

BIOME GUIDE PROTOCOL

Eczema & Atopic Dermatitis Protocol

Evidence-based prebiotic, probiotic, and dietary strategies
to restore gut-skin axis balance and reduce flare severity

Covers: Atopic Dermatitis | Eczema | Gut-Skin Axis | Skin Barrier Restoration

Based on 16 systematic reviews, meta-analyses, and RCTs from PubMed | March 2026

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Understanding the Gut-Skin Axis

Atopic dermatitis (AD) affects up to 20% of children and 10% of adults worldwide, making it one of the most common chronic inflammatory skin conditions. While topical treatments address surface symptoms, a growing body of research reveals that the gut microbiome plays a central role in driving the immune dysfunction behind eczema flares.

The **gut-skin axis** describes the bidirectional communication between intestinal microbes and skin health. When gut microbial balance is disrupted, it triggers systemic immune changes that manifest as skin inflammation, barrier breakdown, and increased sensitivity to allergens.

Five Immune Pathways Connecting Gut to Skin

Pathway	Mechanism	Impact on Eczema
TLR Activation	Gut dysbiosis increases bacterial translocation, triggering toll-like receptor signaling	Drives systemic inflammation that manifests in skin
Th1/Th2 Imbalance	Microbiome composition directly modulates T-helper cell balance via dendritic cell education	AD is driven by Th2 dominance; restoring Th1/Th2 balance reduces flares
SCFA Deficiency	Reduced butyrate and propionate production from depleted SCFA-producing bacteria	Impairs skin barrier integrity, reduces Treg generation, increases inflammation
Intestinal Barrier Dysfunction	Increased gut permeability allows microbial products (LPS) into the bloodstream	Systemic immune activation worsens skin inflammation
Treg Suppression	Dysbiotic gut fails to induce adequate regulatory T cells	Unchecked inflammatory response in skin; poor tolerance

Why butyrate matters for your skin: Gut-derived butyrate promotes filaggrin protein expression (essential for skin barrier), enhances ceramide synthesis, and inhibits HDAC3-mediated NF-κB inflammatory signaling in keratinocytes. AD patients consistently show low fecal butyrate levels and reduced abundance of butyrate-producing bacteria.

Sources: PMC11017189; Frontiers Microbiol 2022 (PMC9932284); Mucosal Immunology 2022 (PMID: 35672452); Inflammation 2024 (PMID: 38159175)

Your Microbial Fingerprint in Eczema

Research consistently identifies specific microbial imbalances in people with atopic dermatitis. Understanding which bacteria are depleted and which are overrepresented helps guide targeted prebiotic and probiotic interventions.

Depleted Taxa (Goal: Restore)

Bacterium	Role	Why It Matters in AD
Bifidobacterium spp.	SCFA production, Treg induction, pathogen exclusion	Markedly reduced in infants with AD; low levels correlate with disease severity
Faecalibacterium prausnitzii	Major butyrate producer, anti-inflammatory	Depleted in AD; low abundance predicts more severe skin disease
Lactobacillus spp.	Immune modulation, Th1/Th2 balancing	Decreased in AD gut microbiota compared to healthy controls
Coprococcus	Butyrate producer	Part of depleted SCFA-producing consortium in AD
Eubacterium	Butyrate and propionate producer	Reduced in AD; contributes to overall SCFA deficit
Blautia	SCFA production	Lower abundance in AD gut microbiome profiles

Enriched Taxa (Goal: Reduce)

Bacterium	Concern	Evidence
Clostridium difficile	Toxin production, gut inflammation	Early colonization associated with later AD development
Escherichia coli	LPS-driven inflammation	Elevated in AD gut microbiota
Staphylococcus aureus	Skin barrier disruption, superantigen production	Enriched in both gut and skin of AD patients
Enterobacteriaceae	Pro-inflammatory LPS producers	Elevated in AD gut microbiome
Klebsiella	Pro-inflammatory	Increased in AD gut profiles

Sources: PMC11017189; Frontiers Microbiol 2025; Nature Sci Rep 2019; MDPI Biomedicines 2024

Prebiotic Strategy

Prebiotics are non-digestible fibers that selectively feed beneficial gut bacteria. For eczema, the goal is to boost Bifidobacterium, Faecalibacterium, and other SCFA-producing taxa that support skin barrier function and immune tolerance.

Prebiotic	Target Taxa	Dose	Evidence
scGOS/lcFOS (9:1)	Bifidobacterium, Lactobacillus	8 g/L formula; 5-8g/day adults	RCT: AD 13.6% vs 27.9% placebo in at-risk infants (Arslanoglu 2008)
Inulin / FOS	Bifidobacterium, F. prausnitzii	5-10g/day	Bifidogenic; increases butyrate via cross-feeding
Resistant Starch	Roseburia, Eubacterium, F. prausnitzii	10-20g from food	Potent butyrate driver from green banana, cooled rice/potato
Pectin	Bifidobacterium, Faecalibacterium	5-10g from food	Gentle fermentation; apples, citrus peel
Polyphenols	Akkermansia, F. prausnitzii	From whole foods	Anti-inflammatory; berries, green tea, dark chocolate

Key RCT: Prebiotic Prevention in Infants

Arslanoglu et al. 2008 (Journal of Nutrition): 134 at-risk infants received scGOS/lcFOS (8g/L) or placebo for 6 months. The prebiotic group had significantly lower rates of atopic dermatitis (13.6% vs 27.9%), recurrent wheezing (7.6% vs 20.6%), and allergic urticaria (1.5% vs 10.3%). Benefits persisted beyond the supplementation period, suggesting lasting immune modulation through intestinal flora modification.

Daily Gut-Skin Prebiotic Shake

Gut-Skin Repair Shake

1 cup kefir or coconut yogurt (live cultures)

1/2 frozen banana + 1/2 green (unripe) banana (resistant starch)

1/2 cup mixed berries (polyphenols, pectin)

1 tbsp ground flaxseed (omega-3, fiber)

1 tsp inulin powder (3-5g, titrate slowly)

1 tsp green banana flour (resistant starch boost)

Optional: 1/2 tsp turmeric + pinch black pepper (curcumin absorption)

Tip: Start with half portions of inulin and green banana flour in week 1 to minimize bloating. Increase to full amounts by week 2-3.

Source: Arslanoglu et al. J Nutr 2008 (PMID: 18492839)

Probiotic Strains with RCT Evidence

The following probiotic strains have demonstrated significant improvements in eczema severity (measured by SCORAD or EASI index) in randomized, placebo-controlled clinical trials. Choose based on your age group and primary treatment goal.

Strain(s)	Trial Details	Key Results
B. lactis CECT 8145 + B. longum CECT 7347 + L. casei CECT 9104	Navarro-Lopez 2018 JAMA Dermatology n=50 children, 12 wks 10 ⁹ CFU/day	SCORAD: -83% vs -24% placebo (p<0.001). Reduced topical steroid use (OR 0.63). Ranked #1 in network meta-analysis.
L. rhamnosus HN001	Wickens 2018 Pediatr Allergy Immunol 11-year follow-up 6 x 10 ⁹ CFU/day	Eczema at 11y: RR 0.46 (p=0.015). Lifetime eczema: HR 0.58 (p=0.002). First probiotic with decade-long protection.
L. salivarius LS01 + B. breve BR03	Iemoli 2012 J Clin Gastroenterol n=48 adults, 12 wks	SCORAD: p<0.0001 improvement. Improved Th17/Treg ratio (p=0.029), Th1/Th2 ratio (p=0.028). Reduced microbial translocation.
L. plantarum CJLP133	Han 2012 Pediatr Allergy Immunol n=83 children, 12 wks 0.5 x 10 ¹⁰ CFU 2x/day	SCORAD: -9.1 vs -1.8 placebo (p=0.004). Reduced eosinophil count (p=0.023) and IFN-gamma/IL-4 levels.
L. rhamnosus GG	Kim 2014 meta-analysis 25 RCTs, n=1,599	Overall SCORAD: -4.51 points. Children 1-18y: -5.74. Adults: -8.26. Lactobacillus mixtures outperformed Bifidobacterium alone.

Choosing the Right Strain for Your Profile

Children with moderate AD (ages 4-17): Start with the CECT triple mix (B. lactis CECT 8145 + B. longum CECT 7347 + L. casei CECT 9104). This combination showed the strongest SCORAD reduction (-83%) and ranked #1 in comparative effectiveness analysis. Commercially available as Prodefen Plus or similar formulations.

Adults with AD: Choose L. salivarius LS01 + B. breve BR03. This is the only strain combination tested specifically in adults with documented immunological improvements (Th17/Treg and Th1/Th2 rebalancing).

Prevention in at-risk infants: L. rhamnosus HN001 from birth through age 2, with maternal supplementation during late pregnancy and breastfeeding. Only strain with decade-long protection data.

General pediatric AD: L. plantarum CJLP133 or L. rhamnosus GG are well-studied alternatives with solid SCORAD improvements across broad pediatric age ranges.

Sources: Navarro-Lopez JAMA Dermatol 2018 (PMID: 29117309); Wickens Pediatr Allergy Immunol 2018 (PMID: 30430649); Iemoli J Clin Gastroenterol 2012 (PMID: 22955355); Han Pediatr Allergy Immunol 2012 (PMID: 23050557); Kim 2014 meta-analysis

Supporting Supplements

Supplement	Dose	Evidence	Mechanism
Vitamin D3	1,000-2,000 IU/day	Meta-analysis of 11 RCTs (n=686): SMD -0.41 (p<0.01). Earlier MA: -5.81 SCORAD points	VDR activation, cathelicidin production, Th1/Th2 modulation, skin barrier support
Sodium Butyrate	300-600 mg/day	Preclinical + mechanistic studies. HDAC3 inhibition confirmed in AD models	Filaggrin upregulation, ceramide synthesis, NF-kB suppression, Treg induction
Omega-3 (EPA/DHA)	1-2g combined daily (EPA-dominant)	Anti-inflammatory evidence in atopic conditions; supports SCFA-independent pathways	Prostaglandin modulation, resolvins production, membrane fluidity
L-Glutamine	5g/day	Gut barrier integrity support; reduces microbial translocation	Enterocyte fuel source, tight junction maintenance, reduces "leaky gut"
Zinc (conditional)	15-30 mg/day (if deficient)	Mixed results: beneficial only in zinc-deficient patients (Gray 2019 review)	Skin healing, immune function. Test levels before supplementing.

Note on Evening Primrose Oil (EPO): Despite its popularity for eczema, a Cochrane review found insufficient evidence to recommend oral EPO or borage oil (GLA sources) for atopic dermatitis. Most large RCTs showed no significant benefit over placebo. We do not include EPO as a primary recommendation in this protocol.

Sources: Nielsen et al. Nutrients 2024 (PMID: 39683522); Gray et al. JEADV 2019 (PMID: 30801794); Inflammation 2024 (PMID: 38159175); Cochrane Review PMC8105655

Dietary Recommendations

Foods to Emphasize

Prebiotic-rich foods: Jerusalem artichokes, chicory root, garlic, onions, leeks, asparagus, green bananas, oats. These feed the depleted Bifidobacterium, Faecalibacterium, and other SCFA-producing bacteria identified in the microbial fingerprint above.

Polyphenol-rich foods: Blueberries, blackberries, raspberries, green tea, dark chocolate (>70% cacao), turmeric. Polyphenols support anti-inflammatory gut taxa and have direct antioxidant effects on skin tissue.

Omega-3 sources: Fatty fish (salmon, sardines, mackerel) 2-3 times per week. Plant-based alternatives include walnuts, chia seeds, and ground flaxseed.

Fermented foods: Plain yogurt, kefir, sauerkraut, kimchi. Introduce these slowly to provide live beneficial cultures alongside prebiotic fiber.

Resistant starch sources: Cooled rice, cooled potatoes, green banana flour. Cooking and then cooling starchy foods increases their resistant starch content, which potently drives butyrate production.

Foods to Approach with Caution

Important: Blanket elimination diets are NOT recommended.

While cow's milk, eggs, wheat, soy, and peanuts are common AD triggers, systematic reviews show no overall benefit from untargeted food elimination in AD. The NIAID expert panel recommends eliminating specific food allergens ONLY when confirmed by allergy testing.

Prolonged unnecessary food elimination can paradoxically increase the risk of developing true IgE-mediated food allergy, especially in children. If you suspect a food trigger, work with an allergist to test before eliminating.

Keep a food diary to track potential flare correlations, then test suspect foods one at a time under medical guidance.

Foods That May Worsen Gut Dysbiosis

Processed and ultra-processed foods (emulsifiers like polysorbate-80 and carboxymethylcellulose can directly disrupt the gut barrier), excess refined sugar (feeds pro-inflammatory bacteria), artificial sweeteners (may alter microbiome composition unfavorably), and excess alcohol (increases intestinal permeability).

Your Two-Phase Protocol

Phase 1: Gut Repair and Barrier Restoration (Weeks 1-4)

Action	Details	Why
Start prebiotics	GOS/FOS blend, 3-5g/day (titrate up slowly)	Feed depleted Bifidobacterium and SCFA producers
Begin sodium butyrate	300 mg/day	Direct SCFA supplementation for gut-skin barrier support
Start vitamin D3	1,000-2,000 IU/day	Skin barrier support, immune modulation, cathelicidin production
Introduce omega-3	1g EPA/DHA daily	Anti-inflammatory prostaglandin modulation
L-glutamine	5g/day	Intestinal barrier repair, reduce microbial translocation
Daily shake	Gut-Skin Repair Shake (half portions week 1)	Prebiotic fiber + polyphenols + live cultures
Food diary	Track meals and flare patterns daily	Identify potential food triggers for later testing

Phase 2: Probiotic Therapy and Immune Rebalancing (Weeks 3-12)

Action	Details	Why
Add primary probiotic	Choose strain based on age/profile (see selection guide above)	Targeted immune rebalancing, SCORAD reduction
Increase prebiotics	Titrate to 5-8g/day	Maximize SCFA production and microbiome diversity
Increase butyrate	Titrate to 600 mg/day	Full-dose barrier and immune support
Continue Phase 1	All supplements, shake, food diary	Maintain gut repair foundation
Track SCORAD/EASI	Monthly self-assessment or dermatologist visit	Objective measure of progress

What to Expect

Weeks 1-2: Possible mild bloating as the gut adjusts to increased prebiotic fiber. This is normal and should resolve within a few days. Start with half portions if needed.

Weeks 2-4: Initial gut barrier improvements. You may notice less GI discomfort and slightly less skin dryness as butyrate and vitamin D begin working.

Weeks 4-8: Gradual skin improvement begins. Reduced flare frequency and intensity as immune rebalancing takes effect. Most RCTs show measurable SCORAD change by week 4-6.

Weeks 8-12: Significant SCORAD improvement expected based on clinical trial timelines. Reduced need for topical steroids. The Navarro-Lopez trial showed 83% SCORAD reduction by week 12.

Beyond 12 weeks: Continued maintenance recommended. The Wickens HN001 data shows protective benefits lasting years after supplementation. Maintain prebiotic-rich diet and consider cycling probiotics seasonally.

Safety Considerations

This protocol complements standard dermatological care.

Do not discontinue prescribed medications (topical corticosteroids, calcineurin inhibitors, emollients, or systemic therapies) without consulting your dermatologist. The prebiotic and probiotic interventions in this protocol are intended as adjunctive support, not replacements for evidence-based medical treatment.

For children: Always consult a pediatrician before starting any supplement regimen. Probiotic dosing in children should follow the specific RCT protocols cited above.

Vitamin D: Monitor serum 25(OH)D levels if supplementing above 2,000 IU/day long-term.

Zinc: Only supplement if deficiency is confirmed by testing. Excess zinc can cause copper depletion and GI side effects.

Food elimination: Never eliminate multiple food groups simultaneously in children without guidance from a registered dietitian and allergist.

Disclaimer

This protocol is for educational and informational purposes only. It does not constitute medical advice, diagnosis, or treatment. The information presented is based on published peer-reviewed research, but individual results may vary. Always consult a qualified healthcare provider before making changes to your health regimen, especially if you are pregnant, nursing, taking medications, or have a pre-existing medical condition.

Sources

1. PMC11017189 - Gut-skin axis mechanisms in atopic dermatitis (systematic review)
2. Navarro-Lopez et al. 2018, JAMA Dermatol 154(1):37-43 - CECT triple probiotic, SCORAD -83% (PMID: 29117309)
3. Wickens et al. 2018, Pediatr Allergy Immunol 29(8):808-814 - L. rhamnosus HN001, 11-year follow-up (PMID: 30430649)
4. Iemoli et al. 2012, J Clin Gastroenterol - L. salivarius LS01 + B. breve BR03, adult AD (PMID: 22955355)
5. Han et al. 2012, Pediatr Allergy Immunol - L. plantarum CJLP133, pediatric AD (PMID: 23050557)
6. Kim et al. 2014 - Meta-analysis of 25 RCTs (n=1,599), SCORAD outcomes by age group
7. Arslanoglu et al. 2008, J Nutr - scGOS/lcFOS probiotic prevention, n=134 infants (PMID: 18492839)
8. Nielsen et al. 2024, Nutrients - Vitamin D meta-analysis, 11 RCTs, n=686 (PMID: 39683522)
9. Gray et al. 2019, JEADV - Zinc and AD systematic review (PMID: 30801794)
10. Frontiers Microbiol 2022 (PMC9932284) - SCFAs in inflammatory skin diseases
11. Mucosal Immunology 2022 (PMID: 35672452) - Gut-derived SCFAs modulate skin barrier
12. Inflammation 2024 (PMID: 38159175) - Sodium butyrate ameliorates AD via HDAC3 inhibition
13. PMC8105655 - Cochrane review: Evening primrose oil for eczema (insufficient evidence)
14. Frontiers Microbiol 2025 - AD and microbiota interactions systematic review
15. Nature Sci Rep 2019 - Gut microbiota profile in children with AD
16. PMC3970830 - Diet and dermatitis: food triggers review

Ready to learn more?

Visit biomeguide.com to explore our probiotic strain database, condition guides, and microbiome testing resources. Every strain mentioned in this protocol has a detailed profile page with links to the original research.

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