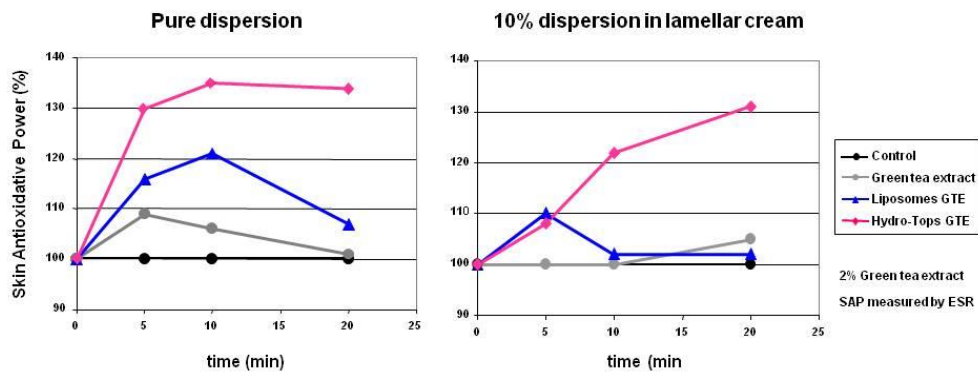


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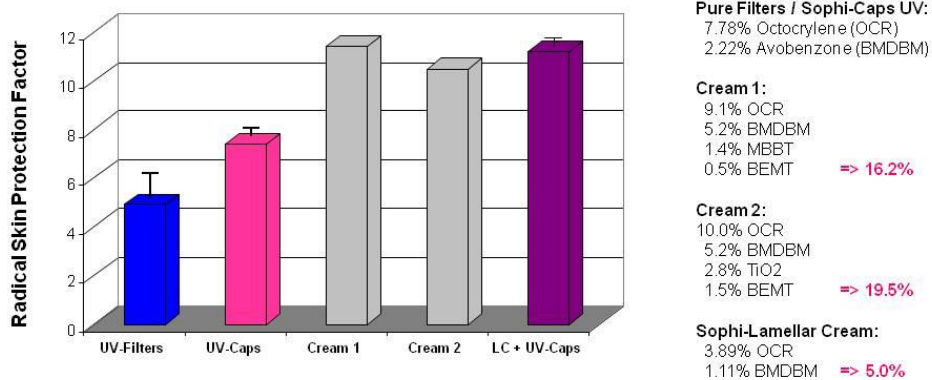
## Alternative carrier systems Alternativen zu traditionellen Trägersystemen

### Scientific Background Information

**Fig.1: Penetration & efficacy of Green tea extract (GTE) in the skin**



**Fig.3: Protection of sun care formulations against UV-induced radicals**



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## Sophi-Caps®



### Technology Offer:

The Sophi-Caps technology offers a non-penetrating system with high encapsulation of e.g. UV-filters (50%), oils, essential oils and insect probably repellents.

### Advantages:

- \* Exceptionally high encapsulation efficacy (up to 50%)
- \* Homogeneous distribution of actives on the skin surface
- \* Avoid direct contact of actives with the skin – less irritation
- \* Lipophilic components are easy to incorporate into water based formulations

### Sophi-Caps UV:

These Caps contain 50% of the organic UV- filters Avobenzone (UVA) and Octocrylene (UVB) in a ratio of 1:3.5. This combination offers photostabilization of Avobenzone and prevents the UVA filter from crystallization.

These caps are dispersed in a water / ethanol solution and can be used directly after thickening with e.g. xanthan gum or in innovative oil-free sun care formulations like sprays, foams or gels.

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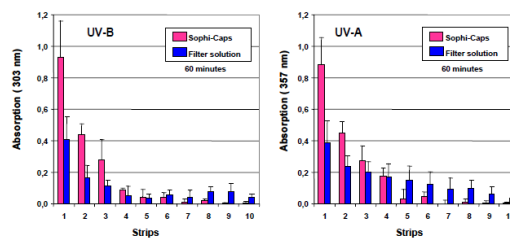
## Sophi-Caps® UV



### Study-1: UV-Absorption of filters on the skin

Sophi-Caps UV and a solution with the same concentration of filters were applied on the inner forearm of 5 volunteers. After 60 minutes the area was removed by tape stripping and the absorption of each strip was measured by UV spectroscopy.

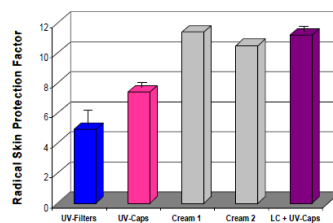
A significant increase in the absorption of UV light in the upper skin layers was determined after application of Sophi-Caps. At the same time a higher amount of the non-encapsulated filters was detected in the deeper skin layers which indicates the penetration of free filters.



### Study-2: Radical protection of formulations

Sophi-Caps UV and a filter solution were applied on skin samples and the protection against the formation of free radicals after sun exposure was determined by ESR (Gematria Test Lab). The measurements were also done with 2 commercial formulations and Sophi-Caps incorporated into a cream with lamellar structures.

Even a concentration of 5% of encapsulated UV-filters incorporated in the lamellar structures of a cream gives similar high protection against induced free radicals like a commercial cream (cream 2) with 19.5% of free filters.



Pure Filters / Sophi-Caps UV:  
 7.78% Octocrylene (OCR)  
 2.22% Avobenzone (BMDBM)

Cream 1:  
 9.1% OCR  
 5.2% BMDBM  
 1.4% MBET  
 0.5% BEMT → 16.2%

Cream 2:  
 10.0% OCR  
 5.2% BMDBM  
 2.8% TiO2  
 1.5% BEMT → 19.5%

Sophi-Lamellar Cream:  
 3.89% OCR  
 1.11% BMDBM → 5.0%

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## Sophi-Hydro-Tops®



### Technology Offer:

The Sophi-Hydro-Tops technology offers a penetrating system with high encapsulation of hydrophilic, amphiphilic and to some extent lipophilic active ingredients

### Advantages:

- \* **Exceptional homogeneity in size distribution**
- \* **Better penetration into deeper skin layers compared with flexible liposomes**
- \* **Lipid concentration up to 20% => higher encapsulation efficiency of actives  
=> higher bioavailability of actives in deeper skin**
- \* **High stability in final formulations**
- \* **Usable in “green cosmetics” - no soy, no genetic modification**

### Sophi-Hydro-Tops EGCG:

These vesicles contain 2% of epigallocatechin gallate (EGCG) extracted from the leaves of green tea. This antioxidant has similar properties in scavenging of free radicals like pure ascorbic acid but is stable of at least 3 months at 40°C.

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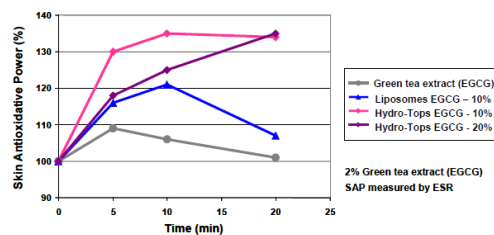
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## Sophi-Hydro-Tops® EGCG



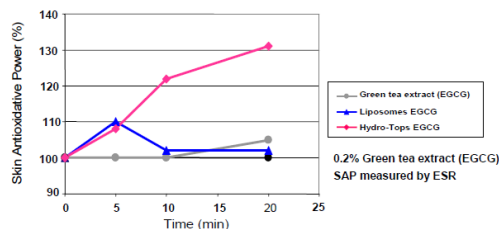
### Study-1: Penetration of EGCG in vesicles

The penetration as well as the antioxidative capacity in the deeper skin layers can be determined by ESR (Gematria Test Lab). The pure EGCG exhibit minor antioxidative effects in the skin but this can be increased by the encapsulation into flexible liposomes (x3). Already after 20 minutes the activity of the liposomal EGCG disappears. Hydro-Tops EGCG show significantly higher power in the skin (x6; x4.5) and a long-lasting effect. The kinetic differs by the amount of lipid used for the preparations.



### Study-2: Vesicles with EGCG in lamellar cream

The vesicle preparations and the pure EGCG were incorporated into a lamellar cream and penetration as well as the antioxidative capacity were measured. The pure EGCG again exhibit minor antioxidative effects in the skin. The penetration of EGCG was increased by the flexible liposomes (x3) but these liposomes were not stable in the formulation over the time. Hydro-Tops show significantly higher antioxidative power in the skin (x14.5) and a long-lasting effect.



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## Sophi-Lipo-Tops®



### Technology Offer:

The Sophi-Lipo-Tops technology offers a penetrating system with high encapsulation of lipophilic active ingredients and oils. Stabilization of sensitive components can be achieved.

### Advantages:

- \* Exceptional high encapsulation efficiency
- \* Better penetration into deeper skin layers compared with nano-emulsions
- \* Lipophilic components easy to formulate into water based formulations
- \* Usable in "green cosmetics" - no soy, no genetic modification

### Sophi-Lipo-Tops:

In contrast to nanosome (nano-emulsion based on phospholipids) the Lipo-Tops exhibit higher encapsulation efficiency of lipophilic active ingredients in combination with oils. Also significant stabilization of sensitive components was obtained by the encapsulation into Lipo-Tops.

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## Sophi-Lipo-Tops®



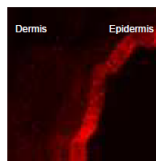
### Study-1: Penetration of Dil into skin

Lipo-Tops and nanosomes were prepared containing the lipophilic fluorescence component Dil (red) and soy bean oil.

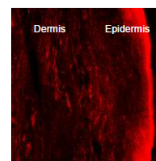
The vesicle preparations were applied onto human skin and the penetration into the skin was determined after 8 hours by confocal laser scan microscopy.

With the nanosomes the Dil is distributed in the stratum corneum and in the upper layers of the epidermis. In contrast to nanosomes, the Lipo-Tops are able to transport the dye in the deeper skin areas.

#### Nanosomes



#### Lipo-Tops



Dil (1,1-Dioctadecyl-3,3,3,3-tetramethylindocarbocyanineperchlorate)

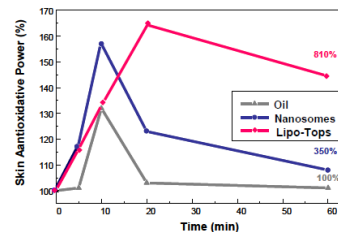
### Study-2: Efficacy of Tocopherol in the skin

The penetration as well as the antioxidative capacity of tocopherol in the deeper skin layers were determined by ESR (Gematria Test Lab).

The pure tocopherol exhibit minor antioxidative effects in the skin but this can be increased by the encapsulation into flexible liposomes (x 3.5). Already after 20 minutes the activity of the liposomal tocopherol is lowered.

Lipo-Tops show significantly higher power in the skin (x 8.1) and a long-lasting effect.

Depending on the oil used for preparing the vesicles the kinetic and penetration depth can be influenced.



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