Why TLC PureOrigin Excludes Non-Nutritive Sweeteners: A Scientific and Precautionary Rationale

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Research interests: gut–brain axis, functional nutrition, and translational microbiome science.

Abstract

Advances in microbiome science have challenged the assumption that non-nutritive sweeteners (NNS), including "natural" glycosides such as stevia and monk fruit as well as synthetic compounds such as sucralose, are biologically inert. Human, animal, and ex-vivo studies show that several NNS are metabolically and microbiologically active. The strength of that evidence, however, varies by compound. It is causal for saccharin and sucralose in humans, and mechanistic-to-mixed for stevia and monk fruit. TLC PureOrigin excludes non-nutritive and high-intensity sweeteners from its formulations as a precautionary choice consistent with a microbiome-focused product philosophy, not as an assertion that these compounds are proven harmful. The flavored formulas are instead sweetened with a small amount of organic coconut sugar, a nutritive whole-food sweetener whose metabolism is well understood, rather than a non-caloric one whose long-term microbiome effects are unresolved. This paper sets out that rationale and the evidence behind it.

1. Introduction

Non-nutritive sweeteners are widely positioned as "clean" substitutes for sugar. Microbiome and metabolic research has made the blanket claim of physiological neutrality untenable. Several NNS interact with the gut ecosystem once consumed (Suez et al., 2022; Ruiz-Ojeda et al., 2019). It does not follow that every NNS is harmful, and the honest evidence base is mixed. TLC PureOrigin's position is therefore framed as precaution under uncertainty. Where an ingredient is not nutritionally necessary and its long-term effects on the microbiome are unresolved, the company chooses to leave it out. On that basis, formulations exclude non-nutritive and high-intensity sweeteners, both synthetic (sucralose, saccharin, aspartame, acesulfame-K) and plant-derived (stevia, monk fruit, thaumatin), and derive sweetness instead from a small amount of organic coconut sugar, a nutritive whole-food sweetener, alongside the flavor of cocoa, real vanilla, and spice.

2. Scientific Evidence

2.1 NNS Are Biologically Active, Not Inert

The strongest human evidence comes from the randomized controlled trial of Suez et al. (2022): in 120 NNS-naïve adults, saccharin and sucralose impaired glycemic responses at below-ADI doses, all four tested sweeteners altered the stool and oral microbiome, and fecal transfer from responders into germ-free mice reproduced the glucose intolerance, a microbiome-mediated causal link. Two nuances matter and are often omitted: stevia altered microbial function but did not impair glycemia at the cohort level, and responses were highly individualized, reflecting baseline microbiome state (Suez et al., 2022). For sucralose specifically, its intestinal metabolite and impurity sucralose-6-acetate has been shown to be genotoxic and to impair intestinal barrier integrity in human colonic epithelium (Schiffman et al., 2023), among the strongest single reasons for caution with sucralose.

2.2 Stevia and Monk Fruit: Active, but the Evidence Is Genuinely Mixed

In an ex-vivo human-microbiome metaproteomic study, the glycoside sweeteners stevioside, rebaudioside A, and monk fruit extract altered microbial function despite modest compositional change. They reduced one enzyme in a butyrate-synthesis pathway and lowered *Roseburia*, while also increasing microbial extracellular-structure (type IV pilus) functions that the author interpreted as potentially supporting competitive exclusion of pathogens (Wang, 2021). The net signal for these glycosides is therefore mixed rather than uniformly adverse. A 2026 in-vitro study is sometimes read as a stevia-specific concern, but the evidence does not support that reading It tested isosteviol, an acid-rearrangement product of steviol that targeted chemical analysis reports is *not* actually present in commercial stevia sweeteners (Morlock & Heil, 2020), and found that it inhibited the butyrate producer *Roseburia intestinalis* only in combination with the antidepressant duloxetine, not on its own (Blasche et al., 2026). That finding is a reason to study real-world ingredient mixtures, not evidence that stevia harms the gut.

Against the adverse signals, two randomized human trials found that daily stevia for 4–12 weeks did not alter gut-microbiota diversity (Kwok et al., 2024; Singh et al., 2024), nor fecal short-chain fatty acid (SCFA) concentrations where these were measured (Kwok et al., 2024). On safety, EFSA (2010) and JECFA concluded that steviol glycosides are not genotoxic in vivo and established an acceptable daily intake of 4 mg/kg/day (steviol equivalents). For monk fruit, EFSA (2019) did not complete its safety assessment, citing insufficient data on the genotoxicity of microbial metabolites, a genuine data gap rather than a demonstrated hazard, while short-term human data show reduced postprandial glucose relative to sucrose (Tey et al., 2017). The accurate summary is that stevia and monk fruit are biologically active in the gut but that net harm in humans is not established.

2.3 Sucralose

Sucralose is poorly absorbed and reaches the colon largely intact. Reviews and animal studies associate it with reduced diversity, lower butyrate, and enrichment of Proteobacteria (Ruiz-Ojeda et al., 2019), and the Suez trial demonstrated causal, microbiome-mediated glycemic impairment (Suez et al., 2022). Together with the sucralose-6-acetate findings, sucralose carries the clearest mechanistic case for caution among the compounds discussed here.

2.4 The Barrier and Metabolic Rationale

Where NNS reduce SCFA availability, the mechanistic concern is coherent: butyrate fuels colonocytes and supports tight-junction integrity, so reduced butyrate could weaken barrier function and permit low-grade endotoxin exposure implicated in insulin resistance (Cani et al., 2007; Conz et al., 2023). This pathway is well established in principle; its magnitude for any specific sweetener at dietary intake in humans remains preliminary, and should be described as plausible rather than proven.

2.5 Regulatory and Labeling Context

Under FDA and Health Canada frameworks, “natural” designations and GRAS status address ingredient source and acute toxicity, not chronic microbiome or metabolic effects (Magnuson et al., 2016). Plant or fermentation origin does not confer biological inertness. The 2023 WHO guideline, a conditional recommendation based on low-certainty evidence, advises against using non-sugar sweeteners for weight control, reflecting a lack of demonstrated long-term benefit rather than proof of harm (World Health Organization, 2023). Regulatory safety recognition therefore remains incomplete with respect to long-term microbial ecology.

3. Discussion and Translational Perspective

The cumulative evidence indicates that NNS interact with the gut microbiome in measurable ways, most robustly for saccharin and sucralose and more variably for stevia and monk fruit (Suez et al., 2022; Wang, 2021). These interactions are not evidence of overt toxicity, and for the plant-derived glycosides the human data are mixed. What the evidence does support is that “sweet without calories” is not the same as “biologically neutral,” and that responses are individualized, so population-level safety claims can obscure risk in susceptible hosts (Suez et al., 2022).

On that basis, TLC PureOrigin sweetens with a small amount of organic coconut sugar, roughly 3.2 to 3.6 grams per 40-gram serving in the flavored formulas, and none in the unflavored, rather than any non-nutritive or high-intensity sweetener, and builds flavor from Dutch-processed cocoa, real vanilla, and spice. Neither product line uses a synthetic emulsifier. Whey concentrate is non-instantized and lecithin-free, and the plant formula contains no lecithin, gums, or

emulsifiers. This is a deliberate tradeoff rather than a health claim about sugar. The formulas carry a small, well-characterized amount of a nutritive sweetener instead of a non-caloric one whose long-term effect on the microbiome is unresolved. Coconut sugar is not presented here as metabolically superior to other sugars. It is a conventional caloric sweetener used in modest amounts, chosen because the uncertainty this paper describes is specific to non-nutritive sweeteners. The rationale is explicitly precautionary. For a product positioned around microbiome and metabolic compatibility, ingredients whose long-term microbial effects are unresolved and which are not nutritionally necessary are reasonable to exclude.

4. Conclusion

Non-nutritive sweeteners are biologically active rather than inert, with effects that are strongest and causal for saccharin and sucralose and mixed for stevia and monk fruit (Suez et al., 2022; Wang, 2021). This does not establish that "natural" NNS are harmful, and honest communication should say so. TLC PureOrigin's exclusion of non-nutritive sweeteners, while sweetening with a small amount of coconut sugar instead, is best understood as a proactive, precautionary formulation choice made under scientific uncertainty, prioritizing microbiome compatibility while acknowledging that the evidence for the plant-derived glycosides remains incomplete.

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