

# Lactobionic Acid

FOR A RADIANT AND SMOOTH SKIN



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# Lactobionic Acid

Lactobionic acid is derived from the oxidation of lactose. It is an aldobionic acid comprising one molecule of sugar galactose and one molecule of gluconic acid attached via an acetal linkage.

It is also often referred to as a polyhydroxy bionic acid due to its multiple hydroxy groups. Lactobionic acid has a molar mass of 358 daltons and is a larger molecule than traditional alpha hydroxy acids. It has been asserted that lactobionic acid is still enough to penetrate. It has many applications in food, pharmaceuticals, medicine, and cosmetics.

## Functions:

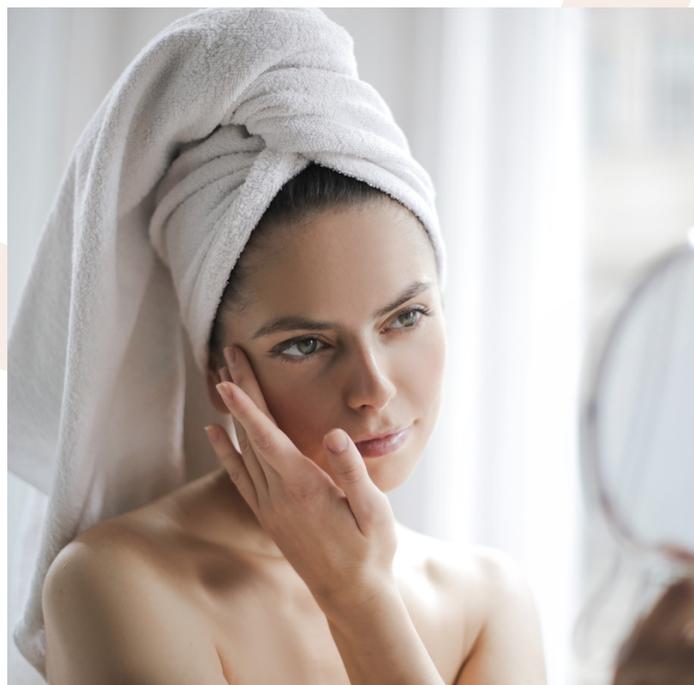
1. **Prevent and reverse the appearance of photoaging lines and wrinkles**, uneven pigmentation, enlarged pores, and roughness; promote firmness by inhibiting the MMP enzyme responsible for degradation of collagen and consequent wrinkling and skin laxity.
2. **More effective, safer, and better tolerated than glycolic acid** (alpha hydroxy acids) to exfoliate and help smooth the skin
3. The safety and efficacy can be further increased by using **natural alkyopolyglucoside-based vehicle** instead of polyethylene glycol emulsifier (PEG)
4. **Antioxidant**: scavenges free radicals and inhibits lipid peroxidation.
5. **Skin lightening**: Suppresses melanin production in cultured mouse melanocytes in the presence of an analog of a melanocyte stimulating hormone 6% lactobionic acid in an alkylpolyglucoside-based emulsion led to market decrease in the melanin index after being applied to skin sites on the forearm for only 2 weeks.
6. **Increased skin hydration**: it is a natural humectant and has strong water binding properties and has demonstrated the ability to increase the production of glycosaminoglycans in the skin.
7. **Enhanced barrier function** increases the integrity and cohesion of the stratum corneum and accelerates barrier recovery.
8. **Increased skin thickness**: 8% lactobionic acid increased skin thickness of the forearm by an average of 6.9% after 12 weeks, compared to a 1.9% increase in untreated forearms.



*Lactobionic acid has a strong skin moisturizing property* as shown in the following work: [1] some of the most hygroscopic chemicals, after being dehydrated in an oven, were exposed in a cell at 100% atmospheric humidity for 4 hours, and then the amount of water absorbed per each chemical was evaluated. Lactobionic acid absorbed the greatest amount of water, corresponding to 65-75g/mole, compared to the other known skin humectants, such as glycerol (55 g/mole), sorbitol (25 g/mole, propylene glycol (12 g/mole) and other AHAs (glycolic and citric acids 15-25 g/mole, Lactic acid 5-15 g/mole).

*Lactobionic acid on the skin retains atmospheric water together with the water contained in the cosmetic with very strong bonds*, thanks to its chemical structure like a glycosaminoglycan, creating a gel with a high degree of skin hydration with an emollient and protective acid that contains the 14% of water. [2]

Other studies have shown that the topical application on humans of Lactobionic acid, probably for antioxidant action, *can reduce the production of cutaneous Metalloproteinases (MMPs), synthesized following sun exposure, protecting the skin from photoaging sun damage*. Metalloproteinases are enzymes produced in the physiological processes of aging and under UV stimulation UV. They are capable of degrading skin proteins, such as collagen, elastin, hyaluronic acid, causing a rearrangement of the structure of the dermis with consequent formation of wrinkles, loss of tone and appearance of telangiectasias. [2]



Some clinical studies [3][4] have shown a reduction in the melanin index and therefore a skin lightening effect of Lactobionic acid applied twice daily for two weeks. of Lactobionic acid applied daily twice a day for two weeks on 26 volunteers.

Structure		Activity
Hydroxyl group in a position ( $\alpha$ -OH)		Provide similar effects as AHAs (exfoliation, skin smoothing, antiaging, etc.) <ul style="list-style-type: none"> <li>→ Highly hygroscopic due to polyhydroxyl [(OH)s]</li> <li>→ Antioxidant and prevent tissue damage associated with hydroxyl radicals (due to chelation of Fe 2+)</li> <li>→ Maintenance a normal or hyperacidic pH of stratum corneum due to acidic carboxyl group (-COOH)</li> <li>→ Enhance stratum corneum barrier function</li> <li>→ Anti-aging</li> <li>→ An endogenous sugar (of a hexose type) used in biosynthesis of e.g. glycosaminoglycans or collagen</li> <li>→ Enhance wound healing</li> <li>→ Hygroscopic</li> <li>→ Make LA more tolerable and less irritation to skin:               <ul style="list-style-type: none"> <li>- rosacea</li> <li>- atopic dermatitis</li> <li>- can be used after cosmetic procedures</li> </ul> </li> </ul>
Bionic acid	Gluconic acid (polyhydroxy acids)	
	Galactose (sugar)	

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## Bibliography

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