Skinmimics®

The obvious solution for mature Skin
Providing the skin protection, prevention and regeneration

- Proven in-vivo benefits on volunteers older than 50 years-old
- Revitalizes dry mature skin by optimizing the total epidermal water management system
- Repairs skin's own water protection barrier
- Activates skin's own water natural moisturizing system (sphingolipids, filaggrin)
- Increases the glycerol and water transport mechanism (aquaporin-3)
- Contains the recently identified cell-signalling Sphingokine® molecules
- Ready-to-use multi-lamellar concentrate that can easily be incorporated into cosmetic formulations

Personal Care

INCI Name (CTFA name)

Ceteareth-25; Glycerin; Cetyl Alcohol; Behenic Acid; Cholesterol; Ceramide NP; Ceramide NS; Ceramide EOS ; Ceramide EOP; Ceramide AP; Caprooyl Phytosphingosine; Caprooyl Sphingosine

Chemical and physical properties (not part of specifications)

Form	Liquid
Active matter	Approx. 2,2 %

Mature skin is characterized by changes in all of its parts. The skin's normal functions slow down and because it does not work as fast to shed dead cells, the skin looses, for instance, radiance. However, dry, thin and sagging skin is amongst the most common complaints of women who have entered their 50s.

Recognizing the specific needs of mature skin, Degussa Goldschmidt Personal Care designed Skinmimics® to provide formulators with an innovative and high tech combination of active ingredients to fulfill the expectations of today's and tomorrow's consumers, the joy of feeling young and healthy.

Properties

Skinmimics® is designed to provide mature skin with three important aspects of skin treatment:

- Protection by correction and repair of membrane defects of the stratum corneum lipid barrier,
- Prevention by supplementation of skin's own precursor substances to finally activate the skin lipid synthesis,
- Regeneration by stimulation of epidermal renewal and repair (filaggrin, aquaporin 3).

Skinmimics® is a unique multi-lamellar concentrate based on Degussa's advanced Ceramide technology and the newly identified Sphingokines®. Skinmimics® is a skin-identical equimolar blend of new and unique long chain Ceramides (including Ceramide EOP, EOS, NS, NP and AP) with a broad distribution of fatty acid side-chains, new vegetal based cholesterol and behenic acid. These three types if lipids, essential for protection benefits, are combined with the unique Sphingokines® , signalling molecules playing a key role in the prevention and regeneration attributes of Skinmimics®.

Efficacy studies

- ***Protection: In-vitro evaluation***

Biophysical characterizations were performed at ESFR (Synchrotron facility, Grenoble, F).

Small and wide angle X-ray diffraction was used to design the lipid composition of Skinmimics® and to evaluate its organization in comparison to the lipid arrangement naturally present in stratum corneum (SC).

Several studies provided insight into the complex lipid architecture underlying the skin's barrier function and it could be proven that a unique mixture of stratum corneum lipids resemble the lamellar and lateral stratum corneum lipid organization.
Both Skinmimics® and the stratum corneum lipids resembled in alternating broad/ narrow/ broad sequences of bilayers ("Sandwich model" of SC lipid organization). Fig. 1 represents the corresponding small angle diffraction profiles of both human SC and Skinmimics® lipids.

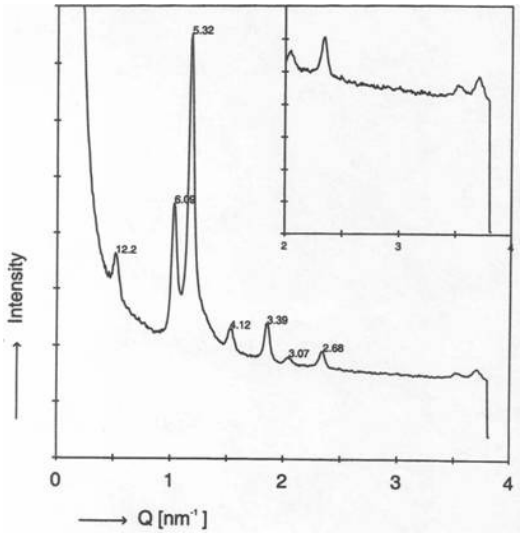

Fig. 1a: Small angle X-ray diffraction profile: Human Stratum Corneum lipids

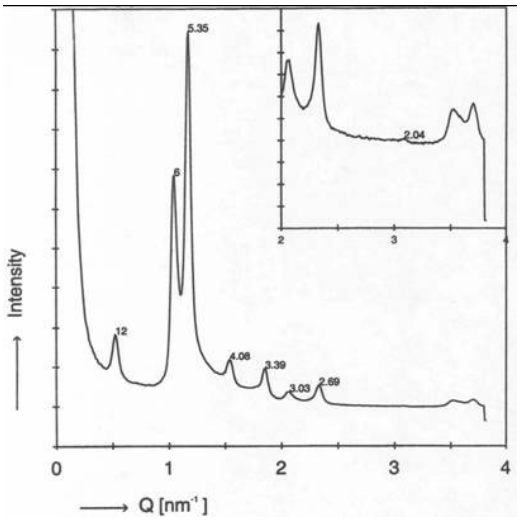

Fig. 1b: Small angle X-ray diffraction profile: Skinmimics® components

It was demonstrated that Skinmimics® delivers all compounds necessary to mimic the lamellar spacing of the SC lipid layers which helps to be properly integrated into the stratum corneum.

- ***Prevention and Regeneration: In-vitro evaluation***

The studies were performed at the University of Regensburg, D.

The effect of Sphingokines® molecules on gene expression was analyzed using DNA-chip technology and human primary keratinocytes.

Primary keratinocyte cell cultures were incubated with and without Sphingokines®, cultivated and finally the RNA of cell cultures was prepared. The lipid content of human primary keratinocytes was assessed by electrospray ionization tandem mass spectrometry (ESI-MS/MS).

It was observed that Sphingokine® NP (Caprooyl-Phytosphingosine) and Sphingokine® NS (Caprooyl-Sphingosine) trigger the expression of genes for late-stage epidermal differentiation (for instance loricrin, involucrin) and genes involved in the formation of the "lamellar bodies". In parallel, both Sphingokines® were shown to enhance the synthesis of key sphingolipids (such as free sphingoid bases, glucosylceramides, medium-chain and especially long-chain ceramides) in the keratinocytes. The Sphingokines® cell-signalling concept was born.

- ***Protection, Prevention, Regeneration: In-vivo*** **long-term evaluation study**

The studies were performed at the IUF, University of Düsseldorf, D (3).

Six female and four male volunteers (age: 35-65 years) were recruited to apply one time daily over a period of 4 weeks a gel thickened with Xanthan Gum and Carbomer containing 5 % Skinmimics® on one side of their backside whereas the other side was kept untreated.

The influence of Skinmimics® at the genetic level was observed by real time rt-PCR (Reverse transcriptase polymerase chain reaction) on tissue samples obtained from the backside of the volunteers. Several markers were checked: markers involved in the formation of the stratum corneum lipid barrier (e.g. Serinepalmitoyl transferase-1 and -2, responsible for ceramides *de novo* synthesis, ceramide glucosyltransferase, involved in the formation of barrier lipid precursors), differentiation markers (e.g. involucrin, transglutaminase-1, filaggrin and loricrin) and finally aquaporin-3 (transporter of water and glycerol). Results were analysed regarding the age dependency effect (above and below 50 years). These results are shown in Figures 2 pointing out that all markers observed were significantly upregulated in comparison to the untreated skin areas (= Control, 1-fold gene induction). In addition, a higher response for volunteers aged above 50 years was obtained for all markers confirming the added-value of Skinmimics® for mature skin.

The efficacy of Skinmimics® was finally evaluated with corneometry, measurement of transepidermal water loss (TEWL) and cutometry. The different measurements were performed after climatization of the volunteers before the treatment period and after 1, 2, 3 and finally 4 weeks of application. Six female and four male volunteers (age: 35-65 years) were recruited to apply one time daily over a period of 4 weeks a gel thickened with Xanthan Gum and Carbomer containing 5 % Skinmimics® on one of their volar forearms. The other forearm was kept untreated to compare the efficacy of Skinmimics® with non-treated skin.

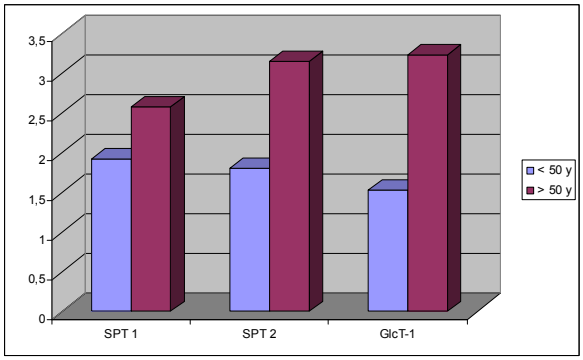

Fig. 2a: Gene induction of markers involved in lipid barrier formation

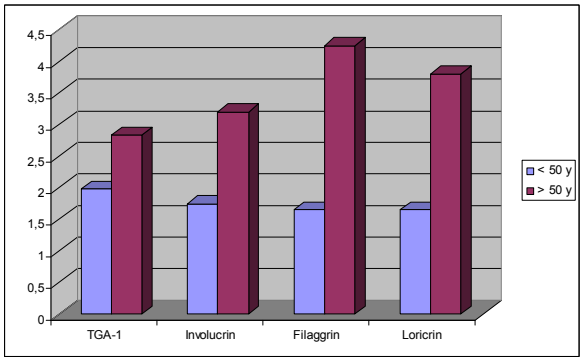

Fig. 2b: Gene induction of epidermal differentiation markers

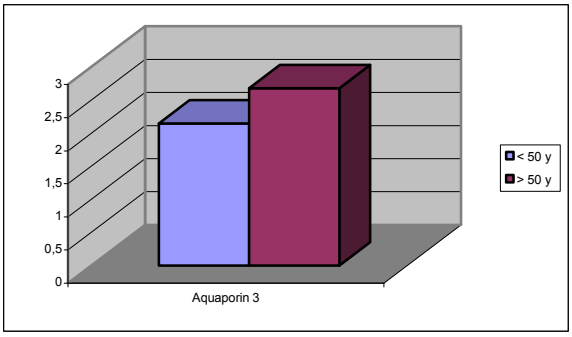

Fig. 2c: Gene induction of Aquaporin-3

Corneometry and skin barrier

Skin hydration and TEWL were assessed with a Corneometer and a Tewameter, respectively, both from Courage & Khazaka (Cologne, D).
It was shown that the hydration of the skin treated with Skinmimics® could be improved significantly ($p < 0.01$) and a significant TEWL reduction related to the untreated skin areas was determined ($p < 0.05$). Data not shown.

Cutometry

The skin elasticity has been assessed with a Cutometer MPA 580 (Courage & Khazaka, Cologne, D) by determining the overall skin elasticity (parameter R2). A high R2 value stands for high elasticity and a value of 100 % would indicate that the skin completely returns to its original state.
Fig. 3 indicates the highly significant increase of the R2 parameter during the application period of Skinmimics® up to more than 90 % ($p < 0.01$).

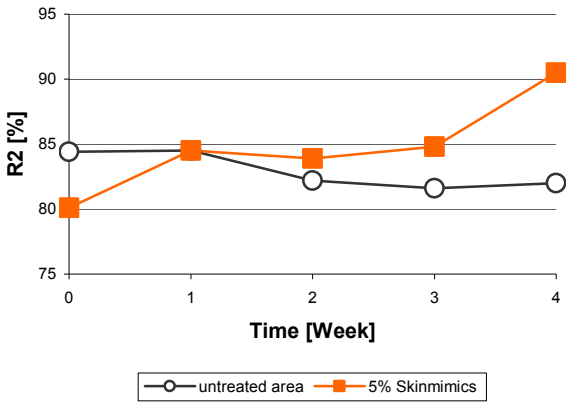

Figure 3: Skin elasticity (R2)

From these in-vivo evaluations, it can be confirmed that Skinmimics® will help mature skin to be revitalized by providing protection, prevention and regeneration.

Formulating with Skinmimics®

The incorporation of Skinmimics® in cosmetic preparations is straightforward.
In general, Skinmimics® is directly added to the water phase of formulations. Being a liquid product, Skinmimics® can also be used for cold processed formulations.
As Skinmimics® has a nonionic character it is in general compatible with all relevant types of anionic and cationic raw materials in formulations.
When adding Skinmimics® to an exisiting O/W formulation containing liquid crystalline structures, the emulsion viscosity can drop as rearrangement of these liquid crystalline structures is possible. In this case the emulsion viscosity can be readjusted by increasing the amount of consistency enhancers (e.g. TEGO® Alkanol 16 (Stearyl Alcohol)) or by adding polymeric stabilizers like TEGO® Carbomers and/or Xanthan Gum.

Although Skinmimics® has been designed to be used in O/W emulsions, it can also be used in W/O emulsions.

When using Skinmimics® in W/O emulsions it has to be checked whether its addition to an existing W/O formula leads to phase inversion (such a phase inversion is in principle possible as Skinmimics® is based on the hydrophilic O/W emulsifier Ceterareth-25). A phase inversion can normally be prevented by using a sufficient amount of suitable W/O emulsifiers like ABIL® EM 90 (Cetyl PEG/PPG-10/1 Dimethicone), ISOLAN® GPS (Polyglyceryl-4 Diisostearate/Polyhydroxystearate/Sebacate) or ISOLAN® PDI (Diisostearoyl Polyglyceryl-3 Dimer Dilinoleate).

Applications

Skinmimics® has been designed for mature skin and is suitable for both O/W and W/O creams and lotions for:

- Skin moisturization
- Anti-aging and anti-wrinkle products
- Skin protection and skin repair

Recommended usage concentration

2 - 5 %

Packaging

1kg and 5 kg package

-Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport and for dangerous substances
- protective measures for storage and handling
- measures in accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

Guide Line Formulations

O/W Cream for Mature Skin WR 2/05-7c	
Phase A	
TEGO® Care 450 (Polyglyceryl-3 Methylglucose Distearate)	3.00 %
TEGO® Alkanol 18 (Stearyl Alcohol)	1.00 %
TEGIN® M Pellets (Glyceryl Stearate)	0.50 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	12.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	4.00 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	3.00 %
Tocopheryl Acetate	0.50 %
Phase B	
Glycerin	3.00 %
Skinmimics®	5.00 %
Water	66.60 %
Phase C	
TEGO® Carbomer 134 (Carbomer)	0.20 %
TEGOSOFT® P (Isopropyl Palmitate)	0.80 %
Phase D	
Sodium Hydroxide (10 % in water)	0.40 %
Phase Z	
Preservative, Parfum	q.s.

Preparation:

1. Heat phase A and B separately to approx. 80°C.
2. Add phase A to phase B with stirring.[1)]
3. Homogenise.
4. Cool with gentle stirring to approx. 60°C and add phase C.
5. Homogenise for a short time.
6. Cool with gentle stirring and add phase D below 40°C.

[1)] **Important:** If phase A has to be charged into the vessel first, phase B must be added **without** stirring.

O/W Lotion with Skinmimics® WR 2/05-25	
Phase A	
AXOL® C 62 Powder (Glyceryl Stearate Citrate)	1.50 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	6.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	5.00 %
TEGOSOFT® P (Isopropyl Palmitate)	2.50 %
Phase B	
Glycerin	3.00 %
Panthenol	0.50 %
Skinmimics®	5.00 %
Water	75.10 %
Phase C	
TEGO® Carbomer 141 (Carbomer)	0.20 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	0.80 %
Phase D	
Sodium Hydroxide (10% in water)	0.40 %
Phase Z	
Preservative, Parfum	q.s.

Preparation:

1. Heat phase A and B separately to approx. 80°C.
2. Add phase A to phase B with stirring.[1)]
3. Homogenise.
4. Cool with gentle stirring to approx. 60°C and add phase C.
5. Homogenise for a short time.
6. Cool with gentle stirring and add phase D below 40°C.

[1)] **Important:** If phase A has to be charged into the vessel first, phase B must be added **without** stirring.

Low Viscosity O/W Lotion with Skinmimics® WR 11/05-3a	
Phase A	
ABIL® Care 85 (Bis-PEG/PPG-16/16 PEG/PPG-16/16 Dimethicone; Caprylic/Capric Triglyceride)	2.00 %
TEGOSOFT® G 20 (Octyldodecanol)	4.00 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	5.50 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	4.00 %
TEGOSOFT® OS (Ethylhexyl Stearate)	4.00 %
Tocopheryl Acetate	0.50 %
Phase B	
Glycerin	3.00 %
Allantoin	0.10 %
Panthenol	0.50 %
TEGO® Cosmo C 100 (Creatine)	0.30 %
Skinmimics®	5.00 %
TEGO® SMO 80 V (Polysorbate 80)	0.20 %
Water	68.20 %
Phase C	
TEGO® Carbomer 141 (Carbomer)	0.30 %
Keltrol F (Xanthan Gum, Lubrizol)	0.10 %
TEGOSOFT® OS (Ethylhexyl Stearate)	1.60 %
Phase D	
Sodium Hydroxide (10 % in water)	0.70 %
Phase Z	
Preservative, Parfum	q.s.

Preparation:

1. Add phase A to phase B with stirring.[1)]
2. Homogenise.
3. Add phase C and homogenise for a short time.
4. Add phase D and stir well.

[1)] **Important:** If phase A has to be charged into the vessel first, phase B must be added **without** stirring.

W/O Lotion with Skinmimics® (Cold processing) WR 11/05-13	
Phase A	
ISOLAN® GPS (Polyglyceryl-4 Diisostearate/ Polyhydroxystearate/ Sebacate)	3.00 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	7.00 %
TEGOSOFT® TIS (Triisostearin)	3.00 %
Cyclomethicone	7.00 %
Phase B	
Glycerin	3.00 %
Magnesium Sulfate Heptahydrate	1.00 %
Skinmimics®	5.00 %
Water	71.00 %
Phase Z	
Preservative, Parfum	q.s.

Preparation:

1. Heat phase A to approx. 80 °C.
2. Add phase B (80 °C or room temperature) slowly while stirring.
3. Homogenise for a short time.
4. Cool with gentle stirring below 30 °C and homogenise again.

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Especially concerning Active Ingredients

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