

A close-up, soft-focus photograph of a baby's face. A hand is visible near the baby's eye, possibly holding a small object. The image has a warm, golden-brown color palette.

SUSTAINED AND CONTROLLED  
DELIVERY SYSTEM

# NANO LPD's Multivitamin

The logo for infinitec, featuring three overlapping blue circles of varying sizes.

infinitec

activos s.l.

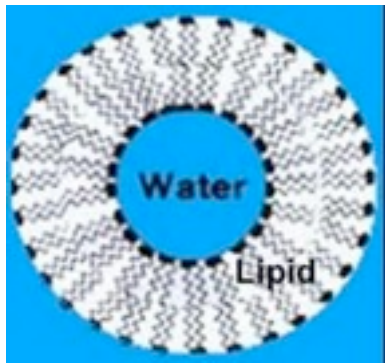
NANO LPD's Multivitamin

# LPD's

## Definition

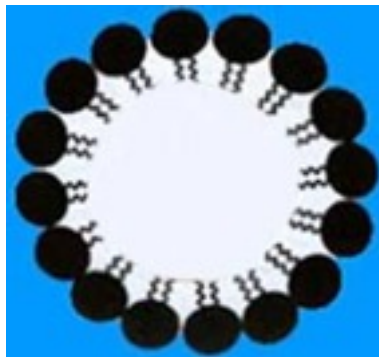
- They are extremely small vesicles (lower than 300nm)
- Mainly made of phospholipids
- The phospholipids are organised in bilayers

**LPD's**

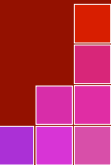


Phospholipids in bilayer

**Micela**



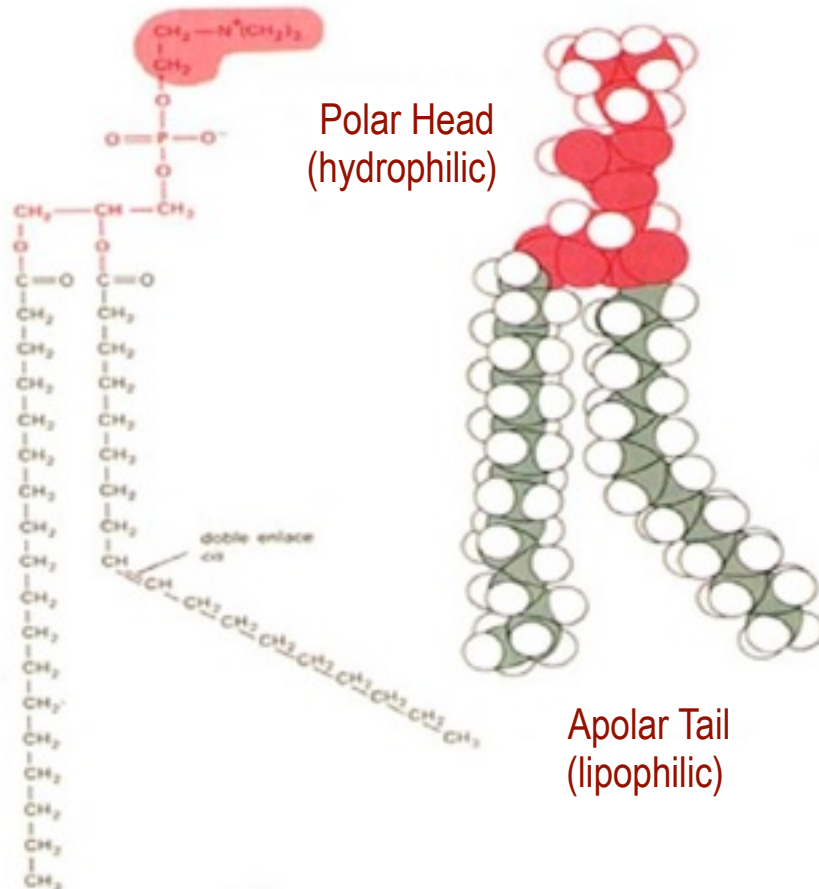
Phospholipids in monolayer



# LPD's

## Composition

### Phospholipid Structure



➤ They are mainly made of natural origin phospholipids

➤ Their characteristics are :

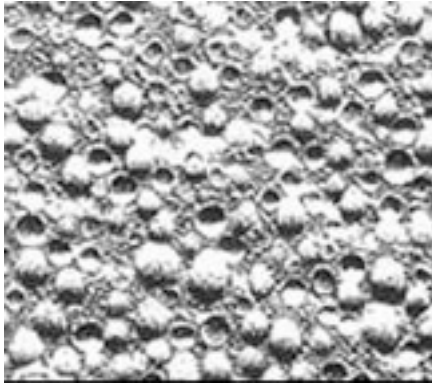
➤ To have a hydrophilic part ( polar head)

➤ and to have a lipophilic part (apolar tail)



# LPD's

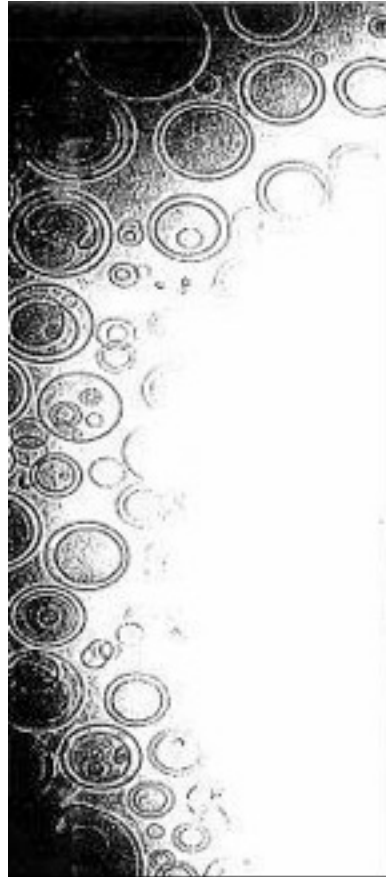
## Clasificación



LPD's unilamelars



LPD's multilamelars



LPD's oligolamelars

### ➤ Size:

➤ Small (diameter < 100 nm)

➤ Big (diameter > 100 nm)

### ➤ Number of bilayers:

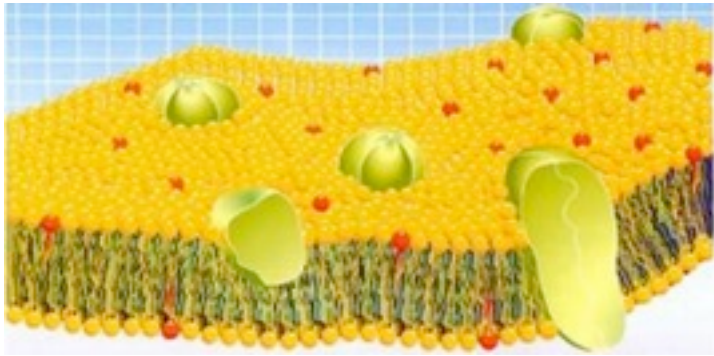
➤ Unilamelars

➤ Oligolamelars

➤ Multilamelars

# LPD's

Analogy between the cellular membrane structure and LPD's



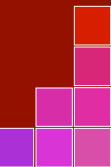
Cellular Membrane



LPD's

## Usages and Advantages

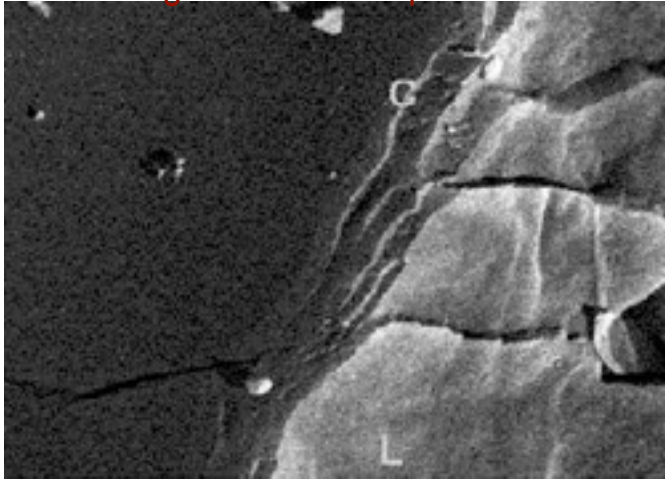
- They are **natural** delivery systems of active ingredients
- They are **controlled** and **released** carrier systems
- They are structure analogues of the cellular membranes (phospholipids)
- They increase the efficacy and decrease the unwanted side effects of the active ingredients (toxicity)



# LPD's

## Usage and Advantages

Damaged Skin. Low lipid content SC



Skin treated with LPD's. Re-epithelialized SC

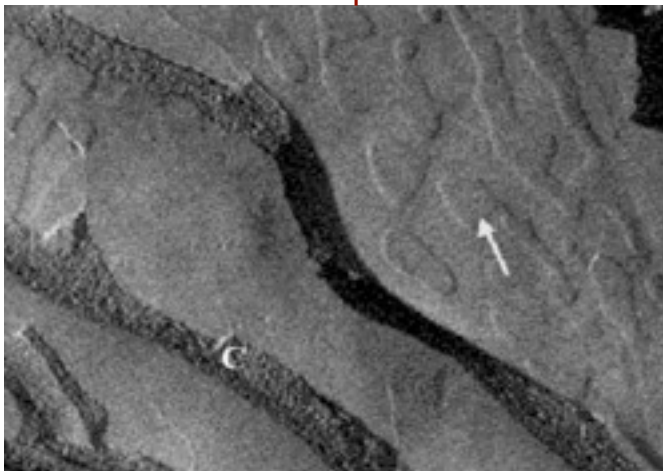
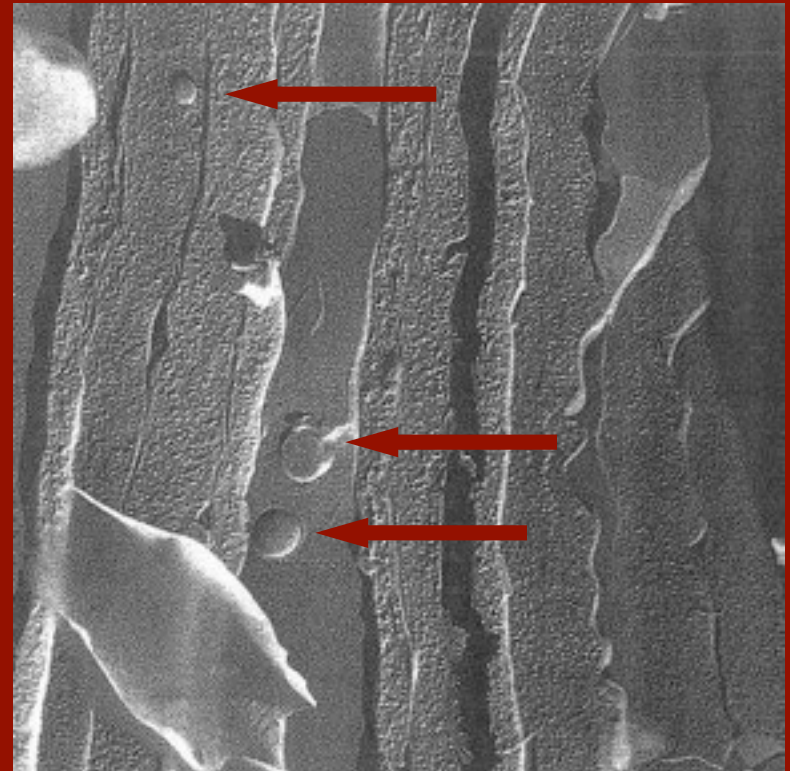


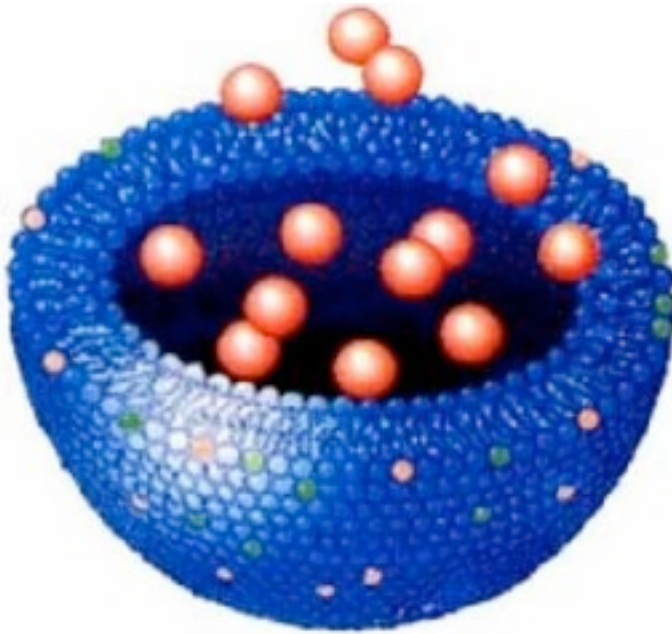
Image of the LPD's going through the SC



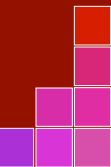
# LPD's

## Usage and Advantages

Interaction LPD's – active ingredient

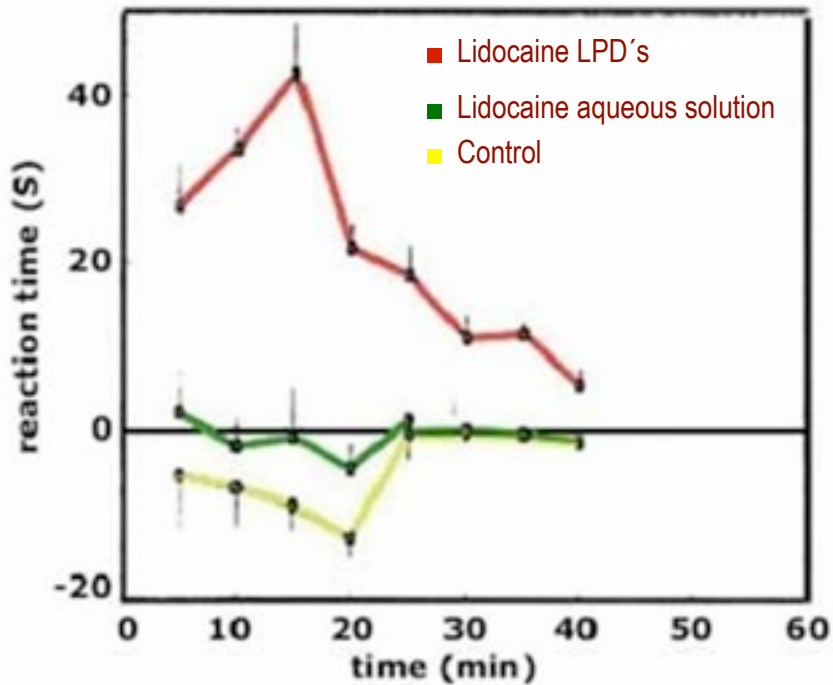


- The active ingredients reallocate at the interface of the LPD's
- Because of the structure and also the phospholipid bilayer composition, the LPD's can incorporate: :
  - Hydrophilic Actives (within the vesicle)
  - Lipophilic Actives (between the layers)



## Usages and Advantages

Improvement of the analgesic action of the lidocaine (topically applied)



- Prolongation of the bioavailability of the active ingredient
- Better absorption, penetration and diffusion of the active ingredient
- Stabilization of the active ingredient
- Introduction of alternative administration ways of the active ingredient

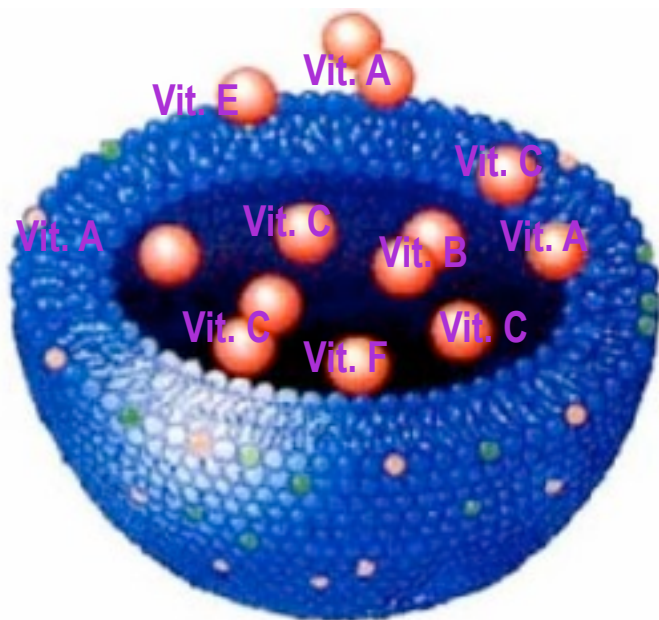


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# LPD's Multivitamin

## composition and actions



LPD's Multivitamin

### VITAMINS AND THEIR DERIVATIVES IN SKIN CARE

VITAMIN A	Normalize keratinization
	Downregulate sebum production in acne
	Reverse and treat photodamage
	Striae
	Cellulite
VITAMIN C	Antioxidant
	Regulates collagen synthesis
	Formation of stratum-corneum barrier lipids
	Regenerates Vitamin E
	Provides photoprotection
VITAMIN E	Membrane antioxidant
	Protects against oxidative damage
	Provides photoprotection
VITAMIN F	Cellular regeneration of the membranes and tissues

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ACTIVOS S.L.

# LPD's Multivitamin vitamin A

**Blocks the UV induction of the  
matrix metalloproteinases (MMP)**

**Inhibit UV-induced  
pigmentation**

**Stimulates fibroblast  
proliferation**

**vitamin a**

**Stimulates keratinocyte  
proliferation**

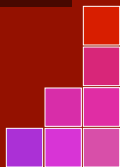
**Decreases the collagen degradation**

**Increases collagen synthesis**

**Lightening of sun-induced age spots  
and overall uneven pigmentation**

**Plumping up the dermis  
Greater thickness and resistance to  
trauma**

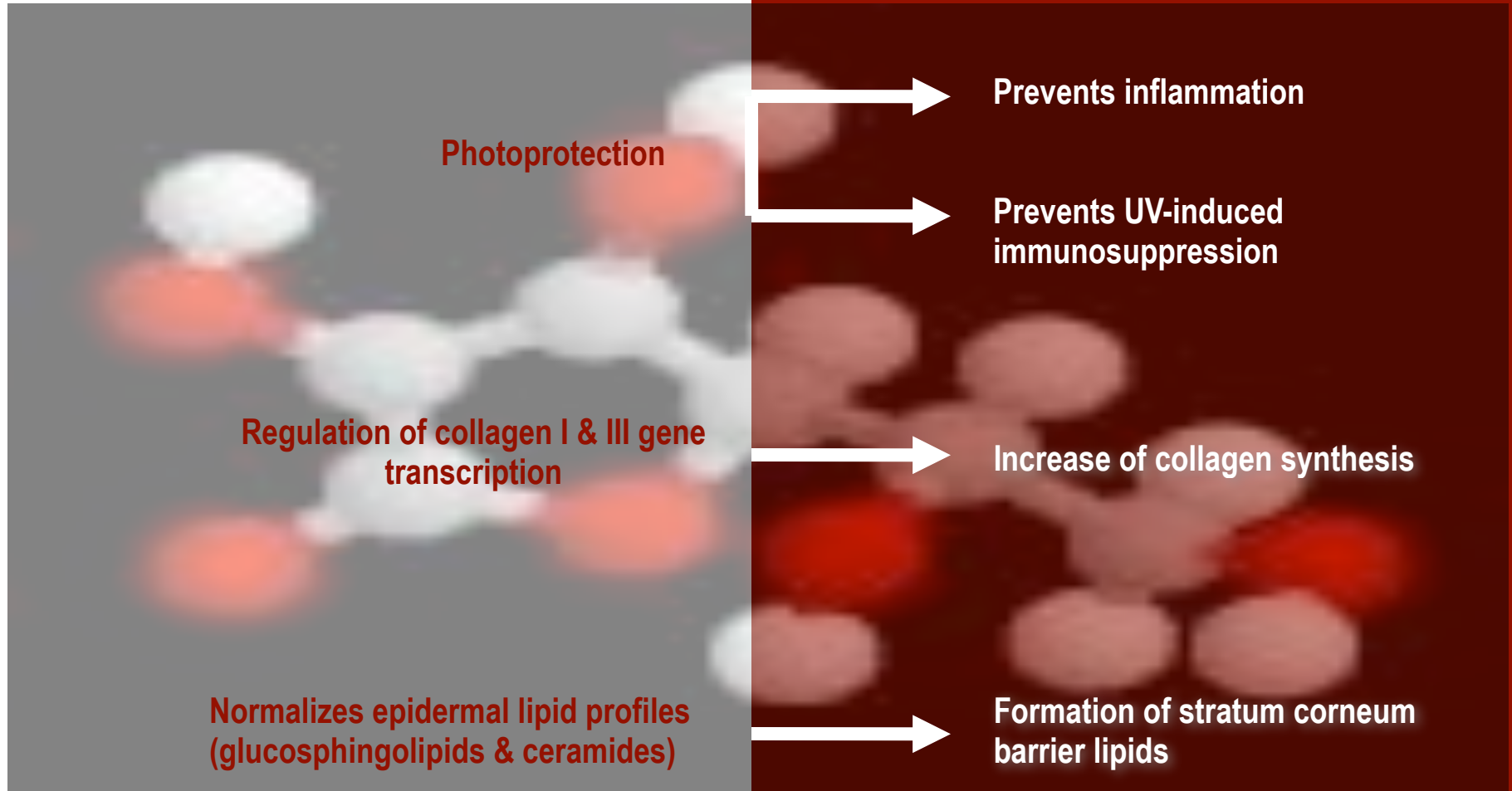
**Shedding of mature keratinocytes  
Smoother skin-surface texture**



**infinitec**

ACTIVOS S.L.

# LPD's Multivitamin vitamin C



# LPD's Multivitamin vitamin E

## Photoprotection

Regulation of collagen I & III gene  
transcription

Normalizes epidermal lipid profiles  
(glucosphingolipids & ceramides)

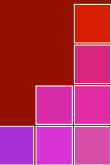
Protective effects on UV-induced  
oxidative damage

Protection against erythema

Protection against  
immunosuppression and depletion of  
Langerhans cells

Increase of collagen synthesis

Formation of stratum corneum  
barrier lipids





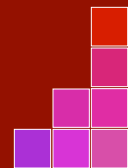


# LPD's Multivitamin vitamin F

## Mixture of polyunsaturated fatty acids :

- Linoleic Acid C18:2                      50 - 57%
- Linolenic Acid C18:3                    0,7 - 1,2%
- Arachidonic Acid C20:4                0,2 - 0,4%

- The polyunsaturated fatty acids in vitamin F can not be synthesised by the body
- Intervene in cellular regeneration of the membranes and tissues
- Ability to modify states of the skin as dryness, rashes and peeling
- Envigorating properties
- Improve the look of the cutis (also applied to eliminate small folds and wrinkles)



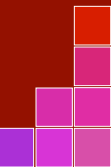
# LPD's Multivitamin efficacy test

## ➤ In vitro test :

- Fibroblast outgrowth
- MMP inhibition
- Collagen biosynthesis

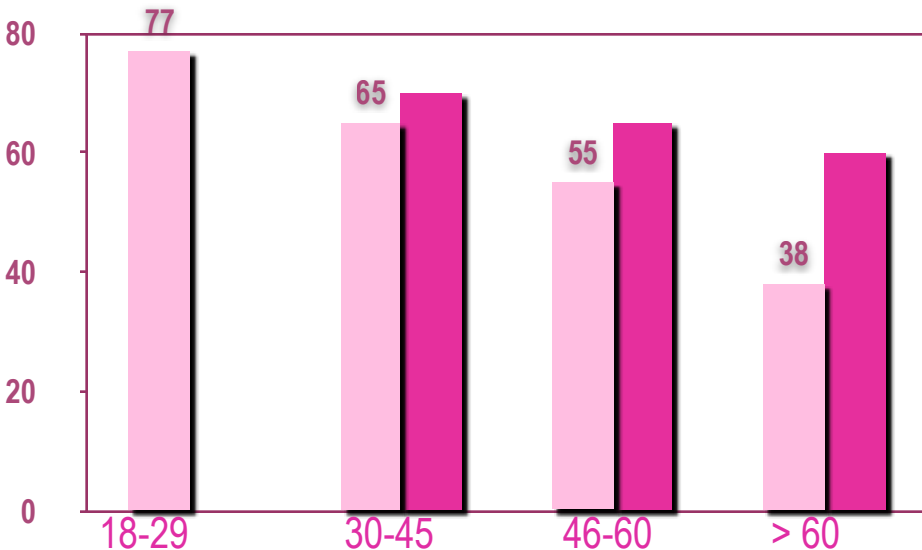
## ➤ In vivo test :

- Macro-relief of human skin



# LPD's Multivitamin fibroblast outgrowth

Fibroblast outgrowth (% positive skin fragments)



Untreated fibroblast

Treated fibroblast LPD's Multivitamin

- **Objective** : evaluate the capability of LPD's Multivitamin to increase fibroblast growth potential

- **Methodology** :

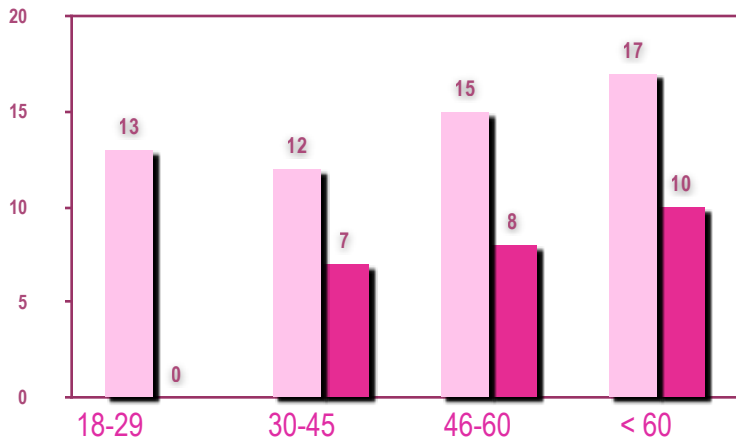
- Freshly obtained skin samples from persons of varying age were cut into small pieces and placed in culture medium to allow outgrowth of fibroblasts
- Four age groups : 18-29, 30-45, 46-60, < 60 years old
- Data are presented as the % of skin pieces from which fibroblast were isolated

- **Results** :

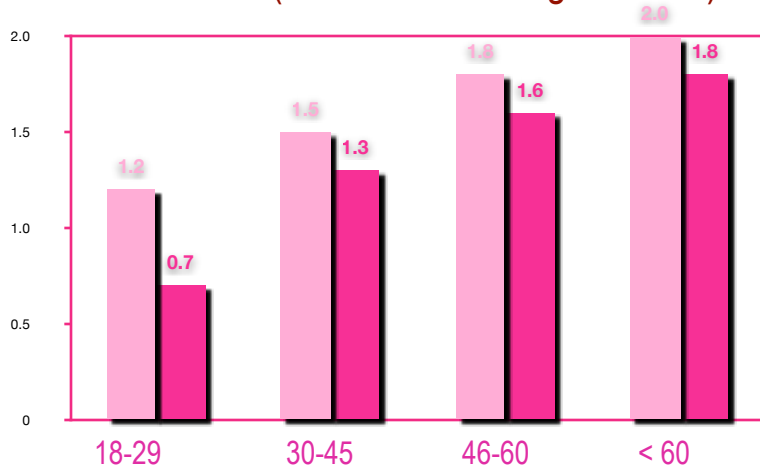
- Fibroblast growth potential is reduced with increased age
- Fibroblast growth potential is increased with LPD's Multivitamin treatment

# LPD's Multivitamin MMP assays

## Collagenase (MMP-1. Interstitial collagenase)



## Gelatinase (MMP-9. 92 kDA gelatinase)



- **Objective** : evaluate the capability of LPD's Multivitamin to inhibit MMP concentration

### • Methodology :

- Freshly obtained skin samples from persons of varying age
- Collagenase (MMP-1) levels were measured by hydrolysis and quantitated with Western blot method
- Gelatinase levels (MMP-2 and MMP-9) were measured by gelatin zymography and quantitated by scanning laser densitometry

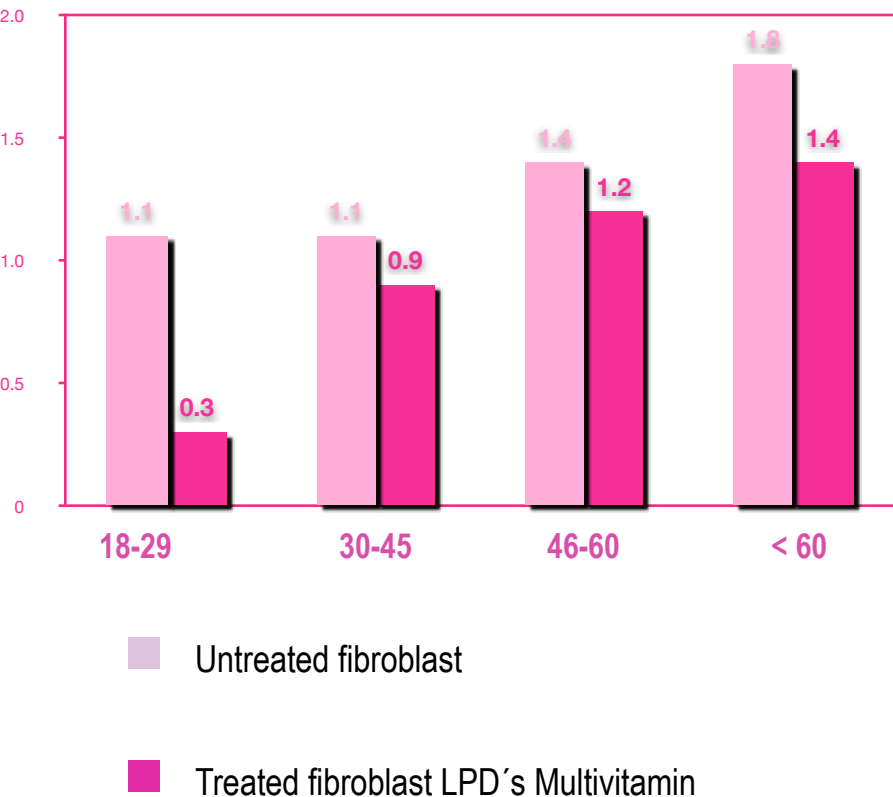
### • Results :

- MMP levels are increased in skin with increasing age
- MMP levels are reduced in skin with LPD's Multivitamin treatment



# LPD's Multivitamin MMP assays

Gelatinase (MMP-2. 72 kDA gelatinase)



• **Objective** : evaluate the capability of LPD's Multivitamin to inhibit MMP concentration

• **Methodology** :

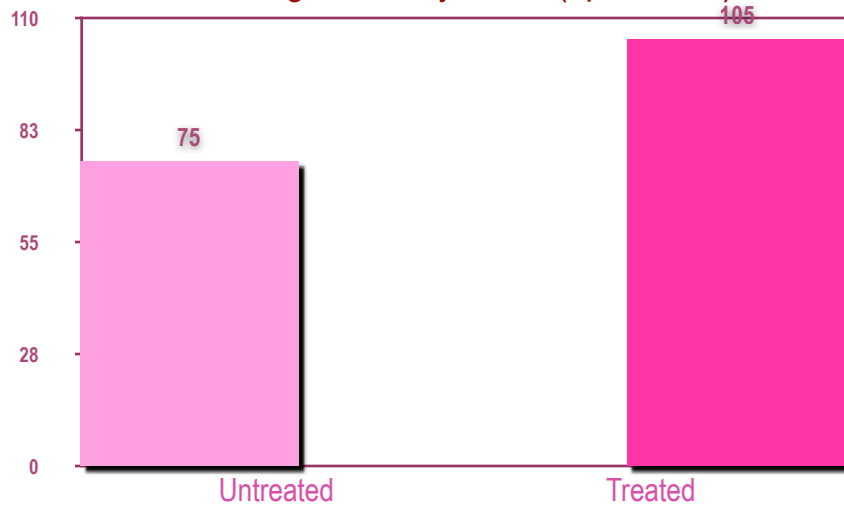
- Freshly obtained skin samples from persons of varying age
- Collagenase (MMP-1) levels were measured by hydrolysis and quantitated with Western blot method
- Gelatinase levels (MMP-2 and MMP-9) were measured by gelatin zymography and quantitated by scanning laser densitometry

• **Results** :

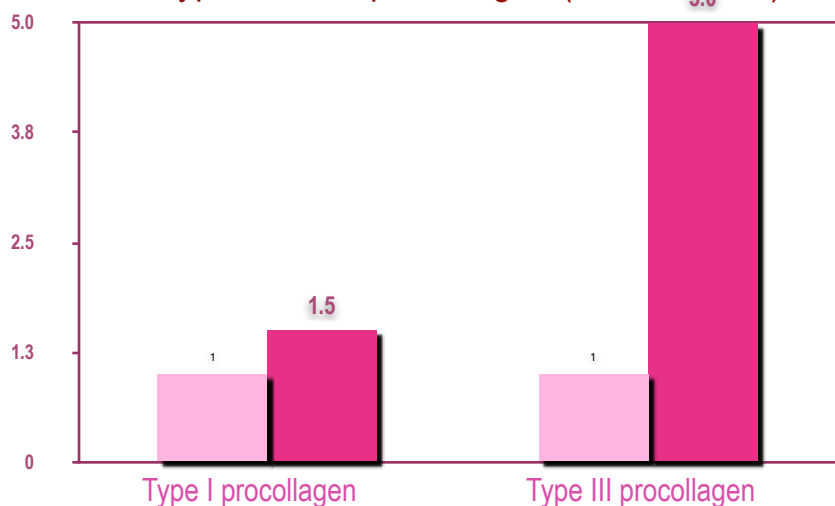
- MMP levels are increased in skin with increasing age
- MMP levels are reduced in skin with LPD's Multivitamin treatment

# LPD's Multivitamin Collagen biosynthesis

Collagen biosynthesis (cpm x 10<sup>3</sup>)



Type I and III procollagen (fold increase)



- **Objective** : evaluate the capability of LPD's Multivitamin to increase collagen synthesis

- **Methodology** :

- Freshly obtained skin samples from aged persons were incubated for 24h. in keratinocyte basal medium

- Total collagen biosynthesis was assessed by incorporation of [<sup>14</sup>C] proline into pepsin-resistant, TCA-precipitable material

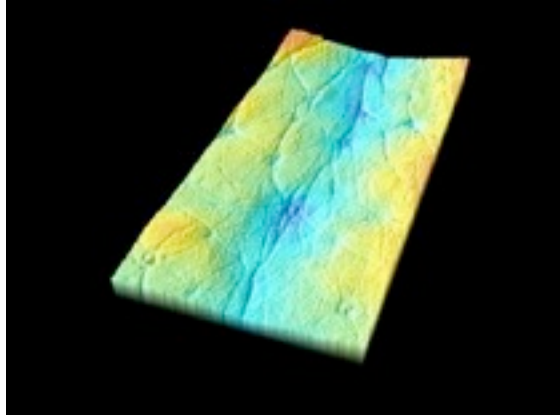
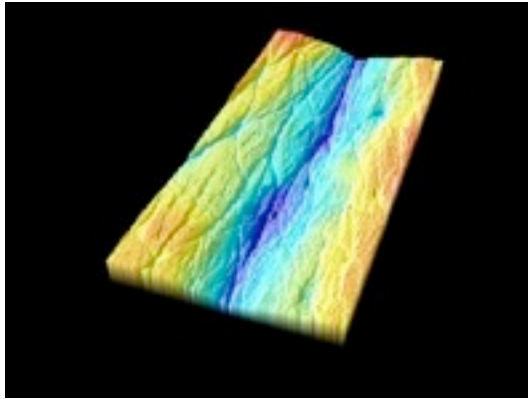
- Type I and III procollagen (α1 chain) protein levels were assessed by western blot analysis immunohistology

- **Results** :

- LPD's Multivitamin increases collagen synthesis in aged skin

# LPD's Multivitamin

## Macro-relief of human skin



N=21	
Ra	RMS
-25,55	-25,45

• **Objective** : evaluate the capability of LPD's Multivitamin at 5% to reduce wrinkles

• **Methodology** :

- Determination of the macro-relief of silicon replica from 15 volunteers obtained from the area surround the eyes.

- 4 weeks treatment, analysis of samples at time 0, before the beginning of treatment and at 4 weeks (28 days of application)

- The rugosity average has been assessed through confocal profilometry with a Profilemeter Plu and stereoscopic microscopy Optech ST3

• **Results** :

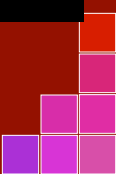
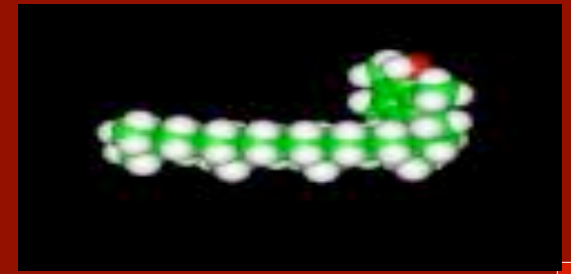
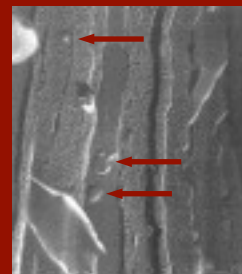
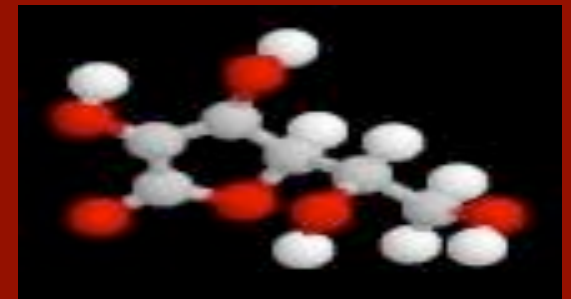
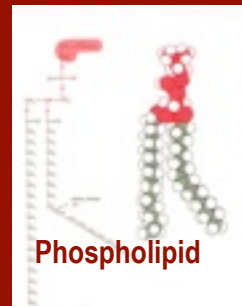
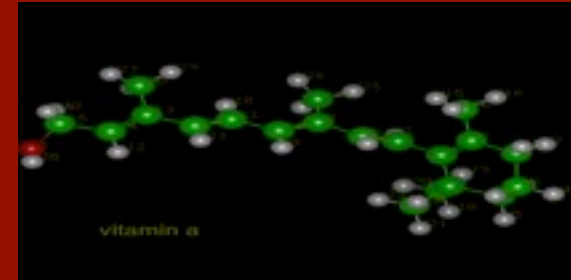
- Reduction of wrinkles of 25%

# LPD's Multivitamin

- New technology :
  - Nanosystems
  - Natural
  - Controlled and sustained release
  
- Natural active ingredients of proven efficacy
  - Vitamin A
  - Vitamin C
  - Vitamin E
  - Vitamin F



$\varnothing < 250\text{nm}$







# LPD's Multivitamin

## ➤ COSMETIC APPLICATIONS :

- Antiageing agent
- Antioxidant
- Prevention of photodamage

## ➤ DOSAGE :

- 3-5 % OF LPD's Multivitamin

