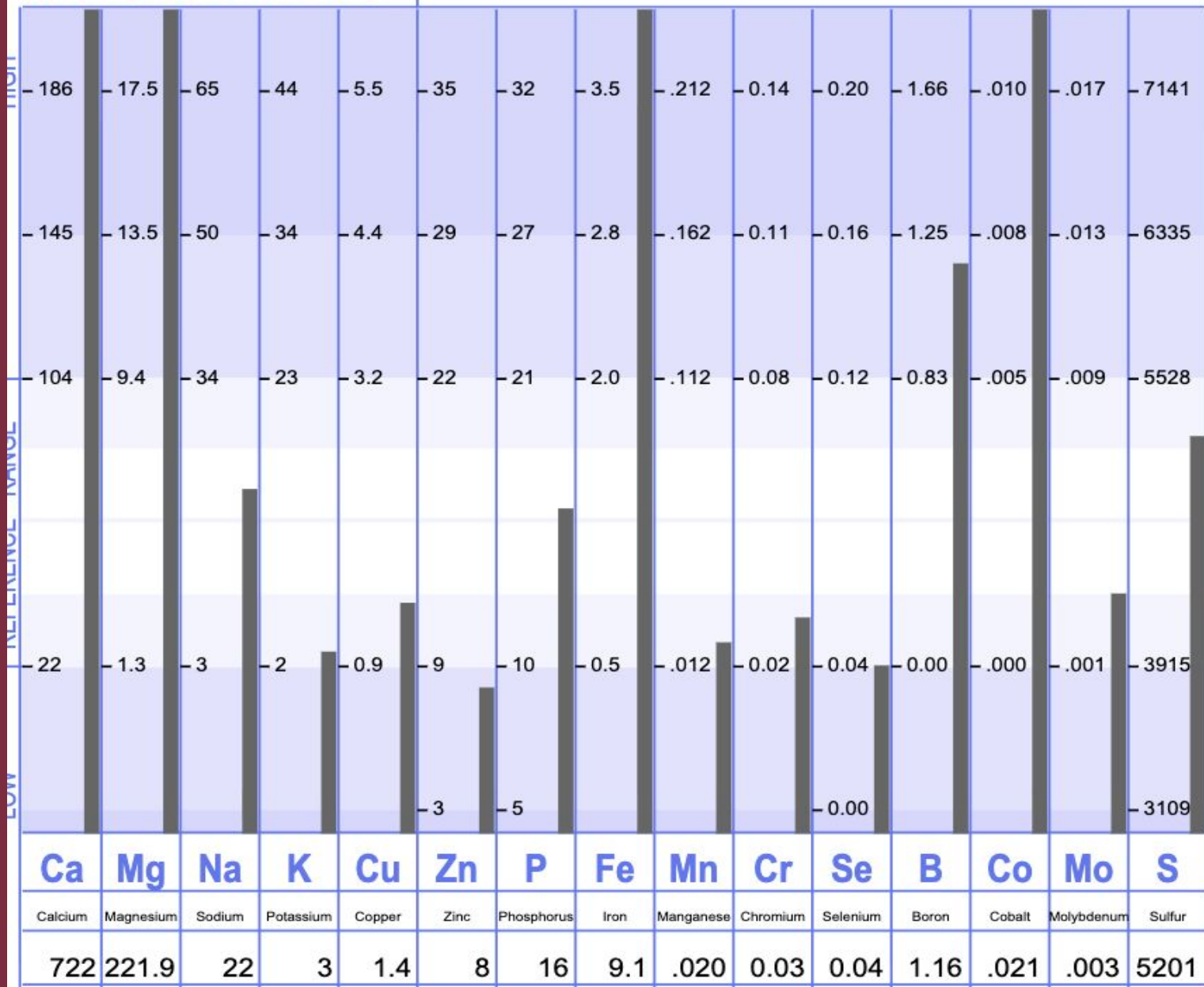
"Soft tissue calcification indicates a deficiency in the bone, therefore we should supplement with more calcium."

The Clinical Reality

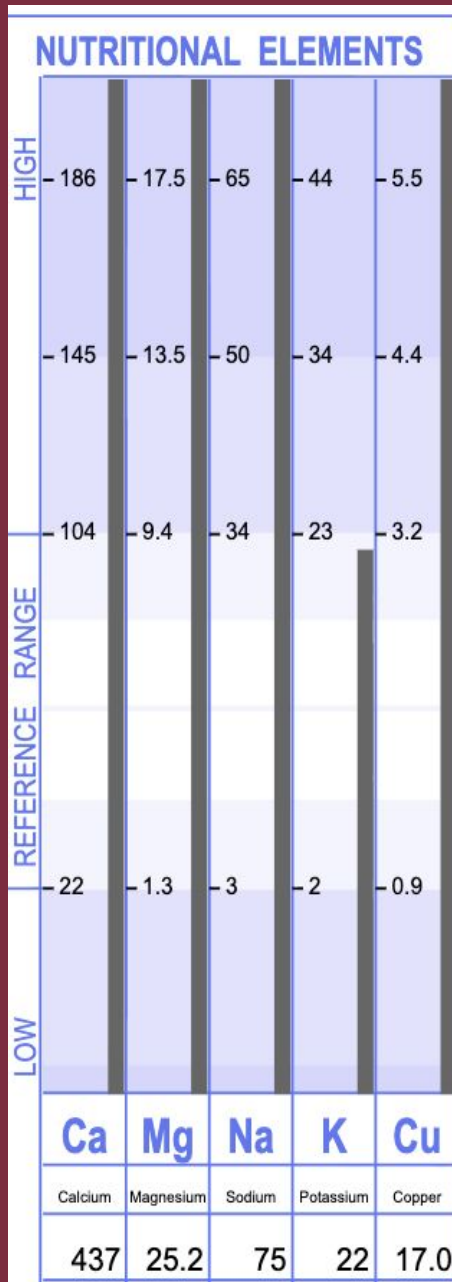
- ✗ Calcium is already at **toxic levels** in the soft tissues.
- ✓ The body needs **co-factors** to move calcium back into the bone.
- ⚠ Supplementation is **harmful** and can worsen the condition.

STOP SUPPLEMENTING CALCIUM IN A "SHELL" PATTERN

NUTRITIONAL ELEMENTS



CURRENT CLIENT



Clinical Symptom Profile

- **Neurological & Fascia:** Body stiffness, burning in fascia & tingling (heightened after craniosacral work).
- **Sleep Disturbances:** Waking frequently, particularly between 12 AM - 3 AM.
- **Energy Fluctuations:** Notable crashes and low levels in morning and evening.

How to Break Up the Calcium Shell

Nutritional

- **Vitamin K2:** Keeps Ca in bone.
- **Vitamin A:** Critical to break shell.
- **Iodine:** Especially if Ca > 200.

Metabolic

- **Slow Oxidizer Protocol**
- **Thyroid Support:** Case-by-case.
- **Address Copper Toxicity**

Emotional

- **Trauma Release:** EMDR, EFT.
- **Talk Therapy & Counseling**
- **Acupuncture Support**

Patient Journey: 62 Year Old Female

Main complaints:

Osteoporosis Diagnosis – downgraded to Osteopenia

Severe Arthritis, especially in hands / joints

Constipation

Fatigue

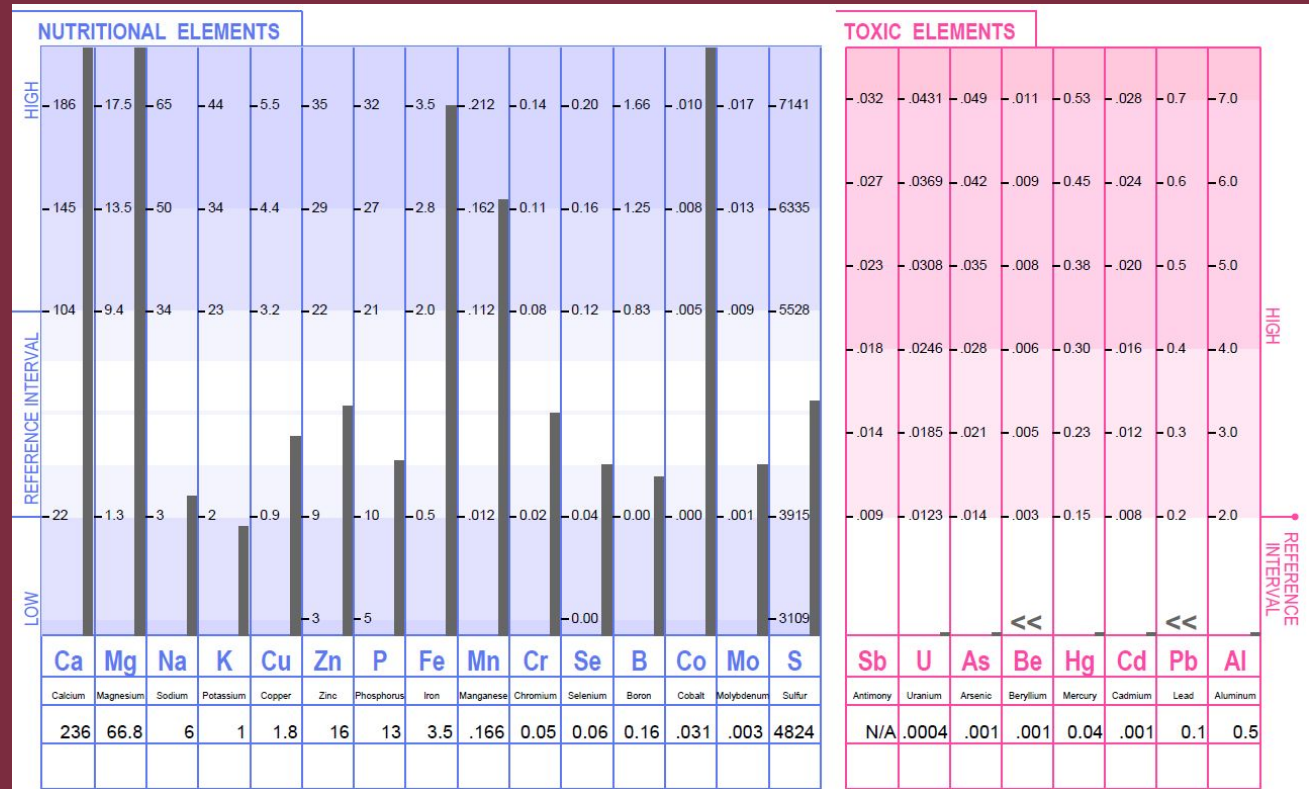
Recurring bacterial & viral infections

Reaction to starchy carbohydrates

Inability to continue exercise that she knows she needs to support her condition

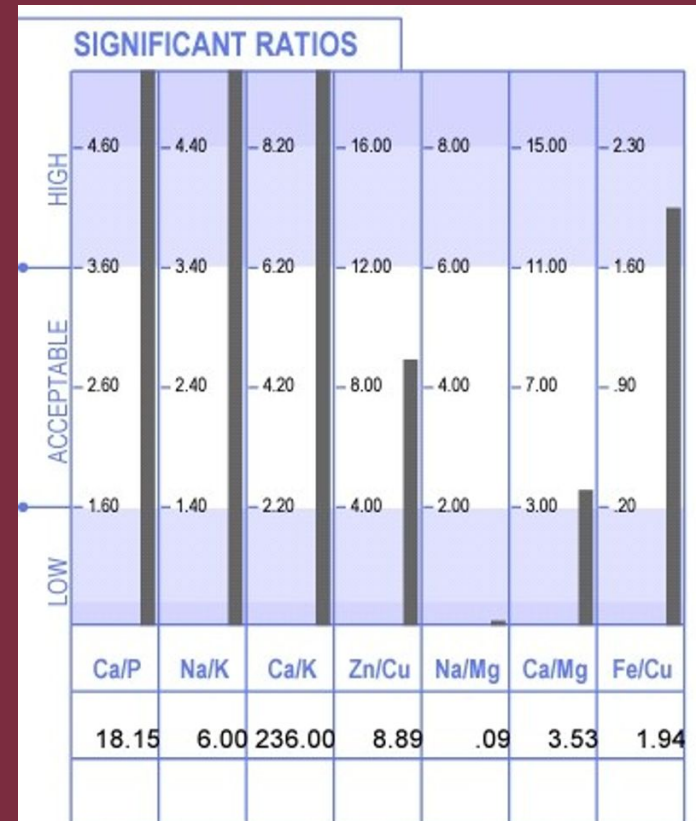
Patient Journey: 62 Year Old Female

- Ca Shell
- Extreme Mg loss
- Na low
- K low
- CuTx (based on markers)
- Fe & Mn high
- Co high
- Poor eliminator



Patient Journey: 62 Year Old Female

- Parasympathetic dominance
- Heightened stress ratio
- Thyroid expression very sluggish
- Hormone ratio balanced, but with Cu on board = estrogen dominance
- Depleted adrenal function
- Dysregulated blood sugar



Patient Journey: Protocol 1

In this case the protocol included:

Support all of the basics for slow oxidation including: sea salt, potassium, magnesium, B vitamins, choline, MK-7, Vitamin C, Vitamin A, Vitamin E, zinc, selenium, boron, dandelion root, NAC, ALA, enzymes.

Additional Recommendations:

Adrenal glandular
Binder for toxin removal
Probiotic
ACV
Iodine

Symptom Update

Severe Arthritis / Joint Pain

Everything starting to improve

Fatigue

Much better than previously

Exercise Intolerance

Feeling more like herself

Constipation (severe)

Bowels moving well

Intolerance Starchy Carbohydrates

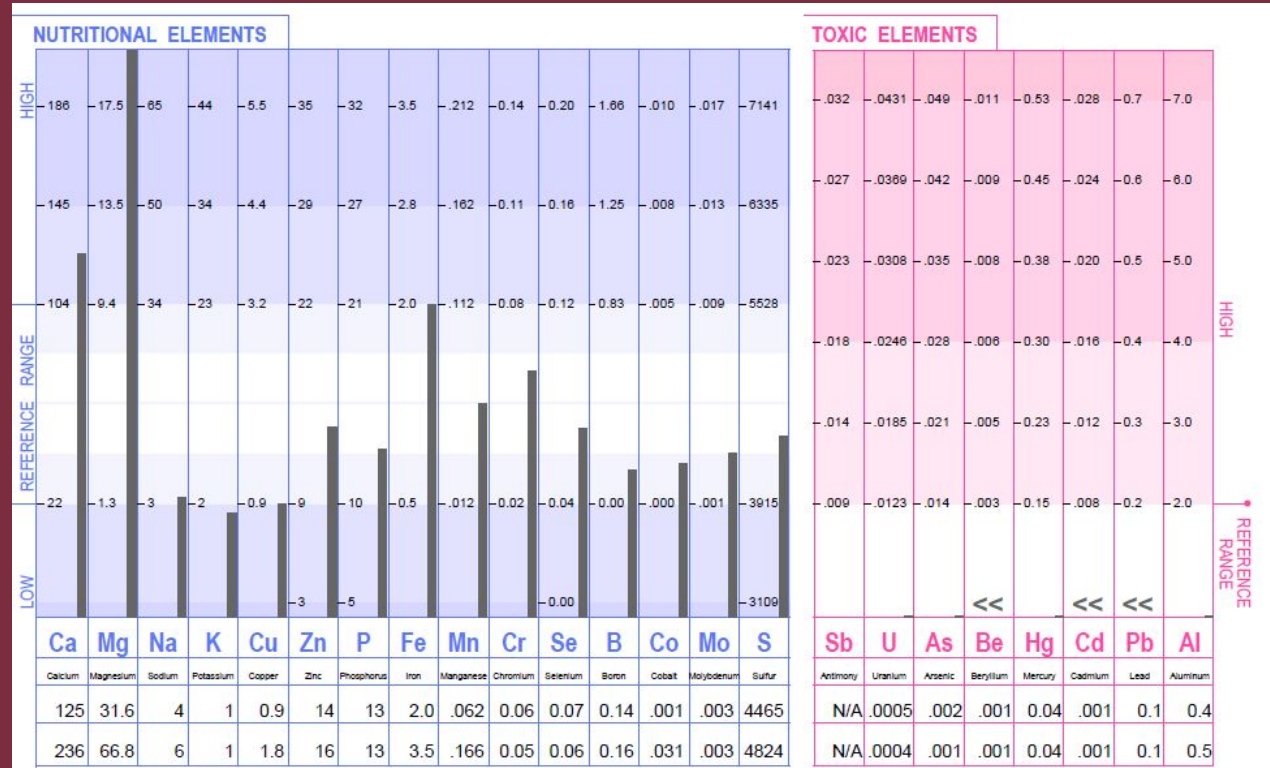
Have removed majority from the diet

Recurring Infections

Much less issues now, feeling better

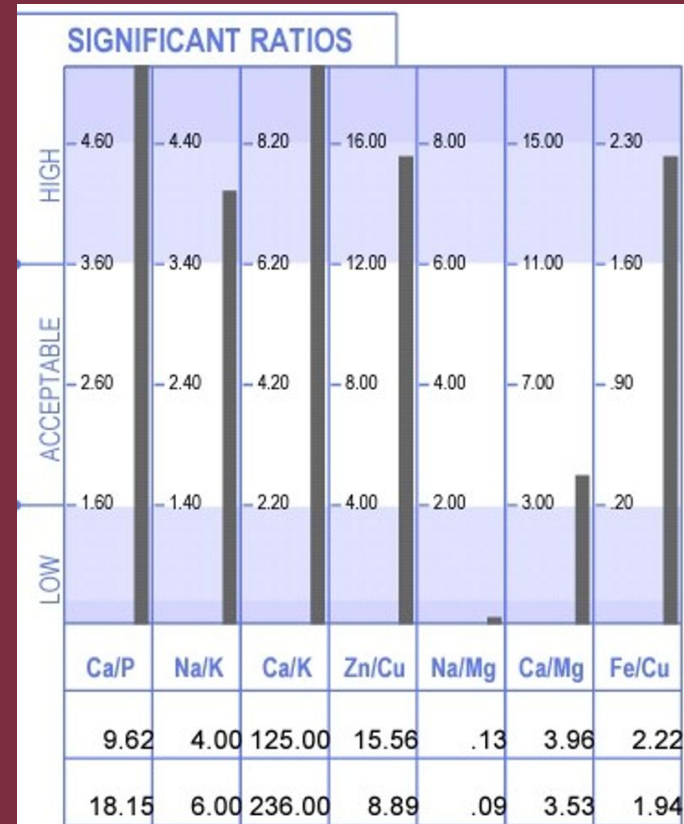
Patient Journey: 63 Year Old Female

- Calcification reduction tremendous
- Mg lowering
- Na and K lowering from the stress of calcium movement
- Fe & Mn lowering nicely
- Co corrected = liver better



Patient Journey: 63 Year Old Female

- Body not so deep in parasympathetic dominance
- Stress response lowering
- Thyroid ratio getting better
- Hormone ratio correction based on copper
- Adrenal ratio building slowly
- Blood sugar ratio minimal movement
- Infection ratio increasing - possible bacterial infection



Patient Journey: Protocol 2

In this case the protocol included:

Support all of the basics for slow oxidation including: sea salt, potassium, magnesium, B vitamins, choline, MK-7, Vitamin C, Vitamin A, Vitamin E, zinc, manganese, selenium, boron, dandelion root, NAC, ALA, enzymes.

Additional Recommendations:

Adrenal glandular
Binder for toxin removal
Probiotic
ACV
Iodine
Extra liver support

Symptom Update

Severe Arthritis / Joint Pain

Completely changed - mobile

Constipation (severe)

Bowels continue to move well

Fatigue

Fatigue has lifted

Intolerance Starchy Carbohydrates

Started adding these back into the diet

Exercise Intolerance

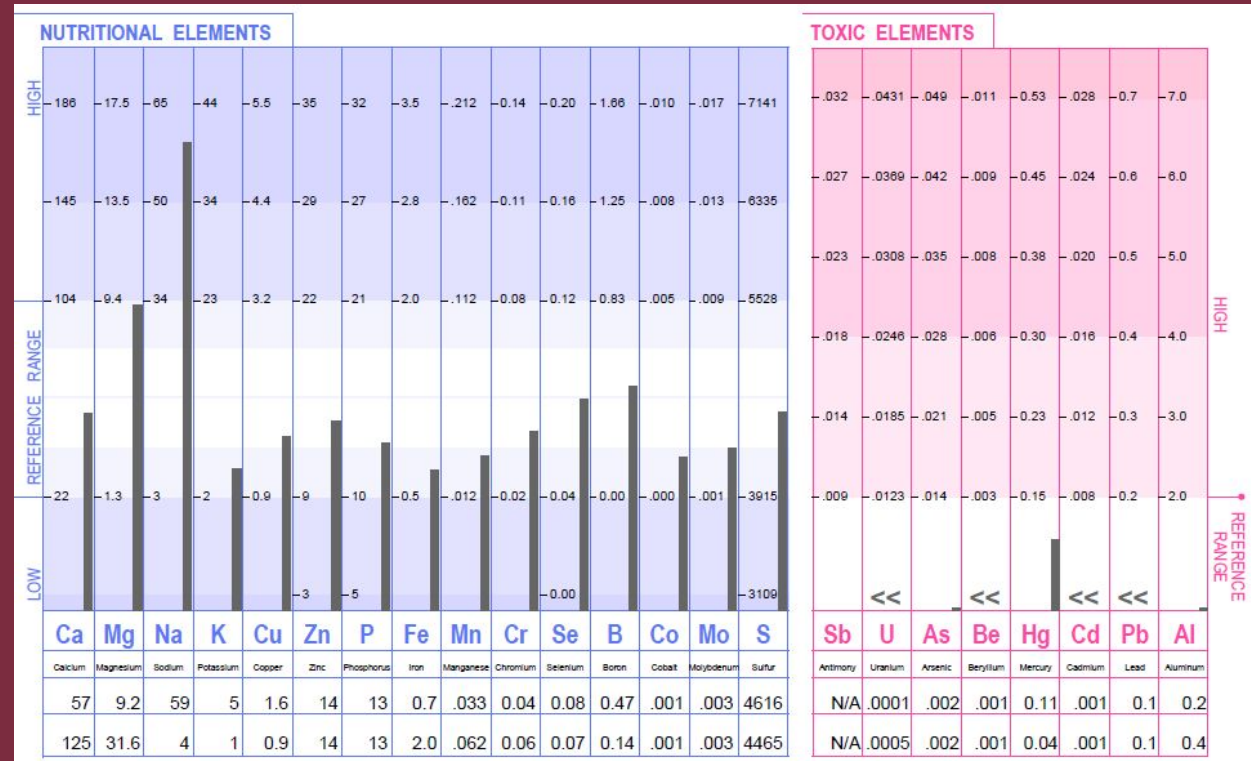
Exercising again without issue

Recurring Infections

Feeling much better

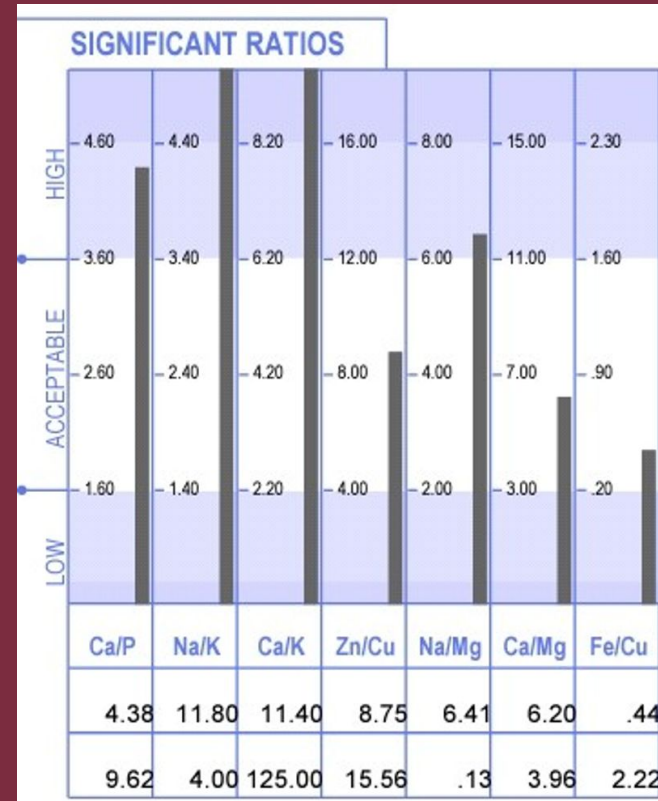
Patient Journey: 63 Year Old Female

- Calcium almost optimal
- Mg lowering into a balanced position
- Na completely bouncing back = thriving energy
- K rebounding
- Fe normalized
- Detoxing Hg



Patient Journey: 63 Year Old Female

- Body starting to balance
- Stress response higher
- Thyroid ratio getting better
- Hormone ratio correction
- Adrenal ratio now overactive
- Blood sugar ratio correction
- Infection ratio lowering



Update after 5 years of MB

- Bone scans are good
- Retests once annually
- Mineralizes everyday



Clinical Application

Integrating HTMA into Your Chiropractic Practice

The Structural Link

- **Lead & Bone Health:** Lead displacement of Calcium creates structural fragility.

- **Calcium Elevation:** Elevated Tissue Ca can lead to reduced spinal movement.

Muscle Tension: Magnesium deficiency drives muscle stiffness, making adjustments harder.

Holding the Adjustment

- **Collagen & Connective Tissue Strength:** Bioavailable Copper is critical for collagen cross-linking and connective tissue strength.
- **Nervous System Tone:** Sodium and Potassium balance the autonomic nervous system, allowing the body to integrate structural changes.
- **Better Outcomes:** Combining biochemical data with structural care leads to faster recovery and long-term patient retention.

The Path to Mineral Rebalancing

A Five-Step Process for Holistic Health Balance

01



Test

Utilize HTMA to gather precise, cellular-level data on mineral status and heavy metal burden.

02



Interpret

Analyze key ratios (Ca/K, Na/Mg, Na/K) to identify metabolic type and stress stages.

03



Rebalance

Implement targeted mineral support, dietary shifts, and lifestyle changes to restore vitality.

"When we address the mineral foundation, we unlock the body's innate capacity for both physical and emotional resilience."

The Path to Mineral Rebalancing

A Four-Step Process for Holistic Health Balance

04



Integrate

Combine mineral rebalancing with structural chiropractic care for lasting patient outcomes.

05



Retest & Reformulate

Retest, reformulate, and establish continued long-term care to support permanent vitality.

"When we address the mineral foundation, we unlock the body's innate capacity for both physical and emotional resilience."

LET'S DISCUSS

Q&A

Let's Connect



Come see us at our Booth



[SHETALKSHEALTH.COM](https://shetalkshealth.com)



[@SHETALKSHEALTH](https://www.instagram.com/shetalkshealth)



SOPHIE@SHETALKSHEALTH.COM

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What is HTMA + The Labs

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- Wilson, L. (2005). **Nutritional Balancing and Hair Mineral Analysis**, Ch. 2, pp. 17–20.
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- Wilson, L. (2005). **Nutritional Balancing and Hair Mineral Analysis**, Ch. 2, pp. 17–20.
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- Wilson, L. (2005). **Nutritional Balancing and Hair Mineral Analysis**, Ch. 1, pp. 13–

SOURCES

The MacroMinerals

- Watts, D.L. (1995). *Trace Elements and Other Essential Nutrients*, Ch. 5 “Calcium,” pp. 52–63.
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- Gröber et al. (2015), Nutrients — Magnesium is a natural calcium antagonist with wide physiological implications.
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- Wilson, L. (2005). *Nutritional Balancing and Hair Mineral Analysis*, Ch. 2 “Interpretation Principles,” pp. 32–33.
- Watts, D.L. (1995). Trace Elements and Other Essential Nutrients: Clinical Application of Tissue Mineral Analysis, Ch. 6 “Magnesium,” pp. 66–76.
- Core source on magnesium’s role in enzymatic processes, cardiovascular function, muscle relaxation, deficiency symptoms, and synergists/antagonists.
- Malter, R. PhD. (2003). The Strands of Health: A Guide to Understanding Hair Mineral Analysis. Source of the “Magnesium Burn Rate” concept linking stress and Mg depletion, referenced in Slide 35 (stress–Mg vicious cycle).
- Sircus, M. (2011). Transdermal Magnesium Therapy. Basis for the popular quote “Magnesium is literally the lamp of life”
- Watts, D.L. (1995). Trace Elements and Other Essential Nutrients: Clinical Application of Tissue Mineral Analysis, Ch. 13 “Sodium, Potassium, Chloride,” pp. 147–153.

SOURCES

Covers sodium physiology, adrenal regulation (aldosterone), fluid balance, blood pressure, and both deficiency and excess symptoms.

- Wilson, L. (2005). Nutritional Balancing and Hair Mineral Analysis, Appendix IV “The Mineral Reference Guide: Sodium,” pp. ~321-323

Details sodium as the “solvent mineral,” links to adrenals and stomach acid, burnout with chronically high Na, and ideal levels.

- Malter, R. PhD. The Strands of Health: A Guide to Understanding Hair Mineral Analysis (2003).

Practitioner source for the psychological dimension — the “JUDGE” concept tied to sodium and stress responses

- Watts, D.L. (1995). Trace Elements and Other Essential Nutrients: Clinical Application of Tissue Mineral Analysis, Ch. 13 “Sodium, Potassium, Chloride,” pp. 147–153.

Discusses potassium’s intracellular role, thyroid hormone sensitization, nerve conduction (especially cardiac), carbohydrate metabolism, deficiency/excess symptoms, and synergist/antagonist relationships.

- Wilson, L. (2005). Nutritional Balancing and Hair Mineral Analysis, Appendix IV “The Mineral Reference Guide: Potassium,” pp. ~321–323.

Details potassium as an anti-stress mineral, copper’s impact in lowering potassium, links to adrenal/cortisol dynamics, heart palpitations, and epidemic low potassium patterns seen in HTMA.

- Malter, R. PhD. (2003). The Strands of Health: A Guide to Understanding Hair Mineral Analysis. Provides practitioner context on potassium as a key anti-stress mineral and psychological effects of K imbalance (including heart rhythm disturbances).

- Weiner ID, Wingo CS. (1997). Hypokalemia — Consequences, Causes, and Correction. J Am Soc Nephrol. 8(7):1179–1188.

<https://pubmed.ncbi.nlm.nih.gov/9219169/>

Peer-reviewed medical source confirming widespread deficiency symptoms: arrhythmias, muscle weakness, constipation, fatigue, etc.

Copper

Dr. David L. Watts – Trace Elements and Other Essential Nutrients

- Chapter 7: Copper (pp. 78–95)

Healthview Newsletter (Eck)

- Copper is embedded within: Nine Rules of Mineral Analysis (e.g., Rule #2: a mineral can look “normal” but still be imbalanced — copper often cited)

Dr. Lawrence Wilson – Nutritional Balancing and Hair Mineral Analysis

- No dedicated “Copper” chapter, but copper runs throughout:

- Interpretation sections on hidden copper toxicity (copper appearing low or normal but actually stored/biounavailable).

SOURCES

Wilson, L. (2005). Nutritional Balancing and Hair Mineral Analysis, Appendix IV “The Mineral Reference Guide: Phosphorus,” pp. ~318–321.

Discusses phosphorus levels on HTMA, vitality interpretation, thresholds for catabolism (<15 mg% and <11 mg%), and issues with elevated levels (>25 mg%).

• Healthview Newsletter #27–29 (1981, Paul Eck & Sam Biser).

Introduces phosphorus as a core mineral in energy metabolism and vitality, reinforcing its role in the energy/adrenal/oxidation system.

• Calvo MS, Lamberg-Allardt CJ. (2015). Phosphorus.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC4642415/>

Peer-reviewed summary of phosphorus' physiological role in bones, teeth, and energy systems, supporting the scientific basis of the HTMA interpretation.

Clinical Application and The Oxidation Types

• Watts, D.L. (1995). Trace Elements and Other Essential Nutrients: Clinical

Application of Tissue Mineral Analysis, Ch. 9 “Oxidation Types,” Chpt. 33

Defines oxidation types, compares ARL vs TEI ratios (Ca/P, Ca/K, Na/Mg), and explains slow vs. fast oxidation. Includes physiological traits, psychological tendencies, and metabolic effects.

• Wilson, L. (2005). Nutritional Balancing and Hair Mineral Analysis, Ch. 5 “Oxidation Types,” pp. 55

Explains slow oxidation patterns, biochemical features (low adrenal/thyroid activity, Ca buildup, Na/K retention issues), and lists common symptoms.

• Healthview Newsletter #27–29 (1981, Paul Eck & Sam Biser).

Original introduction of slow and fast oxidation concepts by Paul Eck; includes symptom descriptions, causes (diet, stress, copper toxicity), and references to Hans Selye's General Adaptation Syndrome (stress stages).

• Selye, H. (1950). The Physiology and Pathology of Exposure to Stress. Montreal: Acta Inc.

• Eck, P. & Wilson, L. (1989). Tissue Mineral Analysis and Nutritional Balancing. First systematic publication of slow vs. fast oxidizer dietary guidelines.

• Healthview Newsletter #27–29 (1981, Paul Eck & Sam Biser). Introduces the rationale for different diets based on oxidation rate (slow vs. fast).

• Paul Eck's Healthview Newsletter #27–29 (1981, with Sam Biser).

SOURCES

Introduces the concept of balancing minerals through lifestyle: diet, rest, handling stress, appropriate supplements. This is essentially the precursor to the “pillars” idea.

- Wilson, L. (2005). Nutritional Balancing and Hair Mineral Analysis.

CLASS 2 TRACE MINERALS, SIGNIFICANT RATIOS & PATTERNS

Trace Minerals

- Watts: Dedicated chapter on copper: Chapter 7, P.78
- Watts: Zinc: Chapter 8, P.96
- Watts: Iron chapter: Chapter 9, P.106
- Watts: Manganese chapter: Chapter 10 P.117
- Watts: Chromium chapter: 11, P. 124
- Watts: Selenium chapter 12, P.132
- Watts: Boron is included in “ultra-trace elements” (p.163): skeletal health, bone maintenance, hormone interactions.
- Watts: Lithium (p.165): role in mood, nervous system, ultra-trace classification, synergists/antagonists.
- Watts: Cobalt (p.163): linked with B12 synthesis, anemia, neurological effects, synergists/antagonists.
- Watts: Molybdenum (p.166): cofactor in oxidation reactions, aldehyde metabolism, linked with copper metabolism, excess causes molybdenosis.
- Watts: Sulfur (p.169): classified as ultra-trace, part of amino acids (cysteine, methionine), detox pathways, insulin production.

SOURCES

Significant Ratios & Patterns

David L. Watts – Trace Elements and Other Essential Nutrients

- Chapter 2 – Nutritional Relationships mineral synergists & antagonists
- Chapter 3 – Nutritional–Endocrine Relationships explains how mineral ratios reflect endocrine activity (thyroid, adrenals, pancreas, sex hormones)
- Ratio Tables (end of Ch. 3 / beginning of Ch. 4) introduces the 7 significant ratios (Ca/P, Na/K, Ca/K, Zn/Cu, Na/Mg, Ca/Mg, Fe/Cu)

Lawrence Wilson – Nutritional Balancing and Hair Mineral Analysis

- Chapters 2–3 principles of HTMA interpretation (ratios principle, systems principle, adaptation principle)
- Chapters 4–7 thyroid, adrenals, oxidation rate, stress stage → applied through the ratios (Ca/K = thyroid ratio, Na/Mg = adrenal ratio, Na/K = life/death ratio)

- Ratio Pattern Interpretations (Double High/Low, Bowl, Hill, Step-Up, Step-Down, Deep Bowl) are Wilson's overlay on Eck's and Watts' ratio science

Paul Eck – Healthview Newsletter #27–29 (1981)

- Provides the historical foundation:
 - o Ca/P = metabolic ratio
 - o Na/K = life/death ratio
 - o Ratios as predictors of energy, stress, and oxidation types

Common Conditions

Wilson, Lawrence. Nutritional Balancing and Hair Mineral Analysis. Prescott, AZ: L.D. Wilson Consultants, 2005.

- Chapters 2–3 – Principles of Interpretation (ratios principle, adaptation principle, systems principle)
- Chapters 4–7 – Thyroid, Adrenals, Stress Patterns, Oxidation Rate (links mineral ratios and oxidation types to systemic conditions)
- Appendix IV – Mineral Reference Guide – Summaries of individual minerals, their roles, synergists/antagonists, and associated health conditions

The Stress Response

David Watts – Trace Elements and Other Essential Nutrients

- Ch. 3 – Nutritional–Endocrine Relationships - details on stress stages (alarm, resistance, exhaustion), Na/K as stress indicator, adrenal/thyroid involvement. Provides the physiological basis but less of the lifespan/aging narrative.

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SOURCES

CLASS 4 – INTERPRETING HTMA + COPPER

Interpreting HTMA

- Dr. Paul C. Eck & Healthview Newsletter – The Healthview Newsletter, Issues #27–29: A Beginning Course on Energy and Minerals
The Re-Test
- Dr. David L. Watts’ Trace Elements and Other Essential Nutrients: Clinical Application of Tissue Mineral Analysis, likewise, there is no stand-alone “Retesting” chapter. The subject comes up in the introduction and interpretation guidance, where he emphasizes the value of serial HTMAs for monitoring changes, trends, and toxic metal elimination

Copper

Dr. David L. Watts – Trace Elements and Other Essential Nutrients

- Chapter 7: Copper (pp. 78–95)
Healthview Newsletter (Eck)
- Copper is embedded within: Nine Rules of Mineral Analysis (e.g., Rule #2: a mineral can look “normal” but still be imbalanced — copper often cited)
- Dr. Lawrence Wilson – Nutritional Balancing and Hair Mineral Analysis
- No dedicated “Copper” chapter, but copper runs throughout:
- Interpretation sections on hidden copper toxicity (copper appearing low or normal but actually stored/biounavailable).
- Discussions of copper in energy production, mental health, adrenal function, and oxidation types.

TOXIC METALS

General Concepts: Heavy Metals, Toxicity, Sources

- Watts, David L. Trace Elements and Other Essential Nutrients: Clinical Application of Tissue Mineral Analysis. (Ch. 14, pp. 156–171 – Toxic Elements and Their Clinical Significance: overview of heavy metals, sources, accumulation, toxicokinetics, impact on enzyme systems and disease)
- Wilson, Lawrence. Nutritional Balancing and Hair Mineral Analysis: A Practical Guide. (Sections on toxic metals, hidden toxicity, mineral replacement, cumulative effects)
- 2. Detection, Ratios, Interpretation
- Eck, Paul C. & Healthview Newsletter, Issues #27–29. (Discussion of toxic metals on hair tests, limits of blood/urine, and the principle that “low readings do not equal absence”)
- 3. Toxic Metals and Disease
- Wilson – Toxic metals implicated in major degenerative diseases (Parkinson’s, diabetes, cancer, MS, aging acceleration, mental illness).
- Watts – Clinical applications, including neurotoxicity, carcinogenesis, enzyme inhibition, and endocrine disruption.

Provides the physiological basis but less of the lifespan/aging narrative.