



## PHOSPHATIDYLCHOLINE ("PC")

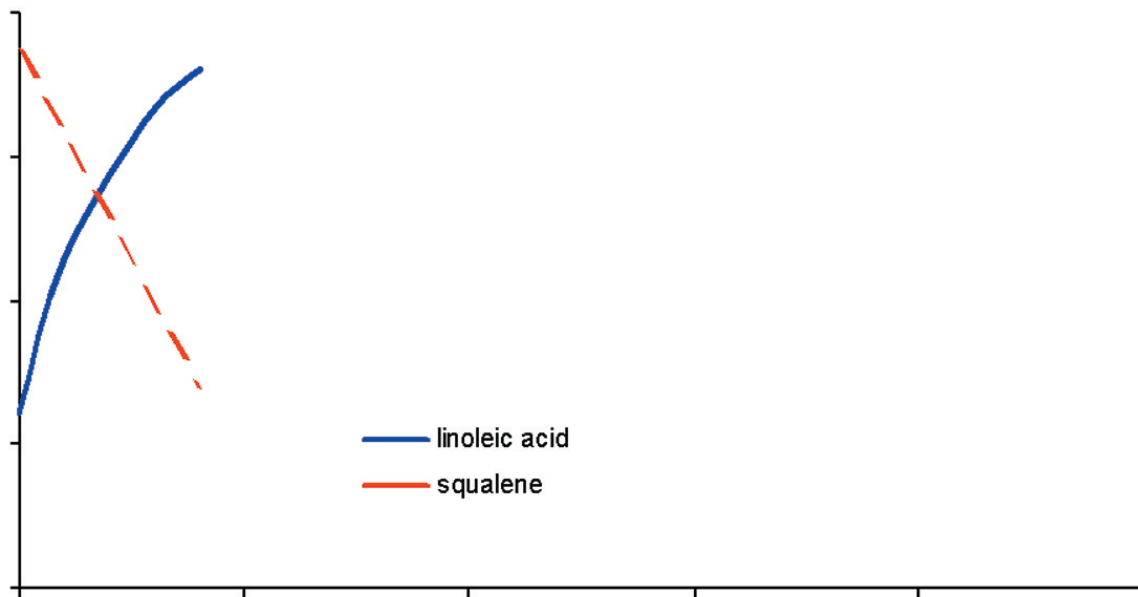
### RESEARCH SUMMARY

## STUDY 1 & 2

### PC clears acne and normalizes sebum output on its own!

Independent studies were done in 2000 where 14 patients with acne grades one and two (study #1) and another study where 7 patients with grade one and two were treated with PC (1mg / cm<sup>2</sup>). The skin was tested initially and at eight weeks for its lipid levels (linoleic acid and squalene). The results show that PC normalizes the lipid ratios by increasing linoleic acid and decreasing squalene both of which help support all of the studies that follow on PC.

### Effect of liposomal PC on the linoleic acid and squalene content in skin surface lipids of acne-affected subjects



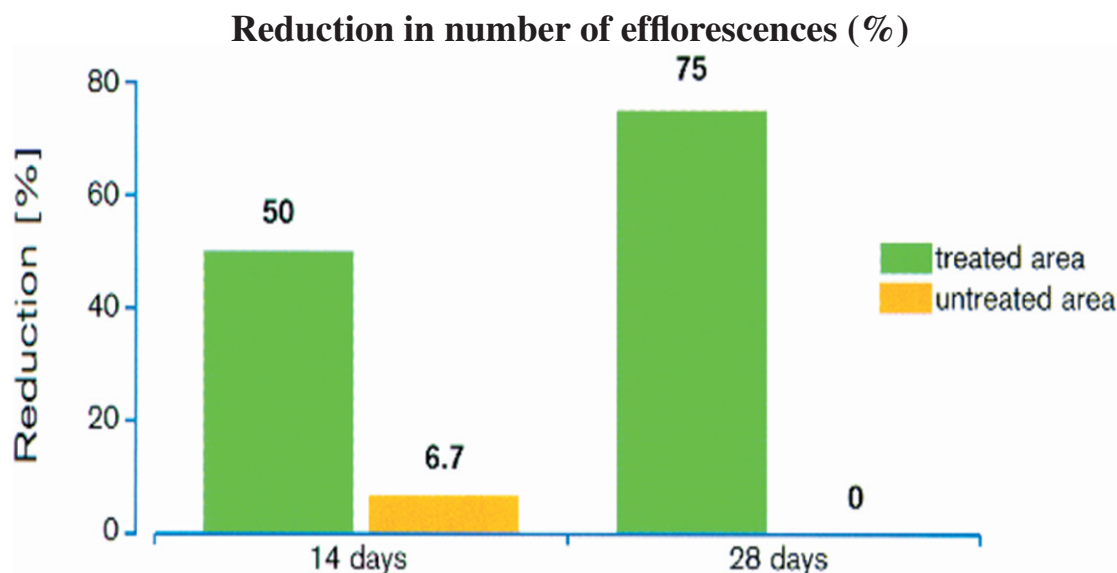
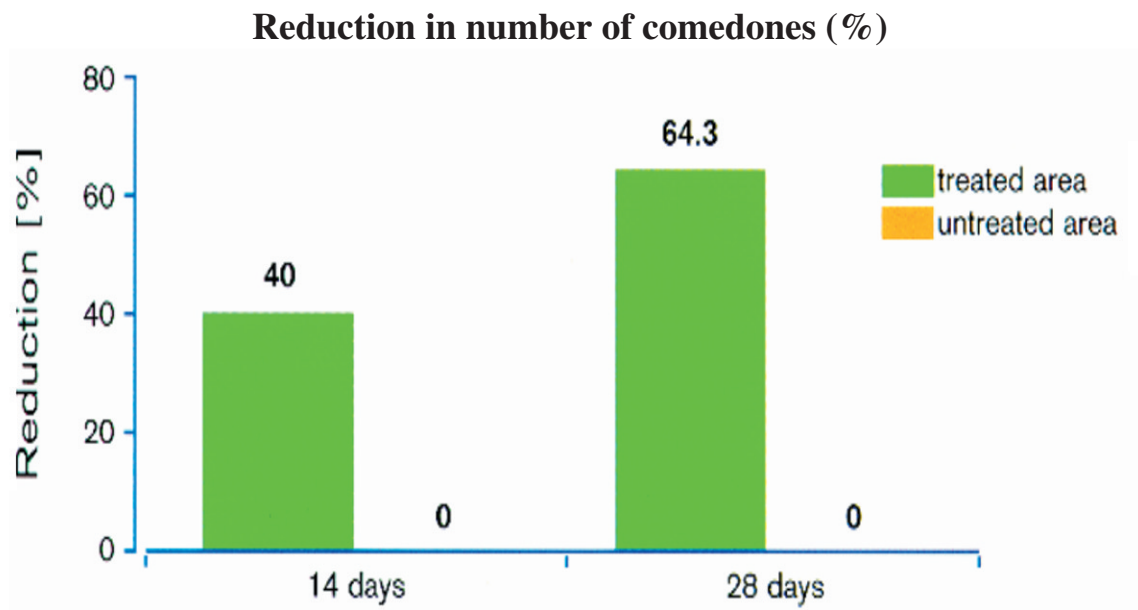
### TAKE HOME MESSAGE:

PC provides EFA's linoleic acid and alpha-linolenic acid to dehydrated skin which restores the barrier, reduces overall oil production while normalizing sebum content .

## STUDY 3

### PC is great for Acne!

This study performed by an independent lab in 2000 evaluated the effects of PC on acne. 77 patients with acne vulgaris grades one and two (on no other treatment for their condition) were given 1mg Phosphatidylcholine / cm<sup>2</sup> for eight weeks. The results showed that comedones and efflorescences were significantly improved within 2 weeks and remarkably improved after 4 weeks. The contralateral side was used as the control.



### TAKE HOME MESSAGE:

PC through its barrier healing properties and sebum regulating ability treats both acne and inflammation in the skin with no other active ingredients used.

## **STUDY 4**

**PC is a powerful penetrator of active ingredients!**

**The Skin Permeation Enhancing Effect of Phosphatidylcholine:**

**Caffeine as a Model Active Ingredient**

Chinhan Kim et al., J. Cosmet. Sci., 53, 363-374, November / December 2002

### **Key Points of Study**

- ❖ The preparation with PC gave the highest significant skin permeation effect, which explains why it is used for prescription medications in patches, etc.
- ❖ Penetration enhancement was excellent with a variety of nano-sized particles which means it can be effective with a variety of active ingredients
- ❖ Caffeine is released rapidly from the PC vesicles proving that the actives are well utilized by the skin after they ride on the back of PC to get into the skin

## **STUDY 5**

**PC is great for wound healing and infections!**

**“An innovative Topical Drug Formulation**

**for Wound Healing and Infection Treatment:**

**In vitro and in vivo Investigations of a Povidone-Iodine Liposome Hydrogel”**

Reimer et al., Dermatology 2000; 201; 235-241

### **Key Points of Study**

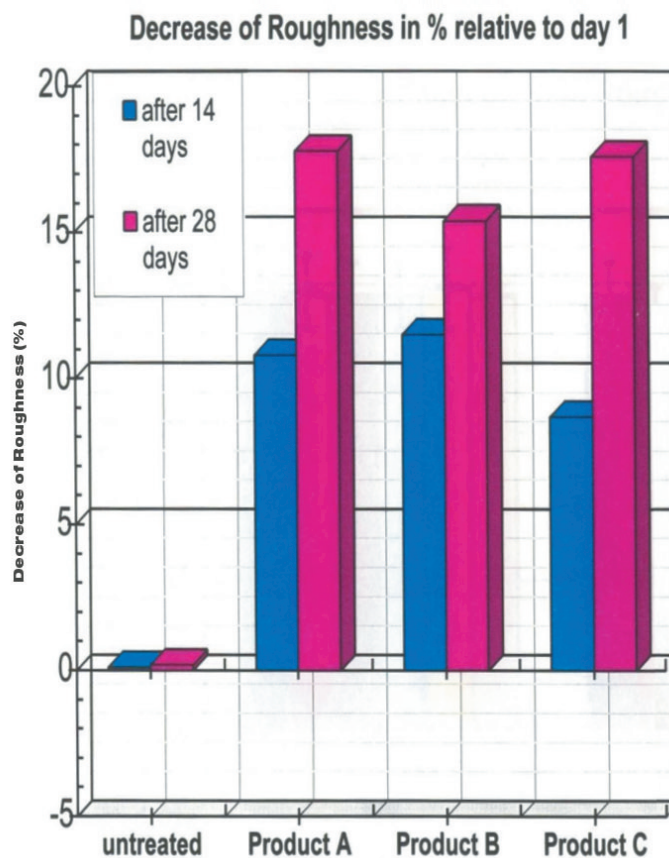
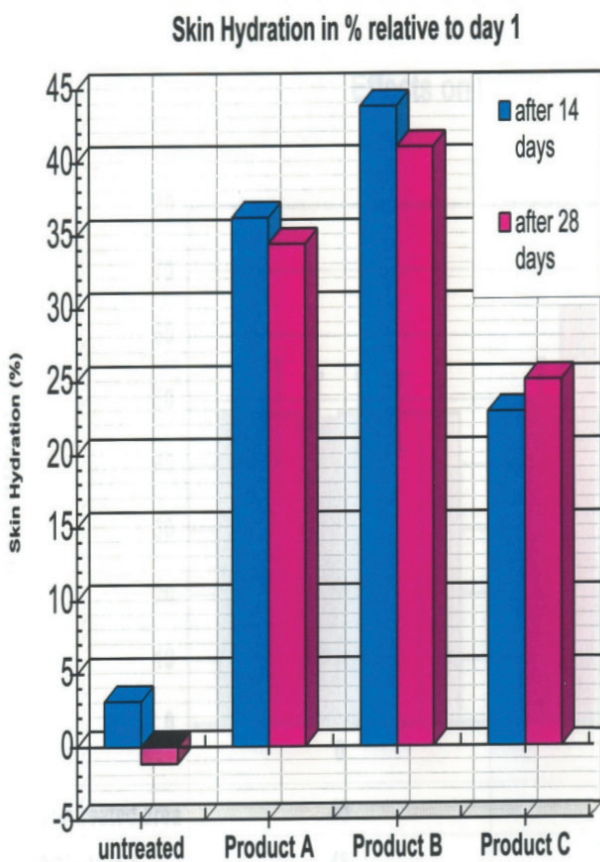
- ❖ Significantly improved life of skin grafts suggesting a nourishing skin health promoting effect of PC
- ❖ Significantly better new skin formation on wounds with PC probably due to its hydrating and skin normalizing qualities
- ❖ PC provides over 300% improved activity of antibacterials probably due to its penetration and protective qualities

## STUDY 6

### PC is a great moisturizing agent!

In an independent study done in 2000, 20 healthy volunteers had 2 mg / cm<sup>2</sup> applied to their skin twice daily of three different preparations of PC (listed below). The results of the study showed that PC significantly improved both hydration and roughness at 2 and 4 weeks.

|   | Product A | Product B | Product C |
|---|-----------|-----------|-----------|
| <b>Phosphatidylcholine Saturated PC</b> | 3%        | 3%        | 3%        |
| Olive oil                               | 10%       |           | 10%       |
| Vitamin A palmitate                     | 0.2%      | 0.2%      | 0.2%      |
| Vitamin E acetate                       | 0.2%      | 0.2%      | 0.2%      |
| Water, demin.                           | 68.9%     | 78.9%     | 69.9%     |
| Carbomer, preneutral.                   | 1%        | 1%        | 1%        |
| Ethanol                                 | 16.6%     | 16.6%     | 15.6%     |
| Perfume                                 | 0.1%      | 0.1%      | 0.1%      |



## **STUDY 7**

### **PC enhances penetration of active ingredients!**

**“Protective Effect Evaluation of Free radical Scavengers on UVB Induced Human Cutaneous Erythema by Skin Reflectance Spectrophotometry”**

Montenegro, L., Bonina, F., Int’l J. of Cosmetic Science, 1995; 17: 91-103.

#### **Key Points of Study**

- ❖ This study confirmed that the liposomal preparation of antioxidants was more effective presumably because it allowed better penetration of active ingredients.
- ❖ SOD and Glutathione were much more effective than Vitamin E and ascorbyl palmitate in reducing erythema within these liposomal formulations.

## **STUDY 8**

### **PC protects against UVB sundamage!**

Thiele, B., Ghyczy, M., “Influence of Phospholipid Liposomes on UVB-Induced Erythema Formation”, Arch Dermatol Res, 1993; 285:428-431.

#### **Key Points of Study**

- ❖ PC reduces erythema (redness) in the UVB treated skin of 31 patients.
- ❖ The mechanism of action is postulated to be an effect of increasing antioxidants and the reduction of free radicals both the result of the high level of EFA’s in this liposomal material.