The Supplement Bioavailability Primer

An 8-page reader's guide to ingredient form selection, absorption data, and how to tell when a brand is hiding the math.

Operated by Genomax LLC (dba GenoMAX²) | Educational, not medical | First published 2026-06-30

Why this primer exists

Most supplement-shopping decisions are made on the front of the bottle. The marketing copy. The brand voice. The ingredient name in 40-point type. The Supplement Facts panel on the back is read by maybe one in twenty buyers.

This is a problem because the panel is the only part of the package that the FDA regulates the content of. It is also where the actual answer to "will this work for me" lives.

This primer is a reader's guide to the part of the bottle most buyers never read. By the end you will be able to do four things:

1. Distinguish ingredient form from ingredient dose, and know why the form usually matters more. 2. Read a bioavailability number critically (fed vs fasted, single-dose vs steady-state). 3. Recognize the three most common ways brands distort form claims. 4. Build a 90-second product-evaluation checklist you can run in a store aisle.

We will use specific examples throughout. The point is not to memorize examples; it is to build an evaluation framework.

This document does not make disease, treatment, or prevention claims. Statements about ingredient absorption refer to documented bioavailability research, not to clinical efficacy for any condition. These statements have not been evaluated by the Food and Drug Administration.

Form vs dose, the fundamental distinction

The first idea worth internalizing is that a milligram on a label is not a milligram in your bloodstream.

When a panel lists "Magnesium 400 mg (as magnesium glycinate)," the 400 mg refers to elemental magnesium content. The "as magnesium glycinate" is the **form**: the chemical structure attached to the active element. The same 400 mg of elemental magnesium would behave differently if the form were oxide, citrate, malate, taurate, or threonate.

Form affects five things:

- **Absorption efficiency**: the percentage of the dose crossing the gut wall. - **Bioavailability**: the percentage that reaches the bloodstream usably. - **Tissue distribution**: which organs the molecule preferentially accumulates in. - **Tolerability**: side-effect profile at the same delivered dose. - **Cost**: chelated and methylated forms cost 3 to 10 times more per gram than oxide and carbonate forms.

A simple illustration. Two products. Both list 400 mg magnesium per serving. Product A uses oxide ($0.40 ingredient cost per bottle). Product B uses glycinate ($3.20 ingredient cost per bottle). The retail price difference might be $10. The absorption difference is large enough that taking 400 mg of oxide can deliver less effective magnesium than 200 mg of glycinate.

When you compare two products in the same category, comparing milligrams without comparing forms is comparing the wrong thing.

Three categories where form selection matters most

Magnesium. The forms vary in absorption efficiency, in gastrointestinal tolerability, and in tissue distribution. Oxide is cheap, sits in the gut, often causes loose stools at modest doses. Citrate absorbs better but has a similar laxative profile. Glycinate is calming, gentle, and absorbs through the amino-acid transport pathway. Malate is favored for muscle endurance contexts. Threonate is studied specifically for crossing the blood-brain barrier (this is the highest-cost form). Picking the wrong magnesium form for the intended use is one of the most common supplement-routine errors.

B12. Cyanocobalamin is the cheap, shelf-stable form. Most B12 supplements use it. The body converts cyanocobalamin to methylcobalamin or adenosylcobalamin internally before use. Methylated B12 forms skip that conversion step and are more directly usable, particularly for individuals with MTHFR genetic variants that slow the conversion. Methylated forms cost more and are less shelf-stable. They also have a stronger stimulant effect on some individuals, which makes evening dosing inadvisable.

Curcumin (turmeric extract). Plain curcumin has notoriously poor oral bioavailability. Less than 1% of a standard dose reaches the bloodstream unmetabolized. Phytosome formulations (curcumin bound to phosphatidylcholine) and liposomal formulations can be 10 to 30 times more bioavailable than plain extract. A 200 mg dose of phytosome curcumin can deliver more usable curcumin than a 2,000 mg dose of plain extract.

In each category, picking the cheaper form at a higher milligram dose typically loses to the better-studied form at a lower one.

How to read bioavailability numbers

Bioavailability is the percentage of an ingested dose that reaches systemic circulation in usable form. It is the single most important absorption metric. It is also the most commonly distorted.

Two studies on the same molecule, in the same form, can report bioavailability values that differ by 5x or more. Both can be technically honest. The difference is what they measured and under what conditions.

Five conditions that change the number:

1. Fed vs fasted state. Some ingredients absorb better on an empty stomach (amino acids, water-soluble vitamins). Others require dietary fat (vitamins A, D, E, K) or a meal to stimulate digestive enzymes. A fasting bioavailability number for a fat-soluble vitamin is artificially low. A fed-state number for an amino acid competing against dietary protein is artificially low in the other direction.

2. Single-dose vs steady-state. A one-time dose and a 14-day daily-dose accumulation can differ by 2 to 3x for ingredients that build up in tissue. Brands often cite the more flattering measurement without identifying which.

3. Healthy young adult vs at-risk population. Bioavailability in healthy adults aged 25 to 40 is usually the upper bound. The same dose in older adults, in people with reduced stomach acid, or in people on competing medications absorbs at a lower rate. Generalizing a healthy-adult number to an older population overstates real-world effect.

4. Co-ingestion. Some ingredients dramatically affect each other. Iron and calcium compete for transport. Vitamin K and other fat-soluble vitamins share absorption pathways. A bioavailability study run with the supplement alone overstates the number you experience taking it inside a multi-supplement routine.

5. Measurement method. Plasma peak concentration, area under the curve over time, and tissue concentration measure different things. A brand that reports "peak plasma concentration up 28%" without naming the measurement method has not told you whether more of the molecule reached the tissue that matters.

When you see a bioavailability claim, ask: vs which form, measured how, in which population, in fed or fasted state, with or without co-ingestants? If the claim does not answer those five questions, it is marketing, not data.

Three traps in form claims

Trap 1: "Our form is X% more bioavailable."

The "more bioavailable than what" is rarely specified. If the comparison is against the cheapest available form, the claim is true of almost every alternative. The honest comparison is form-to-form against the closest peer (glycinate vs. malate, phytosome vs. liposomal), not form-to-form against oxide.

Trap 2: Single-study citations.

A single positive study at a single dose in a single population is suggestive. It is not confirmation. Forms that hold up across 10 to 20 published studies (different populations, different doses, different conditions) are the reliable ones. A "studies show" claim that links to one paper is a single study citation regardless of whether the brand says "studies."

Trap 3: Bioavailability vs clinical effect.

A molecule reaching the bloodstream does not automatically mean it accomplishes a downstream effect. Some forms with very high bioavailability still under-perform clinically because the body clears them too fast or distributes them to tissues where they are not needed. A complete evaluation requires both an absorption number and an outcome study. Marketing brochures often quote one without the other.

When you see only a bioavailability number, the appropriate response is "compared to what, measured how, and what was the downstream effect?"

A 90-second product-evaluation checklist

Use this in a store aisle or on a product page before buying.

Step 1: Flip the bottle and find the Supplement Facts panel. If the panel is hard to find or printed in 6-point type, that is a signal.

Step 2: Look for the form of every named ingredient. Forms appear in parentheses next to the ingredient name. "Magnesium (as magnesium glycinate)" is a form claim you can verify. "Magnesium complex" is not.

Step 3: Count proprietary blends. Zero or one is normal. Three or more is a flag. Proprietary blends are legal but they hide individual ingredient dosing.

Step 4: Check serving size. Different serving sizes are not directly comparable. A 2-capsule serving with 400 mg is not the same as a 1-capsule serving with 400 mg if both bottles have 60 capsules; the cost per dose is twice as different as the per-bottle price implies.

Step 5: Match the form to a published dose range. Open PubMed on your phone. Search "[form name] [outcome]" for the outcome you care about. Read the abstract of the most-cited result. If the dose on your panel is within the studied range, the form claim is plausible. If the dose is half the studied range or less, you are probably under-dosing.

Step 6: Check the manufacturer. If the bottle does not name a manufacturer or facility, that is a flag. If it names a manufacturer, search the FDA warning-letter database for that manufacturer name. A clean record is the minimum bar.

Ninety seconds. Most products fail at step 2 or step 3.

What an honest brand looks like

After enough product comparisons, the patterns of honest brands and dishonest brands become visible.

Honest brand signals:

- Single ingredient form per category. No "magnesium complex blend" with three sub-doses. - Specific form named on the panel, not "premium" or "bioavailable" without identification. - Published dose range matched on the panel. - Third-party batch test certificate accessible without an account. - A manufacturer named on the bottle. - Disease, treatment, or prevention claims absent from the marketing copy. - Disclosure of operating entity and physical address. - A clear path to unsubscribe from communications.

Dishonest brand signals:

- Multiple overlapping forms in one product without per-form dosing. - "Studies show" without specific citations. - Marketing copy implying treatment of named conditions (the FTC fines for this). - No third-party test certificate. - No manufacturer named. - Aggressive cart abandonment, upsell, or "limited time" pressure tactics. - "Money-back guarantee" with conditions that make it unusable in practice.

Most legal supplement brands fall somewhere on the spectrum between these poles. The position on the spectrum is usually consistent across a brand's catalog: a brand willing to inflate one panel will inflate the rest.

How we apply this to our own products

If you read this primer, the natural next question is what we do at GenoMAX².

For every ingredient we ship, we publish on the product page before purchase:

- The form on the Supplement Facts panel (specifically named, in parentheses). - The bioavailability range from the three most-cited primary studies. - The conditions of those studies (fed or fasted, single-dose or steady-state, population age range). - The full PubMed citation chain. - Third-party batch test certificate accessible via QR code on the bottle. - The manufacturer name and facility address.

For every claim on the product page or in our marketing:

- Structure/function claims only. No disease, treatment, or prevention claims. - Disclosure of operating entity (Genomax LLC) and the editorial property (NutraScienceWatch) we also operate. - A single contextual link from any editorial article to a product, carrying `rel="sponsored"` and an adjacent disclosure.

We are launching narrow. Wave one is three foundation routines. Wave two will be smaller than most brands' first launch. The reason is that we have to do the documentation work on every SKU before it ships. If we cannot back the form selection with peer-reviewed sources, we do not ship the SKU.

You are not obligated to buy from us to use this primer. The framework is the value. It works on any supplement bottle in any aisle.

We hope it makes the next bottle you pick up easier to read.

The GenoMAX Team

Citations and further reading

This primer draws on absorption and bioavailability literature available through PubMed. Specific PMIDs are tracked in the product-page footnotes for each ingredient we ship. The framework principles are widely supported in supplement pharmacology textbooks (Goodman & Gilman, USP Dietary Supplements Compendium).

For deeper coverage by category, our editorial property publishes form-comparison explainers at nutrasciencewatch.com. The editorial team operates independent of our product launch calendar.

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