

mibelle**biochemistry**



PhytoCellTec™ Solar Vitis  
Protects epidermal stem cells  
against UV damage





# PhytoCellTec™ Solar Vitis

## Protects epidermal stem cells against UV damage

### A Revolutionary Technology to Protect Skin Stem Cells against UV-induced Aging

PhytoCellTec™ Solar Vitis is a powder based on the stem cells of a rare red-flesh grape tolerant to strong UV radiation.

UV radiation is responsible for 80 % of face aging. Despite the use of sun filters, toxins and oxidants are generated by UV in the skin. This affects the most sensitive cells such as the epidermal stem cells which are rare and essential. Thus, their protection against UV stress is of great importance.

A rare grape cultivar of Gamay was selected. Stem cells from this cultivar were obtained using our PhytoCellTec™ technology and were then incorporated in a water-soluble powder. These grape stem cells contain special epigenetic factors and metabolites which are able to protect human skin stem cells against UV radiation.

Using a novel Progenitor Cell Targeting technology, PhytoCellTec™ Solar Vitis was shown to:

- help the skin stem cells to maintain their stem cell characteristics
  - protect these precious cells against UV-induced stress.
- Besides, a clinical study showed the capacity of PhytoCellTec™ Solar Vitis to increase the tolerance of the skin to UV.

PhytoCellTec™ Solar Vitis can thus protect both the skin and the epidermal stem cells against the stresses induced by UV, the main aging factor.

### Claim Ideas for PhytoCellTec™ Solar Vitis

- Protects skin stem cells against UV stress
- Increases the skin's UV tolerance
- Fights photo-aging
- For a vital and healthy-looking skin

### Applications

- Advanced "stem cell cosmetic" formulas
- Face and body care to protect the most valuable skin cells, the stem cells
- Daily skin care to prevent photo-aging

### Formulating with PhytoCellTec™ Solar Vitis

- Recommended use level: 0.4–1 %
- Incorporation: Dissolve PhytoCellTec™ Solar Vitis into the aqueous phase or add pre-solved, during the cooling phase (<60 °C). PhytoCellTec™ Solar Vitis is dissolvable at up to 20 % in water.
- Thermostability: Temperatures of up to 60°C for a short time do not affect the stability of PhytoCellTec™ Solar Vitis.

### INCI / CTFA-Declaration

Vitis vinifera (Grape) Fruit Cell Extract (and) Isomalt (and) Lecithin (and) Sodium Benzoate (and) Aqua / Water

### Additional Information

- PhytoCellTec™ Solar Vitis contains 50 % of Solar Vitis stem cell extract
- Phenoxyethanol-free

# PhytoCellTec™ Solar Vitis

## A grape cultivar with a high self-protecting power

### High Anthocyanin Content in a Rare Grape

PhytoCellTec™ Solar Vitis is based on the stem cells of the Gamay Teinturier Fréaux grape.

This cultivar, originating from the Burgundy region in France, is characterized by its red flesh and juice due to the extremely high anthocyanin content.

Most red grape varieties have white flesh under their skin but in the case of the Gamay Teinturier Fréaux, anthocyanin pigments are also present in the pulp.

Anthocyanins are powerful antioxidants and free radical scavengers. They act as a “sunscreen” by absorbing UV radiation. Their effectiveness is further enhanced by interaction with other phytochemical substances present in the grape.

The high level of tannins also gives an undesirable taste to wines. This variety has therefore, almost completely disappeared.

# PhytoCellTec™ Solar Vitis

## UV can affect epidermal stem cells

### Protection of Stem Cells is Essential

Our skin contains stem cells which are located in the basal layer of the epidermis.

Their main functions are to replenish and maintain the balance of cells within the skin as well as to regenerate damaged tissues.

Epidermal stem cells are thus:

- essential for the renewal and repair of the skin
- the unique source of keratinocytes.

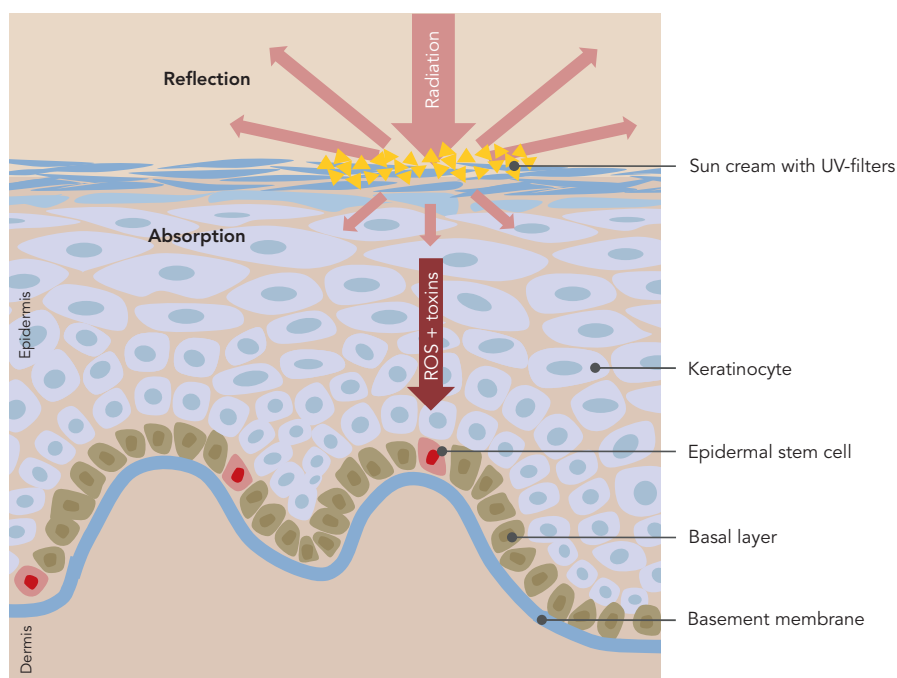
Therefore, their protection is of great importance.

### Skin Stem Cells and UV Radiation

UV radiation which generates toxins and reactive oxygen species (ROS) in the skin, is responsible for 80 % of face aging.

Despite the use of sun filters, toxins and ROS are still generated by UV in the skin. This affects the most sensitive cells such as the epidermal stem cells. That is why the protection of skin with sun filters is insufficient.

### Skin Stem Cells and UV Stress



# PhytoCellTec™ Solar Vitis

## Grape stem cells to protect epidermal stem cells

### Skin Repair is Controlled by Epidermal Stem Cells

UV radiation generates free radicals in the skin which can provoke erythema and affect the activity of epidermal stem cells leading to photo-aging.

Because epidermal stem cells control skin repair, preserving these precious cells is essential to protect the whole skin against UV-induced damage.

### Plant Stem Cells for Skin Stem Cells

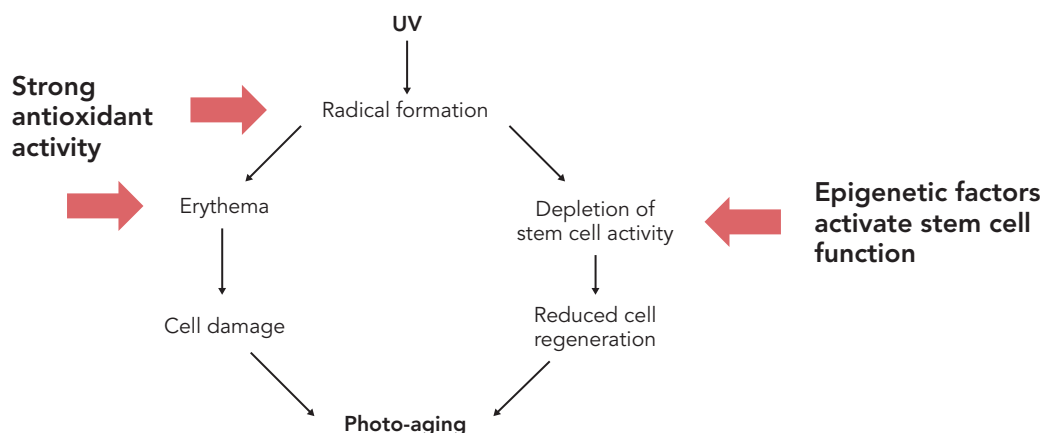
All stem cells, independent of their origin (plant, animal or human) contain specific epigenetic factors whose function is to maintain the self-renewal capacity of stem cells. Therefore the Solar Vitis stem cells are used to help to preserve the vitality of human skin stem cells.

### Double Protection against UV-induced Damage

Thanks to the grape stem cells, PhytoCellTec™ Solar Vitis preserves the vitality of skin stem cells.

Besides, due to the strong antioxidant power of the Gamay Teinturier Fréaux grape, PhytoCellTec™ Solar Vitis protects the skin cells and notably the epidermal stem cells against UV-induced stress.

### Mechanism of PhytoCellTec™ Solar Vitis



# PhytoCellTec™ Solar Vitis

## Advanced biotechnology to cultivate plant stem cells

### PhytoCellTec™ by Mibelle Biochemistry

Mibelle Biochemistry has developed a novel technology called PhytoCellTec™, enabling the large scale cultivation of cells from rare and endangered plant species.

This technology is based on the unique totipotency of plant cells that is to say:

- the capacity of every plant cell to regenerate new organs or even the whole plant
- the capacity of every plant cell to dedifferentiate and become a stem cell.

Our PhytoCellTec™ technology relies on the wound healing mechanism of a plant: part of a plant is wounded to induce the formation of callus cells. This healing tissue consists of dedifferentiated cells which are stem cells. Callus cells are harvested and cultivated in a suspension. A novel bioreactor system enables the large scale production.

To obtain the PhytoCellTec™ Solar Vitis cosmetic ingredient, these stem cells are harvested and homogenized at 1200 bar together with phospholipids to encapsulate and stabilize oil- and water-soluble components into liposomes. The resulting extract is carefully sprayed on a powder based on isomalt.

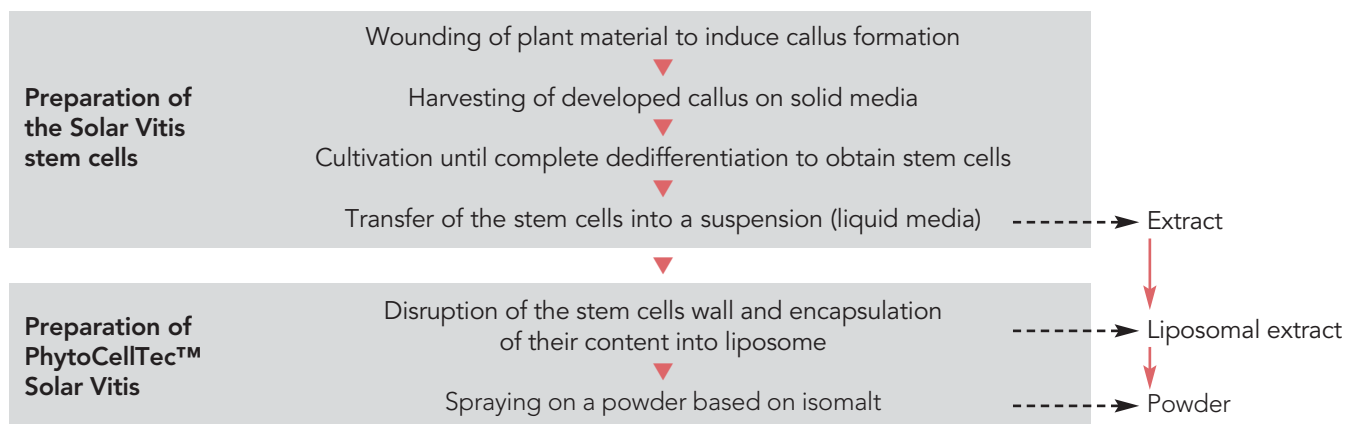
PhytoCellTec™ Solar Vitis is thus rich in epigenetic factors and metabolites which preserve the function of skin stem cells and protect them against UV radiation.

### Advantages of PhytoCellTec™ Technology

This innovative technology developed by Mibelle Biochemistry offers the following advantages:

- possibility to cultivate cells of rare and endangered plants based on small amounts of origin plant material
- availability of plant material independent of the season and market demand
- plant material completely free of environmental pollutants and pesticides
- constant concentrations of metabolites in the stem cells

### PhytoCellTec™ Solar Vitis Process



# PhytoCellTec™ Solar Vitis

## Study results



### Preparation of Epidermal Stem Cells

A novel Progenitor Cell Targeting technology was used to prepare human epidermal stem cells.

This technology consists of culturing a skin sample in a medium specifically designed to mimic the micro-environment of the stem cell in the epidermis.

This special, fully defined cell culture medium leads to an enrichment of so called keratinocyte progenitor cells that can be considered as stem cells. This enrichment was quantitatively controlled through FACS (Fluorescence-activated cell sorting) of cells which were labelled with CD34 and  $\alpha 6$  integrin, two well-known markers of epidermal stem cells. Compared to freshly isolated cells, the cell population of passage 3 was characterized by a 10-fold increase of CD34/ $\alpha 6$  integrin double labelled cells.

The Progenitor Cell Targeting technology provides a cell culture model which specifically enables the evaluation of the effects of compounds on epidermal stem cells.



### The Capacity to Form a Colony is a Characteristic of Stem Cells

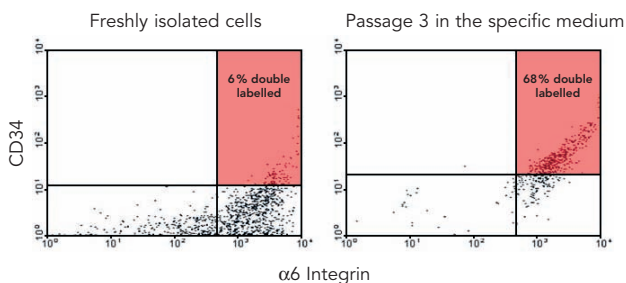
Stem cells can make identical copies of themselves as well as generate specialized cells.

They have the capacity to form a colony consisting of:

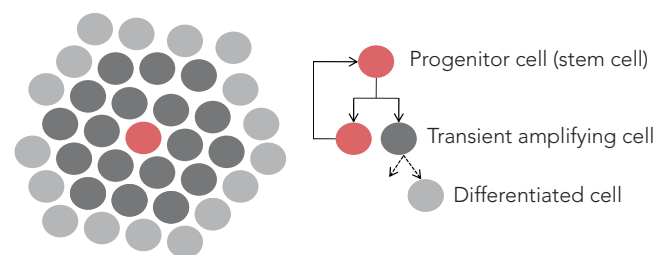
- themselves
- transient amplifying cells (cells in an intermediate state)
- differentiated cells which have lost the capacity to divide.

This capacity to form a colony, called CFE (colony-forming efficiency), is a characteristic of stem cells. To measure CFE, cells are seeded at a low density. The number of colonies formed is a value of the concentration of vital progenitor / stem cells.

### Enrichment of Keratinocyte Progenitor Cells



### Capacity to Form a Colony (CFE)







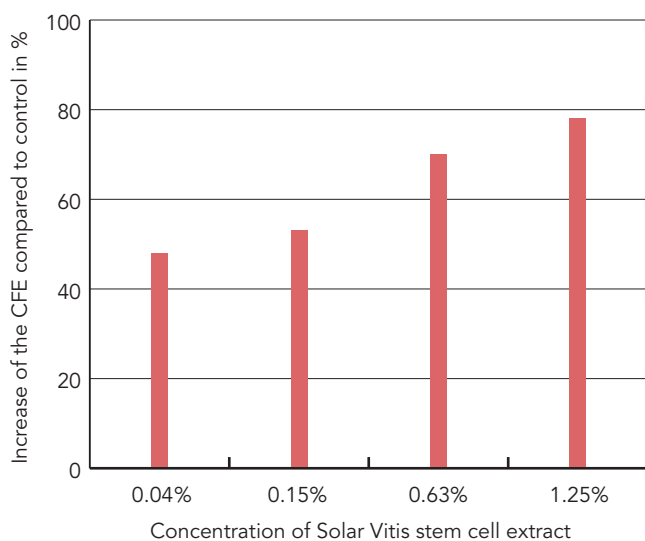
### Maintenance of Epidermal Stem Cell Characteristics

The epidermal stem cells obtained using the previously described method, were treated with different concentrations of the Solar Vitis stem cell extract. Then, the effect of the Solar Vitis stem cell extract on the CFE was analysed.

Results showed the capacity of the Solar Vitis stem cell extract to strongly increase the CFE: the CFE was stimulated by almost 50 % in the presence of 0.04 % Solar Vitis stem cell extract and by almost 80 % in the presence of 1.25 % Solar Vitis stem cell extract.

This clearly shows that Solar Vitis stem cell extract helps the epidermal stem cells to maintain their stem cell characteristics ("stemness").

### Increase of the Colony-Forming Efficiency (CFE)



# PhytoCellTec™ Solar Vitis

## Study results



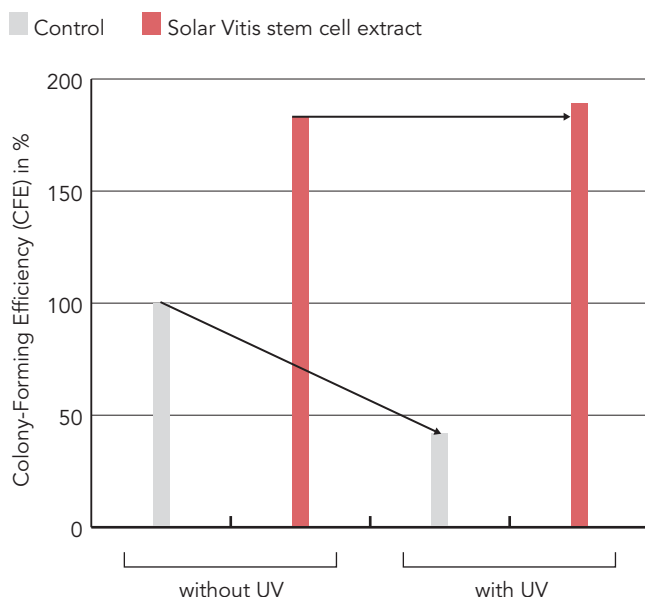
### Protection of Epidermal Stem Cells against UV Stress

The epidermal stem cells obtained using the previously described method, were treated with and without the Solar Vitis stem cell extract. Some were then exposed to UVA+UVB-light at 450 kJ/m<sup>2</sup> whilst others were left unexposed. Afterwards, the CFE was determined.

- Results confirmed that the Solar Vitis stem cell extract increased the CFE of epidermal stem cells.
- Results also showed a 58 % decrease of the CFE when epidermal stem cells were exposed to UV radiation (control). But, the presence of the Solar Vitis stem cell extract could completely counteract the negative effect of UV on these cells: the CFE remained at the same level.

This clearly shows that Solar Vitis stem cell extract protects epidermal stem cells against UV-induced stress.

### Protection of Stem Cells against UV Stress





### Protection of the Skin against UV-induced Stress

The capacity of PhytoCellTec™ Solar Vitis to protect the skin against UV-induced stress was evaluated by determining its influence on the minimal erythral dose (MED). MED is the lowest amount of UV that produces skin redness 24 hours after exposure. This is thus a value of the stress induced by UV on skin.

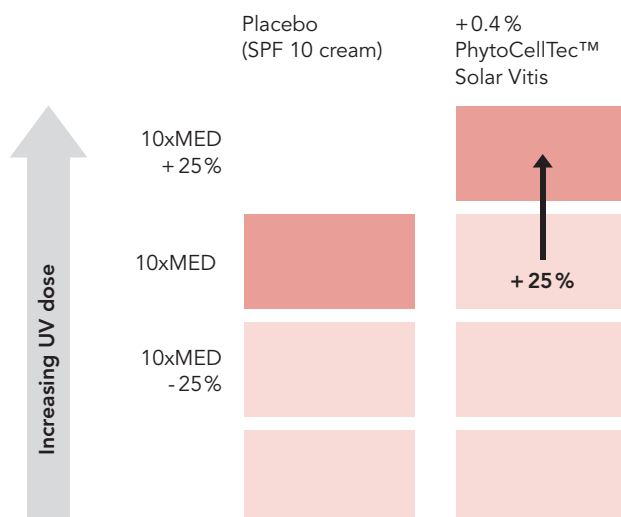
MED was determined by assessing visually skin redness 24 hours after UV radiation using a sun simulator.

- At the beginning of the study, MED was determined on the untreated skin of 20 volunteers aged from 19 to 63.
- Then, the test areas were treated once with a SPF 10 cream with and without 0.4 % PhytoCellTec™ Solar Vitis.
- Afterwards, the skin was irradiated with UV doses whose intensities were in the range of the MED multiplied by the SPF.
- 24 hours later, the redness of the skin was evaluated again.

Results showed that PhytoCellTec™ Solar Vitis significantly increased the MED compared to the placebo: The skin tolerated a 25 % higher UV dose, which corresponds to an increase of the SPF from 10 to 13.

PhytoCellTec™ Solar Vitis can thus protect the skin against UV-induced stress.

### Increase of UV Tolerance



# PhytoCellTec™ Solar Vitis

## Protects epidermal stem cells against UV damage

### Claim Ideas for PhytoCellTec™ Solar Vitis

- Protects skin stem cells against UV stress
- Increases the skin's UV tolerance
- Fights photo-aging
- For a vital and healthy-looking skin

### Applications

- Advanced "stem cell cosmetic" formulas
- Face and body care to protect the most valuable skin cells, the stem cells
- Daily skin care to prevent photo-aging

### Marketing Benefits

- Plant stem cells to protect skin stem cells (patent pending)
- Proven efficacy on skin stem cells

The information contained in this publication is provided in good faith and is based on our current knowledge. No legally binding promise or warranty regarding the suitability of our products for any specific use is made. Claim ideas are offered solely for your consideration, investigation and verification. Mibelle Biochemistry will not assume any expressed or implied liability in connection with any use of this information.