How can split ends be characterized? New parameters to assess the severity of split hairs

Marianne Brandt, Stephan Bielfeldt, Klaus-Peter Wilhelm, proDERM Institute for Applied Dermatological Research GmbH, Schenefeld, Germany

Introduction
Various everyday procedures cause damage to our hairs like heat or chemical treatments, combings after washing and sun exposure that often lead to the appearance of split ends in hairs [1, 2, 3, 4, 5]. Hair care products often are developed to provide a protective effect against induction of split ends in hairs or to provide a semi-permanent repair effect. It was our aim to find methods that characterize the sensory perception of split hair with the aim to avoid the often-used time-consuming counting of complete hair tresses under a microscope.

Methods & Results

PREVENTION

For evaluating if products can help prevent the induction of split ends, product application was performed before mechanical stress induced split ends to the hairs. A defined number of randomly chosen hairs were counted for split ends. The method was set up in such a way that the untreated control showed a percentage of approximately 30% split ends after the mechanical stress (Example results in Figure 1).

In order to take into account the need for objective measurements, we further investigated the area of the tress ends as an additional parameter. This silhouette method (Figure 4) is widely used for evaluating hair volume.

The area values as a measure of hair volume demonstrates a reduction in volume of the damaged tips of the tresses due to product application (Figure 5). Comparing the expert assessments to the area measurements, the same clear product effect was shown.

The presented methods demonstrate well reproducible effects of products to prevent or repair split ends of hairs induced by mechanical stress. They give complementary insight into the performance of products developed for treating split ends in hairs.

All methods are highly standardized and straightforward to perform. The parameters used give an overall view of how cosmetic products can improve the look and feel of damaged hair with split ends.

Figure 1: Percentage counts of split hairs related to the total number of counted hairs; n = 10 bleached European tresses per treatment

Figure 2: Median results of visual assessment of split ends by expert graders; A = untreated reference, B and C = products for split ends treatment; n = 10 repeatedly damaged tresses with washing, bleaching, combing

Figure 3: Images before (above) and after (below) application

Figure 4: Silhouette images of product for split ends treatment (see Figure 5)

Figure 5: Mean results of area measurements of tips of tresses; A = untreated reference, B = product for split ends treatment; n = 10 repeatedly damaged tresses with washing, bleaching, combing

Conclusion

The area values as a measure of hair volume demonstrates a reduction in volume of the damaged tips of the tresses due to product application (Figure 5). Comparing the expert assessments to the area measurements, the same clear product effect was shown.

After inducing split ends to untreated hairs, expert graders performed visual and tactile evaluations of split ends taking into account the number of split ends, degree of split severity and feel of hair. After product application, the experts repeated the grading of split ends per hair tress. The three parameters were graded on separate scores and the sum score was used as an overall measure for split ends. The maximum possible sum score was 10 (Figure 2).

The present methods demonstrate well reproducible effects of products to prevent or repair split ends of hairs induced by mechanical stress. They give complementary insight into the performance of products developed for treating split ends in hairs.

All methods are highly standardized and straightforward to perform. The parameters used give an overall view of how cosmetic products can improve the look and feel of damaged hair with split ends.

Literature