PRODUCT FOCUS

Shoots of sunflowers
to energize and rejuvenate the skin

Sprouts are the young shoots that develop from germinating seeds. Plant materials are a rich source of micronutrients and dietary fiber, but they also contain an immense variety of biologically active secondary metabolites that provide plants with color, flavor and protection against environmental attack. Because the shoots of a plant are especially vulnerable, secondary metabolites are very abundant at this stage. Sprouts can be easily produced by hydroponic cultivation. An aqueous preparation of 10 days old sunflower sprouts (Sunflower Shoot Active) was tested in a series of cell culture assays for potential benefits in skin care products.

Gene	Expression (Sunflower Shoot Active/Control)	Activity of Gene Product	Role/Function in Cells/Tissue
Filaggrin	2.43	Binds to keratin fibers	Skin barrier formation Skin hydration
Gamma-Glutamylcysteine Synthetase	2.27	Forms glutathione	Protection against free radicals and reactive oxygen species
Matrix Metalloproteinase 1	0.08	Cleaves collagen I, II and III	Skin thinning Loss of elasticity
Matrix Metalloproteinase 3	0.07	Degrades broad range of extracellular matrix components	Skin thinning Loss of elasticity
Matrix Metalloproteinase 9	0.23	Digests denatured collagens	Skin thinning Loss of elasticity

Table 1.

The effect of the Sunflower Shoot Active on human keratinocytes was analyzed by DNA microarray technology. The array used contained 1300 probes for genes that are known markers for skin barrier, extracellular matrix, DNA repair, detoxification and inflammation. The results are shown in table 1. The most up-regulated genes in the presence of the Sunflower Shoot Active were filaggrin, a marker of epidermal differentiation, and gamma-glutamylcysteine synthetase, an enzyme for the formation of cells' own antioxidants. The most down-regulated genes encode enzymes of the matrix metalloproteinase family that are responsible for the degradation of collagens and elastin. The H_2O_2-induced senescence model was used to test the Sunflower Shoot Active on human fibroblast cells. Senescence was followed by histochemical staining for beta-galactosidase activity, a senescent phenotype-associated marker. The results, shown in figure 1, demonstrate that fibroblasts cultured in the presence of the Sunflower Shoot Active are protected against senescence compared to a control culture. At a cellular level, energy is produced in specialized cellular organelles, called mitochondria. The 'mitochondrial theory of aging' states that reactive oxygen species (ROS) are generated as a negative side effect during energy production and that these ROS over time damage mitochondria. This leads to constricted energy production and to reduced function of cells and tissues, which is aging. The effect of the Sunflower Shoot Active on energy production was tested on a reconstructed epidermis model. After 4 weeks' culture, the models underwent an aging process. The energy level (concentration of ATP) was lower than at the beginning of the culture which is shown in figure 2. But the epidermis cultured in the medium with the Sunflower Shoot Active contained significantly more energy than the epidermis of the control culture.

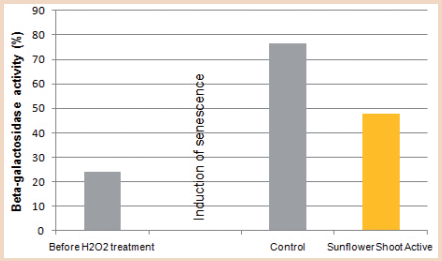

Figure 1.

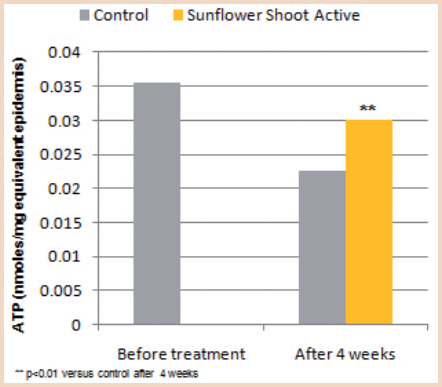

Figure 2.

The results indicate both, protective and reconstructive effects of the Sunflower Shoot Active. These are strong indications for a potential as skin rejuvenation ingredient.

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