MORE MOISTURE WITH ALOE-MOSS

Moisture source | Mosses have great potential as cosmetic ingredients. Especially with aloe moss, it has been shown that it cannot only increase the moisture content in the skin but also has a positive influence on its distribution.

Dr Katharina Kappler,
Study Manager, Mibelle Biochemistry, Buchs, Switzerland,
www.mibellebiochemistry.com

Mosses, however, are difficult to collect in a sustainable way and may contain toxins absorbed from the environment, preventing them from use for cosmetics. To still utilise the potential of mosses in the cosmetic industry, an innovative biotechnology enables the sterile large-scale cultivation of moss tissue in both a reproducible and sustainable way.

This moss cell technology is based on the **cultivation of sterile plant material and the asexual reproduction of mosses**. The protonema is the juvenile, stem cell-like moss tissue with a filamentous root-like structure, from which leafy gametophytes arise. Fragmentation of protonemata or gametophytes leads to moss cell division and growth of new protonemata. Moss cell technology uses repetitive disruption of the tissue to establish a homogenous liquid protonema culture. The resulting moss material is processed by a mild cold pressing extraction method, which was established to harvest all water-soluble metabolites from the moss tissue whilst avoiding the co-extraction of chlorophyll.

Based on this moss cell technology, a new active ingredient containing a moss extract from aloina aloides has been developed. This moss, also known as "common aloe-moss", was named after aloe vera due to the similarity in the appearance of the leaves. In vitro and in vivo studies have shown that aloe-moss extract allows for a balanced skin moisture distribution by enabling an efficient intercellular communication in the epidermis.

Intercellular communication

Communication between cells is necessary for the maintenance of tissue homeostasis. One type of intercellular communication is mediated by so-called gap junctions that connect the cytoplasm of adjacent cells. **Functional gap junctions are necessary for**

photo: Lukas Jonaitis/Shutterstock.com

efficient intercellular communication within the epidermis which is a prerequisite for keratinocyte growth and differentiation and thus for a healthy skin. Connexin expression and gap junctional communication, however, can be impaired during ageing[2].

To test the potential of aloe-moss extract in improving intercellular communication via gap junctions, the propagation of a calcium release signal was investigated in primary human keratinocytes. Calcium is one of the most important signalling molecules required for the formation of the epidermal layers, and thus the maintenance of the skin barrier and skin hydration.

In the experimental setup, initial calcium signalling was induced by the addition of ATP at the edge of the cell layer. Upon binding to extracellular P2Y2 receptors, ATP triggers the production of inositol 1,4,5-triphosphate (IP3) and the subsequent release of calcium ions from intracellular calcium stores[3]. The **increase in cytoplasmic calcium** was detected by a fluorescent calcium indicator (Fura-2AM). The transfer of signalling molecules, such as IP3, via gap junctions leads to the distribution of the calcium release signal and a consequent increase in cytosolic calcium in adjacent cells[4]. Due to the reaction of calcium with the fluorescent Fura-2AM, the propagation of the signal can be visualised and recorded by microscopy.

Confluent primary human keratinocytes treated with 0.25% aloe-moss extract for four days prior to the experiment showed an enhanced velocity of the calcium signal propagation, as demonstrated by a significant reduction in the calcium wave time. In addition, the **final calcium signal was enhanced by two-fold in cells treated with aloe-moss extract compared to untreated cells**. Furthermore, to cause premature ageing, glyoxal was added to the cells three days prior to the experiment[5]. The calcium signal, which was reduced following treatment with glyoxal, was not only restored but additionally enhanced by the treatment with aloe-moss extract (figure 1). These results demonstrate that the aloe-moss extract can improve intercellular communication in normal as well as in aged skin cells.

Skin moisture distribution

The efficacy of the aloe-moss active ingredient[6] (INCI: Xylitol (and) Caprylyl Glycol (and) Ketoglutaric Acid (and) Aqua / Water) was tested in a placebo-controlled clinical study including 43 Caucasian women aged between 37 and 65 years with signs of ageing, such as crows' feet wrinkles. The volunteers applied a cream with 2% of the aloe-moss active ingredient or a corresponding placebo cream on the entire face twice daily for 28 days. Skin hydration was measured using corneometry at 53 specific points in the face of each volunteer. The standard deviation of the 53 hydration measurements was determined as a measure of hydration evenness. After 14 and 28 days of treatment, mean skin hydration of the whole face improved and hydration evenness increased significantly by 14% and 20%, respectively. The **more balanced moisture distribution** was also visible in the picture of an average face, which contains a mapping of the mean skin hydration values determined at the different spots in the face of each volunteer (figure 2). In addition, to assess the effect of aloe-moss active on signs of skin ageing, skin elasticity was assessed using cutometry and wrinkle volume and depth were measured by Aeva-HE fringe projection technique. The treatment with 2% aloe-moss active for 28 days led to an **improvement in skin elasticity and to a reduction of wrinkle volume and depth** by 13.1% and 8.2%, respectively. Thus, by boosting intercellular communication via gap junctions in the epidermis, aloe-moss extract allows for a synchronised reaction of the skin, which leads to a homogenous facial skin moisture distribution and reduced signs of skin ageing. □

References

1 Meşe G., Richard G., White T.W. Gap junctions: basic structure and function. Journal of Investigative Dermatology. 2007, 127(11): 2516-2524.

2 Del Monte U., Statuto M. Drop of connexins: a possible link between aging and cancer? Experimental Gerontology. 2004, 39(2): 273-275.

3 Korkiamäki T., et al. Altered calcium-mediated cell signaling in keratinocytes cultured from patients with Neurofibromatosis type 1. The American Journal of Pathology. 2002, 160(6): 1981-1990.

4 Tsutsumi M., et al. Mechanical-stimulation-evoked calcium waves in proliferating and differentiated human keratinocytes. Cell and Tissue Research. 2009, 338(1): 99-106.

5 Berge U., Behrens J., Rattan SI. Sugar-induced premature aging and altered differentiation in human epidermal keratinocytes. Annals of the New York Academy of Sciences. 2007, 1100: 524-529.

6 MossCellTec Aloe

figures:

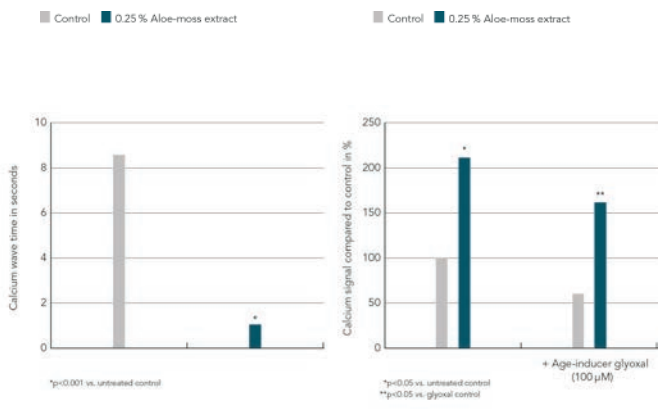

figure 1: Improved calcium signalling in keratinocytes treated with aloe-moss extract.

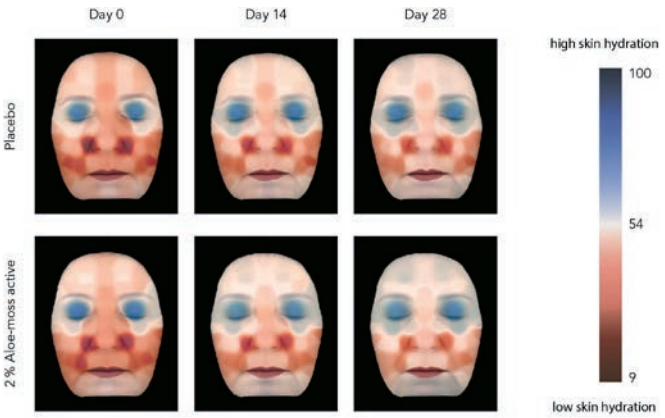

figure 2: Balanced skin moisture distribution after treatment with aloe-moss active ingredient.