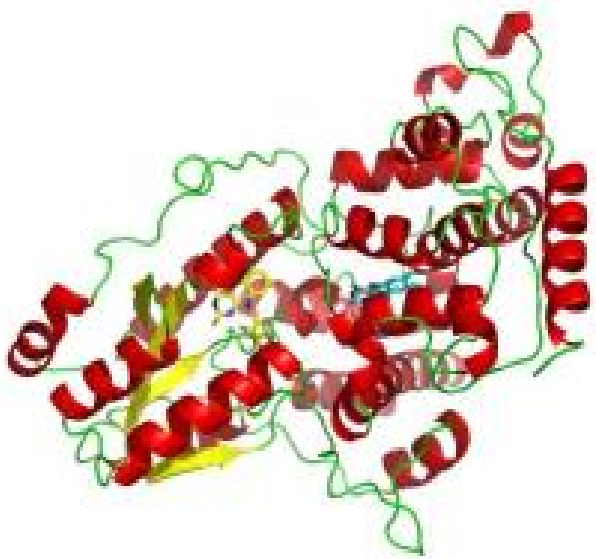
BARNET

PHOTOSOMES-V®



- DNA Repair Technology
- Breaks Dimers
- Photoactivation

CONCEPT

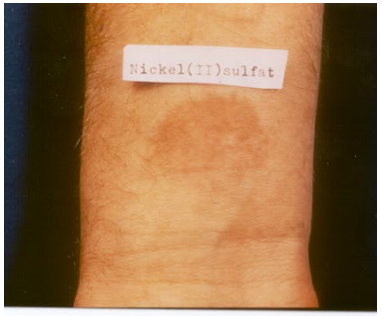
DNA is at the heart of cells, in the nucleus and in mitochondria. This has to be seen as the “computer” of the cells. Any disruption leads to major consequences such as loss of production of certain molecules, impaired molecule synthesis inflammatory messengers release, digesting enzyme release and in vivo immunodeficiency and wrinkles.

The causes of DNA damage are various: Sun (UV light), air pollution (ozone) and metabolism (2-20% of oxygen is converted to free radicals). With age the efficiency of metabolism declines. Removal of damaged proteins also declines and oxidative damage accumulates.

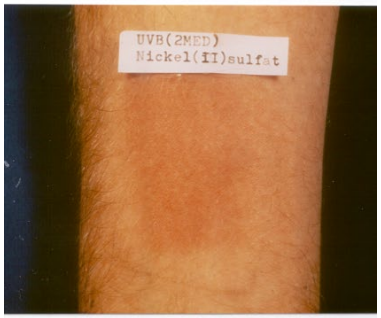
After a sunburn there are 100,000 damages to DNA in each cell and it takes one day to remove half of the direct damage. There are solutions. Photosomes-V is one of the solutions, a way to repair damage in DNA with photolyase.

INCREASE IN IMMUNE PROTECTION AFTER 1 HOUR

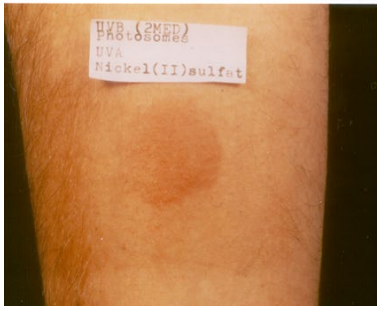
1% PHOTOSOMES-V



Nickel sulfate:
wheal and flare
immune response



UV erythema and
suppression
of immune response



Photosomes-V prevents
UV-B erythema
and restores immune
response

Increase in
resistance to
Immune
suppression in
1 h:

- 80% in epidermis
- 46% in dermis

Stege et al., PNAS 97:1790, 2000

Wheal and flare: the characteristic immediate reaction to an injected allergen in a skin test

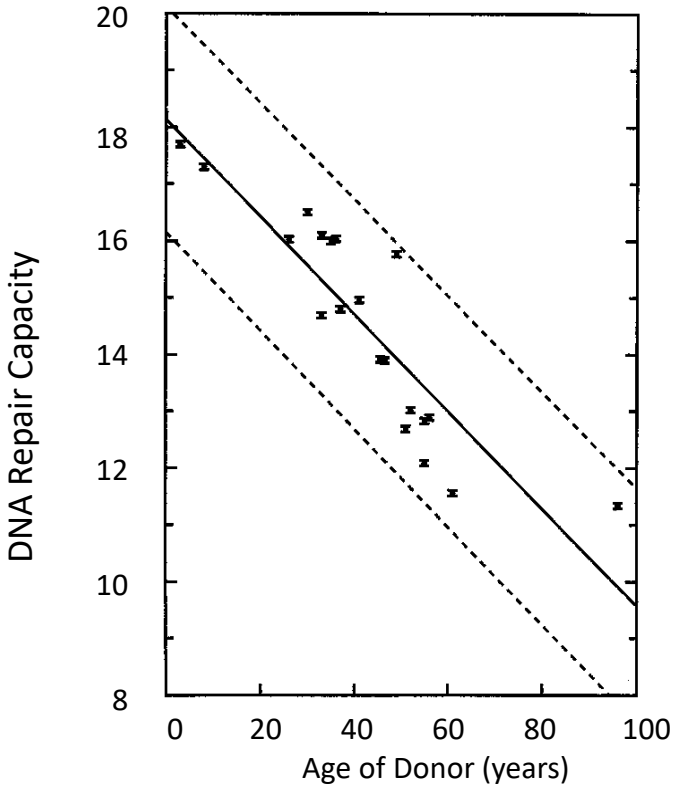
ADVANCED BIOTECHNOLOGY

Photosomes-V is a liposome containing the enzyme Photolyase. This enzyme is expressed by blue-green algae. These liposomes are made of 3 different phospholipids. One of the phospholipids is pH sensitive.

This smart targeting technology allows for a delivery of the liposomes in the epidermis and a release of the enzymes with the acidity of the lysosomal sacs. These enzymes are DNA binding proteins with a natural affinity for dimers. Once in contact of the DNA activated by light, they break the dimers and repair DNA.

Photolyase is a light-activated repair system of sun damage on DNA.

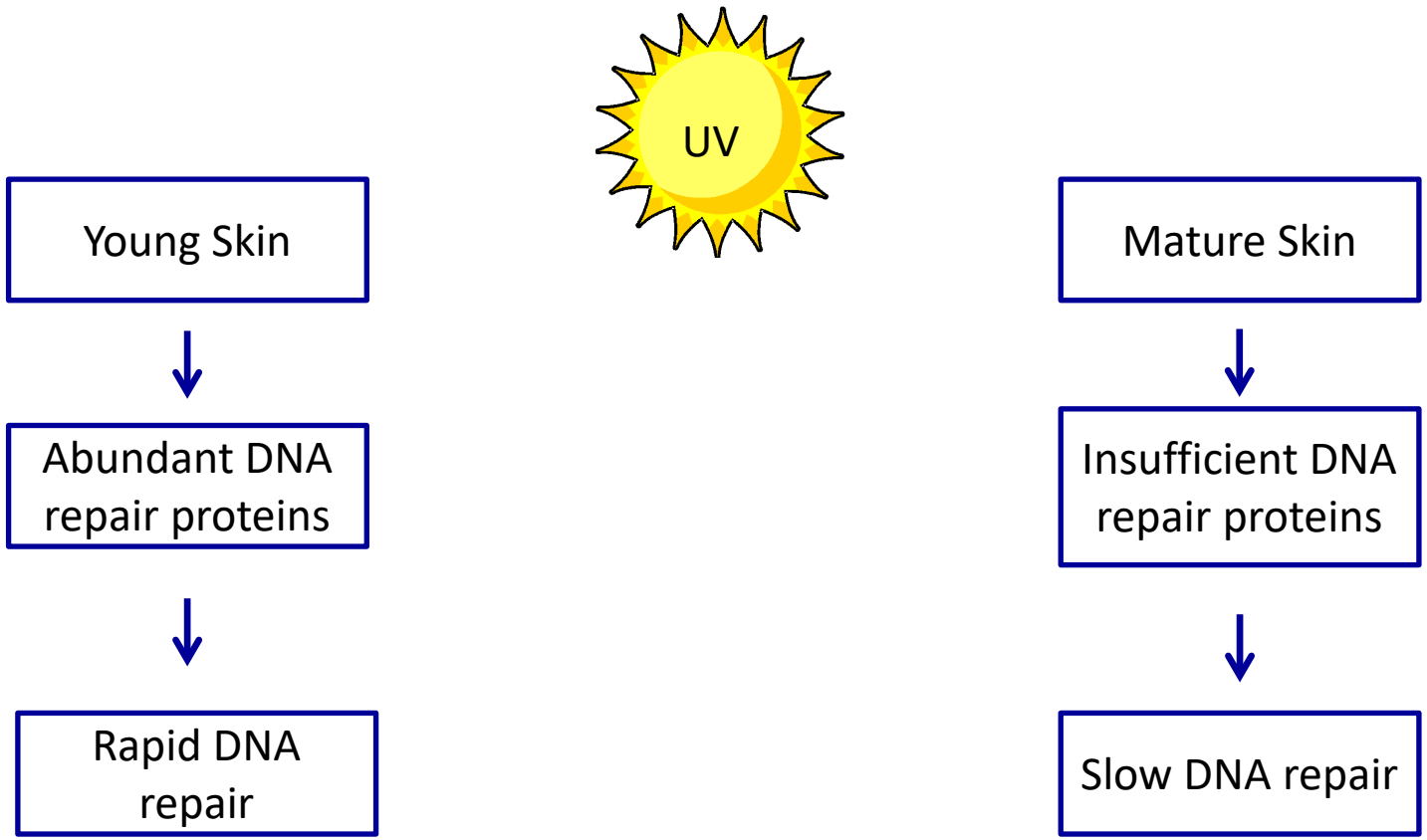
DNA REPAIR DECLINES WITH AGE



"We found an age-related decline in DNA repair capacity of –0.6% per year in primary skin fibroblasts from normal donors from the 1st to 10th decade of life"

Moriwaki et al., Mut. Res. 364:117, 1996

DNA REPAIR DECLINES WITH AGE

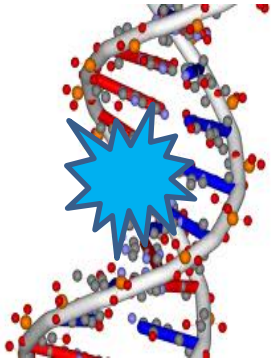


Goukassian et al FASEB J 16, 2002

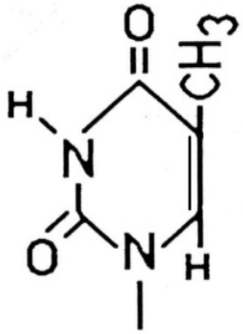
UV CREATES DIRECT DNA DAMAGE CALLED DIMERS

UV

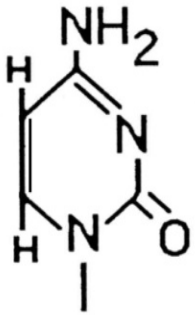
DNA Damage



Photoaging



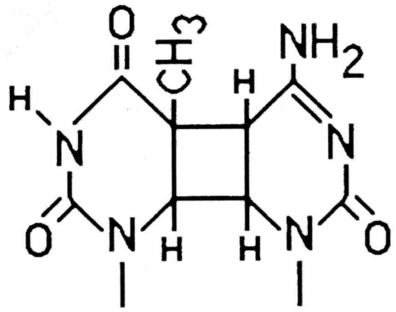
Thymine



Cytosine

UV

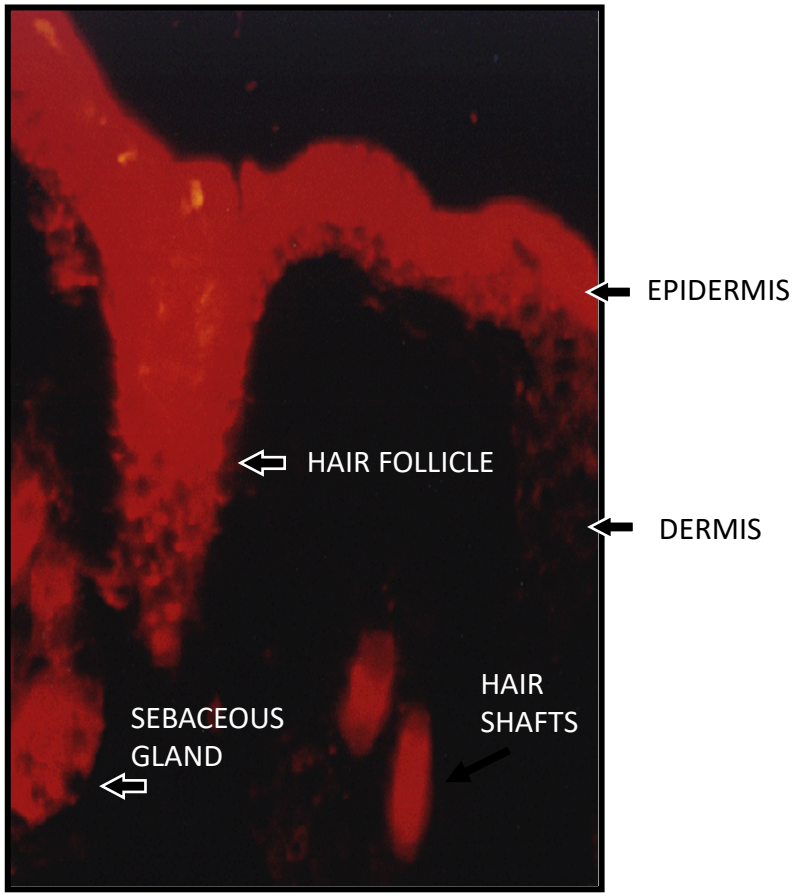
Attaches
two bases



Cyclobutane pyrimidine
dimer (CPD)
(A type of DNA damage)

LIPOSOME DELIVERY INTO THE SKIN

Liposomes (red) delivered to epidermis

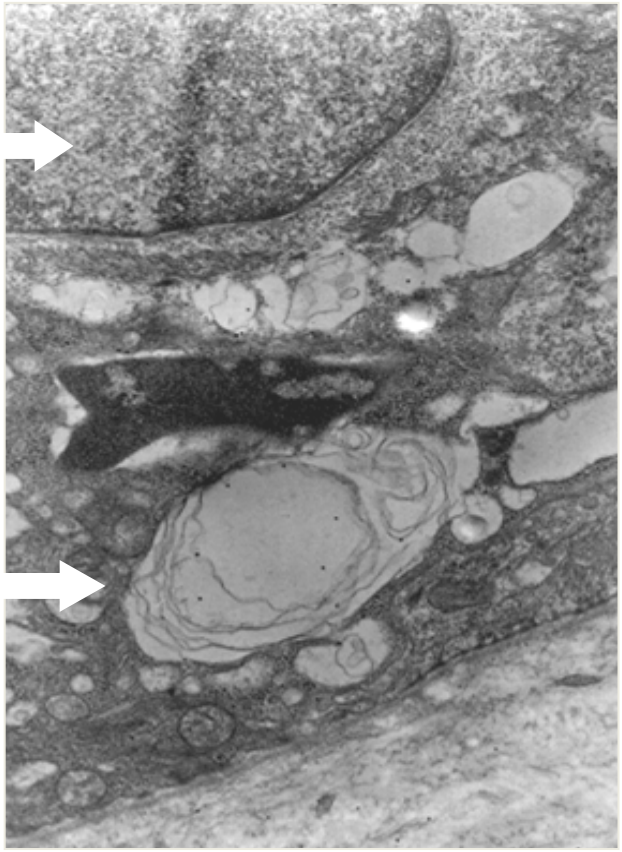


DELIVERY OF THE ENZYME INTO SKIN CELL

Magnification of a cell

Nucleus

Liposome

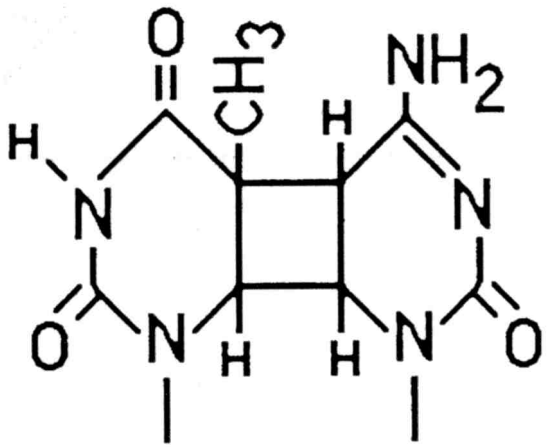


Yarosh et al. JID 103:461, 1994

The picture shows the delivery of enzymes into the nucleus.

PHOTOSOMES-V PHOTOREACTIVATION

- Direct reversal of DNA damage through Photoreactivation
- Liposomes deliver photolyase into skin
- Photolyase activity
  - Recognizes DNA damage
  - Absorbs visible light (photoreactivating light)



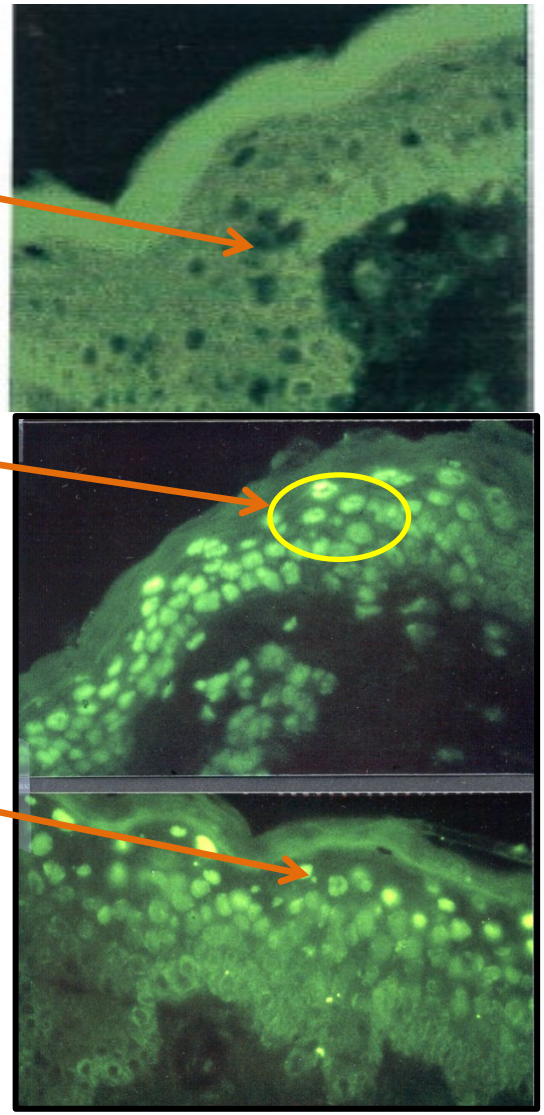
Cyclobutane pyrimidine dimer CPD

PHOTOSOMES-V 1% ENHANCES REPAIR IN SKIN

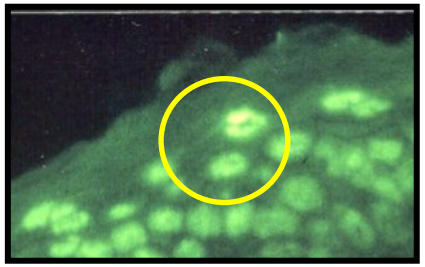
No UVB exposure

Post 24-hour exposure with UVB
(presence of CPDs)

Post 24-hour UVB exposure +
Photosomes-V + Visible light
with reduction in CPDs

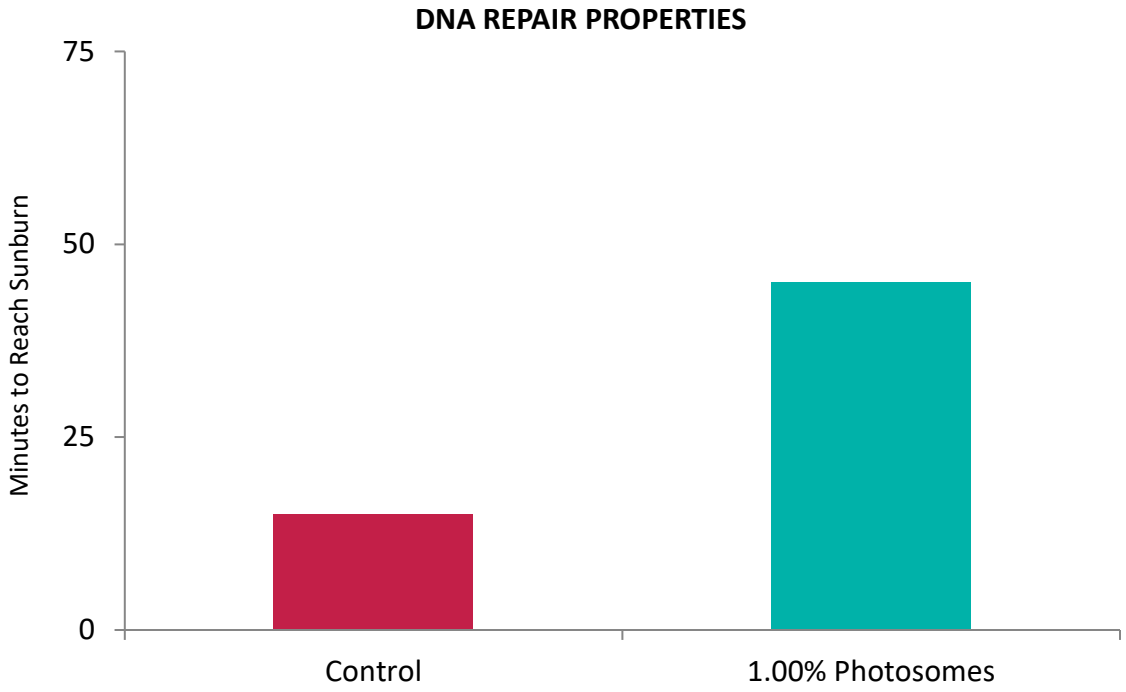


CPDs



Stege et al., PNAS
97:1790, 2000)

PHOTOSOMES-V DNA REPAIR PROPERTIES



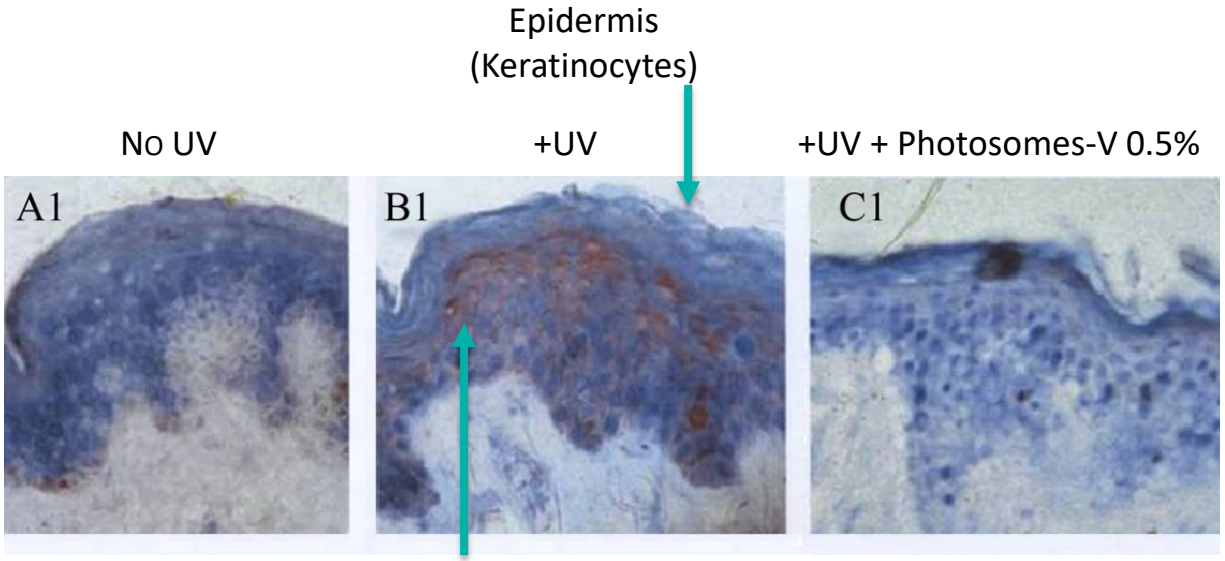
IN VIVO

- Photosomes-V was tested in vivo (5 subjects) to increase time exposure to sun before a sunburn becomes visible. This exemplifies the DNA repair effect as DNA damage is occurring.
- An in vivo study was performed where Photosomes-V or a control was applied to several test sites. After one hour the solar simulating light was applied, a different amount to each site, increasing in minutes of light at each site. After 24 hours the treated sites were examined.
- The site treated with the control for less than 15 min got red, as did all the sites that were treated with more than 15 min.
- The Photosomes-V treated sites, redness did not appear until looking at the site that got 50 minutes of exposure to the solar stimulating light.

PHOTOSOMES-V 0.5% REDUCES PHOTOAGING

UV causes release of MMP-1 through cross talk

- MMP-1 (collagenase) were stained brown, using antibodies
- Photosomes-V repair DNA in Keratinocytes which do not send stress signals to Fibroblasts. Without stress Fibroblasts do not produce MMP-1

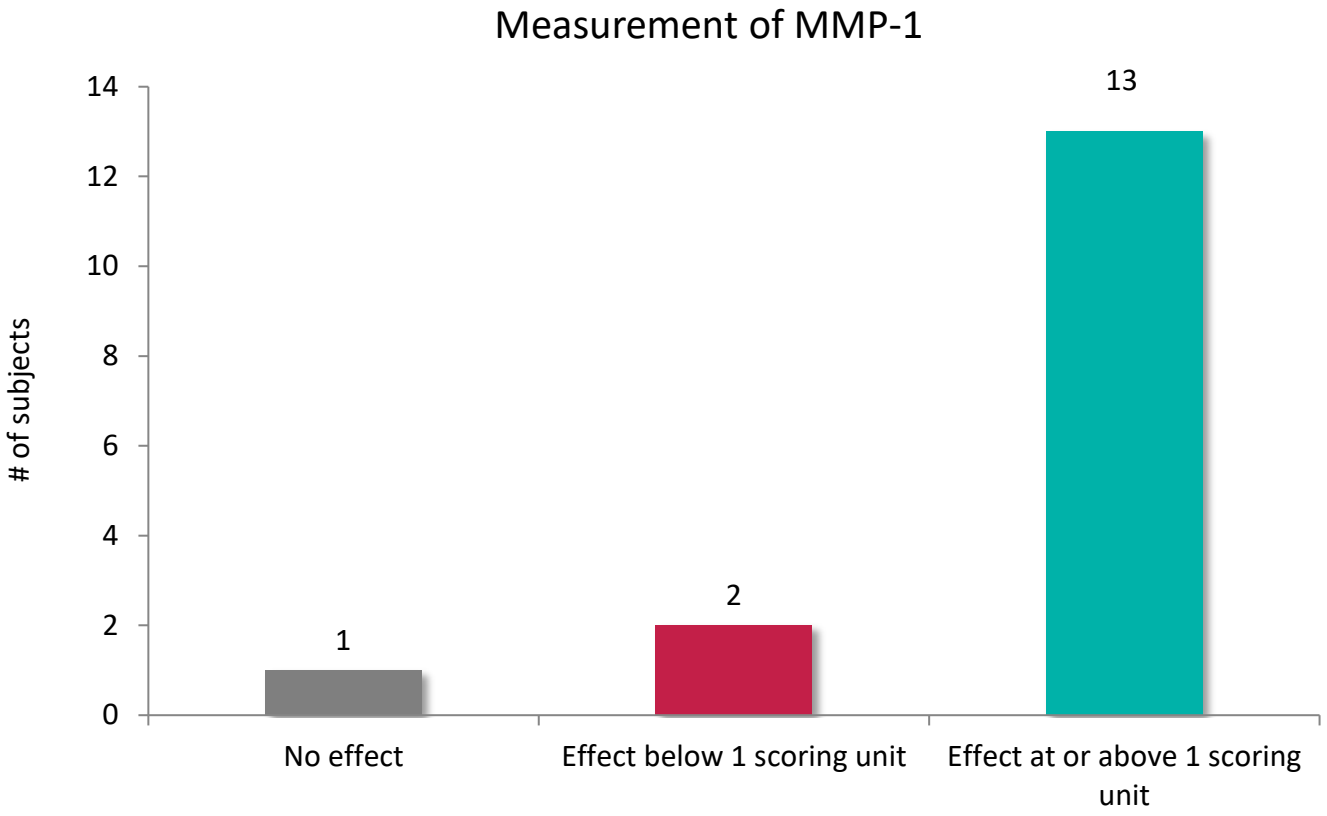


Dong et al., Exp. Derm. 17:2, 2008

PHOTOSOMES-V IN VIVO AT 0.5%

- 16 individuals
- Exposed to 1MED of UV-B on the skin of the buttocks
- Measurement after 1 hour
- Treatment of skin with or without Photosomes-V (0.5%) lotion
- Exposure of skin to UV-B
- Exposure of skin to 30 min photoreactivating light
- Biopsy after 22.5 hours
- Biopsies are observed in all 16 subjects and scored for MMP-1 staining on a scale of 1-3, after or not using Photosomes-V.

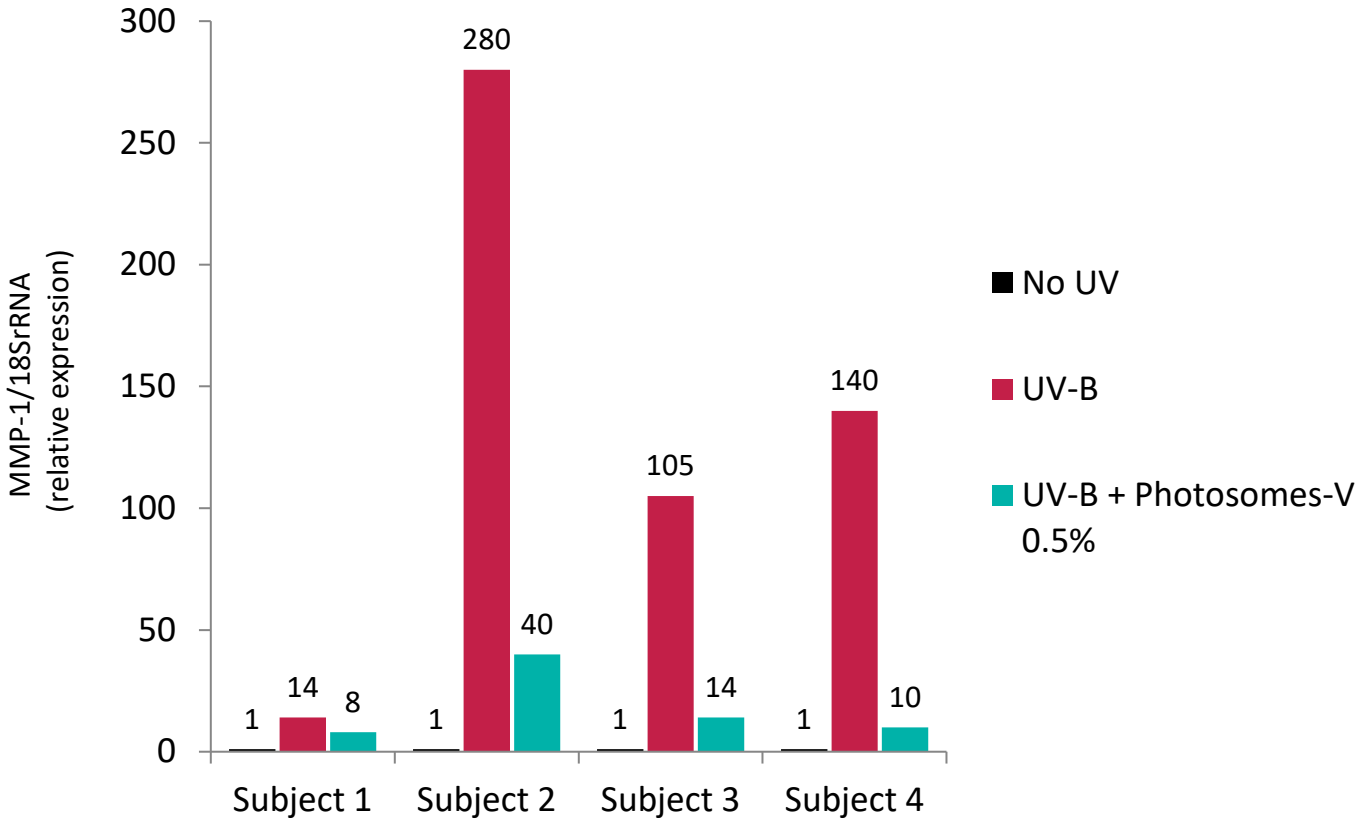
MEASUREMENT OF MMP-1



Tested in vivo at 0.5%, Photosomes-V reduced significantly MMP-1 expression.

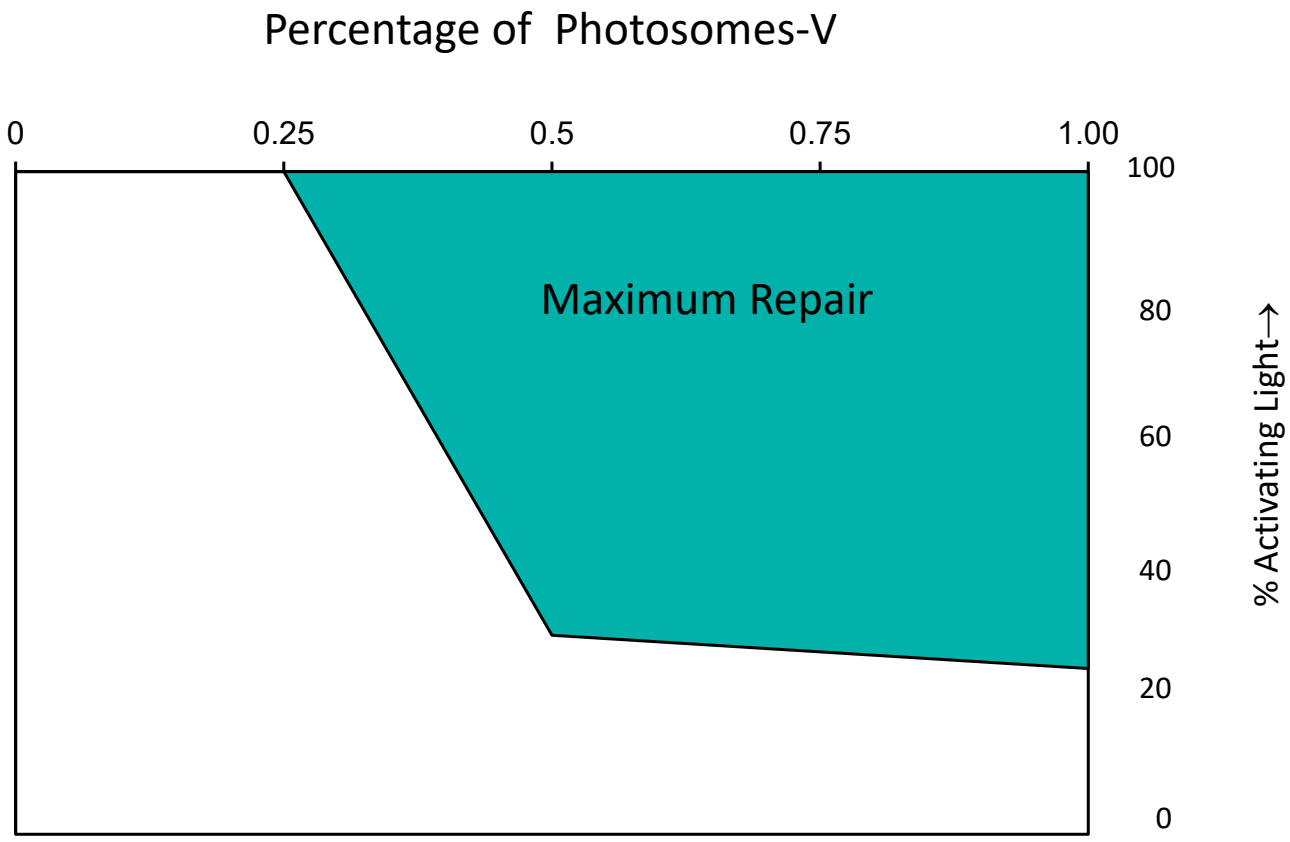
EXAMPLES OF RESULTS ON 4 VOLUNTEERS IN VIVO

MMP-1 EXPRESSION



MMP-1 is a major enzyme for collagen digestion. Destruction of collagen is a hallmark of photoaging.

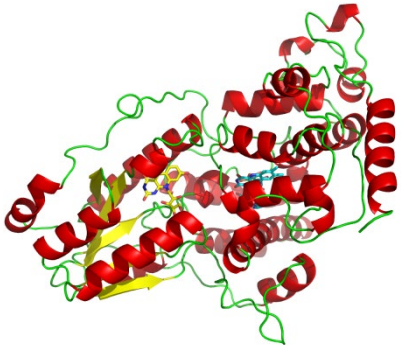
PHOTOSOMES-V DOSE RESPONSE



Increasing Photosomes-V concentration means less light is needed for activity.

CONCLUSION

- Repair Enzyme = Photolyase
  - Expressed from blue-green algae
- Encapsulated in vegetable liposomes
- Light-activated repair of sun damage



BARNET

PHOTOSOMES-V®

INCI Name: Water (and) Plankton Extract (and) Lecithin

Preservative: Phenoxyethanol*

Suggested Use Level: 0.50-1.00%

Formulation Guidelines: Photosomes-V is a white to pale yellow translucent liquid with liposomes suspended in an aqueous solution and a characteristic odor. Photosomes-V is water soluble. The recommended pH range is 6.0-8.0.

Global Compliance and Product Features:

COUNTRY	COMPLIANCE
AUSTRALIA	Listed AICS
CANADA	Listed DSL
CHINA	Listed IECIC; Contact Us
EU	<1 MT Exempt

For additional information please contact technical@barnetproducts.com.
*An alternate version, Photosomes V-PF, preserved with Phenethyl Alcohol and Hydroxyacetophenone is available upon request.