Oral Ceramides NP 99.5%

Barrier Restoration, TEWL Reduction, Deep Hydration, and Sensitive-Skin Tolerability

Abstract

Ceramides constitute ~50% of stratum-corneum lipids and, together with cholesterol and free fatty acids, organize a tri-lamellar matrix that limits trans-epidermal water loss (TEWL) and shields against external irritants.

Age, UV exposure, and environmental stress deplete endogenous ceramides, driving dryness, sensitivity, and barrier impairment. Oral ceramide supplementation has been shown to improve hydration, reduce TEWL, and enhance smoothness and elasticity.

Among subtypes, Ceramide NP (N-stearoyl phytosphingosine) most closely mirrors the dominant human skin species and demonstrates superior barrier-repair performance with low irritation - attributes desirable for oral nutria-cosmetics and sensitive-skin populations.

Notably, many clinical reports used plant extracts containing ≤~0.5% ceramides, so labeled intakes of 20-40 mg extract delivered only ~0.1-0.4 mg/day of active ceramide.

By contrast, 99.5% high-purity Ceramide NP enables micro-dose, high-payload delivery (e.g., ~1.99 mg active from 2 mg), and outstripping active levels in extract-based studies while aligning with precision-nutrition principles.

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Meadowfoam seed is a clean, non-grain botanical source enriched in phytosphingosine precursors and noted for oxidative stability and biocompatibility.

In multi-ingredient systems, Ceramide NP forms the barrier foundation while Niacinamide, elastin peptides, and hyaluronic acid support internal structure and hydration, establishing a layered strategy that restores barrier integrity, boosts water retention and improves overall skin resilience.

Keywords

Ceramide NP; tri-lamellar lipid matrix; TEWL reduction; skin hydration; Skin barrier repair; phytosphingosine; nutria-cosmetics; Skin Barrier Restoration; Deep Hydration; boosts water retention; skin resilience.

Ceramides are a class of lipid molecules naturally found in the stratum corneum-the outermost layer of human skin. They account for approximately 50% of the skin's lipid composition and play a crucial role in forming the skin barrier and maintaining moisture balance. Together with cholesterol and free fatty acids, ceramides form a "tri-lamellar lipid matrix" that prevents trans-epidermal water loss (TEWL) and protects the skin from external irritants.

Factors such as aging, UV radiation, and environmental stress lead to a gradual decline in ceramide levels, contributing to dry, sensitive, and compromised skin.

Oral supplementation with ceramides has been shown in multiple clinical studies to significantly enhance skin hydration, reduce TEWL, improve smoothness and elasticity, and support the repair of the skin barrier structure.

- ✓ *Takahashi M, et al. (2009). Oral intake of plant-derived ceramides improves skin barrier function in humans: A randomized, double-blind, placebo-controlled trial. Journal of Nutritional Science and Vitaminology, 55(5): 447–453.*
- ✓ *Odanaka W, et al. (2012). Effect of oral supplementation with glucosylceramide extracted from rice on skin hydration in humans: A double-blind randomized placebo-controlled trial. Journal of Functional Foods, 4(2): 339–346.*
- ✓ *Ogawa R, et al. (2008). Age-related changes of ceramide profiles in human stratum corneum. Skin Research and Technology, 14(2): 203–210.*

I Differences and Advantages of Ceramide NP Compared to Other Types of Ceramides

There are several structural subtypes of ceramides commonly used in skincare and oral beauty products, including:

- Ceramide NP (N-stearoyl phytosphingosine)
- Ceramide NS (N-stearoyl sphinganine)
- Ceramide AP (Alpha-hydroxy fatty acid ceramide)
- Ceramides EOP and EOS (Esterified with omega-hydroxy fatty acids)

Key Advantages of Ceramide NP:

- **Most structurally identical to natural human skin ceramides**

  Ceramide NP closely resembles the natural ceramide structure found in the human stratum corneum. It is identical to N-(stearoyl)-phytosphingosine, the dominant ceramide component in the skin barrier.

- **Superior in restoring the skin barrier**

  Ceramide NP has been shown to be particularly effective in repairing damaged skin barriers, alleviating dryness and sensitivity, and significantly reducing trans-epidermal water loss (TEWL).

- **Low irritation and suitable for oral use and sensitive skin**

  Compared to more acidic ceramide types such as Ceramide AP and EOS, Ceramide NP has a milder profile, making it ideal for use in oral nutria-cosmetics and for individuals with sensitive skin.

✓ *Guillou S. et al. (2011). Benefits of ceramide NP in skin barrier repair and hydration. International Journal of Cosmetic Science, 33(6), 511–518.*

✓ *Kuller LH, et al. (2019). Structural diversity of ceramides and their roles in skin barrier function. Skin Pharmacology and Physiology.*

II Differences and Advantages of Meadowfoam Seed Extract Compared to Other Ceramide Sources

1) Common botanical sources of ceramides include:

- Rice bran
- Wheat germ
- Fermented yeast (e.g., *Saccharomyces cerevisiae*)
- Meadowfoam seed

2) Key Advantages of Meadowfoam Seed Extract:

A. Naturally rich in long-chain fatty alcohols and plant-derived sphingolipids

Meadowfoam seeds are abundant in ceramide precursors such as phytosphingosine, making them an ideal source for extracting structurally complete Ceramide NP.

B. Gentler, hypoallergenic, and gluten-free

As a non-grain botanical source, Meadowfoam is a safer alternative for individuals

with wheat or gluten sensitivities. It is also non-GMO and suitable for global clean-label formulations.

C. Higher stability and better biocompatibility

Meadowfoam seed oil has natural antioxidant properties, which enhance the oxidative stability of extracted ceramides. It also offers superior skin affinity and compatibility compared to rice bran or wheat-derived alternatives.

- ✓ *Nagasawa T. et al. (2013). Natural ceramides extracted from meadowfoam seed improve skin hydration and barrier function. Journal of Oleo Science.*
- ✓ *Sakamoto K. et al. (2021). Comparison of skin barrier function improvement by ceramides derived from different botanical sources. J Cosmet Dermatol.*

III Recommended oral dosage of Ceramide NP

Ceramide NP (N-stearoyl phytosphingosine) is the most structurally identical ceramide to that found in human skin, making it a key component in oral beauty supplements.

1) Based on clinical studies and commercial practices:

- Recommended oral dosage: 10-40 mg/day
- Common effective range: 20-30 mg/day
- Taken consistently over 4-8 weeks, Ceramide NP has been shown to:

- Increase skin hydration
- Reduce trans-epidermal water loss (TEWL)
- Improve dryness and sensitivity

2) **However, most clinical trials used plant-based extracts (e.g., rice bran, wheat germ) containing less than 0.5% ceramides, meaning:**

- 20-40 mg/day of extract ≈ **0.1-0.4 mg** of active Ceramide NP

By contrast, Keyora uses 99.5% ultra-pure Ceramide NP, delivering 1.99 mg of active ceramide per 2 mg dose - 5 to 20 times more than the amount used in published studies.

This positions Keyora as a true precision nutrition formulation-delivering high efficacy at a micro-dose level, with excellent bioavailability and proven functional benefits.

✓ *Guillou S, et al. (2011). Benefits of ceramide NP in skin barrier repair and hydration. Int J Cosmetic Science, 33(6): 511–518.*

3) **Clinical Research Context: Low-Purity Extracts in Oral Ceramide NP Studies**

In nearly all published clinical studies, the oral forms of Ceramide NP used were not high-purity isolates (≥99%), but rather standardized plant extracts containing small amounts of ceramide.

Key Findings:

- Typical daily intake in studies: 20-40 mg of plant extract
- Ceramide NP content in these extracts: ~ 0.5%
- → Resulting in an actual intake of only 0.1–0.4 mg/day of active Ceramide NP

These findings demonstrate that very low amounts of Ceramide NP 99.5% (0.1-0.4 mg/day), when delivered consistently, are sufficient to achieve clinical skin benefits.

Common Practice in Clinical Studies: Use of Standardized Plant Extracts Instead of High-Purity Ceramide NP

- ✓ *Iwamoto N, et al. (2008). Oral administration of ceramide NP improves water content and elasticity in human skin. J Nutr Biochem, 19(8): 543–548.*
- ✓ *Oe M, et al. (2017). Oral supplementation with N-stearoyl phytosphingosine improves dry skin conditions. Skin Pharmacol Physiol, 30(1): 30–35.*

4) Common Practice in Clinical Studies:

Use of Standardized Plant Extracts Instead of High-Purity Ceramide NP

In nearly all published clinical studies, the ceramides used for oral supplementation are not 99% pure isolated compounds, but rather plant-derived extracts standardized to contain low levels of natural ceramides. The actual intake of active Ceramide NP in these studies is substantially lower than the labeled dosage of the extract.

Study	Source Material	Ceramide Content	Estimated Active Ceramide Intake
Odanaka et al., 2012	Rice bran extract	0.6–1.2%	20 mg × 1% ≈ 0.2 mg
Kawamura et al., 2017	Corn germ extract	~1%	40 mg × 1% ≈ 0.4 mg
Takahashi et al., 2009	Rice bran (unprocessed)	Estimated 0.5–1.5%	Up to 40 mg of raw extract ≈ 0.2–0.6 mg

5) Key Insight:

Even though extract dosages range from 20 to 40 mg/day, the actual active ceramide content delivered is typically only 0.2-0.4 mg/day.

This further highlights the superiority of high-purity Ceramide NP (e.g., 99.5%), where a micro-dose (such as Keyora's 2 mg/day) can provide ~1.99 mg of active compound, vastly exceeding clinically effective thresholds demonstrated in these studies.

6) The advantage of Keyora products

Most oral ceramide products on the market rely on plant extracts containing less than 1% active ceramide, delivering only 0.2-0.5 mg of ceramides per day.

In contrast, Keyora uses **ultra-pure 99.5% Ceramide NP.**

With just 20 mg per day, it delivers nearly 20 mg of active ceramide - over 50-100 times more than conventional extract-based formulations - for precise and effective skin support.

IV Synergistic Relationship Between Ceramide NP and Collagen Tripeptides / Elastin / Hyaluronic Acid

Synergy between Ceramide NP and other key ingredients:

Ceramide NP forms the foundation of the skin's barrier function, while Niacinamide, elastin, and Hyaluronic Acid (HA) work together to restore internal structure and moisture. Their synergy establishes a three-layer defense: structure + hydration + barrier, ideal for anti-aging and skin rejuvenation formulas.

Skin health relies on the synergy of two critical systems:

- Dermal structural matrix (Elastin / Hyaluronic Acid)

  → Supports elasticity, firmness, hydration volume

- Epidermal barrier system (Ceramide NP / Niacinamide)

  → Responsible for regulating skin hydration retention, melanin production, antioxidant defense, and sensitivity tolerance.

Ingredient	Layer of Action	Primary Function	Synergy with Ceramide NP
Niacinamide	**Stratum corneum**	Stimulate fibroblast activity, increase Type I collagen synthesis	Dual-action reinforcement of the skin barrier: ● promoting internal moisture retention and external water locking

Ingredient	Layer of Action	Primary Function	Synergy with Ceramide NP
			• while simultaneously improving dryness, dullness, and rough texture.
Elastin Peptides	**Dermis**	Restore the elastic fiber network and improve skin elasticity	Ceramide NP reduces TEWL, enhancing elastin network stability
Hyaluronic Acid (400k Da)	**Dermis**	Boost ECM hydration and volume, maintaining plumpness	Ceramide NP locks in Hyaluronic Acid (HA) moisture, forming a dual-layer hydration defense
Ceramide NP	**Epidermis**	Reinforces lipid layer, reduces TEWL, and improves tolerance	Provides a stable barrier environment to maximize nutrient absorption and retention

Synergistic Effects of Niacinamide and Ceramide in Skincare

1) Skin Barrier Repair

Nicotinamide increases ceramide and involucrin production via stimulation of keratinocyte differentiation.

- Ceramide NP is one of the most essential lipids in the stratum corneum, filling intercellular spaces and reducing trans-epidermal water loss (TEWL).
- Niacinamide stimulates epidermal cells to synthesize ceramides, free fatty acids, and cholesterol, helping to rebuild the skin barrier.

Synergistic Advantage: Dual mechanism enhances and accelerates the repair of compromised barriers, particularly in sensitive, dry, or redness-prone skin.

✓ *Tanno O, et al. "Nicotineamide increases ceramide and involucrin production via stimulation of keratinocyte differentiation." British Journal of Dermatology. 2000;143(3):524–531.*

2) Moisture Retention Enhancement

Niacinamide enhances the biosynthesis of ceramides and other stratum corneum lipids, thereby improving skin hydration.

- Ceramides physically lock in moisture, reducing TEWL.

Niacinamide increases the biosynthesis of natural moisturizing factors (NMF) such as filaggrin and its degradation products, improving the water-binding capacity of the stratum corneum.

- Niacinamide increases the production of natural moisturizing factors (NMF), such as squalene and urea.

Synergistic Advantage: Ceramides offer structural support, while Niacinamide provides metabolic support, resulting in long-lasting hydration.

✓ *Draelos ZD.* The effect of ceramide-containing skin care products on eczema resolution duration. *Cutis. 2008;81(1):87–91.*

✓ Tanno O, Ota Y, Kitamura N, Katsube T, Inoue S. *Nicotineamide increases ceramide and involucrin production via stimulation of keratinocyte differentiation.* Br J Dermatol. 2000;143(3):524–531.

3) Environmental Stress Protection

Niacinamide has been shown to reduce UV-induced immunosuppression and enhance DNA repair mechanisms in keratinocytes.

- Niacinamide possesses antioxidant and anti-inflammatory properties that help protect the skin from UV and environmental damage.

Ceramide-based moisturizers form an occlusive barrier to protect skin from external irritants and pollutants.

- Ceramides create a lipid barrier that prevents external irritants from penetrating the dermis.

Synergistic Advantage: Niacinamide provides antioxidant defense while Ceramide NP reinforces physical protection - a dual strategy against environmental aggressors.

✓ *Surjana D, Halliday GM, Damian DL.* Nicotineamide enhances repair of ultraviolet radiation-induced DNA damage in human keratinocytes and ex vivo skin. *Carcinogenesis. 2013;34(5):1144–1149.*

✓ Farwanah H, Wohlrab J, Neubert RH, Raith K. *Profiling of human stratum corneum ceramides by means of normal-phase LC/APCI-MS.* Anal Bioanal Chem. 2005;383(4):632–637.

4) Improvement in Skin Tone and Texture

Ceramide NP-enriched formulations improve skin smoothness, reduce roughness, and enhance overall texture.

- Ceramides improve the structure of the stratum corneum, making the skin appear smoother and plumper.

Niacinamide reduces hyperpigmentation by inhibiting melanosome transfer to keratinocytes and improves skin tone homogeneity.

- Niacinamide inhibits melanosome transfer, brightens dull skin tones, and promotes skin renewal.

Synergistic Advantage: Achieves a more even skin tone and refined texture — ideal for mature or dry, pigmented skin.

✓ *Hakozaki T, Minwalla L, Zhuang J, Chhoa M, Matsubara A, Miyamoto K, Hillebrand GG, Bissett DL, Boissy RE.*

The effect of niacinamide on reducing cutaneous pigmentation and suppression of melanosome transfer. *Br J Dermatol. 2002;147(1):20–31.*

✓ Kono T, Eraydin SA, Bhargava R, et al. *The effect of ceramide-based moisturizer on skin texture and hydration in dry skin conditions.* J Cosmet Dermatol. 2020;19(8):1892–1897.

5) Enhanced Tolerance and Reduced Irritation

Topical Niacinamide at higher concentrations (>5%) may cause transient erythema or tingling. however, these effects are reduced when combined with barrier-repairing agents like ceramides.

- Higher concentrations of Niacinamide (>5%) can occasionally cause mild irritation or redness.
- Ceramides help alleviate such reactions by improving the skin's tolerance and reinforcing barrier function.

Synergistic Advantage: Ceramides act as a calming barrier agent, increasing niacinamide tolerability for sensitive skin users.

✓ Draelos ZD. *The effect of a combination of ceramides and niacinamide on skin sensitivity.* J Clin Aesthet Dermatol. 2018;11(12):13–17.

✓ *Hakozaki T, et al.* The effect of niacinamide on reducing cutaneous pigmentation and suppression of melanosome transfer. *Br J Dermatol. 2002;147(1):20–31.*

Conclusion：

Ceramide NP serves as the foundation for barrier protection and moisture retention. When combined with elastin peptides, hyaluronic acid, and Niacinamide, it forms a triple defense for the skin - structure, barrier, and hydration.

This synergy offers enhanced anti-aging benefits and makes Ceramide NP an indispensable component in advanced skincare formulations.

- ✓ *Zague V, et al. (2018). Collagen peptides modulate metabolism of dermal fibroblasts. J Cosmet Dermatol, 17(5): 840–847.*
- ✓ *Mori T, et al. (2014). Elastin peptides improve skin health and suppress wrinkle formation. J Dermatol Sci, 74(1): 30–36.*
- ✓ *Oe M, et al. (2017). Oral N-stearoyl phytosphingosine improves dry skin conditions. Skin Pharmacol Physiol, 30(1): 30–35.*
- ✓ *Papakonstantinou E, et al. (2012). Hyaluronic acid: A key molecule in skin aging. Dermatoendocrinol, 4(3): 253–258.*