

TrichoScale® : A non-invasive tool for quantifying hair loss/hair growth

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TrichoScale®

Introduction

The TrichoScale® is a validated and non-invasive tool for quantifying hair loss/hair growth. Thus, it is an ideal measuring instrument to objectively quantify the effectiveness of a hair loss treatment.

In short, the growth cycle of hair consists of three phases: an active growth phase (anagen phase), a transition phase (catagen phase) and a resting phase (telogen phase). The anagen phase takes about 2-6 years, the following catagen phase takes only a few weeks and the telogen phase lasts for 3-4 months and then the hair falls out.

The TrichoScale® takes advantage of this principle. In the definition of the TrichoScale® procedure (see below) a telogen hair is a hair that has not grown in the three days after hair clipping, whereas an anagen hair is a hair that has grown three days after hair clipping (>0,3 mm per day). And therefore the TrichoScale® software is able to calculate the parameters of hair growth.

Procedure

On the first day, the test field is identified and the hair is clipped evenly to a length of 0,5 mm in a measuring field of 0,903 cm² by means of a mini hair trimmer. Images are taken at a 20fold magnification in order to evaluate the evenness of the clipped measurement area. After three days, the test subjects return to the study site in order to monitor hair growth after hair dying for approx. 10-15 min. For the duration of the study the test field is always the same for every test subject and 3 images of the same area are recorded. Images are analyzed using TrichoScale® Version 2.11 or by manual evaluation for the parameters telogen and anagen rate [%].

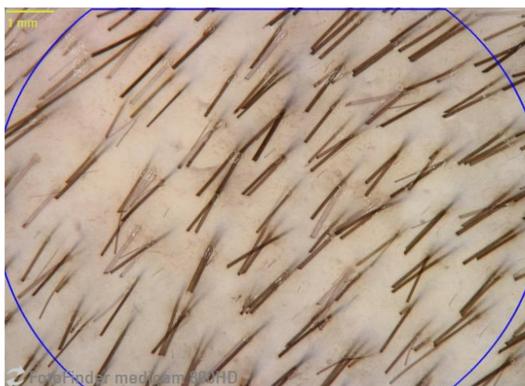


Figure 1: Test area three days after hair clipping.

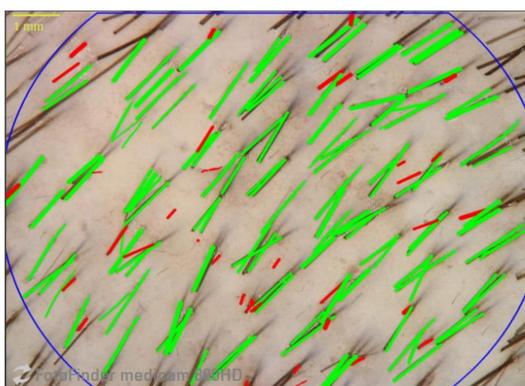


Figure 2: Hairs highlighted in green are defined as anagen hairs (growth phase) and hairs highlighted in red are telogen hairs (resting phase). Errors in the software (e.g. overlapping hairs) can be manually adapted later.

Additional measurements

In addition, the efficacy assessed by TrichoScale® can be complemented by expert and test subject assessments as well a photographic documentation.

Expert and test subject assessments

The expert and test subject assessments are performed on the basis of a questionnaire that are obtained at baseline and at the end of the study. A five point scale is used for evaluation of hair quality parameters such as shine, volume and strength and of scalp health parameters such as dryness, scaling and general scalp health. Results are expressed as the change between pre- and post treatment scores.

Photographic documentation

To objectively measure the responsiveness to hair loss treatment a photographic documentation is advisable. Color photographs of the head are taken of both sides, the front, back and the top using Fotofinder dermascope (Fotofinder Systems GmbH, Bad Birnbach, Bavaria, Germany) under identical environmental conditions as well as identical conditions of hair color and hairstyling.

Test procedure



Figure 4: Flow chart of a measurement with the TrichoScale® at our Institute for Experimental Dermatology.

Results based on a study

Study design

A study using a randomized, placebo-controlled and double-blind design with a 16-week treatment period was conducted. The study was carried out on 80 healthy test subjects testing different active substance concentrations. The subjects were selected according to the inclusion criteria healthy male with non-illness-related, light, diffuse hair loss, and fine and lifeless hair. Exclusion criteria were the evidence of skin diseases of the scalp, history of allergic reactions to shampoo, perfumes or topically applied hair care products, medication affecting the skin response such as antibiotics and anti-inflammatory drugs, short hair (<5 cm) and the use of substances promoting hair growth during a period of three months before the start of the study. All participating test subjects were informed about the objectives and scope of the study and gave written informed consent prior to the study. They accepted not to alter their haircut, style or dye their hair and not to use any other topical treatment products, oral products or any nutritional supplementation aiming at improving hair status during the course of the study.

Results

In the 0.1 % active group the anagen rate was increased, but not statistically significant by 1.7 % from an anagen rate of 71.0 % at baseline to 72.2 % after 8 weeks of usage. At endpoint no further improvement was achieved. In the 0.2 % active group the anagen rate was increased by almost 3 % from an anagen rate of 72.5 % at baseline to 74.0 % and 74.4 % after 8 and 16 weeks, respectively. Analysis of the change of the mean anagen rate in the verum groups and the placebo group after 8 weeks showed a statistically significant result in favor for the 0.2 % active group ($p = 0.0421$) and for the 0.5 % active group ($p = 0.0148$). Statistical significance was narrowly missed after 16 weeks for the 0.5 % active group ($p = 0.0883$).

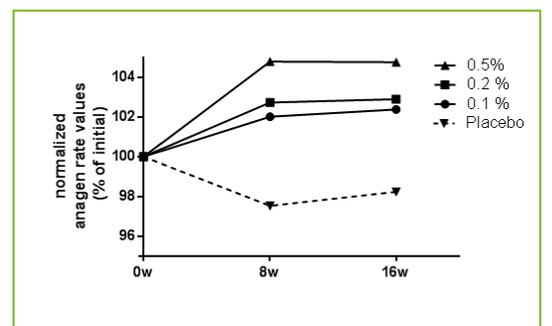


Figure 5: Effect of a hair tonic on hair loss in males.

There was a statistically significant improvement in hair volume (0.1 % active $p=0.0049$; 0.2 % active $p=0.0004$; 0.5 % active $p=0.0087$) and hair strength (0.1 % active $p=0.0131$; 0.2 % active $p=0.0345$; 0.5 % active $p=0.0253$) with all verum concentrations compared to the placebo. In addition, the use of 0.2 % and 0.5 % active was also associated with statistically improved hair shine (0.2 % active $p=0.0343$; 0.5 % active $p=0.0158$) compared to the placebo group.

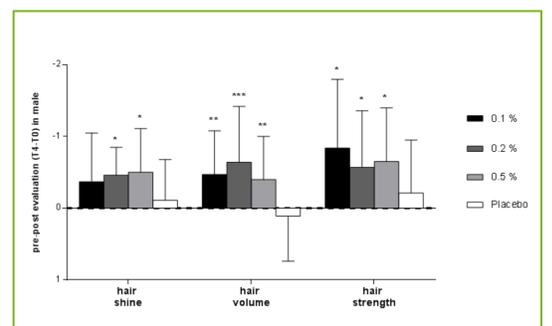


Figure 6: Expert evaluation on hair quality.

The improvement with regard to hair loss can be seen clearly in the photos



Figure 7: Representative photographs of hair loss improvement.

References

- Hoffmann R. TrichoScan: combining epiluminescence microscopy with digital image analysis for the measurement of hair growth in vivo. Eur J Dermatol 2001; 11: 362-368.
- Foitzik K, Hoting E, Heinrich U, Tronnier H, Paus R. Indications that topical L-carnitin-L-tartrate promotes human hair growth in vivo. J Dermatol Sci 2007; 48: 141-144.