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What's Under the Lid? The Part of Supplement Packaging Almost No One Talks About

Analysis by Dr. Joseph Mercola | July 22, 2026

STORY AT-A-GLANCE

- Most people judge supplement packaging by the bottle or jar, but some of the questions that matter most relate to what seals the product: whether the closure keeps oxygen out, whether a powder pack can reseal, properly and what chemistry the liner, induction seal, adhesives, and inks add to the ingredients they sit closest to
- We are moving many appropriate powders out of glass and plastic bottles and into real aluminum-foil packaging — foil pouches and foil-lined canisters — which protects fragile ingredients from oxygen far better than any bottle, while a wide canister stays easy to scoop, simple to dose and sprinkle on food, and easy to reuse
- The real driver of the switch is oxygen: it degrades sensitive actives through the container wall, around the cap, and with every reopening — so our new standard is a real aluminum-foil barrier run with a nitrogen flush, an oxygen absorber and a desiccant, verified as a complete system
- Peer-reviewed research shows that bisphenols, phthalates, and PFAS migrate from food-contact materials into food, and that this migration rises with heat, time, surface area, and fat content. A nontoxic pack with the wrong liner is not a complete packaging solution; our standard is to audit the entire stack: pack, cap, liner, seal, adhesive, inks, desiccant, and every direct food-contact surface
- The question every supplement company should be able to answer — and almost none can — is simply, “What’s under the lid?”

When people ask whether a supplement should come in glass or plastic, they usually think they are asking the single most important question. They are not. The more important question is this: what actually touches, seals, protects, and preserves the product?

That includes the jar, but it does not stop there. It includes the lid, the liner under the lid, and the induction seal. It includes the adhesive, the gasket, the foam layer, the inks, the coatings, the desiccant, and every material that could interact with the contents over months of storage.

It also determines how much oxygen and moisture ever reach the product — which, for our most sensitive ingredients, is what decides whether the formula is still at full strength when you open it. This is the part of packaging almost no one talks about, and it may be one of the most important parts of all.

Why We Are Moving Many Powders Into Foil Pouches

- **The first reason is practical —** Powders do not belong in narrow capsule bottles. Our primary pack is now a foil pouch — a flat-bottom or quad-seal pouch that stands up like a small canister — fitted with a wide, powder-proof closure or a screw-top spout you can scoop or pour from. You can reach the product, see what is left, and dose accurately, instead of fighting powder out of a bottle neck designed for pills.

- **The second reason is philosophical —** A powder you sprinkle on food feels like nutrition, not medication. Supplements should support your diet, not replace it, and the package can signal that difference. A narrow amber bottle belongs in a medicine cabinet; a resealable foil pouch belongs next to the foods you'll mix it into. This puts the product where the eating happens, which is exactly where we want it.

- **The third reason is compliance —** Many people are tired of swallowing handfuls of pills. Taking a scoop of powder is easier — especially for fibers, prebiotics, collagen, amino acids, and minerals, where a meaningful serving is measured in grams rather

than milligrams. People stick with what's easy, and the daily ritual lives or dies on small friction.

A wide foil pouch makes the daily scoop a two-second motion instead of a chore involving swallowing several large pills, and the easier the ritual, the more consistently people do it.

Why Glass Is Not Always the Premium Answer

I used to think glass was the obvious premium choice. It is inert. It feels clean. It is recyclable in theory. But the real-world truth is that glass is heavy. It breaks. It drives up shipping costs, and can shatter in a warehouse, a home, or a travel bag.

And there is a subtler problem that matters even more for sensitive ingredients: glass is an excellent barrier, but it still lets a fresh charge of air into the container every time you open it, and that repeated oxygen exposure is exactly what quietly oxidizes the active ingredient over a product's shelf life.

And while glass is recyclable in principle, the real-world system is far less reliable than most consumers are led to believe. According to the U.S. Environmental Protection Agency, glass containers had a recycling rate of just 31.3% in 2018, while 55.4% were sent to landfills.[1] In many communities mixed glass has low value, breaks and contaminates other recyclables, and can damage sorting equipment.

So, we had to ask a better question: what packaging keeps oxygen out, protects the product and the customer, reduces breakage, supports daily use, and avoids unnecessary chemical exposures? For most sensitive dry powders, the answer is real aluminum-foil packaging — a foil pouch or a foil-lined canister — not another rigid bottle or jar, because no rigid container solves the oxygen problem on its own.

Why Not Just Switch to a Cleaner Plastic Jar?

PET is polyethylene terephthalate, recycling code #1, widely used in food and beverage packaging. It is not polycarbonate. It is not PVC. It is not made with bisphenol A (BPA), and it does not use phthalates as plasticizers. That does not mean every PET package gets a free pass, but it deserves to be judged on its own evidence, not lumped in with every other plastic.

There is one well-documented caveat worth naming. PET is manufactured using antimony as a catalyst, and peer-reviewed work shows that small amounts of antimony can migrate from PET into its contents — a process that accelerates sharply with heat and storage time.

Studies using inductively coupled plasma mass spectrometry have found that storing PET drinks at elevated temperatures, such as a hot car or a summer warehouse, can push antimony migration toward or past regulatory limits.[2,3] But the exposure profile is very different for dry powders compared to hot liquids. Still, the lesson is the same one that governs our whole approach: a material is only as safe as the conditions it actually finds itself in.

A clean PET jar would be a reasonable upgrade over glass on weight and breakage. But it does not answer the question that matters most for our sensitive powders, which is oxygen. A rigid jar, PET or glass, still admits air around the cap and re-admits a fresh headspace of air every time it is opened. That is why our new standard is a real aluminum-foil pack flushed with nitrogen and packed with an oxygen absorber and desiccant. And, as before, the pack is still only one part of the system.

The Liner Is a Hidden Issue

The lid is where packaging gets complicated. A cap looks simple from the outside, but underneath it is often a liner or seal built from multiple layers — paper, foam, foil, polymer film, wax, adhesive, ink, coating, or a heat-seal layer. Each layer has a job: tamper evidence, moisture control, leak prevention, freshness, and proper reseal. That is exactly why the liner deserves scrutiny. On a foil powder pack the closure carries two jobs most people never consider.

First, it is the weakest point for oxygen: a heat-sealed foil edge keeps air out, but a screw cap is a leak path by design, which is why an oxygen absorber sits inside the pack. Second, it has to keep re-sealing without clogging. A plain press-to-close "Ziploc" zipper fails on fine powder — particles lodge in the groove until it no longer seals — so a powder pack needs a powder-proof closure, such as an evacuation-port zipper, a particle-plow slider, or a threaded spout.

A nontoxic jar with a poor liner is not good enough. If the liner relies on questionable plasticizers, PFAS-treated materials, PVC-based systems, bisphenol chemistry, or unnecessary adhesives, the packaging system has not met the standard I want — and the science explains why this is not a theoretical worry.

What the Science Actually Says About Chemical Migration

According to research indexed in PubMed, the closure and the food-contact layer are precisely where the meaningful exposure questions live. A 2024 umbrella review of 52 systematic reviews concluded that every major class of plastic-associated chemical examined was associated with at least one adverse human health outcome, spanning reproductive, endocrine, metabolic, neurodevelopmental, and cardiovascular endpoints.[4]

The 2023 Minderoo-Monaco Commission on Plastics and Human Health reached a similar conclusion, identifying the additives built into plastics — phthalates, bisphenols, and PFAS among them — as carriers of much of plastic's harm to human health.[5]

Packaging is a genuine route of exposure, not a hypothetical one. A 2023 narrative review in the Jornal de Pediatria identified food packaging — especially plastic and recycled material — as an important source of food contamination by endocrine disruptors, with bisphenols and phthalates the chemicals most frequently implicated.[6]

Similarly, a comprehensive 2023 review of food-contact materials documented that phthalates and bisphenols migrate from packaging into food, and that the rate of migration is driven by time, temperature, surface area, and the food's own chemistry.[7]

A 2025 systematic review of 67 studies and more than 5,000 samples found that phthalates and bisphenols migrated consistently, with the highest transfer into high-fat and acidic foods — a direct reason to treat oil-containing powders such as MCT oil powder and coconut milk powder differently from dry, inert minerals.[8]

The regulatory ground is shifting underneath these chemicals, too. In 2023 the European Food Safety Authority reevaluated BPA and reduced its tolerable daily intake roughly 20,000-fold, concluding that dietary exposure to BPA is now a health concern — and identifying food as the main source of human exposure.[9] Just as important, simply swapping BPA for a chemical cousin is no solution.

A 2024 review in Critical Reviews in Toxicology warned of "regrettable substitution," in which BPA is replaced by alternative bisphenols whose hazards are similar or simply unknown.[10]

Why does any of this matter for a daily supplement? Because the health signals attached to these compounds are not trivial. Reviews indexed in PubMed have linked phthalate and bisphenol exposure to precocious puberty and early-onset obesity in children,[11] to pregnancy complications and altered fetal neurodevelopment after prenatal phthalate exposure,[12] and — in epidemiological syntheses of endocrine-disrupting chemicals, with food a major exposure route — to breast cancer risk.[13]

PFAS are another group of troublesome chemicals. A 2024 analysis in Environmental Science & Technology mapped 68 distinct PFAS detected in food-contact materials, including paper, plastic, and coated metal, and found hazard data missing for nearly half of them.[14] A separate study reported detectable PFAS in 84% of globally sourced food-packaging samples.[15]

And these "forever chemicals" do not simply disappear at end of life. Research shows PFAS leach out of food-contact materials during disposal, which complicates the tidy story we tell ourselves about recycling.[16]

Finally, there's the plastic particles themselves. A 2021 study that analyzed human stool found microplastics in every sample, with PET being the single most abundant polymer, and reported higher concentrations in people with inflammatory bowel disease than in healthy controls.[17] For a company whose work centers on gut and mitochondrial health, that finding is a mandate to take the food-contact surface seriously.

What We Mean by a Cleaner Closure System

Our goal is a simple, defensible packaging system. For many dry powders that means a real aluminum-foil pack — a pouch or a foil-lined canister — a powder-proof closure, and a clean liner or induction seal chosen to avoid the categories of chemistry we do not want, including but not limited to BPA, BPS, BPF, PVC, phthalates, PFAS, and unnecessary coatings or adhesives, along with a nitrogen flush, an oxygen absorber, and a desiccant to minimize the headspace inside.

The induction seal matters because it protects the product before opening, providing tamper evidence and an oxygen and moisture barrier to preserve potency, but it is a multilayer system, and it must be matched to both the pack and the powdered ingredient.

The liner and closure matter after opening: they have to reseal properly without clogging on powder, must not flake, shed, or absorb odors, and must protect the powder from oxygen, humidity, clumping, and contamination through daily use. In short, the closure helps ensure product integrity over time.

The Bigger Point

Packaging is part of the product. If you take a supplement every day, the formula matters, but so does the container that holds it, the closure that seals it, the liner that touches it, and the way that package behaves in a hot delivery truck, a humid kitchen, a suitcase, or a pantry shelf.

That is why we are rethinking the entire system. We are moving appropriate products out of glass and plastic bottles and into real aluminum-foil packaging — foil pouches and foil-lined, reusable canisters with foil refills — to keep oxygen out, cut breakage, support travel, and make powders easier to scoop. But we are not stopping at the pack.

The real innovation is the full packaging audit — from the foil barrier and anaerobic fill, to the closure and the liner — because that is where potency is protected and where much of the hidden chemical exposure occurs.

In the future, I believe supplement companies will have to prove not only what is in the formula, but what touches the formula. That is the standard we are moving toward, and it begins with a question almost no one in this industry is prepared to answer: what's under the lid?

FAQ

Q: Are glass containers always preferable over plastic for supplements?

A: Not necessarily. Glass is inert and recyclable in theory, but it's heavy, breakable, and costly to ship, it still lets a fresh charge of air back in every time you open it, and the real-world recycling system is weaker than most people assume — the EPA reported a glass-container recycling rate of just 31.3% in 2018, with 55.4% landfilled.

For most sensitive dry powders, real aluminum-foil packaging protects the product better, keeps oxygen out, reduces breakage in transit and travel, and still avoids the chemical exposures we're concerned about.

Q: Isn't foil packaging still plastic, and isn't plastic linked to BPA?

A: Only in part, and not that kind. A foil pack is mostly aluminum — the barrier — with a thin food-grade inner layer that seals it and touches the powder. It's not polycarbonate or PVC, isn't made with BPA, and doesn't use phthalate plasticizers.

We still judge each material on its own evidence and verify the whole system.

Q: If the pack material is clean, the package is "clean," right?

A: Not necessarily. The lid, the liner beneath it, the induction seal, the adhesives, inks, and coatings all sit closest to the product, and that closure system is where most of the meaningful questions live — both the chemistry that can migrate in and whether the closure keeps oxygen out and reseals on powder. A liner built on questionable plasticizers, PFAS-treated materials, PVC, or bisphenol chemistry can undermine an otherwise nontoxic pack.

Q: Why are some powders moving from bottles into foil packs and foil-lined canisters at all?

A: A few reasons: real aluminum foil keeps oxygen out far better than a bottle, protecting potency; a wide-mouth canister is easier to scoop, see, and dose than a narrow capsule bottle; and it signals "food, not medication."

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