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Minimal Care – Spa-Feeling for Skin and Hair

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abstract

Skin minimalism or minimal skin care is a new trend that is taking hold in the cosmetics world. On the one hand, it is about formulating as few different ingredients as possible into cosmetic products, and on the other hand, it is about creating maximum beauty effects with only one active ingredient, for example. Here we present two hydration products that can do just that. In Skin Care and also in Hair Care.

Introduction

Skin hydration is one of the most important parameters for attractive skin. Basically, it only takes this minimal effort for satisfying effects (Skinimalism). After a visit to the spa, our skin feels like newborn: plump, supple and healthy. On the one hand, this is due to a well-moisturised *stratum corneum*, and on the other hand, it is due to the activation of biological processes that keep the skin in good condition even after the spa visit. Substances that strengthen the skin barrier and bind moisture themselves are mainly responsible for an immediate effect. A basic cosmetic formulation already provides the basic prerequisite by containing lipids and water as an emulsion. Lipids strengthen the water-impermeable lamellar lipid layer of the skin barrier and prevent further dehydration [1]. Water binds to keratin and to the skin's natural moisturisation factor (NMF) and can be retained in the stratum corneum for a certain time [2]. However, this effect only lasts for a relatively short time until the original condition of the skin is reached again. To maintain a real spa feeling for several hours, active ingredients must be formulated into the cosmetic base. Typically, these are substances that strengthen the skin barrier and promote water retention. Here, natural substances that are already present in the skin barrier or are well integrated have proven to be beneficial. On the one hand, these can be lecithins, which integrate into the lamellar lipid layers of the skin barrier, and on the other hand amino acids, also natural components of the skin, namely as part of the NMF. Since NMF originates from the skin protein filaggrin through proteolysis [1], supplementing NMF with natural amino acids seems to be a logical addition for increasing the water retention capacity of the skin. In addition to these "acute" measures to promote skin hydration, the skin can be encouraged via biological activation to generate a greater amount of moisture-retaining substances itself. Here, so-called adaptogenic - stress-relieving and restorative - substances can help to promote the cell biology of stressed skin. The result is an increased production of lipids for the skin barrier and filaggrin for the provision of NMF. The

skin is moisturised from the inside, so to speak. In addition to these medium - to long-term cosmetic aids, there are a number of superficially acting substances. Mostly polymers with a high water-binding capacity. These include, for example, the well-known hyaluronic acid, but also other sugar polymers such as lichenans from the lichen *Cetraria Islandica* (Icelandic moss), which are so effective that they are even used to moisten the mucous membrane of the throat.

But it's not just relaxed, moisturised skin that leaves us feeling satisfied and happy after a visit to the spa. Our hair makes up a large part of our appearance and this also needs the right level of moisture. Too little water in the hair makes it look dull, straw-like, brittle and lacking in strength. Too much, on the other hand, can turn a super-smooth look into a dishevelled tousled look in a matter of minutes. Our hair depends on the care we give it every day. An intact lipid (18-Methyleicosanoic acid / 18-MEA) and closed cuticle are essential to bind and retain water in the hair [3]. Hair is made of keratin and water molecules can penetrate through the hair layers and bind to the keratins with the help of the water bridges. By reorganising the hydrogen bonds, we can style our hair. But daily washing and styling damages our hair. The lipid layer is destroyed and the cuticle damaged. This favours the loss of water. This makes it all the more important to add the right care ingredients to shampoos, conditioners or hair masks. Three of the best-known moisturising ingredients in hair care are glycerine, lecithin and wheat proteins. Glycerine can bind moisture from the air and wheat proteins, or rather the amino acids, can strengthen the hair structure and smooth the hair shaft. Lecithins with the fatty acids also improve the texture of the hair and can effectively capture and lock in moisture. The hair is stronger, shinier and completes the spa feeling.

Materials and Methods

The *in vivo* studies were conducted in accordance with the Declaration of Helsinki of the Worlds Medical Association.

All study participants signed a written informed consent form at the beginning of the study.

In-vivo skin studies

Double-blind, placebo-controlled, intra-individual study with 20 female subjects with Caucasian skin, 36 - 45 years. A cosmetic formulation was applied twice daily to the inner side of one forearm (placebo; INCI: Aqua, Caprylic/Capric Triglyceride, Phenoxyethanol, Caprylyl Glycol, Sucrose Stearate, Carbomer, Sodium Hydroxide). The same formulation with 3% HYDRACTIN®-LMF (INCI: Propanediol, Aqua, *Polypodium Vulgare* Rhizome Extract, *Cetraria Islandica* Thallus Extract, *Sphagnum Magellanicum* Extract, Citric Acid) was applied to the other forearm as verum (randomised). Skin hydration was determined before application and after 14 and 28 with corneometry (Courage and Khazaka, MPA 5 CPU). Elasticity was measured using a cutometer (Courage and Khazake, MPA580), and roughness using fringe projection (Canfield, PRIMOS compact high-res).

Double-blind, placebo-controlled, intra-individual study with 6 female subjects with Caucasian skin, 44 - 65 years with very dry skin. A cosmetic gel base was applied to the leg twice daily (placebo; INCI: Aqua, Carbomer, Phenoxyethanol, Ethylhexylglycerin, Sodium Hydroxide). The same formulation with 2 or 4 % AQUARICH® (INCI: Glycerin, Aqua, *Avena Strigosa* Seed Extract, Lecithin, Potassium Sorbate, Citric Acid) was applied to the other leg as verum (randomised). The skin was imaged with a Hirox® video microscope before application, after 7 and 14 days.

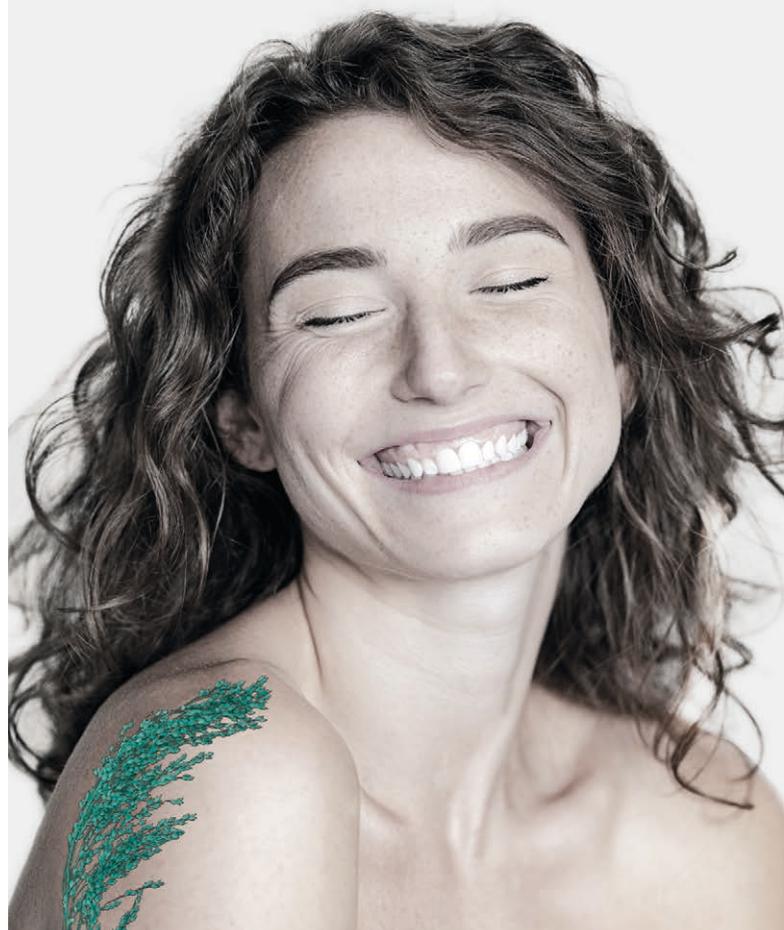
Ex-vivo hair studies

All experiments were performed on brown bleached Caucasian hair strands.

For surface visualisation with electron microscope, the hair braids were treated with the shampoo (INCI: Water, Sodium Laureth Sulfate, Cocamidopropyl Betaine, Sodium Chloride, Citric Acid, Levulinic Acid, Sodium Levulinate, Glycerin, p-Anisic Acid) containing 0. 2% AQUARICH® (INCI: Glycerin, Water, *Avena Strigosa* Seed Extract, Lecithin, Potassium Sorbate, Citric Acid) washed 5 times and dried. Untreated but damaged hair was used for comparison.

The gloss of the hair braids was measured with the Courage+Khazaka Glossymeter. The hair was washed with 0.5% AQUARICH® shampoo (Water, Sodium Laureth Sulfate, Cocamidopropyl Betaine, Sodium Chloride, Sodium Benzoate, Potassium Sorbate, Glycerin, *Avena Strigosa* Seed Extract, Lecithin) in several cycles (1, 3 and 5 times) and dried. One hair strand was washed with the shampoo without AQUARICH® and served as an initial value for comparison.

Tensile strength studies were made with the Z100 Proline table-top testing machine with force transducer XForce type P



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Moisturises particularly dry skin



Rebuilds the damaged skin barrier



Strengthens the healthy skin microbiota



Helps with atopic dermatitis



(ZwickRoell, Germany). Hair was either washed with a shampoo (3 minutes; INCI: Water, Sodium Laureth Sulfate, Cocamidopropyl Betaine, Sodium Chloride, Sodium Benzoate, Potassium Sorbate), treated with a conditioner (3 minutes; INCI: Water, Caprylic/Capric Triglyceride, Cetearyl Alcohol, Citric Acid, Polyglyceryl-3 Dicitrate/Stearate, Glyceryl Stearate, Sodium Benzoate, Potassium Sorbate, Xanthan Gum, Sodium Stearoyl Glutamate) or a leave-on formulation (30 minutes; INCI: Water) that contained either no or 0.5% AQUARICH®.

Results

As expected, skin hydration is increased by the application of a cosmetic base after 14 and 28 days of regular use. This moisturisation could be significantly increased by 27 and 20 respectively compared to the placebo, up to plus 48% compared to the baseline condition, by using HYDRACTIN®-LMF (referred to as H-LMF; **Figure 1**). Similar values were also achieved for an older panel (56 - 65 years) (not shown). Using the moisturising formulation also had a rejuvenating effect as measured by skin firmness and roughness. Firmness increased significantly by 11% and roughness decreased significantly by 14%. In each case, incorporation of the active ingredient showed significant improvements over placebo.

In a leg study on test subjects with very dry skin, the effect of a “physical” moisturising factor was impressively determined. While the untreated skin continued to look dry and scaly, only a slight improvement could be achieved with placebo. Significant improvements were achieved with the use of 2 and 4% AQUARICH® (referred to as AQ). No signs of dry skin and scaling were seen after treatment with the active ingredient (**Figure 2**).

AQ at a concentration of only 0.2% caused a remarkable reduction in the degree of hair damage after application and thus had a very good restructuring effect (**Figure 3**, lower panel). Compared to untreated hair (**Figure 3**, upper panel), treatment with AQ resulted in a smoother, resealed and restored cuticle. The degree of damage was assessed, and the improvement calculated; the results showed that hair damage was alleviated by 40% compared to the untreated sample (data not shown).

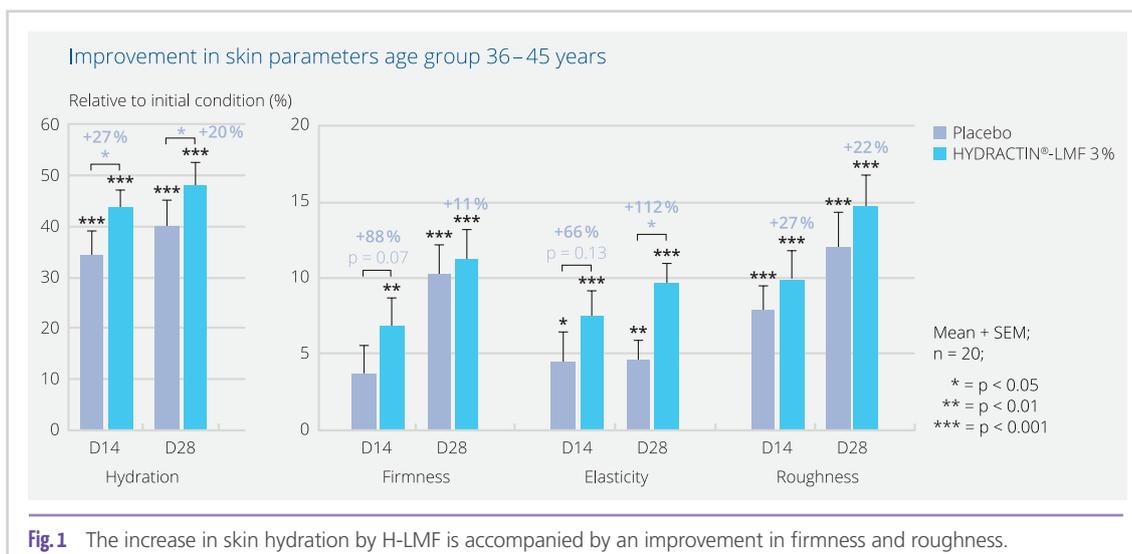


Fig. 1 The increase in skin hydration by H-LMF is accompanied by an improvement in firmness and roughness.

Visual improvement of skin appearance

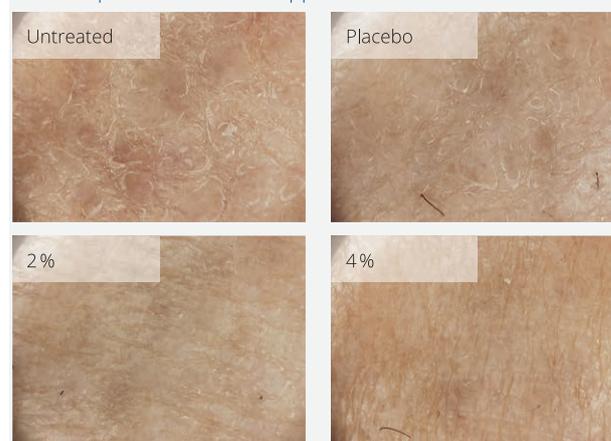


Fig. 2 AQ intensively moisturises the skin and reduces visible, dry skin flaking.

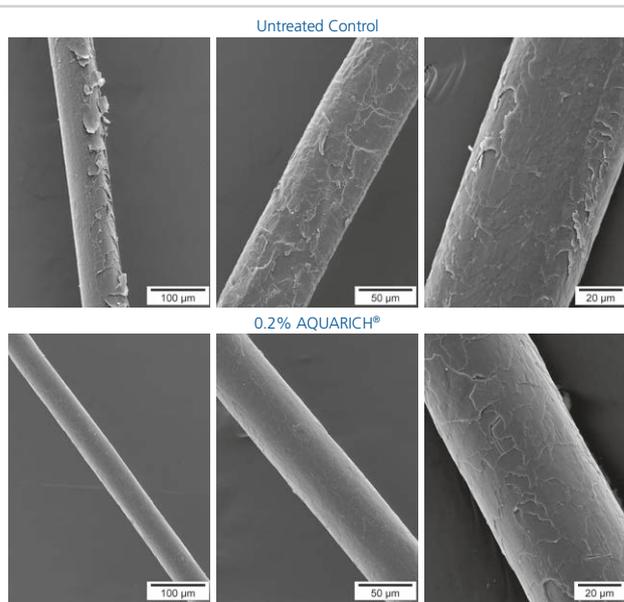


Fig. 3 AQ improves the surface structure of the damaged hair.

Treatment with 0.5% AQ shampoo increased the measured shine by more than 50% after only one treatment cycle com-

pared to placebo. Gloss was increased by 105% after the fifth wash. The results are shown in **Figure 4**.

Treatment with 0.5% AQ shampoo resulted in a 9% increase in tensile strength after only one wash cycle compared to placebo. With increasing number of wash and dry cycles, the tensile strength did not change even after the fifth wash (data not shown). Tensile strength after a single application of 0.5% AQ in a conditioner formulation resulted in an increase in tensile strength of more than 13%. The leave-on treatment resulted in a 30% increase in tensile strength. Our results also showed a dose-dependent mode of action. The 0.25% AQ treatment also halved the tensile strength effect (data not shown). The summary results of the different treatment types are shown in **Figure 5**.

Discussion

Both active ingredients were able to achieve a significant improvement in the condition in studies on the skin. H-LMF, an active ingredient from the fern *Polypodium vulgare*, the lichen *Cetraria Islandica* and the moss *Sphagnum magellanicum* improved both moisturising and ageing parameters. In 2010, *Hillebrand et al.* impressively demonstrated the connection between skin moisturisation and skin ageing. In a study with 122 test persons, it could be shown that skin with below-average moisturisation forms significantly more wrinkles in 8 years than skin with above-average moisturisation [4]. The result of the anti-ageing effectiveness of the active ingredient can be seen in this context. The increased skin moisturisation had a direct effect on skin firmness and roughness. The active ingredient can thus ensure a lasting feel-good skin through long-term increased moisture. Polypodines from the polypodium fern have an adaptogenic effect and stimulate the production of skin lipids and NMF. Lichenans from the lichen can have an immediate effect on skin moisturisation and skin feel. The other active ingredient presented here (AQ) was produced on the basis of lecithin and *Avena Strigosa* Extract. The extract from the rare black oat contains effective amounts of amino acids that supplement the natural moisturising factor NMF. The application on dry skin on the leg impressively proved the effectiveness. Very dry, scaly skin could be returned to normal after 14 days, whereas this was not the case with placebo.

Both active ingredients can therefore contribute to moisturising the skin with very different approaches.

AQ also embodies an excellent solution for the hair. It supports the texture of the hair with numerous amino acids and it is also surface-active and water-loving. This has also been confirmed in our studies. With very low concentrations of effect, we were able to clearly seal and smooth the cuticle. This also led to an increase in shine of the hair right after the first wash. The amino acids were responsible for the higher tensile

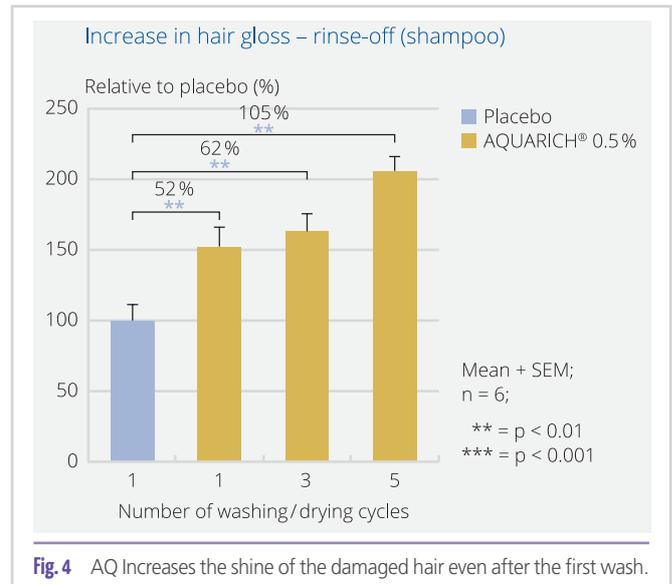


Fig. 4 AQ Increases the shine of the damaged hair even after the first wash.

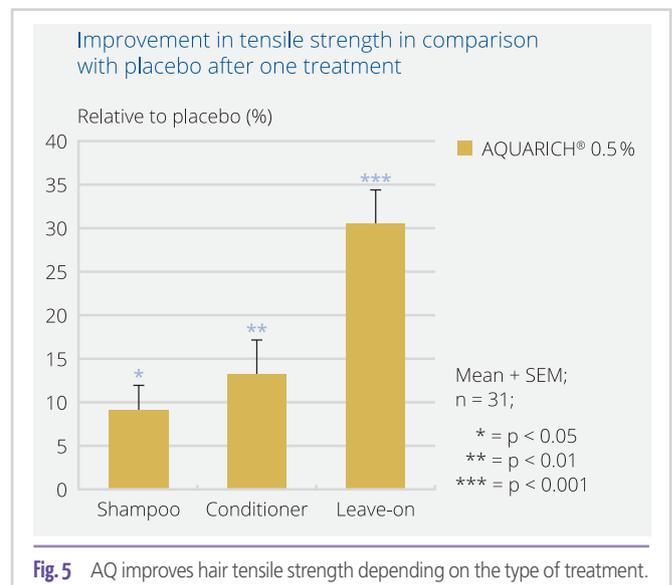


Fig. 5 AQ improves hair tensile strength depending on the type of treatment.

strength of the hair. The increase was dependent on the type of treatment, which proves the effectiveness of AQ.

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