From nutrition to cosmetics

BREAST MILK is considered to be some unique food, which is crucial to the correct growing of a person.

The wide knowledge about the nutrients in breast milk and its effect on the metabolic patterns of human body has driven our original intuition that these nutrients might show a beneficial action when applied on skin.

For some components of breast milk, such as its oligosaccharides, the following properties have been acknowledged:

- IMMUNOMODULATION
- PREBIOTIC ACTION
- REDUCTION OF BACTERIAL ADHESION
- NUTRITION AND SUPPORT TO THE DEVELOPMENT OF THE BRAIN SYSTEM
- MODULATION OF THE EPITHELIAL INTESTINAL SYSTEM
- MODULATION OF THE ACTIVITY AND ADHESION OF LEUKOCYTES

Composition of human milk

Human milk's composition, with description in particular of the main “Human-Milk-Oligosaccharides” (HMO) to be found in highest concentration

Combination of monosaccharides and Trisaccharides

The in-silico dynamic analysis proved that mixtures of mono and trisaccharides can guarantee a correct balance between the amount of water combining with sugar and its bioavailability.

The presence of trisaccharides, even in small quantities, allows a more stable bond with water, with a resulting improvement of the cellular OSMOPROTECTIVE activity.

The optimal ratio between mono and trisaccharide has been proved to be 3:1.

It was demonstrated that this ratio allows an adequate bond with water, so that less static clusters are formed. These dynamic clusters favour the better availability of water in tissues for a correct cellular activity.

In vitro test results

Sugarderm® H2O
For young skins: effective hydration with anti-ageing effect for the skin.

Sugarderm® AGE
For mature skins: its efficacy is on a long-term basis and on all of the 4 markers, for an improved structuring of fibres and much more.
**In Vitro Test: Full-thickness Skin Model**

*Sugarderm®* was tested in a full-thickness skin model with the purpose of evaluating its stimulating power in the gene expression of the 4 typical AGEING MARKERS.

**Collagen IV (COL IV)**

Fibrous glycoprotein, its function is exclusively in the extracellular matrix, making it more resistant to straining forces. In the presence of wrinkles a lack in collagen IV is observed.

**Decorin (DCN)**

Proteoglycan playing a crucial role in the formation and stabilization of collagen. It maintains the normal architecture of the dermal network.

**Elastin (ELN)**

Very important constituting protein of the skin, which is given the typical elastic response when the tissue undergoes mechanical straining.

**Fibrillin 1 (FBN1)**

Glycoprotein with high molecular weight constituting microfibrils of 10nm in diameter that are found in the extracellular matrix. It plays a very important role in the stabilization of the elastic fibres' structure.

The better short-term efficacy of *Sugarderm® H2O* makes it particularly suitable to the products for young skins in need of immediate osmoprotective effect.

*Sugarderm® AGÈ* proved its higher efficiency in the increased production of long-term markers, sustaining an in vivo anti-age activity in mature or toneless skins.

**Visual evidence**

Through immunohistochemistry the increase of Elastin is showed after treatment of the tissue with *Sugarderm® AGÈ*.

The tissue histology was marked through specific fluorescent antibodies for collagen and elastin, so that the obtained results are visually displayed in green colour.
**In vivo test: Sugarderm® AGE**

The aim of the study is to evaluate the anti-age efficacy of Sugarderm® AGE. The test was carried out on 20 female volunteers (average age 57.1 years), within a 6 week application’s period of a cream containing a 0.5% of Sugarderm® AGE and a placebo cream.

**Skin Elasticity**

Skin Elasticity was tested through the Cutometer method MPA 580 (Courage & Kazaka) in a single, blind and randomized placebo-controlled trial. The following parameters were considered:

- **R2** = UA/UF gross elasticity of the skin including viscous deformation. It is the ratio of “ability of recovery” to “final distension”.

- **R6** = UV/UE ratio of visco-elastic to elastic distension. It indicates the relative contributions of viscous and elastic deformation to total deformation.

A statistically significant increase in the mean basal values of gross elasticity (R2:+7.4%) and a decrease (improvement) in the mean basal values of visco-elastic ratio (R6:-10.9%) were detected after 6 weeks of application of the Cream at 0.5% Sugarderm® AGE.

**In vivo test results**

Sugarderm® AGE showed its effective anti-age action through an in vivo improvement for the face skin on several parameters such as thickness, viscoelasticity, and extensibility, so that the skin is smoother and more tonic as a direct result of the stimulation of the elastin and collagen’s network.
**Skin Roughness**

Skin replicas are analyzed by a designed image processing software (Quantilines, Monaderm), which allows a global data analysis of some relief parameters.

In the pictures alongside an example of 3D representations of cutaneous reproduction of the skin treated with Sugarderm® AGE obtained through the software.

The images show a decrease of the peaks of the skin roughness after a 6 week treatment with cream at 0.5% of Sugarderm® AGE.

In addition, the software allows the measurement of the Rz parameter. 

Rz: average maximum roughness, that is the average difference between the highest and the lowest point in five sections of the profile.

An important decrease (improvement) in the mean basal values of average maximum roughness (Rz: -7.1%) was detected in the area treated with Sugarderm® AGE Cream after in vivo test.

**Skin Density**

The Dermascan C® Ver. 3 device (Cortex Technology, Denmark) is a high-resolution scanner emitting high-frequency ultrasound (20MHz). This frequency allows the observation of the tissue up to a depth of 15 mm with 60 μm axial and 200 μm lateral resolution.

Younger skin is highly denser than more mature skin. The efficacy of a re-densifying treatment is supported by a significant increase in skin density, reflecting an improvement in the dermal structures.

A heterogeneous body (i.e. dermal fibre) is echogenic and it is represented through white colour while a homogeneous body does not generate any echo sounds (non-echogenic) and it appears black.

A low echogenic value can be correlated to an alteration and/or disorganisation of the collagen fibres together with an excess of fluids in the derma.

On the other hand, an increase of the skin density values is correlated to an increase or reorganisation of the dermal structures: collagen fibres, cells and extracellular matrix.

These images show how, after 6 weeks of treatment with cream at 0.5% of Sugarderm® AGE, an increase of the echogenic structures (white colour) and therefore of the skin density was observed (+6.7%).

**Conclusions**

Sugarderm® shows Osmoprotective Effectiveness and stimulates 4 typical Aging Markers (Collagen IV, Decorin, Elastin and Fibrillin 1).

In vivo test results clearly determine that Sugarderm® AGE improves significantly both Elasticity, Roughness and Skin Density, this suggests its application for antiaging and hydrating products.
**Sugarderm® AGE**

**Origin and description**
It is a mixture of highly pure oligosaccharides and monosaccharides, obtained through fermentative method.

**Purity**
> 95%

**Regulatory**
INCI: Arabinose and Fucose and Fucosyllactose - CAS# 10323-20-3, 2438-80-4, 41263-94-9

**Preservative**
None

**Aspect**
White to slightly straw yellow powder with its own slight particular scent

**Technical information**
- Solubility: water-soluble
- Method of incorporation: add at the end of formulation at ambient temperature while shaking gently
- Storage: keep in its original package at ambient temperature. Avoid exposure to humidity, light and high temperatures

**Dosage**
0,5%-1%

**Application & Claim**
Face care, Anti-aging concept, Anti-sagging effect. Skin remodelling, Skin & Tonic Technology, Osmoprotector, “Cosmeto-food” concept

**Shelf life**
24 months

**Patent**
"Mixture of active ingredients for compositions for cosmetic use”; Italy (PD2015A000061); Kialab s.r.l.

**Producer**
Kialab s.r.l. - Via Lepetit, 34 - 21040 Gerenzano (VA) - ITALY

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**Sugarderm® H2O**

**Origin and description**
It is a mixture of highly pure monosaccharides, obtained through fermentative method.

**Purity**
> 95%

**Regulatory**
INCI: Arabinose and Fucose - CAS# 10323-20-3, 2438-80-4

**Preservative**
None

**Aspect**
White to slightly straw yellow powder with its own slight particular scent

**Technical information**
- Solubility: water-soluble
- Method of incorporation: add at the end of formulation at ambient temperature while shaking gently
- Storage: keep in its original package at ambient temperature. Avoid exposure to humidity, light and high temperatures

**Dosage**
0,1% - 1%

**Application & Claim**
Osmoprotector, Moisturizing effect, Hydro-repairing, Derma nutrition

**Shelf life**
24 months

**Patent**
"Mixture of active ingredients for compositions for cosmetic use”; Italy (PD2015A000061); Kialab s.r.l.

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Sugarderm® is produced and distributed by

Kialab Srl
C/o Insubrias Biopark
Via Lepetit, 34
21040 Gerenzano (VA) - Italy

Tel. +39.02.96474339
Fax +39.02.96474338
info@kialab.it
www.kialab.it