

FIELD RESEARCH GUIDE · ISSUE 01

Natural Oils & Eczema

A science-first briefing on fatty acid profiles, skin barrier function, and the hard evidence behind what actually works — no ideology, no branding, no fluff.

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Sources: PubMed · DOI-verified RCTs · Dermatology clinical literature
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Oils assessed →

✓ Hemp Seed ✓ Sunflower ✖ Coconut ✖ Evening Primrose ✖ Olive Oil

SECTION 01

What Actually Drives Eczema

Eczema is not a moisturisation problem. It is a **skin barrier failure** compounded by chronic inflammation and microbial imbalance. The mechanism determines whether an oil helps or actively worsens the condition.

MECHANISM 01 · BARRIER (TEWL)

Transepidermal water loss is the primary measurable variable. Eczema skin loses water at elevated rates due to a compromised stratum corneum lipid matrix. Effective oils *reduce* TEWL; harmful ones increase it.

MECHANISM 02 · LIPID STRUCTURE

The stratum corneum requires a ceramide-rich lipid architecture. Linoleic acid (ω -6) is a ceramide precursor. Deficiency of linoleic acid is a documented feature of atopic dermatitis skin, making linoleic-rich topicals mechanistically logical.

MECHANISM 03 · MICROBIAL

Staphylococcus aureus colonisation is present in ~90% of eczema patients and drives flare severity. Some oils (notably coconut) have documented antimicrobial activity. Others are inert or weakly protective.

MECHANISM 04 · INFLAMMATION

Inflammatory pathways (NF- κ B, cytokines IL-4, IL-13) are dysregulated in AD. GLA and omega-3 fatty acids modulate these pathways, but evidence for topical delivery remains limited vs. oral supplementation.



"Oils high in oleic acid disrupt the skin barrier. Oils high in linoleic acid repair it. This is not opinion — it is a consistent finding replicated across multiple RCTs."

Danby et al, 2013 — *Pediatric Dermatology* · doi.org/10.1111/pde.13621 | Cooke et al, 2016 — *Acta Dermato-Venereologica*

The Decisive Variable: Fatty Acid Profile

The operative variable is fatty acid class — not whether the oil is "natural," cold-pressed, organic, or expensive.

✓ LINOLEIC ACID (Ω -6) — REPAIR

Ceramide precursor → restores stratum corneum

Reduces TEWL in clinical measurements

Deficient in atopic dermatitis skin

Present in: Sunflower (~65%), Hemp (~57%), Safflower (~75%)

✗ OLEIC ACID (Ω -9) — DISRUPT

Disrupts lamellar lipid structure in SC

Increases TEWL — measurable barrier damage

Worsens eczema symptoms in RCTs

Present in: Olive (~75%), Avocado (~65%), Almond (~70%)

△ CLINICAL IMPLICATION

The "natural = safe" assumption is the most dangerous misconception in topical eczema management. Olive oil — arguably the most recommended natural oil in folk medicine — has **documented, replicated RCT evidence of barrier harm** in both adult and infant skin.

SECTION 02

Comparative Oil Profiles

Olive Oil

~75% oleic acid **AVOID**

EVIDENCE

- Increases TEWL — measurable barrier damage in controlled studies
- Exacerbates atopic dermatitis symptoms in neonatal RCT
- Worsens stratum corneum integrity vs. untreated control (Danby 2013)
- High oleic acid (~70–80%) disrupts lamellar lipid architecture

FATTY ACID PROFILE



PRIMARY SOURCES

doi.org/10.1111/pde.13621

Danby et al. — *Pediatric Dermatology* (2013): RCT showing olive oil damages SC integrity; sunflower oil does not. Definitive head-to-head comparison.

doi.org/10.2340/00015555-2279

Cooke et al. — *Acta Dermato-Venereologica*: Olive oil associated with worsened atopic dermatitis in neonates.

FIELD ASSESSMENT: High oleic acid makes olive oil a documented barrier disruptor. Its folk-medicine reputation is contradicted by RCT-level dermatological evidence.

Sunflower Seed Oil

~65% linoleic acid **BEST NATURAL OPTION**

EVIDENCE

- Improves skin barrier function — reduces TEWL in controlled studies
- Does NOT damage stratum corneum (direct RCT comparison vs. olive oil)
- Enhances ceramide production via linoleic acid metabolism
- Reference comparator in multiple dermatology studies

FATTY ACID PROFILE



PRIMARY SOURCE

doi.org/10.1111/pde.13621

Danby et al. — *Pediatric Dermatology* (2013): Head-to-head RCT. Sunflower oil preserved barrier; olive oil damaged it. Gold-standard comparison.

EVIDENCE GRADE

Strong. Best-evidenced natural oil for eczema-prone skin. Used as a reference comparator in multiple independent studies.

FIELD ASSESSMENT: Most evidence-backed natural choice. High linoleic acid, well-tolerated, documented barrier benefit. The rational default if you want a natural oil.

Hemp Seed Oil

~57% linoleic + ideal ω6:ω3 ratio **HIGH POTENTIAL**

MECHANISM & EVIDENCE

- High linoleic acid (~55–60%) — mechanistically aligned with barrier repair
- Optimal omega-6 to omega-3 ratio (~3:1) — superior to most plant oils
- Anti-inflammatory profile supports cytokine pathway modulation
- Oral crossover trial: improved TEWL and reduced topical medication use
- △Limited large RCTs for topical use — evidence gap, not evidence of failure

FATTY ACID PROFILE



SCIENTIFIC CONTEXT

Hemp seed oil contains no THC or CBD. It is a pressed seed oil; its dermatological value comes from its fatty acid profile, not cannabinoid receptor activity.

doi.org/10.1080/09546630310003078

Callaway J et al. — *Journal of Dermatological Treatment* (2005): Oral hemp seed oil trial. Improved TEWL, reduced skin dryness and itchiness, decreased topical medication use.

RESEARCH STATUS

Biochemically excellent. Under-researched relative to its profile. Absence of large topical RCTs reflects hemp research funding gaps, not poor performance.

FIELD ASSESSMENT: The most mechanistically promising natural oil. The research hasn't caught up to the biochemistry yet.

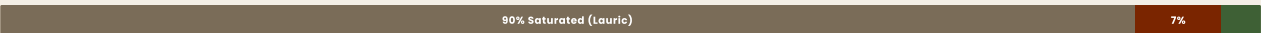
Coconut Oil

~90% saturated — high lauric acid **CONDITIONAL**

EVIDENCE

- Antimicrobial activity against *S. aureus* — clinically relevant for eczema
- Improved hydration and reduced SCORAD vs. mineral oil (RCT)
- Lauric acid (~50%) is the active antimicrobial component
- △Occlusive, not barrier-repairing — seals rather than restores lipids
- △Can trigger comedonal breakouts; flares reported in subset of patients

FATTY ACID PROFILE



PRIMARY SOURCE

pubmed.ncbi.nlm.nih.gov/19134433

Verallo-Rowell VM et al. — *Dermatitis* (2008): RCT comparing coconut vs. mineral oil in AD. Coconut oil superior for antimicrobial action and hydration.

BEST USE CASE

Active *S. aureus* colonisation or as an antimicrobial adjunct — not as a primary barrier repair agent. Use virgin, unrefined only.

FIELD ASSESSMENT: Useful situational tool for antimicrobial action. Not a barrier repair agent. Over-marketed for eczema without evidence to support primary-line use.

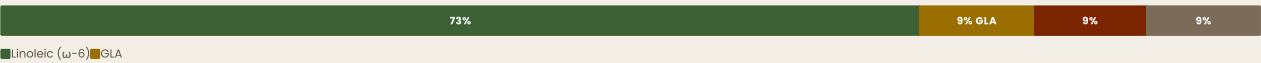
Evening Primrose & Borage Oil

Contains GLA (gamma-linolenic acid) **SECONDARY**

MECHANISM & EVIDENCE

- GLA content targets NF-κB and inflammatory cytokine pathways
- Some benefit reported in oral supplementation trials
- △Topical RCTs show inconsistent outcomes — results do not replicate
- △Weaker evidence base than sunflower or hemp seed oil

FATTY ACID PROFILE (EVENING PRIMROSE)



CLINICAL VERDICT

The GLA pathway is theoretically compelling but has not translated into consistent topical results. The mechanism works better orally where GLA enters systemic circulation.

RECOMMENDATION

Consider oral supplementation over topical. As a topical, it is outperformed by sunflower seed oil for barrier benefit at a lower cost.

FIELD ASSESSMENT: Interesting biochemistry, weak topical evidence. More useful orally. Do not use over sunflower or hemp seed as first-line.

SECTION 03

Direct Comparison & Optimal Protocol

OIL	DOMINANT FATTY ACID	BARRIER EFFECT	ANTIMICROBIAL	EVIDENCE STRENGTH	VERDICT
Olive Oil	Oleic ~75%	✗ Damages SC	👎 Mild	●●●● Strong (negative)	AVOID
Sunflower Oil	Linoleic ~65%	✓ Repairs barrier	👎 Mild	●●●● Strong (positive)	BEST NATURAL
Hemp Seed Oil	Linoleic ~57% + ω-3	✓ Repair profile	👎 Mild	●●●● Moderate (promising)	HIGH POTENTIAL
Coconut Oil	Saturated ~90%	👎 Occlusive only	✓ Strong vs. S. aureus	●●●● Moderate (RCT)	CONDITIONAL
Evening Primrose	GLA ~8–10%	👎 Mixed	👎 Weak	●●●● Weak-mixed	SECONDARY
Petrolatum	Hydrocarbon (inert)	✓ Excellent occlusion	✗ None	●●●● Very strong	BEST OVERALL

✦ THE PETROLATUM NOTE

Petrolatum (petroleum jelly / Vaseline) is the clinical benchmark against which all barrier agents are measured. It reduces TEWL by ~98% and is recommended in virtually every eczema clinical guideline. Rejecting it based on "non-natural" branding is a preference choice, not a medical one.

Evidence-Aligned Application Protocol

Oils seal. They do not hydrate. Always apply oil to damp, humectant-treated skin and follow with an occlusive.

01

HYDRATE

Apply a humectant to damp skin. Draws moisture into the epidermis before sealing.

Glycerin · Urea (10%) · Hyaluronic acid

02

REPAIR

Apply a linoleic-rich oil to restore ceramide precursors to the stratum corneum.

Sunflower seed oil · Hemp seed oil · Safflower oil

03

SEAL

Lock moisture and oil in with an occlusive barrier agent. This step determines efficacy of the above.

Petrolatum · CeraVe Healing Ointment · Aquaphor

Top 3 Clinical Mistakes

MISTAKE 01

Natural = Safe

Olive oil is the definitive counterexample. Multiple RCTs confirm barrier damage. Source, branding, and certification are irrelevant; fatty acid profile is not.

MISTAKE 02

Oil Alone = Treatment

Oils seal moisture; they cannot create it. Applied to dry skin, an oil simply seals in dryness. Always apply over humectant-treated, damp skin.

MISTAKE 03

Ignoring Lipid Ratios

The ω -6: ω -3 ratio and linoleic acid content are the operative variables. Not price. Not organic certification. Not cold-pressed status.

SECTION 04

Cited References

[1]**Effect of Olive and Sunflower Seed Oil on the Adult Skin Barrier: Implications for Neonatal Skin Care***Pediatric Dermatology* · Danby SG et al. · 2013doi.org/10.1111/pde.13621

RCT: Topical olive oil significantly damaged the skin barrier, increasing TEWL and reducing SC integrity. Sunflower seed oil did not. Directly implicates oleic acid as the mechanism of harm.

[2]**Olive Oil Implicated in Worsening Atopic Dermatitis in Neonates — The Role of Emollients***Acta Dermato-Venereologica* · Cooke A et al. · 2016doi.org/10.2340/00015555-2279

Regular olive oil application in neonates associated with worsened atopic dermatitis. Sunflower oil produced neutral-to-positive outcomes. Reinforces oleic/linoleic distinction as clinically determinative.

[3]**Randomized Double-Blind Controlled Trial: Extra Virgin Coconut Oil vs. Mineral Oil as a Moisturizer for Mild to Moderate Xerosis***Dermatitis* · Verallo-Rowell VM et al. · 2008pubmed.ncbi.nlm.nih.gov/19134433

Coconut oil superior to mineral oil for antimicrobial activity and S. aureus reduction. Significant improvement in SCORAD (eczema severity). Note: comparison vs. mineral oil, not linoleic-rich oils.

[4]**The Role of Fatty Acids in the Pathogenesis of Atopic Dermatitis — Ceramide Precursor Deficiency***Journal of Investigative Dermatology* · Elias PM & Feingold KR · 2001doi.org/10.1046/j.0022-202x.2001.01519.x

Establishes linoleic acid deficiency as a fundamental feature of atopic dermatitis. Documents the role of ceramide precursor depletion in SC barrier failure. Foundational mechanistic paper.

[5]**Dietary Hemp Seed Oil Consumption Reduces Atopic Dermatitis Symptoms — Crossover Trial***Journal of Dermatological Treatment* · Callaway J et al. · 2005doi.org/10.1080/09546630310003078

Oral hemp seed oil improved TEWL, reduced skin dryness and itchiness, decreased topical medication use. Supports systemic linoleic acid delivery via hemp. Most rigorous hemp-specific eczema evidence available.

[6]**Emollients and Moisturisers for Eczema — Cochrane Systematic Review (77 RCTs, 6,603 participants)***Cochrane Database of Systematic Reviews* · van Zuuren EJ et al. · 2017doi.org/10.1002/14651858.CD012119.pub2

Emollient therapy reduces flares and prolongs time to relapse. No single emollient consistently superior; individual response highly variable. Most evidence for petrolatum-based agents.

[7]**Staphylococcus aureus and Atopic Dermatitis: A Complex and Evolving Relationship***Trends in Microbiology* · Byrd AL et al. · 2017doi.org/10.1016/j.tim.2017.02.003

S. aureus colonisation present in >90% of lesional AD skin. Drives immune dysregulation and flare severity. Supports antimicrobial strategies as adjunct to barrier repair.

SECTION 05

Further Reading

META-ANALYSIS
Skin barrier function in AD: filaggrin mutations, ceramide deficiency, and the SC lipid envelope Comprehensive review of the genetic and biochemical basis of AD. Essential reading for understanding why linoleic acid deficiency is mechanistically central. Elias PM - Journal of Investigative Dermatology · doi.org/10.1038/jid.2012.429
RCT
Sunflower seed oil vs. aqueous cream: effects on neonatal skin barrier and microbiome in high-risk infants Evaluates sunflower seed oil as a prophylactic barrier agent. Outcome data on TEWL, SC integrity, and microbial colonisation supports recommendation for sensitive skin. Cooke A et al. - Pediatrics · doi.org/10.1542/peds.2014-1511
REVIEW
Skin lipids in atopic dermatitis — ceramide depletion, sphingolipids, and TEWL correlation Deep-dive into SC lipid composition in AD skin. Explains the molecular basis of ceramide deficiency and why linoleic acid topical supplementation is mechanistically rational. Hatano Y et al. - Journal of Allergy and Clinical Immunology · doi.org/10.1016/j.jaci.2008.09.037
CLINICAL TRIAL
Hemp seed oil and atopic dermatitis symptoms — the crossover trial evidence base Oral hemp seed oil trial: improved TEWL, reduced dryness, and decreased topical medication use. Most rigorous hemp-specific eczema evidence to date; see [5] above. Callaway J et al. - Journal of Dermatological Treatment · doi.org/10.1080/09546630310003078
GUIDELINE
Canadian Dermatology Association — Atopic Dermatitis Clinical Practice Guidelines Current Canadian clinical guidelines for AD management. Addresses emollient therapy in paediatric and adult populations. Petrolatum and ceramide emollients are first-line. dermatology.ca/practice-tools/clinical-practice-guidelines/atopic-dermatitis
REVIEW
Coconut oil antimicrobial properties against S. aureus — the lauric acid mechanism Characterises the antimicrobial mechanism of coconut oil against S. aureus. Explains its clinical value specifically in infection-driven flares, distinct from its barrier effects. Shilling M et al. - Journal of Medicinal Food · doi.org/10.1089/jmf.2011.0114
GUIDELINE
National Eczema Association — Understanding the Role of Emollients in Atopic Dermatitis Comprehensive patient and clinician resource for emollient selection. Evidence summaries, ingredient guidance, and skin barrier restoration protocols. nationaleczema.org/eczema/treatments/moisturizing
REVIEW
The role of omega-6 and omega-3 fatty acids in atopic dermatitis — topical vs. systemic delivery Compares topical and oral delivery routes for essential fatty acids in AD. Supports the view that systemic delivery may be more effective than topical for linoleic and GLA mechanisms. Huang TH et al. - Skin Pharmacology and Physiology · doi.org/10.1159/000137016

SECTION 06

Canadian Sourcing Guide

All recommended oils are available across Canada without restriction. Prioritise cold-pressed, unrefined versions — refining removes minor bioactives, though the core fatty acid profile is largely preserved. Food-grade or cosmetic-grade quality is appropriate for topical use.

HEMP SEED OIL	TOP PICK
Manitoba Harvest (Winnipeg, MB) Canada's largest hemp producer. Cold-pressed organic hemp seed oil. Available at Loblaws, Sobeys, Metro, Whole Foods nationwide. manitobaharvest.com	
Naturally Hemp (Alberta) Canadian hemp seed oil, certified organic, cosmetic-grade available. Ships nationally. Cold-pressed, unrefined. naturallyhemp.ca	
Bulk Barn (National) Carries hemp seed oil at a lower price point. Accessible in most provinces. Food-grade quality. bulkbarn.ca	
Canadian Hemp Trade Alliance Directory of certified Canadian hemp producers. Useful for sourcing direct from growers. hemptrade.ca	
SUNFLOWER SEED OIL	BEST EVIDENCE
NOW Foods (Canada-wide) Cosmetic-grade, cold-pressed, hexane-free. Stocked at Nutrition House, GNC, health food independents, Amazon.ca. nowfoods.com ~ amazon.ca, vitacost.ca	
Saffire Blue (Brampton, ON) Canadian cosmetic supply. Sunflower seed oil cosmetic grade, 1L–4L sizes. Excellent for formulation. saffireblue.ca	
Grocery stores (national) ⚠️ Verify you are purchasing standard sunflower oil, NOT high-oleic variants, which have an inverted fatty acid profile inappropriate for eczema. Loblaws · Sobeys · Co-op · Metro · IGA	
COCONUT OIL	SITUATIONAL
Nutiva Organic (widely available) Virgin coconut oil, USDA organic. Costco Canada, Whole Foods, Amazon.ca. Highest lauric acid content when virgin/unrefined. nutiva.com ~ costco.ca, amazon.ca	
Costco Canada (Kirkland Organic) Most economical option. Large-format organic virgin coconut oil. Available nationally. costco.ca	
⚠️ Purchase note Use virgin/unrefined only. Refined coconut oil has reduced antimicrobial activity. Fractionated (MCT) oil is NOT equivalent — different fatty acid profile.	
PETROLATUM / OCCLUSIVE	GOLD STANDARD
Vaseline (100% Pure Petroleum Jelly) Nationally available. All pharmacies, grocery stores. Generic store-brand is equivalent — same active ingredient, lower cost. Shoppers Drug Mart · Rexall · Walmart Canada · Costco	
CeraVe Healing Ointment Petrolatum base with added ceramides. Available at all major Canadian pharmacies. Preferred by Canadian dermatologists. Shoppers Drug Mart · Jean Coutu · Pharmasave	
Aquaphor Healing Ointment 41% petrolatum with mineral oil and lanolin. Available at major Canadian pharmacies. Strong clinical track record in eczema literature. shoppers.com · amazon.ca	

🇨🇦 CANADIAN REGULATORY NOTE

Hemp seed oil is fully legal across Canada under Health Canada regulations and the *Cannabis Act* — it is a pressed seed oil with no cannabinoid content, classified as a food ingredient. No dispensary or licensed producer required. Purchase at any health food store, grocery chain, or online retailer. Cosmetic-grade products are regulated under Health Canada's Cosmetic Regulations (Food and Drugs Act).

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This guide is for informational purposes only.

It does not constitute medical advice.

Consult a dermatologist for clinical decisions.

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