

# New Dow Corning® Liposomes



- ② Two types of liposome system developed to deliver cosmetic actives to different sites within or on surface of the skin / hair.
- ② ***Penetrating liposomes***: prepared using high purity phospholipids.
  - ② capable of stabilizing cosmetic actives and delivering them *into* upper layers of epidermis
- ② ***Non-Penetrating liposomes***: prepared using same high purity phospholipids.
  - ② Stabilized by a sterically-hindering polymeric group. The protective layer prevents the liposome from penetrating the skin.
  - ② Cosmetic actives delivered *onto* surface of skin or hair, e.g. **Suncare** and **scalp** applications

# High Quality Dow Corning® Liposomes



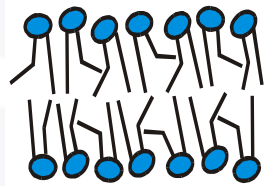
- ④ Composition of liposomes results in optimized system for both neat Carrier System and loaded Carrier Systems
- ④ Physical and chemical stability of liposomes
  - ④ A uniform particle size (12 weeks at room temperature, 4°C and 40°C)
  - ④ A stable pH (12 weeks at room temperature, 4°C and 40°C)
  - ④ A high **chemical stability** of the phospholipids in liposome form vs EtOH / Water dispersion (Half life <sup>31</sup>P NMR method)
  - ④ A high **oxidative stability** of the unsaturated fatty acids vs free lipids in dispersion (rancidity method)
  - ④ Bilayer arrangement is effectively protecting the unsaturated fatty acid chains

Approach targets max. stability of liposome

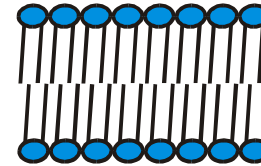
# Unsaturated vs Hydrogenated Phospholipids



## Unsaturated



## Hydrogenated



Form *Penetrating* Liposomes  
Flexible membrane  
High oxidative & chemical stability in liposomal form  
Stabilization of hydrophilic & lipophilic actives  
Source of \*EFA\*  
Soluble in EtOH

Carrier System  
Moisturizers  
Skin depot forming agents

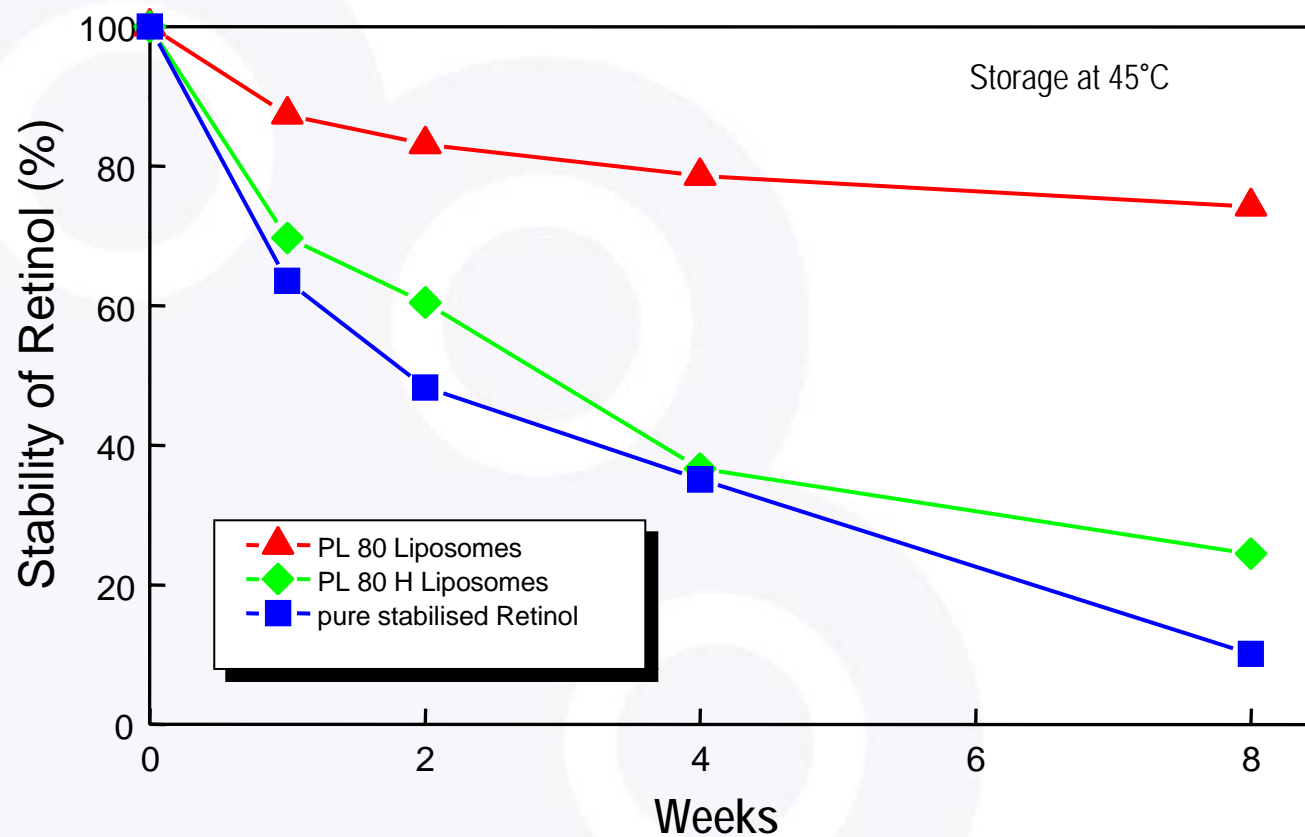
Form *Non-Penetrating* Liposomes  
Rigid membrane  
Inherent chemical & oxidative stability  
Primarily suitable for hydrophilic actives  
Very low stabilization of lipophilic actives  
Protection of lipid barrier  
Insoluble in EtOH

\*EFA *Essential Fatty acids*

**Dow Corning Penetrating liposomes offer best combination of penetration and stability**

**DOW CORNING**

# Stability of Retinol in various Liposomes [Determination of Retinol by HPLC]



Courtesy of Rovi Cosmetics GmbH

PL 80 Liposome = 80% Phosphatidyl choline (PC) unsaturated liposome

PL 80 H Liposome = 80% PC hydrogenated liposome

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# Comparison between Hydrogenated & Unsaturated Dow Corning Liposome Systems



Hydrogenated liposome systems are:

- Non-penetrating carrier systems
- Cosmetic benefits are limited to moisturization since encapsulated actives can not penetrate into skin

Dow Corning® Penetrating Liposome systems:

- Contain unsaturated fatty acids with high physical and oxidative stability as pure material and in final formulations
- Hydrophilic and lipophilic actives can be stabilized within liposome and can penetrate into upper layers of skin
- No cholesterol added to improve oxidative stability
- 100% non-animal derived, GMO free product

# Effects of Liposomal stabilized Linoleic Acid

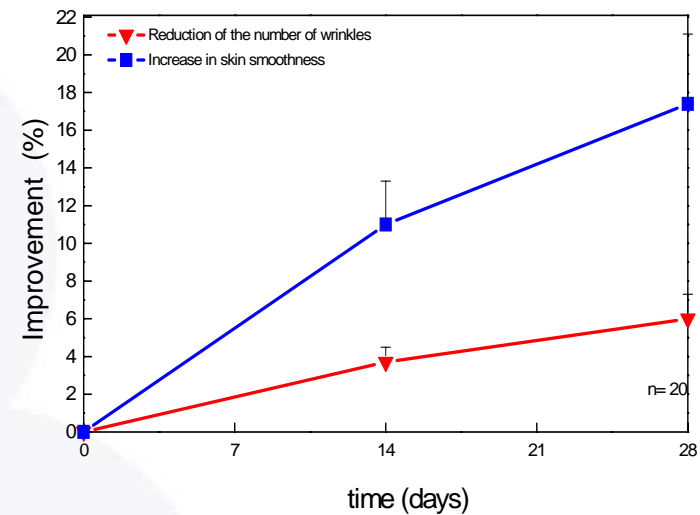


*Study on skin impurities*

*Study on smoothness & wrinkle reduction*



Morganti et al.  
„Botanicals in Acne Therapy“  
EURO COSMETICS &, 2001

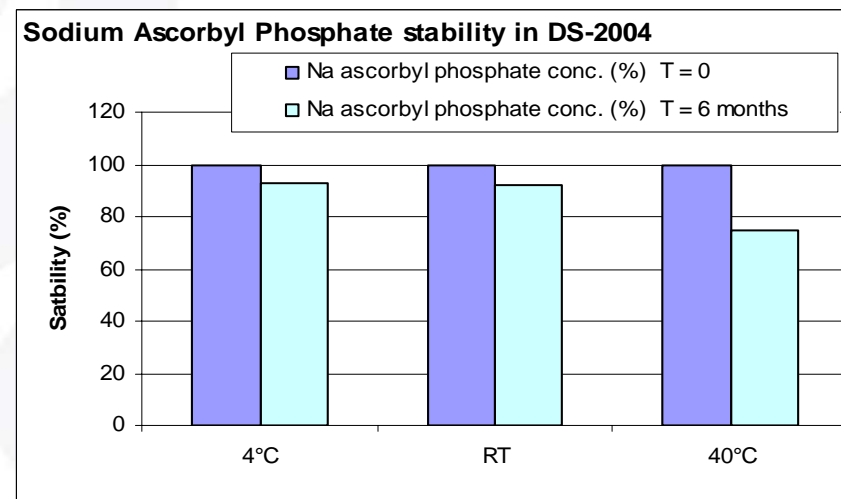
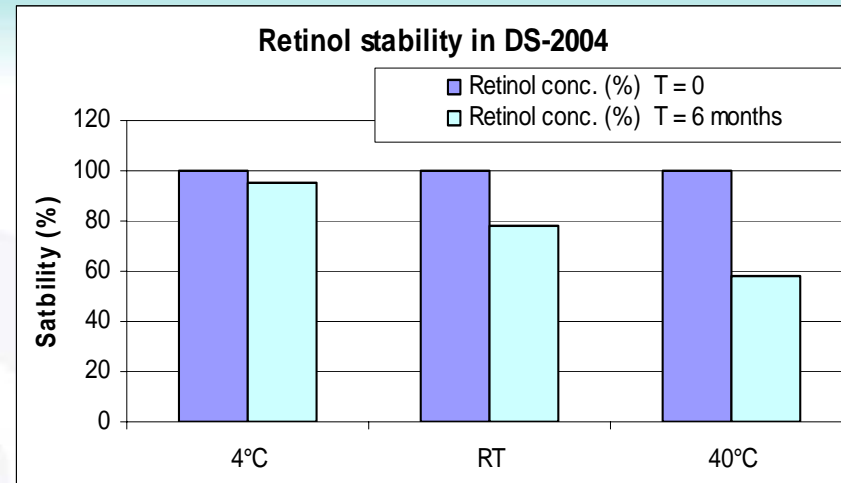


G. Blume  
„Improvement of AHA Salt encapsulated in liposomes“  
Active Ingredients „Conference Proceedings“  
November 1996

# Stability of Vitamins in DC<sup>®</sup> DS-2004 F.A.C.E. Nourishing Liposome [Determination by HPLC]



- Retinol stability:
  - 80% retained vitamin A over 6 months at RT,
  - > 95% at 4°C
- Tocopherol:
  - 100% retained vitamin E over 6 months, at RT, at 4°C and at 40°C
- Sodium Ascorbyl Phosphate:
  - 95% retained vitamin C at RT and 4°C



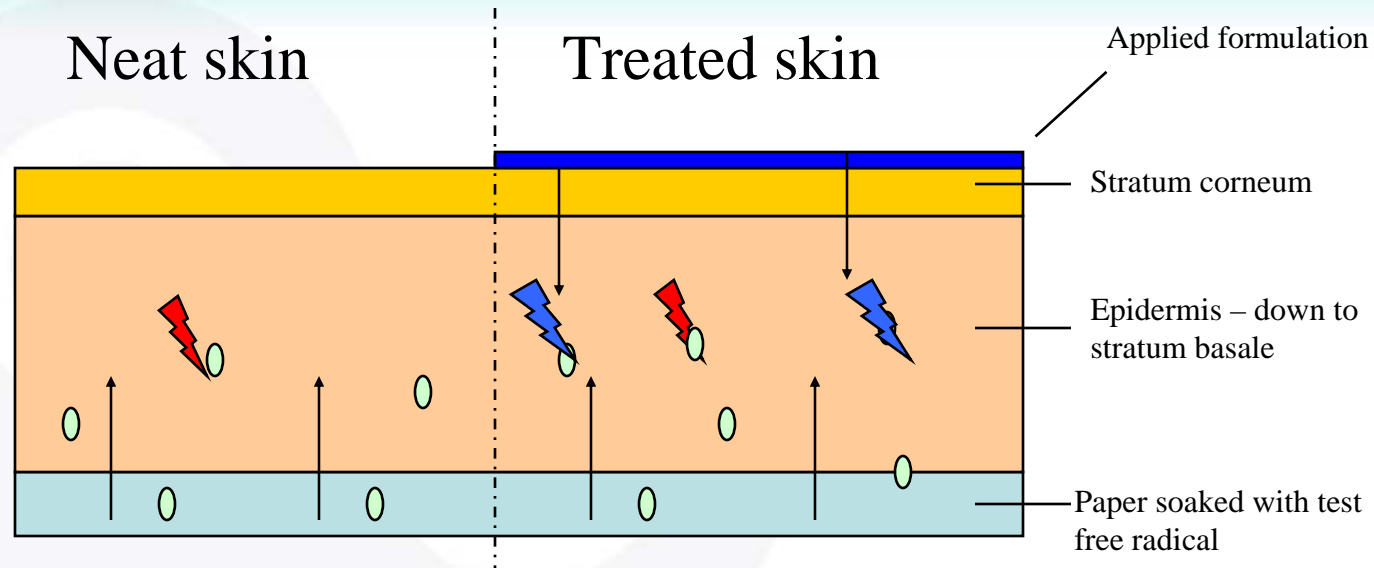
# Determination of Anti-oxidative Power AOP

## ex-vivo



- Skin has an intrinsic Anti-oxidative Potential (AOP), due to the many enzymatic and non-enzymatic antioxidant systems present in the epidermis.
- An active substance, applied on the *stratum corneum* and able to penetrate, will increase the Antioxidative Potential (AOP).
- By spin labeling skin biopsies with a semi-stable free radical and registering the signal intensities by ESR spectroscopy in a biopsy flat cell, it is possible to determine a time dependent penetration profile of the tested substance.
- Different formulations of an active substance can be tested in regard to their ability to enhance the AOP of the skin.

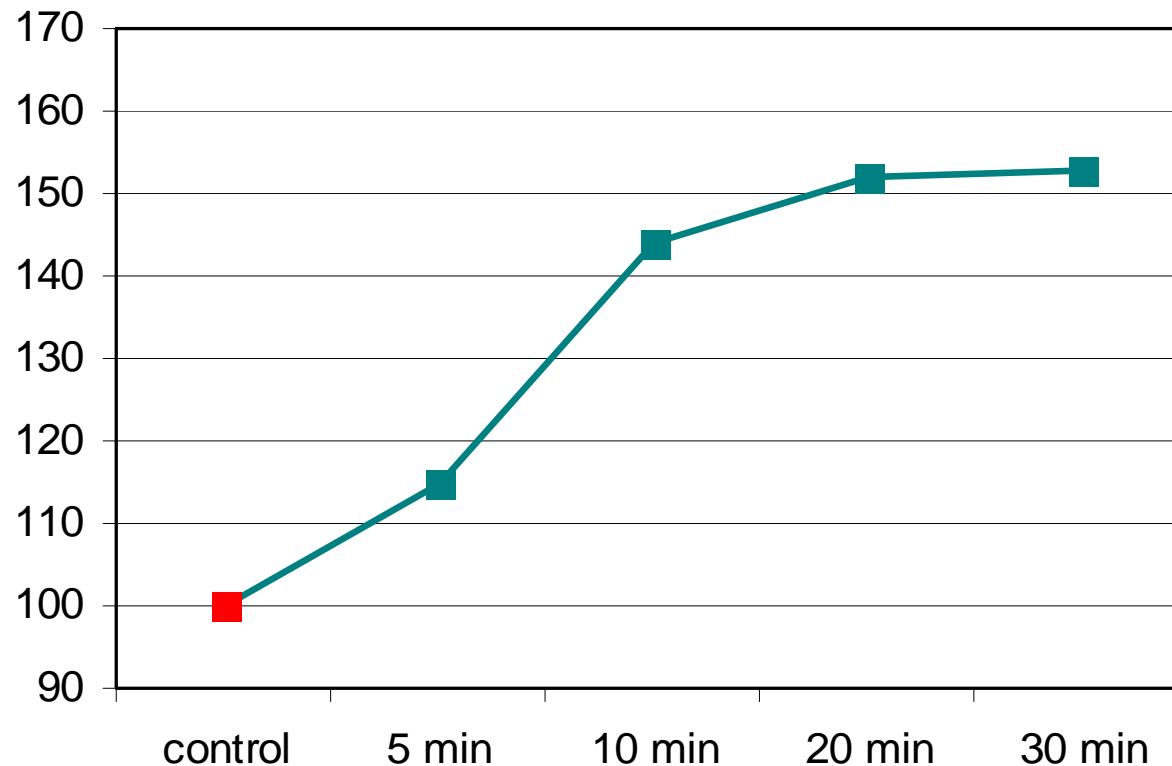
# AOP ex-vivo : Schematic Representation of Measurement



The free radicals will be taken up by the bottom layer of the epidermis, and destroyed by the skin's own anti-radical defense system:

The applied formulation will potentially help this defense if the actives can penetrate deeply enough to neutralize the free radicals at the bottom layer : indication of penetration via efficacy : .

# AOP ex-vivo: Kinetics of Dow Corning® DS-2004 F.A.C.E. Nourishing Liposome



- 20 minutes after application of the liposome cocktail on the skin, the vitamins have reached their maximum efficacy as anti-oxidant – a 52% increase of AOP

## Anti-oxidative Power (ex-vivo) of Dow Corning® DS-2004 F.A.C.E. Nourishing Liposome



- Enhancement in the activity of vitamins by the liposomal encapsulation
- Synergistic effects by the combined encapsulation of tocopherol (vitamin E) and sodium ascorbyl phosphate (vitamin C)
- Penetration of the vitamins by the Dow Corning liposomal carrier system
- Significant enhancement (52%) in the natural anti-oxidative capacity of the skin after 20 minutes (half penetration)
- 1 ml Dow Corning® DS-2004 F.A.C.E. Nourishing Liposome has the same activity as 2 µg pure ascorbic acid

# Breadth of Dow Corning® Liposome Technology



- ⓐ Cocktails of lipophilic and hydrophilic actives
- ⓐ Initial product line: 9 penetrating and 6 non-penetrating liposomes
- ⓐ *Examples:* Retinol, Green tea, Vitamin C phosphate, Arbutin, Rutin, Caffeine, Centella asiatica, Theobromine, Sodium hyaluronate.....
- ⓐ Customization possibilities