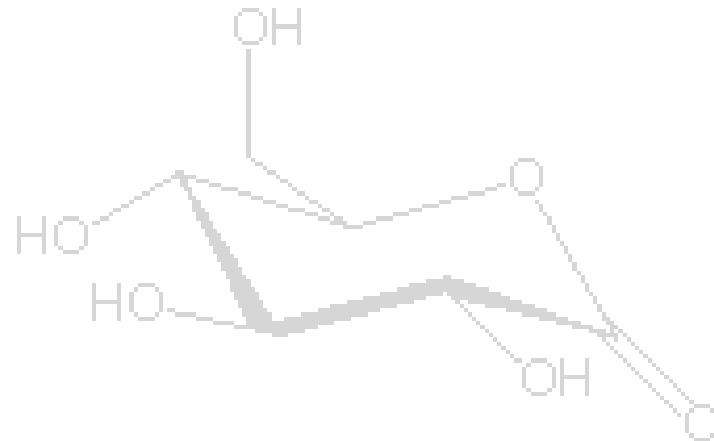


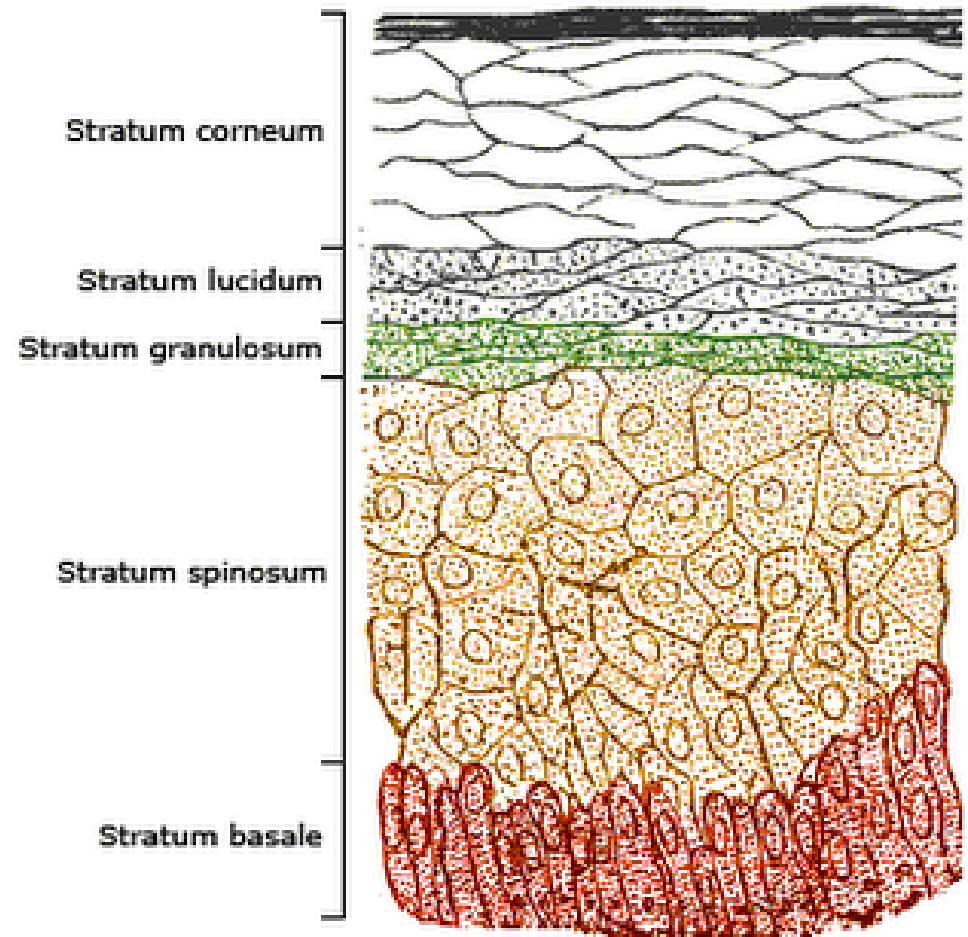
Gluconolactone (PHA)



Signs of Aging Skin

Skin aging results from the deterioration of structures in the skin and the slowing of healthy skin function causing:

- Decrease in structural proteins.
- Irregular pigment production.
- Decline in healthy cell renewal.
- Decrease in natural moisturizers.
- Environmental damage, Free radical oxidation.



Signs of Aging Skin

Decline in skin function leads to visible signs of aging:

- Lines and wrinkles
- Loss of firmness
- Uneven skin tone and discoloration
- Rough texture
- Dull, sallow complexion
- Enlarged pores
- Dry skin



Turning Back Your Skin's Clock

Even if you did not properly care for your skin in years past, there are many technologically advanced ingredients and exceptional botanicals that help repair sun damage and reverse some of the effects of biological, environmental, and mechanical aging.



Polyhydroxy acids (PHAs)

What are they?

Polyhydroxy acids (PHAs) are the next generation of AHAs. They provide the anti-aging, skin-smoothing benefits of the AHAs without the potentially irritating side effects of burning and stringing. **PHAs** include **Gluconolactone** and **Lactobionic acid**, which are structurally larger molecules than AHAs allowing for slower skin penetration (longer absorption time) and thus fewer side effects (non-sensitizing). In addition to the exfoliative benefits of AHAs, **PHAs** provide additional benefits of enhance stratum corneum barrier function and moisturization with humectant properties. This makes for enhanced skin compatibility and ideal use for most skin types, including sensitive or clinically challenged and dry skins. **PHAs** are also protective since most of them contain antioxidant properties. PHAs such as **Gluconolactone** or **Lactobionic acid** may be used in combination with other products, ingredients, or procedures such as **laser** and **microdermabrasion** to provide additional benefits to therapy or to enhance the therapeutic effect.

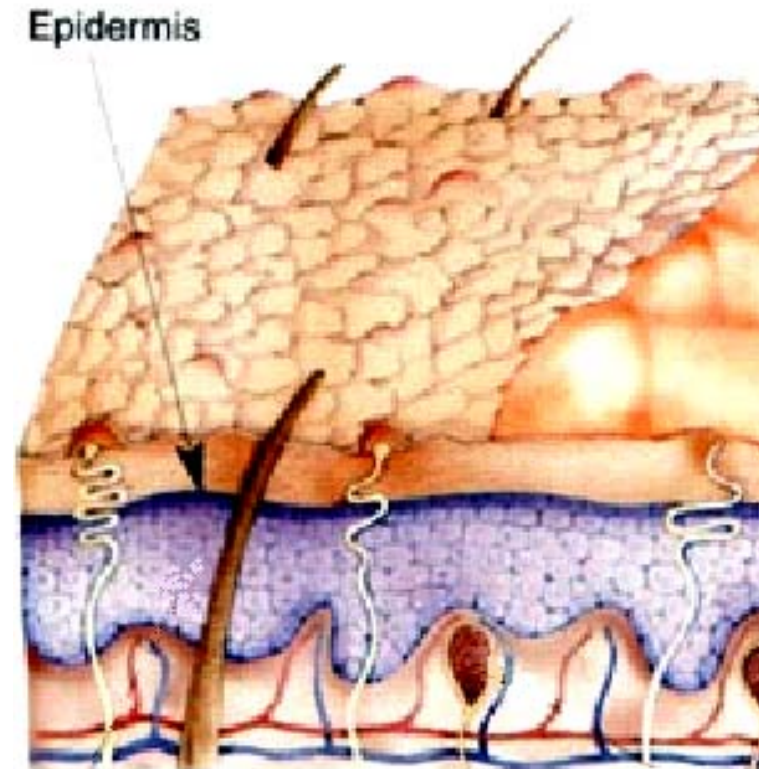
Polyhydroxy acids (PHAs)

Skin benefits

Consistent use of PHA products can improve skin in many ways. PHAs:

1. Promote cell turnover for skin smoothness and radiance

Polyhydroxy acids (PHAs) promote cell renewal directly as they stimulate healthy exfoliation and accelerate skin cell turnover as well as diminish the appearance of pore size for a smooth, radiant, more youthful complexion



pKa's of Food Acids

<u>GROUP</u>	<u>ACID</u>	<u>pKa</u>
Inorganic Acid	Pyrophosphoric Acid	0.90, 1.50, 5.80, 8.20
	Phosphoric Acid	2.10, 7.20, 12.30
	Sulfuric Acid	--, 1.92
Carboxylic Acid	Acetic Acid	4.75
	Carbonic Acid	6.40, 10.30
Dicarboxylic Acid	Succinic Acid	4.20, 5.60
	Adipic Acid	4.43, 4.41
	Fumaric Acid	3.03, 4.44
AHAs	Malic Acid	3.40, 5.10
	Tartaric Acid	3.20, 4.80
	Citric Acid	3.08, 4.74, 5.40
	Lactic Acid	3.86
PHAs	Gluconic acid	3.60

Polyhydroxy acids (PHAs)

Skin benefits

2. Moisturizing - Attract water to skin.

Polyhydroxy acids (PHAs) are humectants resulting from the multiple water-attracting hydroxyl groups found on the molecular structure. By drawing in moisture, they help skin stay hydrated. When skin is sufficiently moisturized, it looks smoother and healthier.



Polyhydroxy acids (PHAs)

Skin benefits



3. Reduce wrinkles.

Polyhydroxy acids (PHAs) provide the same anti-aging power found in alpha hydroxy acids. In one study, after **polyhydroxy acids (PHAs)** were used twice a day for six weeks, results revealed “a decrease in the number, depth and spacing of fine lines, wrinkles and crow’s feet,” Elizabeth Briden, M.D., a dermatologist at the University of Minnesota, tells *Skin & Allergy News*. PHAs are also effective in combination with retinoids.

Polyhydroxy acids (PHAs)

Skin benefits

4. Strengthen skin's barrier.

Our skin barrier, or stratum corneum, plays a vital role in keeping out irritating chemicals and substances. Because **polyhydroxy acids (PHAs)** help improve barrier function, they can make skin less vulnerable to irritants.



Polyhydroxy acids (PHAs)

Skin benefits



5. Lighten hyperpigmentation - Minimizes the look of age spots and discoloration

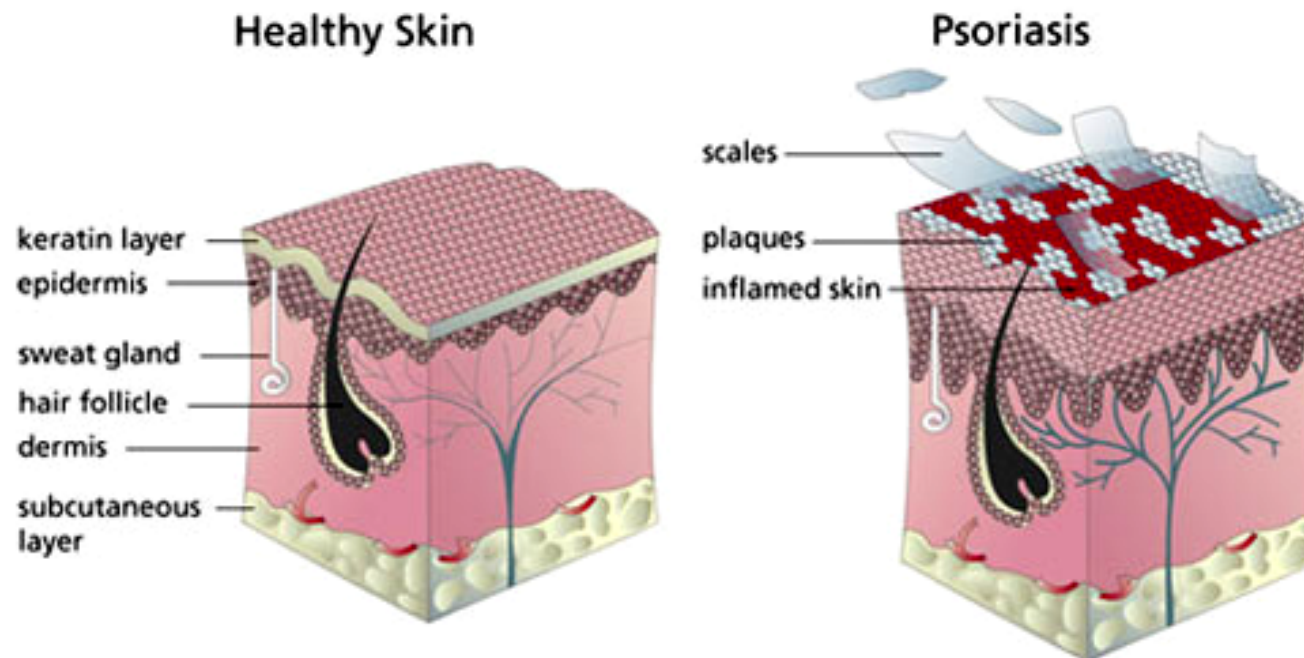
Polyhydroxy acids (PHAs) can lighten hyperpigmentation and photodamage. Polyhydroxy acids exfoliate existing discoloration, revealing a brighter, more even skin tone. Second, the production of new discoloration is interrupted by the vitamin C in the Face Wash.

Polyhydroxy acids (PHAs)

Skin benefits

6. Reduce flare-ups in inflammatory conditions.

Polyhydroxy acids (PHAs) can lower inflammatory episodes of **Acne**, **Rosacea**, **Dermatitis**, **Psoriasis** and **Melasma**

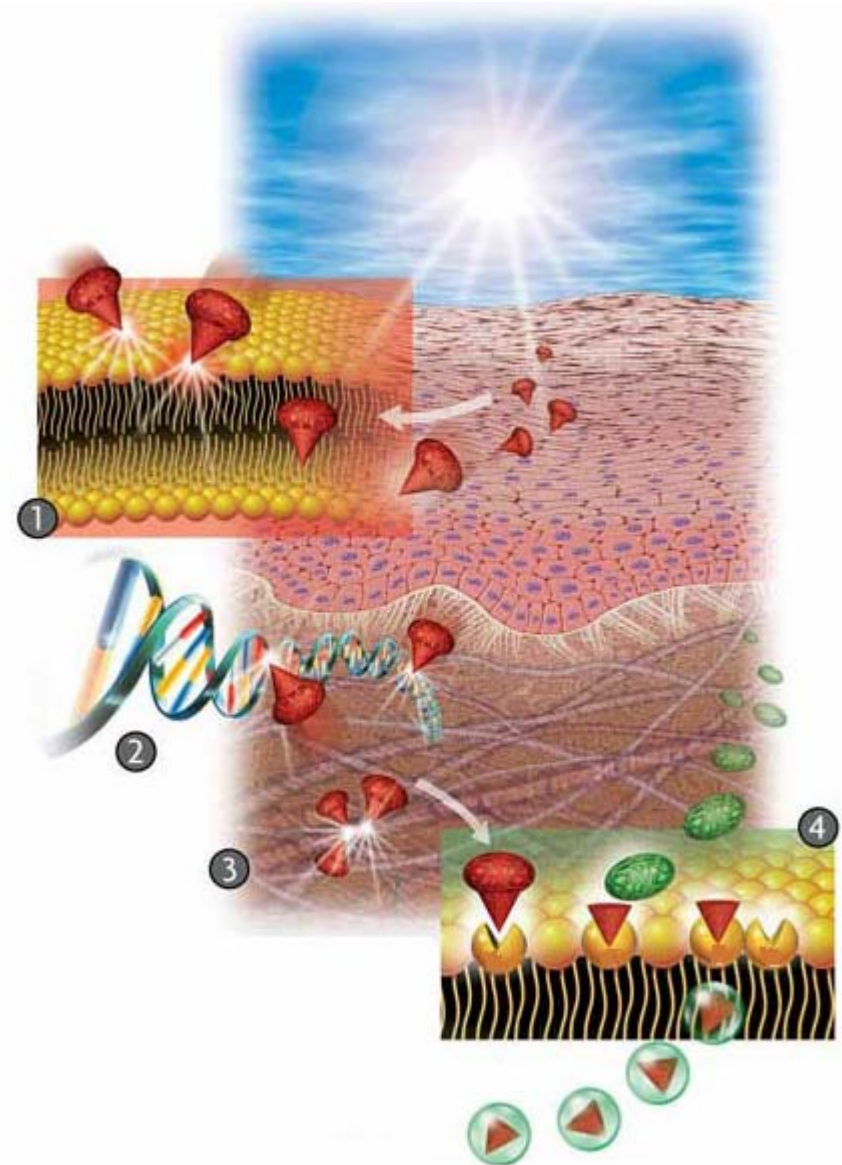


Polyhydroxy acids (PHAs)

Skin benefits

7. Fight free radicals.

Polyhydroxy acids (PHAs), **Gluconolactone**, is an antioxidant known for its free radical-fighting ability, protecting skin from harmful UV exposure. PHAs function as chelators, which trap metals that can have a pro-oxidative effect. Testing model have demonstrated **gluconolactone**'s ability to prevent the oxidation of easily oxidize test substances (hydroquinone and anthralin) with antioxidant results similar to **ascorbic acid (Vitamin C)** and **citric acid**. This property not found in glycolic acid (AHA).



Polyhydroxy acids (PHAs)

Skin benefits

8. UV protection

Recently, Gluconolactone was shown to inhibit the activation of the solar elastosis gene following ultraviolet (UV) exposure.

Gluconolactone provided up to 50% protection against UV radiation, as measured in vitro system, and did not significantly increase sunburn cells in human skin.

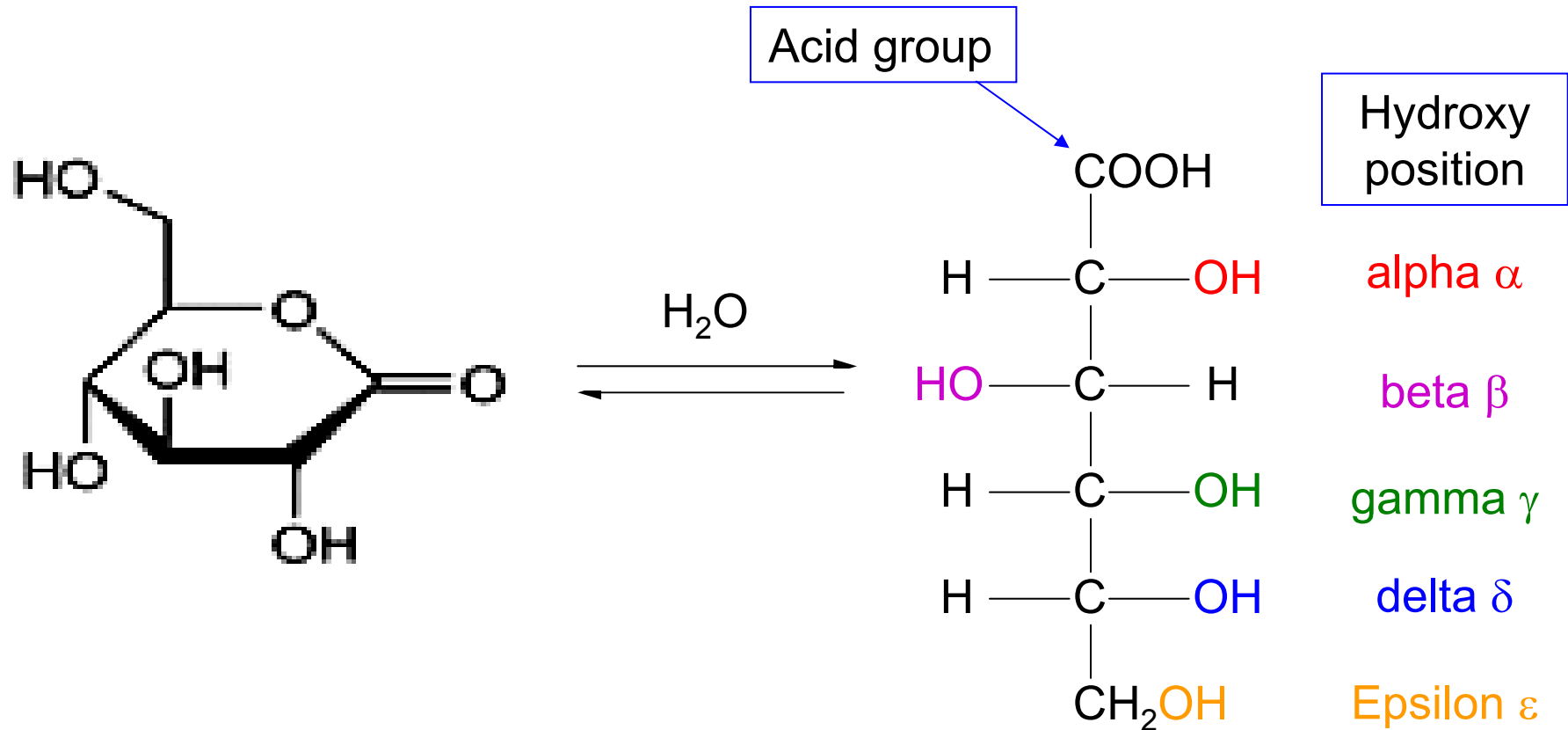
The results demonstrate the ability of the Gluconolactone to protect against UV radiation–induced elastin promoter activation. In addition, in vivo studies demonstrated that gluconolactone treatment does not result in a significant increase in sunburn cells.



Comparison of Polyhydroxy acids (PHAs) with Alpha Hydroxy Acids (AHAs)

POLYHYDROXY ACIDS (PHAs)	ALPHA HYDROXY ACIDS (AHAs)
Large molecule	Small molecule
Multiple hydroxyl groups - attract water, hydrating	Single hydroxyl groups
Gentle and less penetration	Quick penetration
Full strength benefits of AHAs	Numerous skin benefits due to effects on keratinization & Cell renewal
Minimizing the burning, stringing and erythema	Producing burning, stringing and prolonged erythema
Barrier conditioning effects	-
Antioxidant effect	No antioxidant effect
Protecting against UV radiation	-
No increase sun sensitivity	Increase sun sensitivity
For all skin type including sensitive and dry skin.	Not for sensitive skin

Gluconoactone – Polyhydroxy Acid



Lactone form:
Gluconolactone

Polyhydroxy acid form:
Gluconic acid

Gluconolactone (PHA)

It was recommended for skin functions that decline :

1. Decrease in Structural Proteins
 - Lines and wrinkles
2. Irregular Pigment Production
 - Uneven tone and discoloration
3. Decline in Healthy Cell Renewal
 - Rough texture
 - Dull, sallow complexion
 - Enlarged pores
4. Decrease in Natural Moisturizers
 - Dry skin
 - Sensitive skin

