

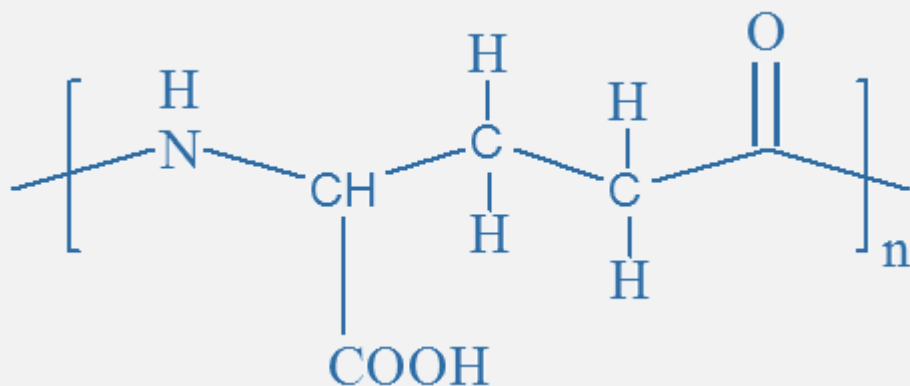
Sodium Polyglutamate

γ -Polyglutamic Acid LMW, MMW and
HMW: A Natural Amino Acid Moisturizer

SODIUM POLYGLUTAMATE – WHAT IS

Originally discovered in the marine jellyfish

(γ-PGA) Poly-γ-glutamate helps the jellyfish to store water in its fragile tissue so that it would not dehydrate in salty sea water.



Structure of γ-PGA

Poly-γ-glutamate (γ-PGA) is a kind of polypeptide in which glutamate is polymerized via γ-amide linkages



Jellyfish

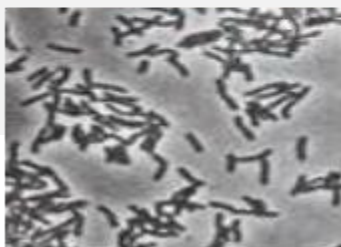
SODIUM POLYGLUTAMATE – WHAT IS

Today, γ -PGA can be gained from a beloved traditional Japanese food-natto, the fermented soybeans.

γ -Polyglutamic Acid is biosynthesized from L-glutamic acid by using the microbe known as *Bacillus subtilis*.



Natto



*Bacillus
subtilis*



Large-scale production



Sample of γ -PGA

SODIUM POLYGLUTAMATE - SPEC

- **INCI Name:** SODIUM POLYGLUTAMATE
- **CAS No.:** 28829-38-1
- **Application:** Skin Care (like toner/emulsion/serum/cream) & Hair Care
- **Usage:**
 - Regular cosmetic: about 0.5% PGA (HMW)
 - Special cosmetic: 1%
 - Anti-wrinkle & Sun care: 0.1-1% PGA (HMW)
 - Mask & whitening products: about 0.3% PGA (LMW)
- **Solubility:** Water-soluble
- **Storage:** Keep in dark and cool place
- **Shelf life:** 2 years



SODIUM POLYGLUTAMATE – SPEC

| Items | γ-Polyglutamic acid (10kDa) – LMW | γ-Polyglutamic acid (700kDa) – MMW | γ-Polyglutamic acid (2000kDa) – HMW |
|----------------------------------|--|--|--|
| Appearance | White to off white granular or powder | White to off white granular or powder | White to off white granular or powder |
| Assay (γ-PGA,%) | ≥92 | ≥92 | ≥92 |
| pH (1% solution) | 5.0~7.5 | 5.0~7.5 | 5.0~7.5 |
| Molecular weight (Da) | ≤10000 | ≥700 | ≥2000 |
| Loss on drying(%) | ≤8 | ≤8 | ≤8 |
| Heavy metals (Pb) | ≤20ppm | ≤10ppm | ≤20ppm |
| Total plate count (cfu/g) | ≤100 | ≤10 | ≤100 |

SODIUM POLYGLUTAMATE – EFFICACY

Long-lasting Moisturizing Properties-Vivo Test

The side chain of γ -PGA can enhance the moisturizing capability of skin without breaking moisture balance of skin. When integrated into skin-care products, γ -PGA can strengthen the moisturizing ability of skin and prevent skin from drying.

Test product: γ -Polyglutamic acid (10KDA, 700KDA, 2000KDA) \times Hyaluronic Acid 700KDA \times Glycerin

Subjects: 5 females, 5 males

Age range: 25-55 years old

Test Site: Inside of the arm

Test Methods: Configure the sample with 0.05% solution, and evenly smears the solution on the marked area.

Collect the data at 0.5h, 1h, 4h and 6h.

Test Period: 0h, 0.5h, 1h, 4h, 6 h

Test Parameters: Skin hydration; Trans epidermal water loss; Skin elasticity

Test condition: Temperature: 20°C- 25°C; Humidity: 40% - 60%;

Test instrument: Moisture Meter SC, Elasti Meter, Vapo Meter SWL5

Design of Study: Aim to evaluate the effect of samples on skin moisture retention and elasticity



SODIUM POLYGLUTAMATE – EFFICACY

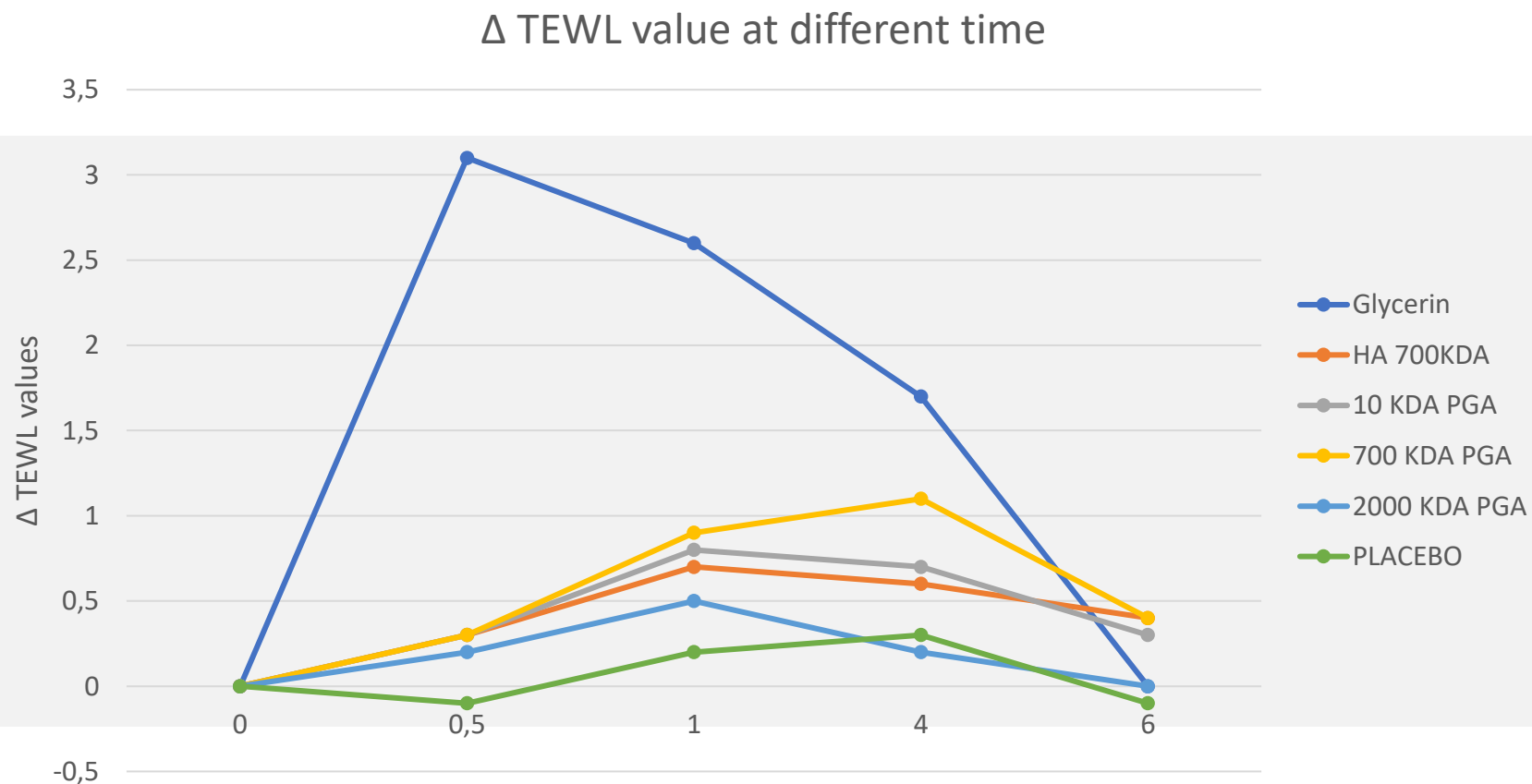


Fig.1 shows that the higher the Δ TEWL value(Trans epidermal water loss), the better the moisturizing effect of the sample.

SODIUM POLYGLUTAMATE – EFFICACY

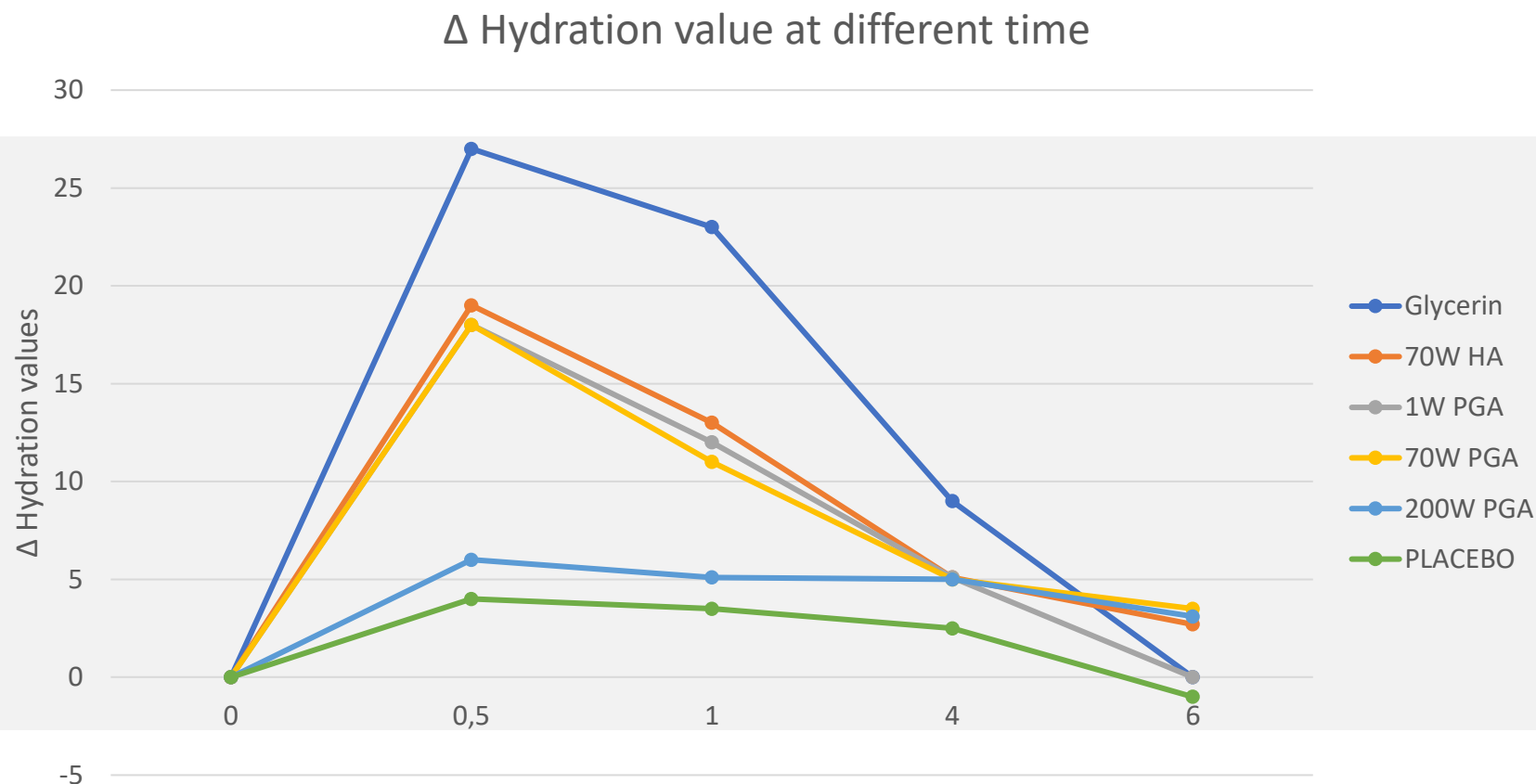


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SODIUM POLYGLUTAMATE – EFFICACY

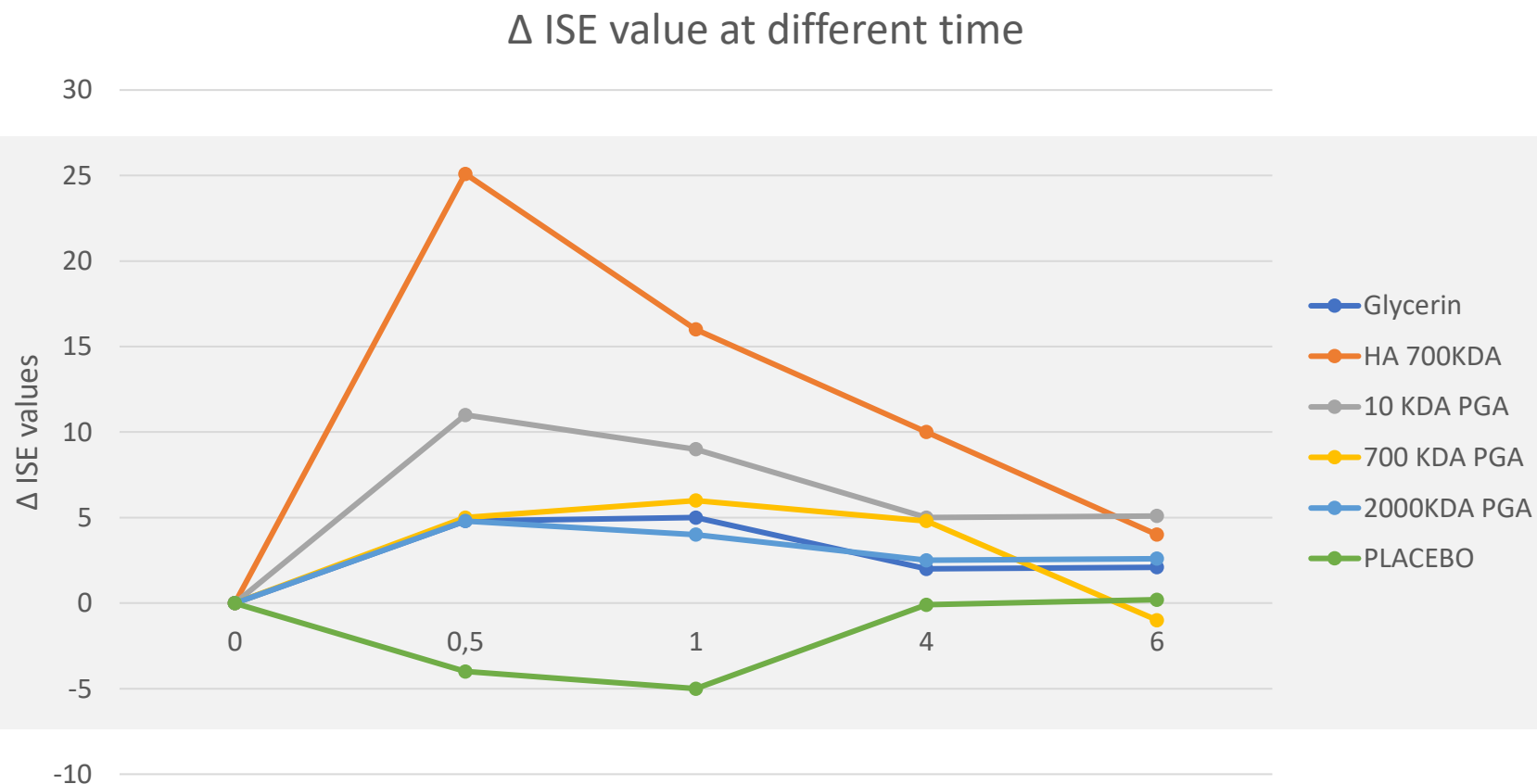


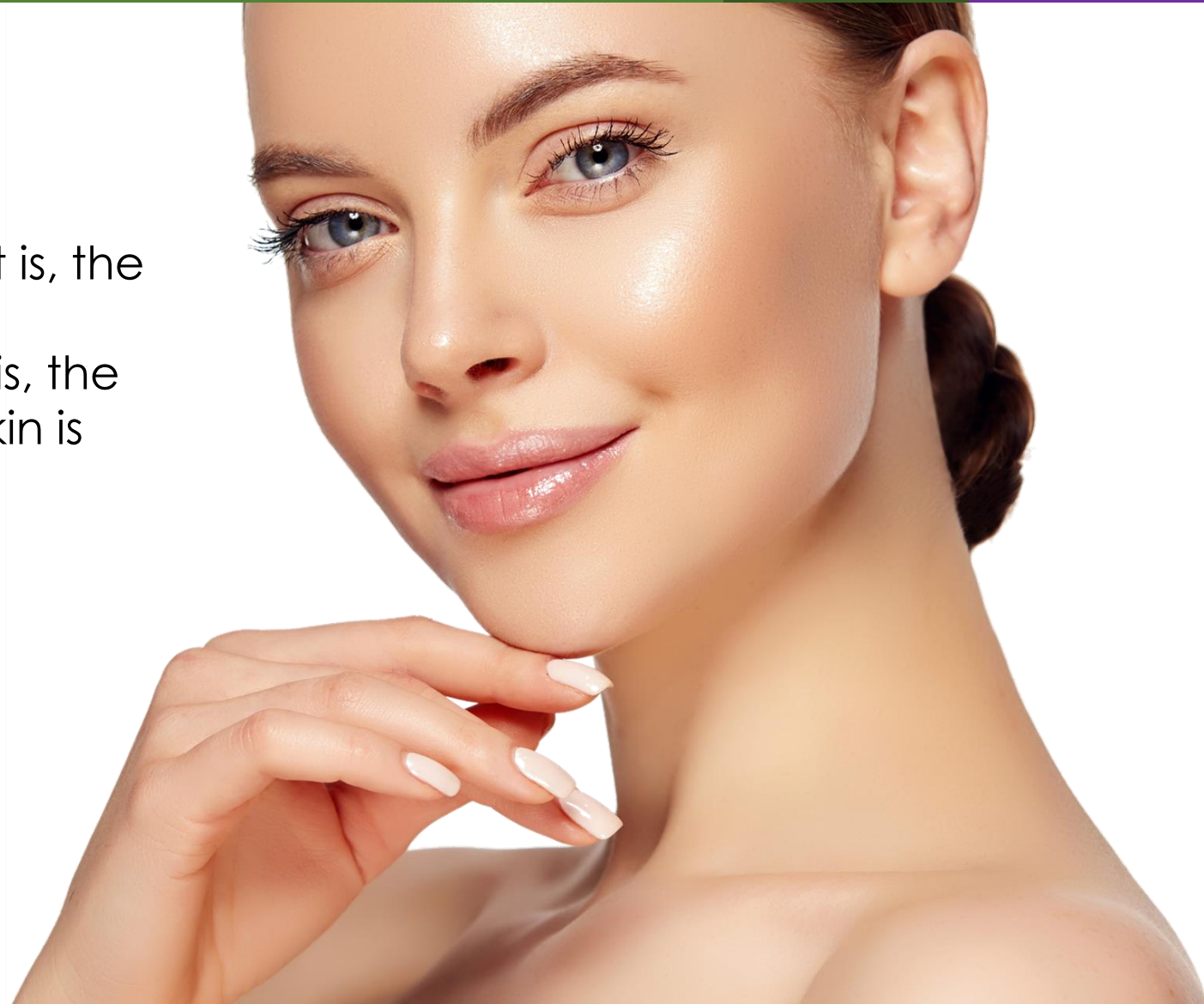
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SODIUM POLYGLUTAMATE – EFFICACY

Conclusion

Through the comparison of experiments:

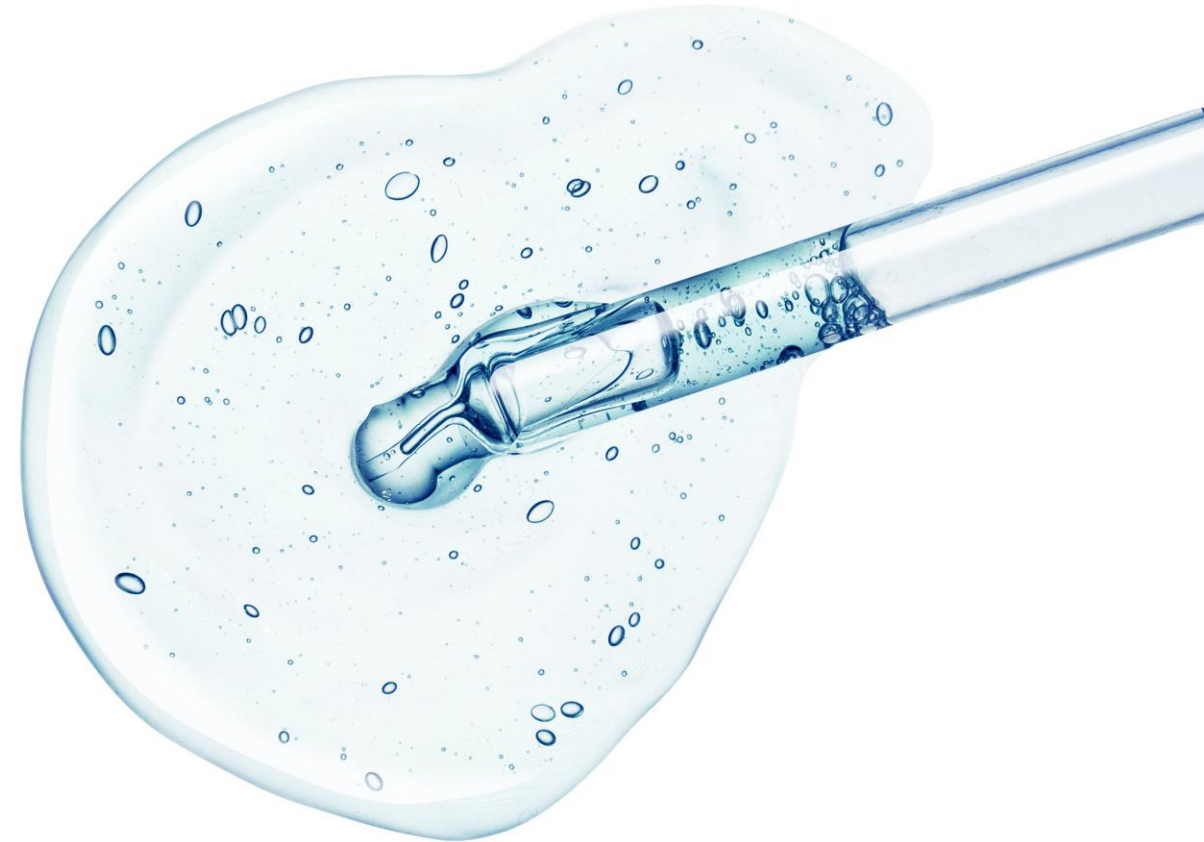
- The smaller the PGA molecular weight is, the better the skin elasticity is.
- The larger the PGA molecular weight is, the better the moisturizing effect on the skin is



SODIUM POLYGLUTAMATE – EFFICACY

Increasing and Maintaining HA of Skin

- Hyaluronic Acid (HA), as a basic component of skin, can lock the moisture of the skin and maintain its elasticity, but HA can be hydrolyzed very quickly by hyaluronidase (HAase) of skin as well.
- It is reported that γ -PGA can effectively inhibit the HAase activity and increase and maintain HA in skin, so γ -PGA can increase and maintain the content of HA in skin. Especially, the higher concentration of γ -PGA (LM) can remarkably increase the HA content. It shows that γ -PGA (LM) and HA can improve skin moisture, elasticity and skin appearance in a synergistic way.



SODIUM POLYGLUTAMATE – EFFICACY

As a hygroscopic material produced by skin, Natural Moisturizing Factor (NMF) provides moisture for skin in cuticle and retain skin moisture. The NMF includes amino acids which are hydrolyzed from skin matrix protein (e.g. Filament aggregating protein), pyrrolidone carboxylic acid (PCA), lactic acid and urocanic acid (UCA).

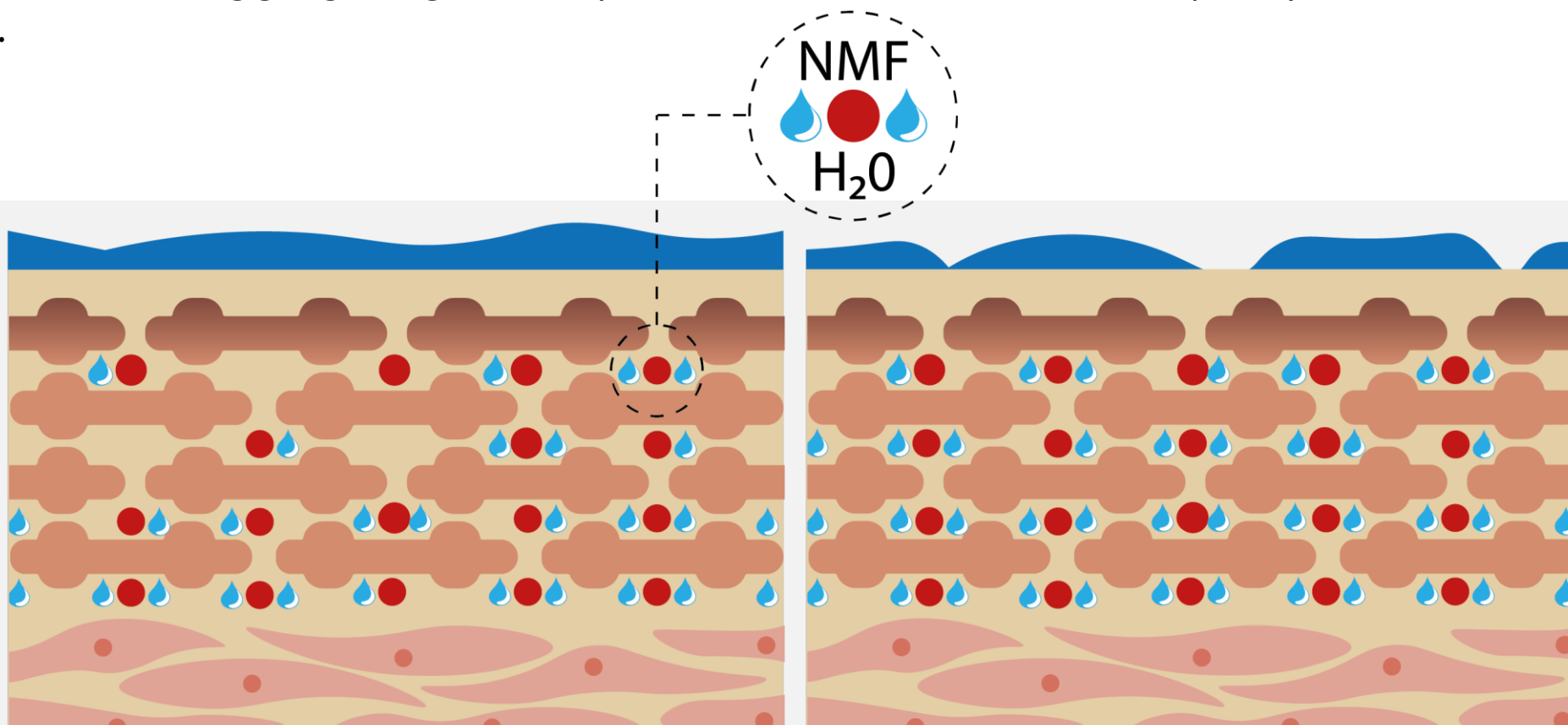


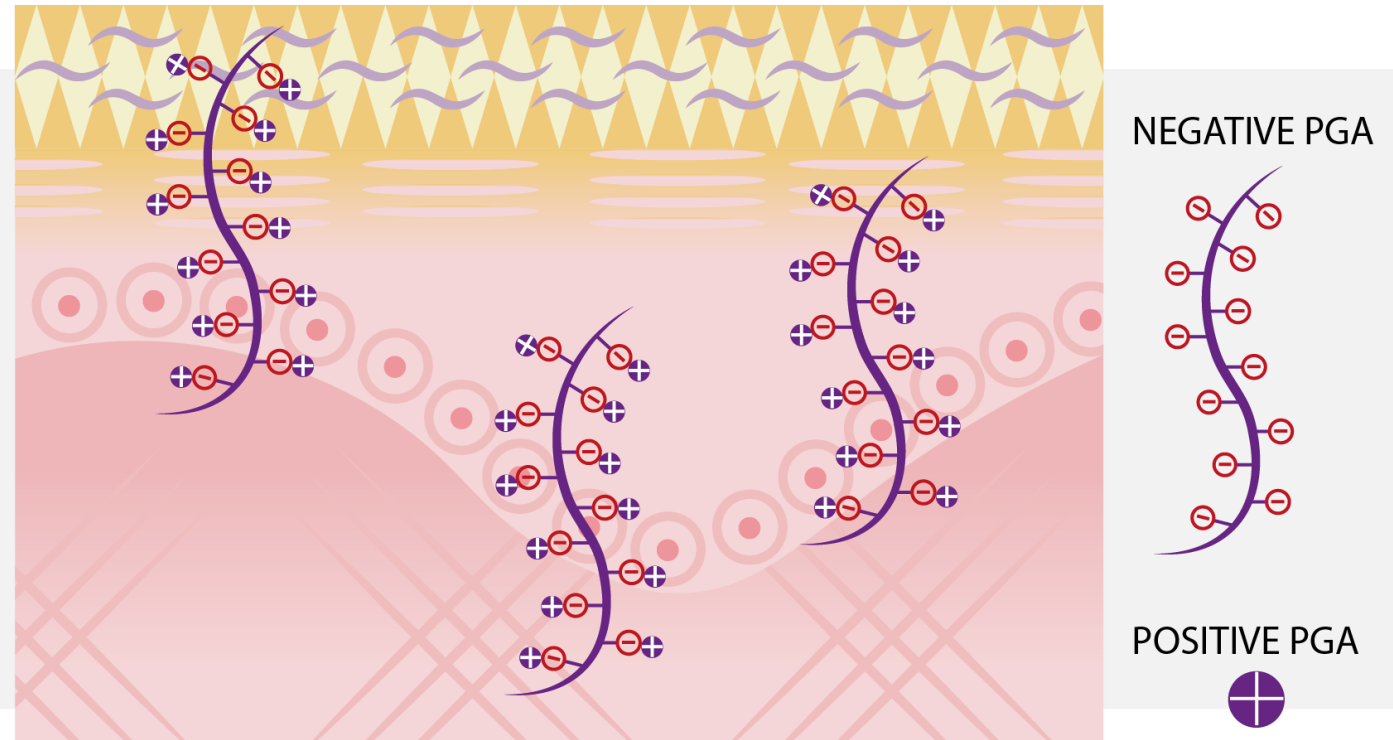
Fig. 4 illustrates how γ -PGA (LM) increases the production of NMF which further enhances the internal moisturizing ability of skin.

SODIUM POLYGLUTAMATE – EFFICACY

Improving Nutrient Supply

Thanks to its controlled release property, γ -PGA can control the release of nutrients and moisture in a continuous manner.




Each γ -PGA monomer has ionized groups like α -COOR, -CO and -NH, which can absorb electropositive nutrients. Hence a good embedding delivery system is created and active ingredients in cosmetics can possibly maximize their efficacy.



SODIUM POLYGLUTAMATE – EFFICACY

Comparison of the effectiveness of PGA, HA and Collagen in cosmetics

As a multifunctional skin-care ingredient, γ -PGA can moisturize and whiten skin and improve skin health. It builds gentle and tender skin and restore skin cells, facilitates exfoliation of old keratin, clears stagnant melanin and gives birth to white and translucent skin.

| | SODIUM POLYGLUTAMATE | Hyaluronic Acid | Collagen |
|--------------------------|--|--|--|
| Source | Bio-fermentation(G+) | Bio-fermentation (G-) | Animal |
| Acessory | No endotoxin | With endotoxin | Animal allergen |
| pH and thermo-satability | Most stable | Stable | Fair |
| Touching feeling | Smooth, soft not oily | Slightly stick | Slightly stick |
| TEWL |  |  |  |
| Elasticity | +++ | ++ | + |
| Inducing the skin's NMF | +++ | - | - |
| Long-lagsting Moisturize | +++ | ++ | + |
| Conclusion | Best moisturizer and synergistic effects | Good | Common |

SODIUM POLYGLUTAMATE – EFFICACY

y-Polyglutamic acid Features:

- Extraordinary skin compatibility, safe & natural
- High hydration power
- Increase skin elasticity & moisturizing capacity
- Increase the amount of both pyrrolidone carboxylic acid and lactic acid as the main components of Natural Moisture Factor (NMF)
- Effectively increases and maintains HA% by inhibiting the HAase activity
- Bring out the moisture-holding ability from the inside of the skin
- A good embedding delivery system & maximize efficacy
- Whiten skin and improve skin health
- Highly strict quality control provides higher quality
- Wide Application



SODIUM POLYGLUTAMATE

γ-Polyglutamic acid has excellent compatibility in non-ionic, anionic and amphoteric ingredients. It is a perfect ingredient for cream, essence, astringent, face mask, eye gel, sunscream, shampoo, body wash, lotion, hair care, baby care formula and so on.

Ingredients: water, Butylene Glycol, Glycerin, Glycol, Hydrogenated lecithin, Alcohol, Hydrogenated starch hydrolysate, Ginkgo Biloba Leaf Extract, Lagerstroemia speciosa, Polysorbate 20, carbomer, Cholesterol, Hydroxypropylmethylcellulose, oyster, palmitoyl Pentapeptide-4, panax Ginseng Root Extract, **Polyglutamic Acid**, Sodium Hyaluronate, Tocopheryl nicotinate, Sodium Hydroxide, Methylparaben, Fragrance



SODIUM POLYGLUTAMATE

moisturize



CLINIQUE
Even Better Brightening
Moisture Cream Plus



It'S SKIN

Its skin
Power 10 Formula
Q10 Effector

relieve



Dr.Jart+
Dermask Water Jet
Soothing Hydra Solution

su:m 37°



su:m 37°
Time energy Skin
Resetting Refining Toner

Sodium Polyglutamate

γ -Polyglutamic Acid LMW, MMW and
HMW: A Natural Amino Acid Moisturizer

Thank you!