SESSION 2

From A to Zinc

Going Deeper

Dose · Delivery · Timing · Synergy · Antagonism

Dr. Kristina Carman & Dr. Ryan Cole | IMAhealth Wednesday Webinar

INDEPENDENT MEDICAL ALLIANCE

IMAhealth.org

Before we start —

How many of you add your collagen to your morning coffee?

Vitamin C degrades significantly above 70°C
Freshly brewed coffee is served at 85–95°C

This is exactly the kind of detail tonight is about.

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Tonight's Session — What We're Covering

01

Deficiency, Dose & Delivery

The full absorption journey from capsule to cell

02

Medication Depletions — Expanded

HRT, thyroid meds, corticosteroids, antacids

03

Supplement Timing & Chronobiology

When to take what — and why the body's clock matters

04

Antagonists & Synergists

What competes, what works together, and the key nutrient pairs

05

Why the Rules Change in Blends

Multivitamins, complexes, and bone support formulas

Deficiency, Dose & Delivery

The absorption journey — 6 steps where things can go wrong

1

Dissolution

Tablet must break down — capsules & powders far more reliable

2

Stomach acid

Minerals need acidity to ionise — PPIs & aging impair this

3

Gut wall transport

Minerals share transporters — competition begins here

4

Blood transport

Carrier proteins (transferrin, VDBP) must be available

5

Cellular uptake

Some minerals need ATP to enter cells — energy required

6

Activation

Many nutrients need conversion: D → active D, B6 → P5P, folate → methylfolate

Delivery Systems — Beyond the Standard Capsule

Standard oral

Most convenient — least effective for some nutrients. Form matters enormously.

Liposomal

Phospholipid shell bypasses gut transport. Superior for vitamin C, glutathione, magnesium.

Sublingual

Absorbs under the tongue directly into bloodstream. B12, melatonin, GABA.

Transdermal

Absorbed through skin. Magnesium chloride spray or bath flakes bypass gut entirely.

IV / Intramuscular

Food matrix often outperforms isolates — whole food nutrients come with cofactors, enzymes, and companion compounds that evolved together.

Medication Depletions: The Full Picture

Session 1 — Recap		
Statins	→	CoQ10
Metformin	→	B12 + CoQ10
PPIs	→	B12, Mg, Zn, Fe, Ca
OCP	→	B6, B12, Folate, Mg, Zn, Se
SSRIs	→	B12, Folate, CoQ10
Antibiotics	→	Microbiome + B vitamins

New Tonight		
HRT	→	B6, Magnesium, Zinc
Levothyroxine	→	Timing critical — Ca, Mg, Fe, Zn all impair absorption
Corticosteroids	→	Ca, K, Mg, Zn, Vit D, Vit C
Thiazide diuretics	→	Potassium, Magnesium, Zinc
ACE inhibitors / ARBs	→	Potassium-SPARING — monitor carefully
Calcium antacids	→	Iron, Zinc absorption impaired

The Levothyroxine Timing Rule — A Critical Example

Levothyroxine must be taken in complete isolation

What significantly impairs absorption:

- Calcium supplements or dairy
- Magnesium and zinc supplements
- Iron supplements
- High-fibre foods
- Coffee — even black coffee
- Antacids (calcium carbonate)

The protocol:

Take on an empty stomach

30–60 minutes before any food, supplements, or coffee

Same time every morning without exception

Subtherapeutic thyroid levels in a well-dosed patient are frequently a timing problem — not a dosing problem.

Supplement Timing & Chronobiology

Three drivers of supplement timing decisions:

1. Competition for absorption

Minerals share gut transporters. When multiple minerals arrive simultaneously, all are absorbed less efficiently. Timing separates the competition.

2. Food requirements

Fat-soluble vitamins (A, D, E, K) need dietary fat — up to 50% less absorbed without it. Water-soluble vitamins need food for tolerability. Vitamin C needs splitting across the day.

3. Circadian biology

The body's 24-hour clock governs hormone secretion, enzyme activity, gut motility, and cellular repair. Aligning supplements with these rhythms meaningfully enhances their effect.

Mineral Timing — The Key Rules

Iron + Calcium	Calcium reduces iron absorption by up to 60% — always separate by minimum 2 hours	CRITICAL
Iron + Zinc	Both use DMT1 transporter — high-dose supplements must be taken at different times of day	HIGH
Zinc + Copper	High zinc depletes copper over time — supplement copper alongside zinc (10:1 ratio)	HIGH
Calcium + Magnesium	Take calcium with daytime meals, magnesium glycinate in the evening before bed	MODERATE
Iron + Coffee / Tea	Tannins bind iron significantly — separate by at least 60 minutes either side	HIGH
All minerals + PPIs	Low stomach acid from PPIs impairs all mineral absorption — address the root cause	HIGH

Iron — Why Every Other Day Works Better

The Hepcidin Cycle

Hepcidin is the master regulator of iron absorption

Iron absorbed → **hepcidin rises**

Hepcidin blocks ***ferroportin***

Gut stays **closed for ~24hrs**

Next-day dose **largely wasted**

The optimal iron protocol:

- Every other day — not daily
- Morning — hepcidin naturally lowest
- Empty stomach for maximum absorption
- Always with vitamin C (100–200mg)
- Away from coffee, tea, and dairy
- Separate from Ca, Mg, Zn by 2+ hours

Choose iron bisglycinate

Chelated to glycine — uses amino acid transport pathway rather than competing divalent transporter. Dramatically less constipation and nausea than ferrous sulfate.

Target ferritin: 50–100 ng/mL (not just above 12)

Chronobiology — Aligning Supplements with Your Body Clock

☀️ Morning

- Iron (every other day, empty stomach + vit C)
- B complex (energising — avoid evenings)
- Vitamin C — first dose
- Tyrosine (cognitive performance and stress)
- SAMe (stimulating — never take late)
- CoQ10 with breakfast (fat meal)
- Iodine
- Thyroid medications — 30–60 mins first

🌙 Evening / Before Bed

- Magnesium glycinate (30–60 mins before bed)
- L-theanine (calm focus or sleep)
- GABA (sleep onset)
- 5-HTP or tryptophan (30–60 mins before bed)
- Melatonin (30–60 mins before bed)
- Glycine 3g (overnight repair)
- Zinc with dinner
- Vitamin D with dinner (largest fat meal)
- Collagen peptides (between meals or evening)

Coffee significantly impairs iron and zinc absorption — separate mineral supplements by at least 60 minutes either side of coffee.

Collagen + Vitamin C — The Cofactor Dependency

Why vitamin C is non-negotiable with collagen

Collagen requires hydroxyproline for structural stability.
Hydroxyproline is made from proline via the enzyme prolyl hydroxylase.
Prolyl hydroxylase is completely dependent on vitamin C as a cofactor.

No vitamin C = the enzyme cannot function = collagen cannot be properly stabilised.
This is the exact mechanism of scurvy.

The hot drink problem

Vitamin C degrades above 70°C

Coffee: 85–95°C
Tea: 90–95°C

Vitamin C in your collagen supplement may be largely destroyed before you drink it.

The solutions

- Allow drink to cool to ~50°C before adding collagen
- Add collagen to cold drinks or smoothies instead
- Choose collagen WITHOUT added vitamin C — take vit C separately as a capsule
- For joint/tendon support: take collagen + vit C 30–60 mins before exercise (Shaw et al, UC Davis)

The Key Synergistic Pairs and Triads

Vitamin D3 + K2 + Magnesium

BONE + CARDIOVASCULAR

The calcium triad. D3 absorbs calcium. K2 (MK-7) directs it into bone, away from arteries. Magnesium activates D3 conversion AND K2-dependent proteins. All three essential — none optional.

Iron + Vitamin C

ABSORPTION

Vitamin C converts ferric Fe3+ to the more absorbable ferrous Fe2+ form. Absorption enhanced by up to 67%. Always take together — never iron alone.

Zinc + Quercetin

ANTIVIRAL + IMMUNE

Quercetin is a zinc ionophore — it transports zinc across cell membranes. Inside the cell, zinc inhibits viral RNA replication. Quercetin without zinc lacks the mechanism. Zinc without quercetin struggles to enter cells.

NAC + Glycine

GLUTATHIONE

Both are rate-limiting for glutathione synthesis. NAC provides cysteine. Glycine is the other limiting cofactor — rarely supplemented alongside NAC despite superior glutathione elevation when combined.

Selenium + Iodine

THYROID

Selenium-dependent enzymes convert T4 to active T3 and protect the thyroid from oxidative stress during hormone synthesis. Never supplement therapeutic iodine without selenium (200mcg).

Magnesium + B6 (P5P)

MOOD + PMS

B6 enhances cellular uptake of magnesium — higher intracellular levels than magnesium alone. Specific evidence in PMS and anxiety. Take P5P not standard pyridoxine.

The Most Important Antagonistic Pairs

Calcium ↔ Iron	Calcium reduces iron absorption by up to 60% when taken together at therapeutic doses.	✓ Separate by 2+ hours. Critical for women on both.
Zinc ↔ Copper	High dose zinc induces metallothionein which binds copper, preventing absorption. Sustained zinc without copper causes copper deficiency.	✓ 10:1 ratio. Copper 2–3mg per 25–30mg zinc. Monitor long term.
High-dose B6 ↔ B2	High dose isolated B vitamins flood shared pathways and deplete others. B6 can deplete B2; niacin can deplete B6.	✓ Always accompany therapeutic B vitamin doses with a complete B complex.
High-dose Vit E ↔ Vitamin K	High dose vitamin E (400+ IU) has anticoagulant properties and can impair K-dependent clotting factors.	✓ Monitor in anyone on warfarin. Choose mixed tocopherols at sensible doses.
Calcium + Magnesium (high dose together)	At therapeutic doses both compete for the same transport system reducing absorption of each.	✓ Split: calcium with daytime meals, magnesium glycinate in the evening.

Why the Rules Change in Blends & Complexes

"If zinc and copper compete — why is there a zinc and copper supplement?"

The answer: dose determines clinical significance

Dose-dependent competition

Mineral competition becomes clinically significant at therapeutic doses — not multivitamin doses. 100mg calcium + 8mg iron in a multi = negligible competition. 500mg calcium + 65mg therapeutic iron together = significant competition.

Ratio is the solution — not the problem

A zinc/copper supplement at 15:1 ratio provides both at doses where combined absorption still delivers adequate amounts of each — and crucially prevents the copper depletion that isolated zinc causes over time.

Well-formulated bone support works synergistically

Calcium citrate + magnesium glycinate + D3 + K2 in a quality formula IS the solution. These nutrients need each other. The formula accounts for ratios and uses bioavailable forms. This is intentional design.

How to Evaluate Any Multi-Ingredient Supplement

Four questions to ask before purchasing any blend:

01 Are the forms bioavailable?

✅ Glycinate, citrate, methylated B vitamins, active forms (P5P, methylcobalamin, methylfolate, ubiquinol)

❌ Oxide, carbonate, cyanocobalamin, folic acid, dl-alpha tocopherol

02 Are the doses meaningful?

✅ Doses that match evidence-based therapeutic or maintenance ranges

❌ "Fairy dusting" — token amounts present on the label but far below any clinical effect

03 Are competing nutrient ratios appropriate?

✅ Zinc:copper at 10:1–15:1. Calcium:magnesium at 2:1. Iron not alongside calcium at high doses.

❌ High zinc with no copper. High iron with calcium carbonate in same capsule.

04 Are potentially antagonistic nutrients at safe doses?

✅ Below the threshold where competition becomes clinically significant

❌ Therapeutic iron + therapeutic calcium together. High B6 isolate without B complex support.

Your Questions

Dr. Kristina Carman ND & Dr. Ryan Cole

The right question is never just what to take —
it is what form, what dose, at what time, with what food,
alongside what other nutrients, in the context of your individual biology.

Tonight's key takeaways:

- Absorption has 6 steps — any one can fail without the right conditions
- Iron every other day (hepcidin) · Always with vitamin C · Morning · Empty stomach
- Don't add collagen to hot drinks if vitamin C is in the formula
- Timing: minerals apart · fat-solubles with food · calming nutrients at night
- Synergy pairs matter: D3+K2+Mg · Iron+C · Zinc+Quercetin · NAC+Glycine
- Blends work when forms are right, doses meaningful, and ratios appropriate