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DECELERINE™

CODE: ES116

Date: March 2008 Revision: 0

GENERAL DESCRIPTION

The root of the hair is contained in the follicle, and this is composed of epithelial and connective tissue sheaths [1]. Hair follicle morphogenesis starts at the third month of human embryogenesis and occurs but once in the lifetime of an individual, so a mammal is born with a fixed number of follicles, which does not normally increase thereafter [2, 3]. The hair follicle is anchored into the dermis, to which is appended a sebaceous gland and an apocrine gland. It must be considered as being composed of two main compartments, a dermal one and an epithelial one. The dermal compartment includes the dermal papilla and the connective tissue sheath, whereas the epithelial compartment includes the dermal papilla surrounding matrix, the outer root sheath, the inner root sheath and the hair fibre [2].

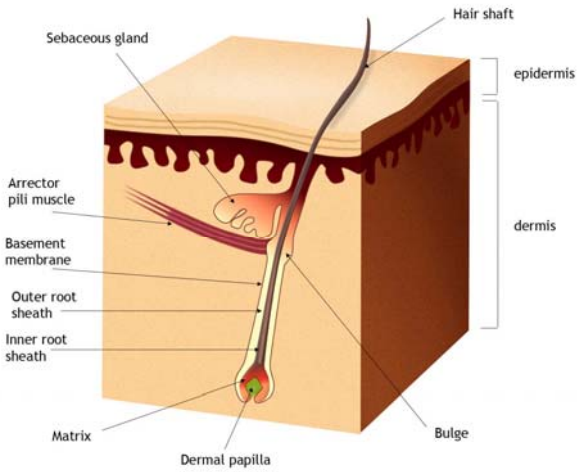

Fig. 1. Hair follicle

Hair growth is not continuous. Instead, hair follicles cycle through successive phases. There are four phases of the hair growth cycle: anagen (growth), catagen (regression), telogen (rest) and exogen (shedding).

Anagen is the phase of active hair growth. It lasts from 2 to 6 years, depending on skin region. Anagen is the period in the cycle when the lower follicle regenerates itself, reconstructs its hair shaft factory, and actively generates pigmented hair shaft. After anagen is completed, follicle growth stops, and **catagen** begins. This short phase (2 - 3 weeks), is a highly controlled process of coordinated cell differentiation and apoptosis, involving the cessation of hair growth and pigmentation, release of the papilla from the bulb and loss of the layered differentiation of the lower follicle [3]. During this catagen phase, the inferior portion of the follicle regresses. The lower follicle moves up to the level of the arrector pili muscle and the base of the fully formed shaft differentiates. This involution phase is followed by a resting phase, the **telogen** phase, which lasts about 3 months. Some time after the follicle enters the resting phase, the hair shaft sheds. Because this shedding process was conceived to have its own definition and controls, it was recently referred to as the **exogen** phase [4].

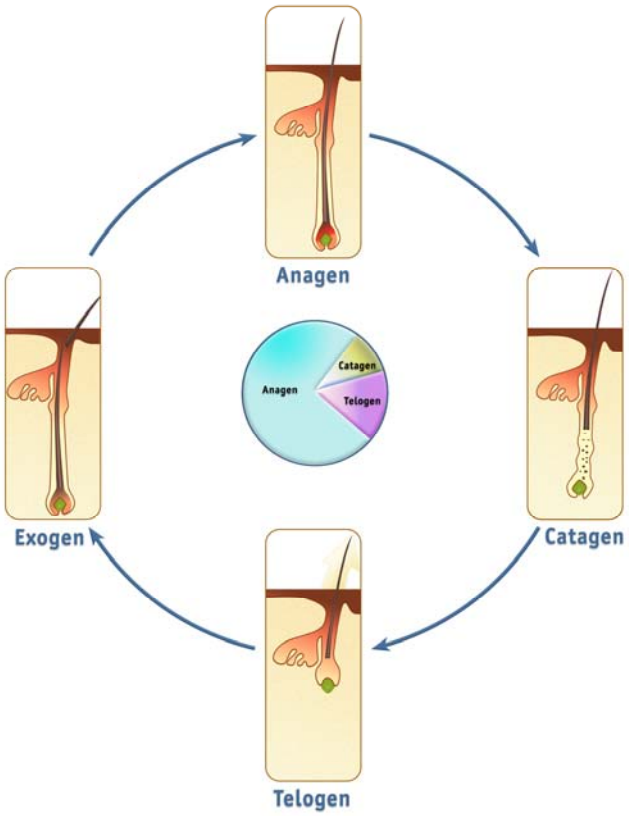

Fig. 2. Hair growth cycle

Then a new hair starts to grow and the follicle is back in anagen phase. The reactivation of follicles to start a new anagen phase is characterised by the reinitiation of cell proliferation in the secondary hair germ, regeneration of the lower half of the follicle and growth of a new hair [5].

Hairs grow in cycles which are not synchronised in human beings; each hair enters phases of the growth cycle at a different time. Approximately from 13 to 17% of hairs are in the telogen phase, 1% are in catagen and the rest, from 82 to 86%, are in anagen. The duration of the anagen and telogen periods differs from one part of the body to another, as attested by the different lengths of hair in different parts of the human integument. The length of hair in any region is primarily a function of the relative durations of anagen and telogen. For example, eyebrow hairs are in anagen for 30 days, 15 days in catagen and 106 days in telogen; and beard hairs are 1 year in anagen and 60 days in the telogen phase [6, 7].

It is generally believed that hair follicles are more responsive to treatment while they are in the growing (anagen) phase. Whether hairs are in anagen/telogen at the time of hair removal is important because only anagen hairs are particularly sensible to physical insults [7].

DECELERINE™ contains a combination of actives that has proved to be effective in inhibiting hair growth and also provides a recovering effect on the skin. Long-term hair removal techniques like photo-epilation act by thermal destruction of the hair follicle and its reproductive system, while DECELERINE™ targets its action in hair follicle cells and weakens new hair formation, gradually decreasing hair density and length.

A continuous application of DECELERINE™ permits the reduction of the frequency of depilation and shaving and eventually removes unwanted hair.

DECELERINE™ is suitable for facial male skin care. After shaving, face skin is prone to irritation and dryness. It is necessary to relieve and soothe the effects of shaving by providing moisturisation and protection to facilitate its epidermal regeneration. After shave products are addressed to smooth and mitigate the effects of shaving, and should improve skin health.

The active ingredients in DECELERINE™ provide a soothing, moisturising and anti-inflammatory effect, which avoid skin to become reddish and dry. Its regenerating properties also help skin to recover more easily from shaving or depilatory treatments.

- Lauryl Isoquinolinium Bromide: hair growth inhibition active

- Pseudoalteromonas Ferment Extract: provides a healing and smoothing effect by stimulating human epidermal keratinocytes growth

- Aloe Vera and Allantoin: have moisturising, soothing and anti-inflammatory properties

DECELERINE™ offers a complete post-shaving or post-depilatory treatment: inhibits hair growth, moisturises, protects, smoothes, improves epidermal regeneration and maintains the skin healthy.

PROPERTIES AND APPLICATIONS

- Decreases length and density of unwanted hair.
- Reduces the frequency of shaving and depilation.
- Has a protecting action on the skin after shaving and depilatory treatments.
- DECELERINE™ contains a combination of actives that provide a soothing, moisturising and regenerating effect on the skin.
- DECELERINE™ is a preservative free formulation.

DECELERINE™ can be used in emulsions, aftershave gels or lotions, body milks, shower gels, and in any formulation for post-depilatory treatments. DECELERINE™ contains a cationic active, and therefore it may present incompatibilities when formulated with anionic surfactants or emulsifiers.

TECHNICAL INFORMATION

PRODUCT SPECIFICATIONS

Appearance:	Translucent gel
Active ingredient content:	3.65% Lauryl Isoquinolinium Bromide
	2.5% Pseudoalteromonas Ferment Extract
	9.98% Barbados Aloe (Aloe Vera) Leaf Extract
	0.5% Allantoin
Colour:	Amber to Brown
pH	3.0 – 5.0

PROCESSING AND DOSAGE

DECELERINE™ must be incorporated into the water phase. If the processing requires heating, it must be added at the final step of the manufacturing process. Care should be taken not to exceed 40°C.

A dosage of 3% of DECELERINE™ in final formulations is recommended.

NOTE: According to the Standard for Cosmetics in Japan, only a 0.05% of the ingredient Lauryl Isoquinolinium Bromide is allowed in final cosmetic products. Therefore, a maximum dosage of 1.37% DECELERINE™ must be used for the Japanese cosmetics market.

STORAGE AND SHELF LIFE

Keep in a clean, cool and dark place. If product is stored as recommended it will remain stable for at least 12 months.

SAFETY

All the raw materials involved are regarded as safe for their use in a cosmetic product.

EFFICACY

Inhibition of beard growth

A panel of 20 male volunteers aged 20 to 60, used a gel containing 3% DECELERINE™ on their face twice daily during 2 months. The first application of the gel was made 48 hours after the last shaving (after measurement at time 0). The volunteers were asked to shave off as they used to do. The next measurements at each timepoint were taken always 48 hours after shaving.

Images of the skin surface covered by hairs were taken by means of a FotoFinder Dermoscope and analysed using the Thricoscan software. The image analysis was performed before treatment, after 30 days and after 60 days of treatment.

The variation of the hairs density and of the mean length of the hairs was evaluated in a 1 cm^2 area selected on the volunteers' face from the analysis of the images at each timepoint.

The data obtained was statistically compared using the Friedman test and the Wilcoxon Matched Paired test.

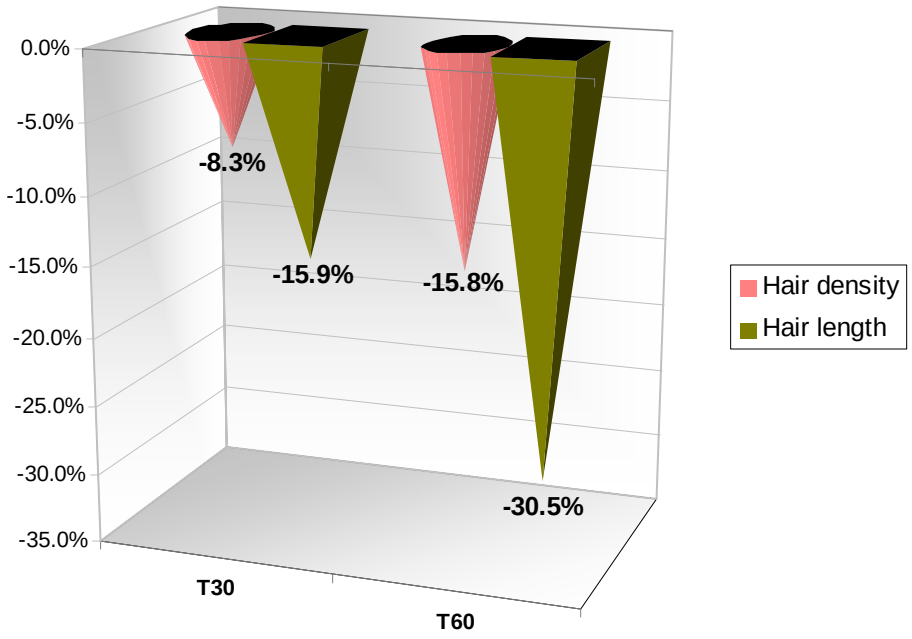

Fig. 3. Percentage variations of the density and length of beard hairs after 30 (T30) and 60 days (T60) of treatment with DECELERINE™

After 30 days of treatment, a significant decrease in the hair density and hair length was observed. The length of hairs diminished by 15.9% ($p<0.01$), and the hair density was reduced by 8.3% ($p<0.05$).

A time-dependent effect was observed after 60 days of treatment. The continuous application of DECELERINE™ decreased the hair length and density with a highly statistically significant variation in comparison with time 0. The percentage of hair length decreased by 30.5% ($p<0.001$) and the hair density by 15.8% ($p<0.05$).

The results are summarised in the following table:

	T30		T60	
Hair density(cm^{-2})	**-8.30%**	($p<0.05$)	**-15.80%**	($p<0.01$)
Hair length (mm)	**-15.90%**	($p<0.05$)	**-30.50%**	($p<0.001$)

A subjective evaluation questionnaire was filled by the volunteers once the study was completed. At the end of the test:

- ✓ 95% of the volunteers felt their skin softer after the product application.
- ✓ 75% of the volunteers considered that the product was effective in decreasing beard regrowth.

The efficacy of DECELERINE™ in slowing down beard growth can be clearly observed with the photographs attached of two of the volunteers who participated in this *in vivo* test (Fig. 3 and 4).

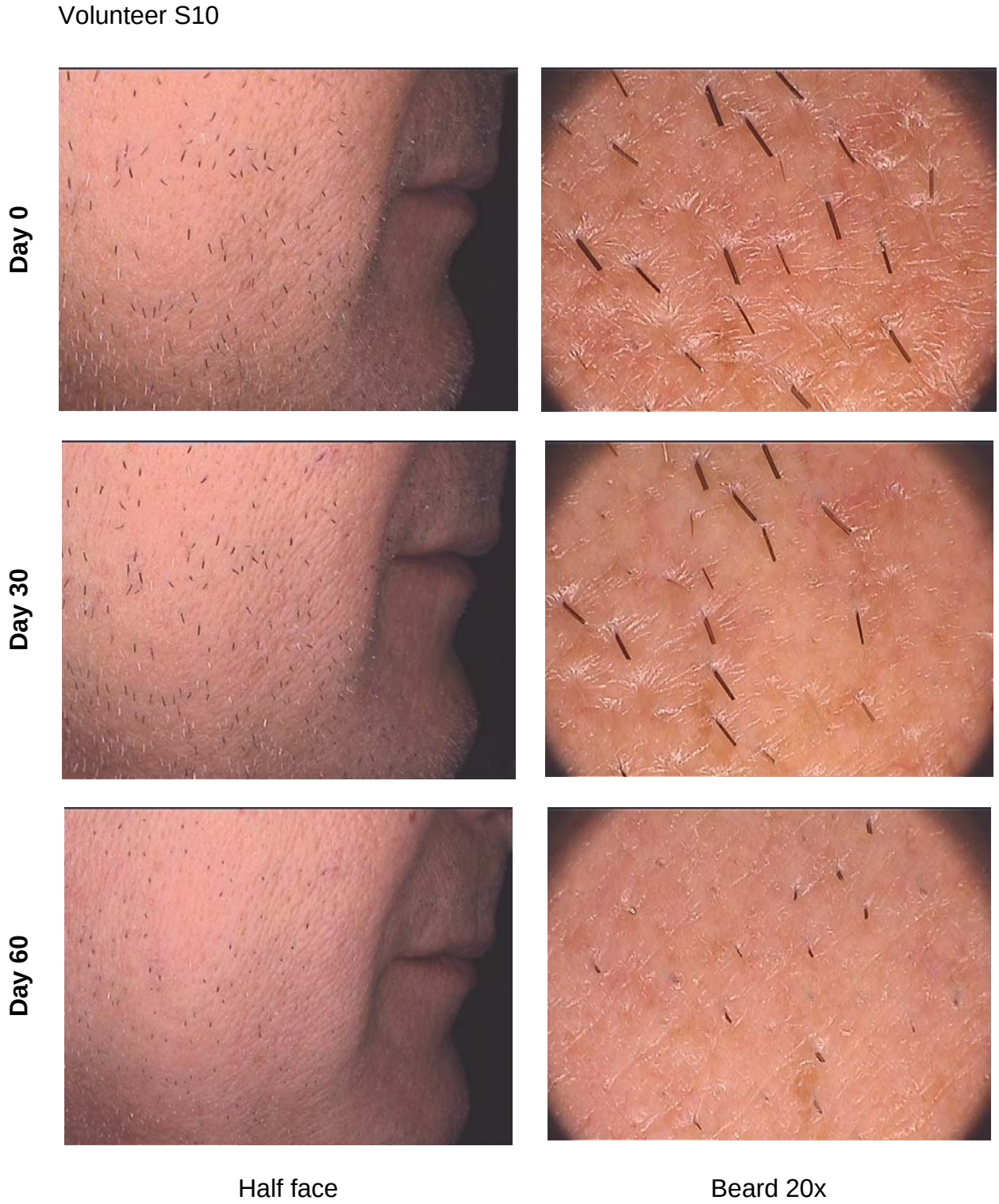

Fig. 4. Image analysis of the beard of volunteer S10. Images on the right were taken of a 1 cm^2 selected area on the volunteer's face. This volunteer experienced a 11% decrease in the hair density, and a **71% decrease in hair length** after 60 days of treatment.

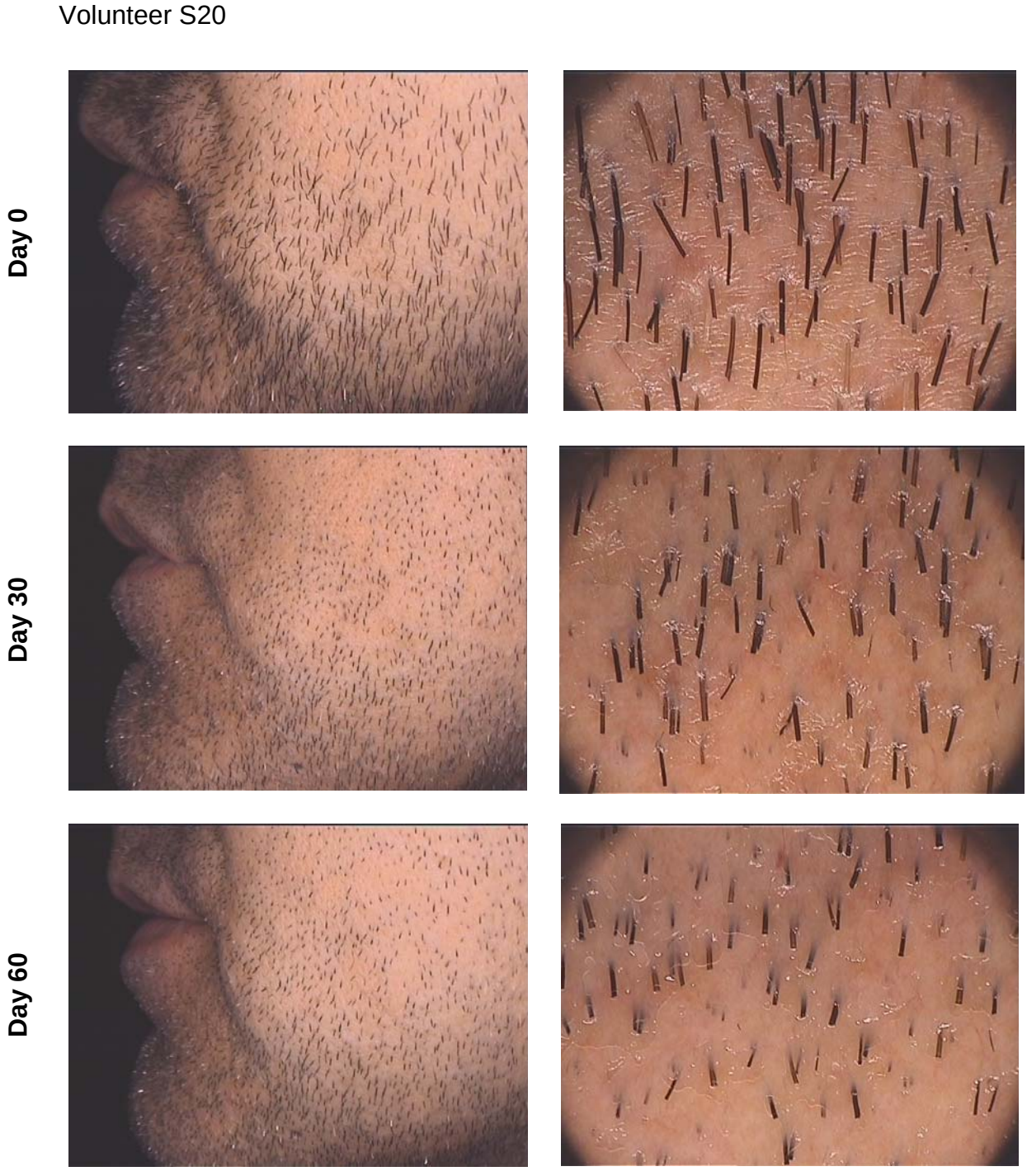

Fig. 5. Image analysis of the beard hairs of volunteer S20. Images on the right were taken of a 1 cm^2 selected area on the volunteer's face. This volunteer experienced a 24% decrease in the hair density, and a **60% decrease in hair length** after 60 days of treatment.

GENERAL PRODUCT INFORMATION

Trade name	DECELERINE™
Product code	ES116

INGREDIENTS

INCI name	CAS No	EINECS No
WATER (AQUA)	7732-18-5	231-791-2
GLYCERIN	56-81-5	200-289-5
BARBADOS ALOE (ALOE BARBADENSIS) LEAF EXTRACT	8001-97-6	287-390-8
LAURYL ISOQUINOLINIUM BROMIDE	93-23-2	202-230-9
PSEDOALTEROMONAS FERMENT EXTRACT	820959-16-8	-
POLYQUATERNIUM-37	2616-33-1	-
DISODIUM EDTA	6381-92-6	205-358-3
ISOPROPYL ALCOHOL	67-63-0	200-661-7
SODIUM SORBATE	7757-81-5	231-819-3
SODIUM BENZOATE	532-32-1	208-534-8
ALLANTOIN	97-59-6	-
GLUCOSE	50-99-7	200-075-7
CAPRYLYL GLYCOL	1117-86-8	215-254-7

Note: Graphs and photographs are available for customer use provided that the final product contains the same concentration of active as the formulations in our tests. Customers must request written permission for use of the graphic material and/or ingredient tradenames to Lipotec. Customers are responsible for compliance with local and international advertising regulations.
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