

# SGS proderm Webinar

## Aging Hair and Skinification

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SGS proderm 



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# Agenda

- Introduction
- In Vitro Methods
- In Vivo Methods
- Take Away Message
- Questions



# Hair Industry 2023



Turnover of the global hair care products market between 2013 – 2022  
with prognoses until 2026 (billions in Euro)



# What is the Skinification Trend?

- A new consumers understanding of beauty care
- Main focus on healthy skin conditions also for body regions like scalp
- Skinification trend is looking for beneficial effects of skin care ingredients also in hair care products
- Industry reacts with a range of products treating the scalp



Shift towards SCALP health in products as additional claims requested by consumers

**Hair Detox**

**Scalp Health**

**Natural**

**Clean Hair Care**

**Skinification**

**Scalp Treatment**

# Aging hair - part of skinification trend

- Aging hair in context of skinification means ingredients from anti aging skin care to treat aged hair
- Intrinsic & extrinsic aging
- Aging hair: often thinner, grey colored, dry, decrease in hair growth, structure, shine, bounce and strenght
- Hair care products ingredients e.g. hyaluronic acid, ceramids, vitamin e, photoprotectors, or biotin which are traditionally used in skin care products



Aging hair is an important consumer topic to tackle and stands close to the skinification trend



# Claims and Test Methods

- The physical appearance of hair is an important issue for consumers
- Claims are used for successful marketing and merchandising
- All claims have to be substantiated by appropriate tests
  - In Vitro: Biophysical methods on hair tresses
  - In Vivo: Efficacy studies on subjects
- Official guidelines are not available



Which claims can be used for the skinification trend and how to test?



A photograph of a man in a shower, seen from the side. He is shirtless and has his hands on his head, with water running down his chest. The background is a white brick wall. A semi-transparent diamond shape is overlaid on the image, centered on the man's head and chest. The text "In Vitro Methods" is written in white, sans-serif font across the bottom of the diamond.

# In Vitro Methods

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# Hair Care: Conditioning, Cleansing and Repair

- Wet and Dry Combing Forces
- Friction Forces
- Hair Suppleness
- Hair Breakage and Split Ends





# Wet and Dry combing Forces

Evaluation of the combability of hair by the force that is needed to pull hair through a combing segment

- Parameters:
  - Mean combing force [N]
  - Maximum combing force [N]

## Possible Claims

- Conditioning
- Detangling effect
- Easy to comb
- Improves combability



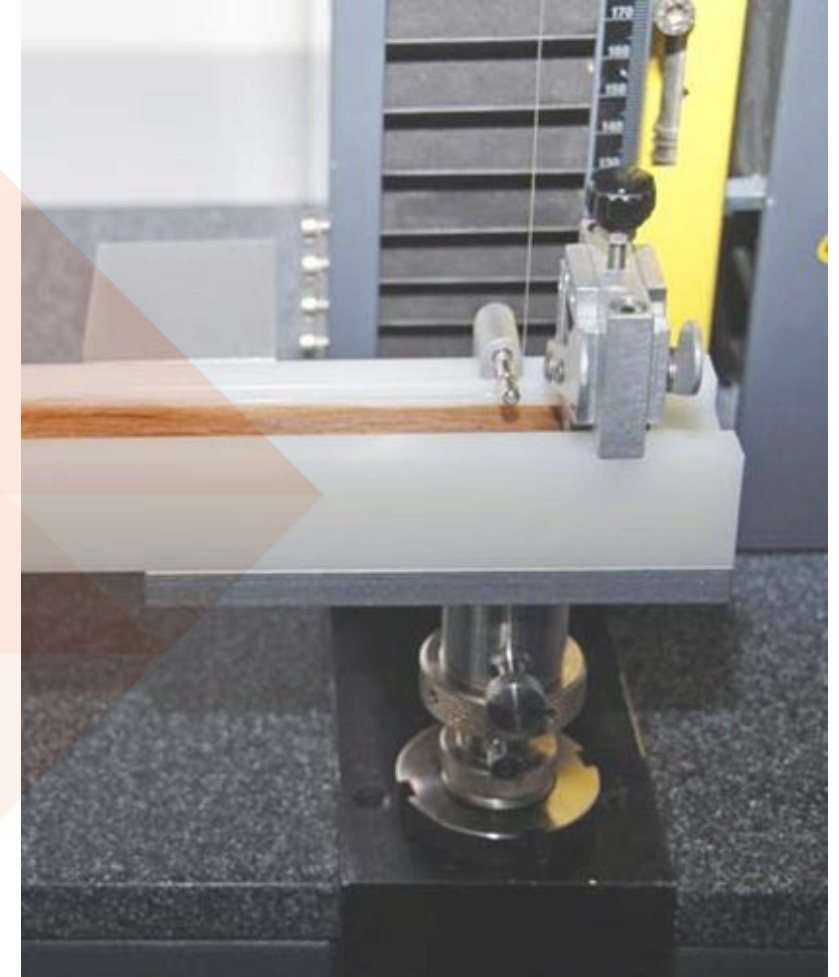
# Friction Forces

Evaluation of the force that is needed to pull a small metal body over the length of the hair tress

- Parameters:
  - Mean friction force [N]

## Possible Claims

- Conditioning
- Makes hair smooth
- Less friction
- Makes hair silky



# Hair Suppleness

Evaluation of the pulling force along little metal bars that slightly bend the tresses

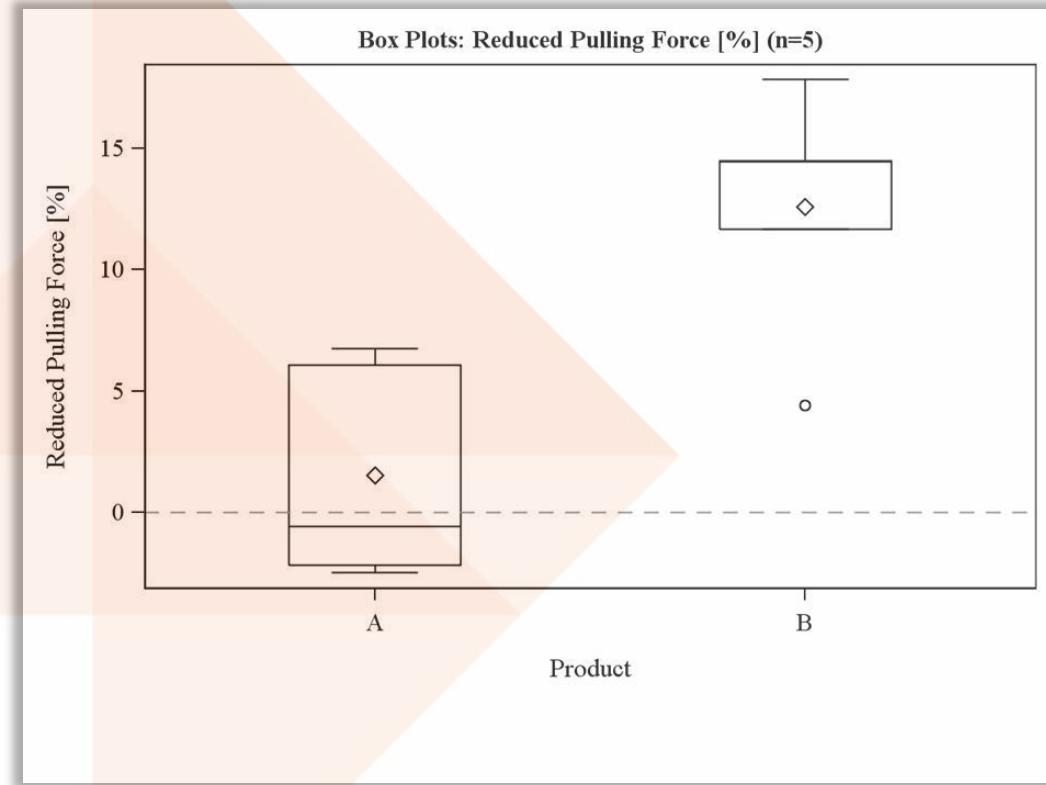
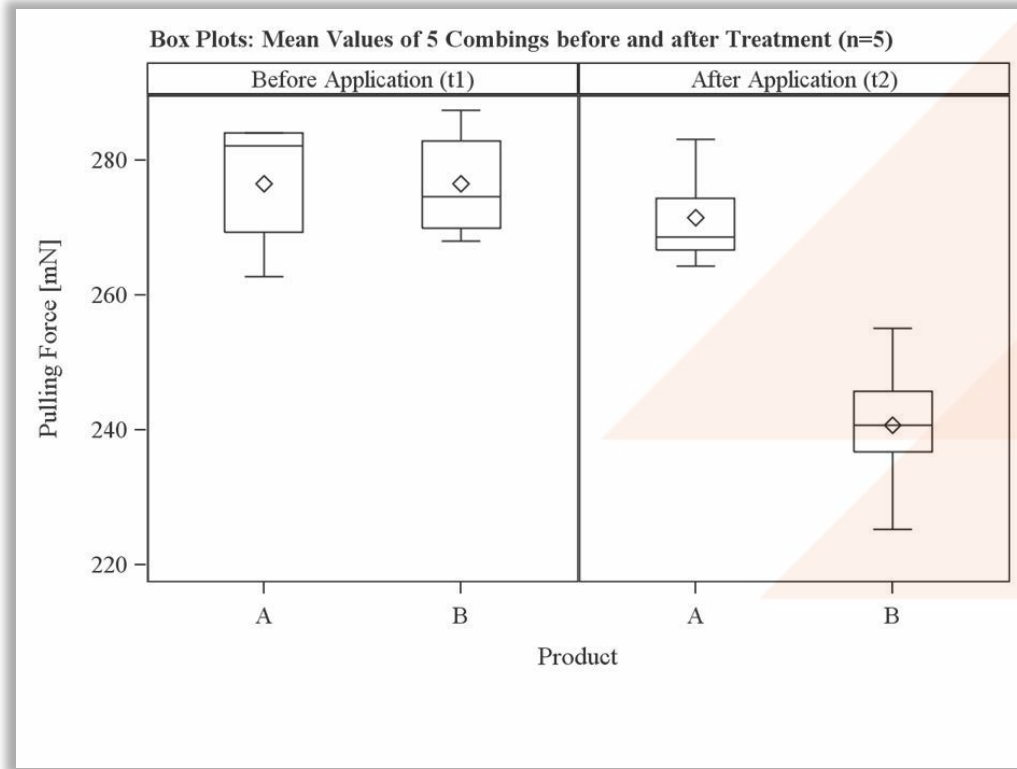
- Parameter: Mean pulling force [N]

## Possible Claims

- Conditioning
- Makes hair supple
- Makes hair softer
- Makes hair silky



# Hair Suppleness



# Hair Breakage and Split Ends

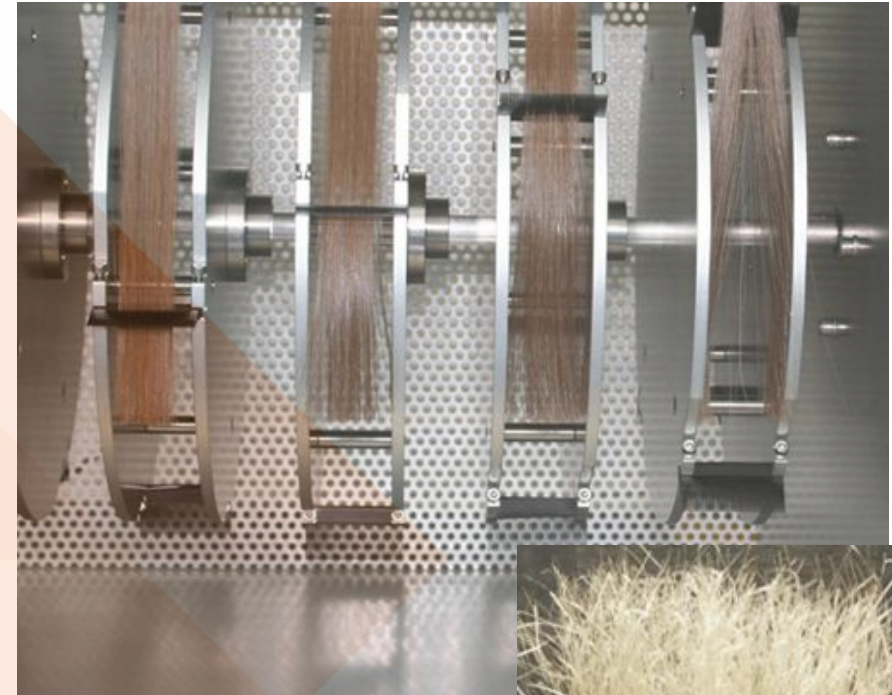
Evaluation of the amount of broken hair fragments and split ends after defined number of automatic combings

■ Parameters:

- Amount of broken hair fibres [px]
- Number of hair with split ends [%]

## Possible Claims

- Anti-breakage
- More resistant
- Anti-split ends
- Reduced split ends



# Hair Styling

- Volume Measurement regarding Styling Efficacy
- Curl Retention Test
- Bending Force



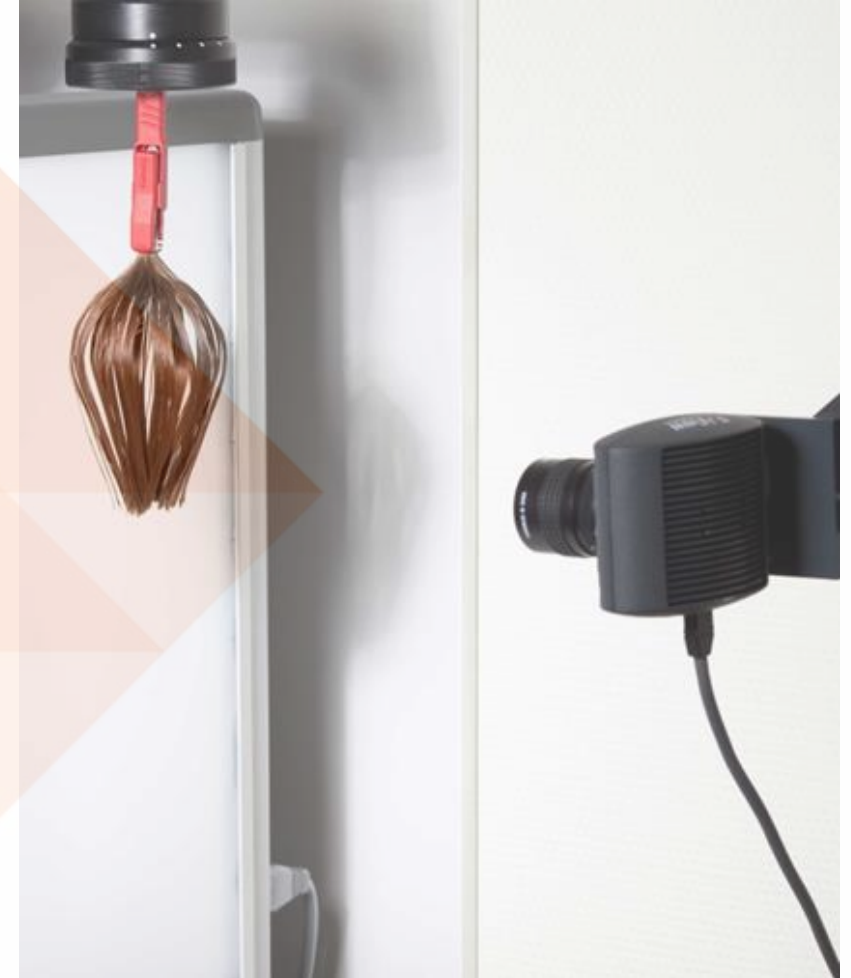
# Volume Measurement: Styling Efficacy

Volume assessment of hair tresses put on special-designed wire bodies by silhouette method

- Parameters: Mean area [cm<sup>2</sup>]

## Possible Claims

- Long lasting hold
- All weather
- Weather proof
- Humidity resistant



# Curl Retention Test

Determination of curl retention of hair tresses by measuring the fall-out of curls

- Parameters: Strand length [mm]

## Possible Claims

- Long lasting hold
- All weather
- Weather proof
- Humidity resistant





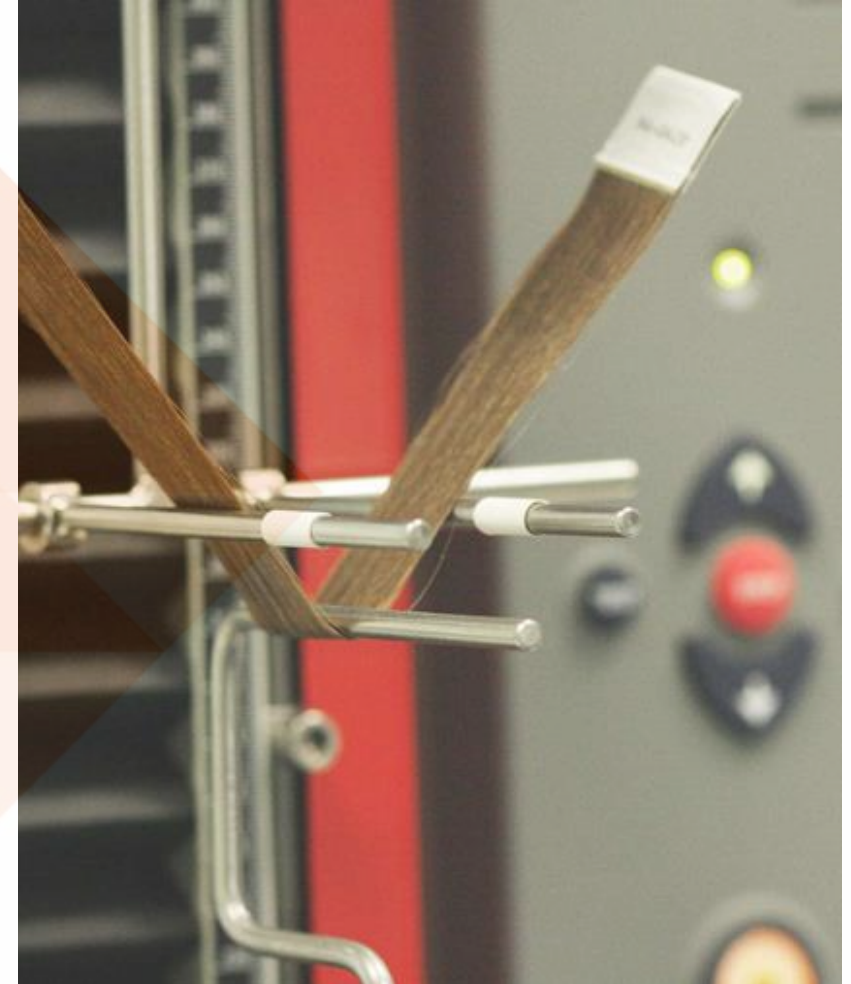
# Bending Force

Evaluation of the firming efficacy of hair styling products by 3-point-bending

- Parameter: Maximum bending force [N]

## Possible Claims

- Long lasting hold
- Strenght of Fixation



# Hair Color by Chromametry

Hair color measurements and evaluation of color-protective efficacy of hair care products

## Parameters:

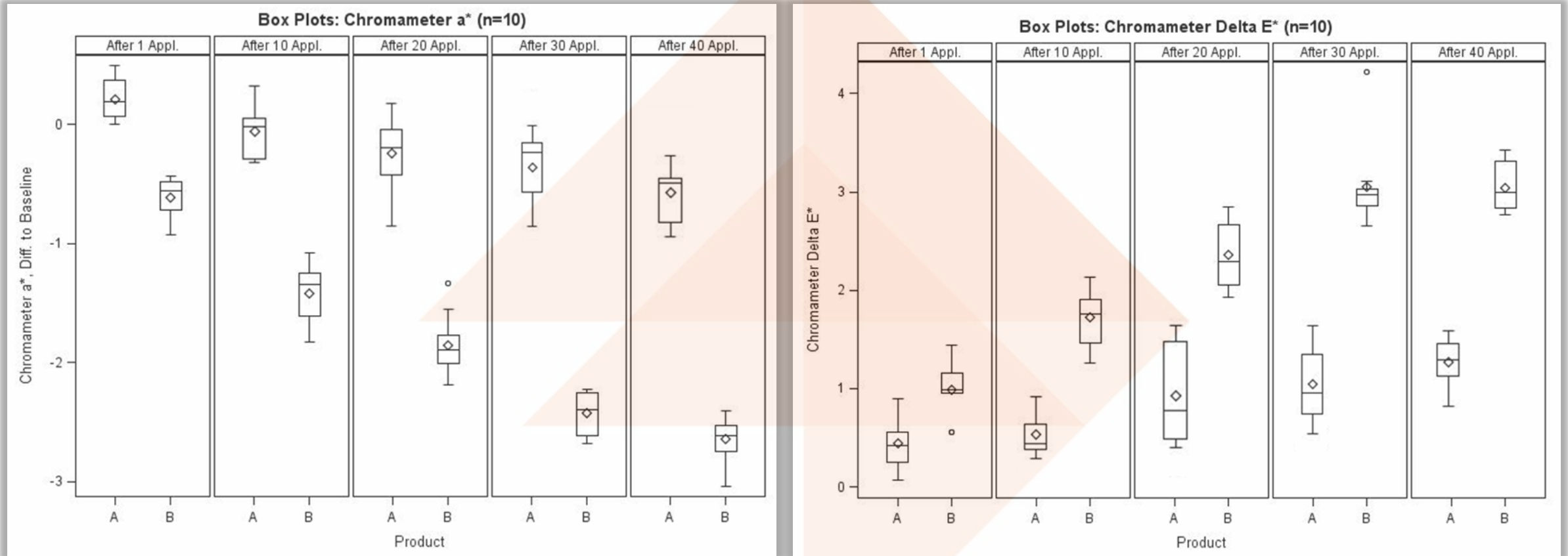
- Mean  $L^*$ ,  $a^*$ ,  $b^*$  values
- $\Delta C^*$ ,  $\Delta E^*$  per tress and time

## Possible Claims

- Color protection
- Effects against color fade
- Keeps color even after X washes
- Long color retaining
- Neutralizing yellow tones
- Protects from UV-bleaching



# Hair Color by Chromametry



# In Vivo Methods

- Hair Loss
- Dry Scalp / Dandruff / Itching Scalp
- Confocal Raman Spectroscopy on Scalp
- Microbiome Analysis



# Hair Loss

In male or female pattern hair loss, a decrease of hair density on the scalp, is seen:

- The anagen rate becomes progressively shorter
- More telogen hair, less anagen hair
- Hairs tend to miniaturize

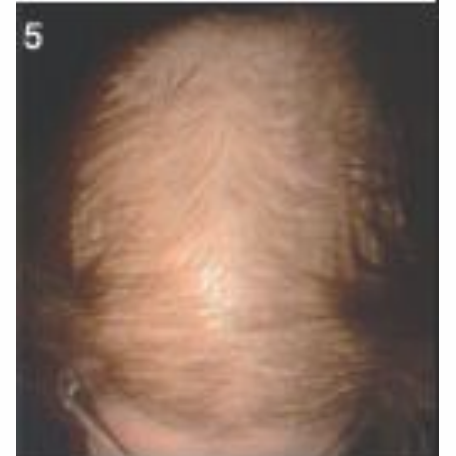
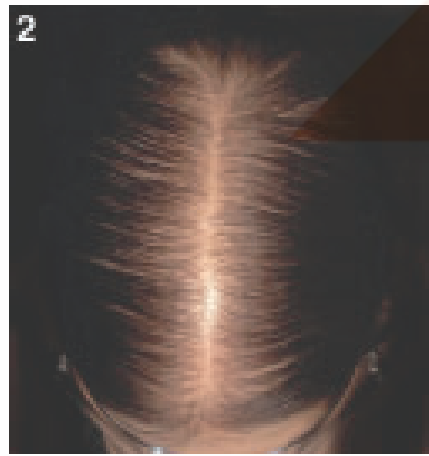


# Hair Loss – Study

- Inclusion according to Hamilton Score (male) or Savin Score (female) or according to self-estimation (weaker)
- Evaluation over 3, better 6 months
- Methods:
  - Clipping of small area on scalp
  - Relocation of areas with microtattoos
  - On day 1 Images for photodocumentation of 'clipping closeness' (for internal control only; no evaluation will be done)
  - Images 2 days after clipping for phototrichogram analysis
  - Image analysis: hair density, rates of anagen and telogen hairs, anagen hair density, telogen hair density, anagen/telogen ratio, cumulative hair thickness, hair growth rate

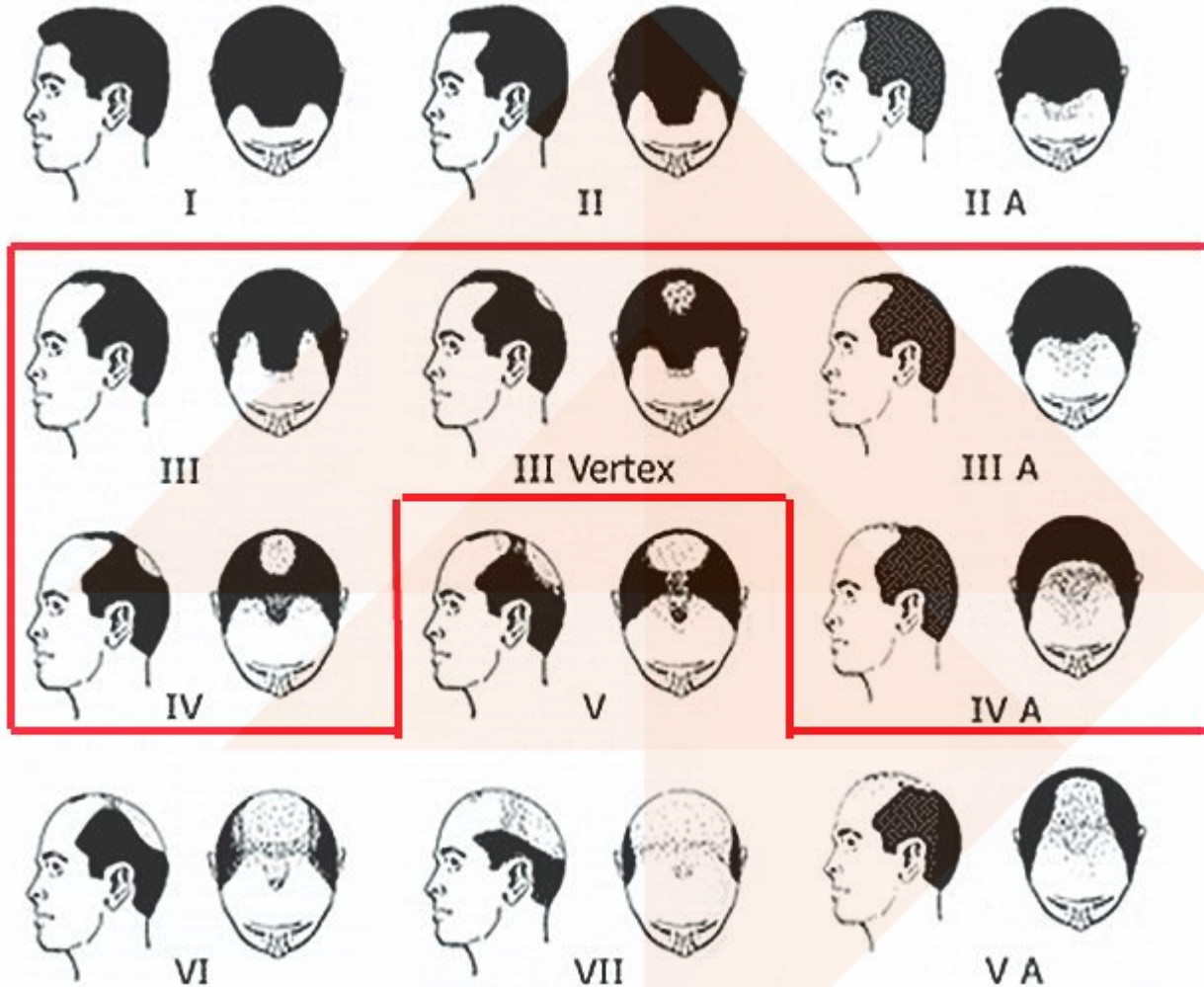
# Hair Loss

- Savin score for female subjects
- Inclusion according to score 2 to 4



# Hair Loss

## Hamilton Score





# Hair Loss



# Hair Loss



Leviacam Images taken

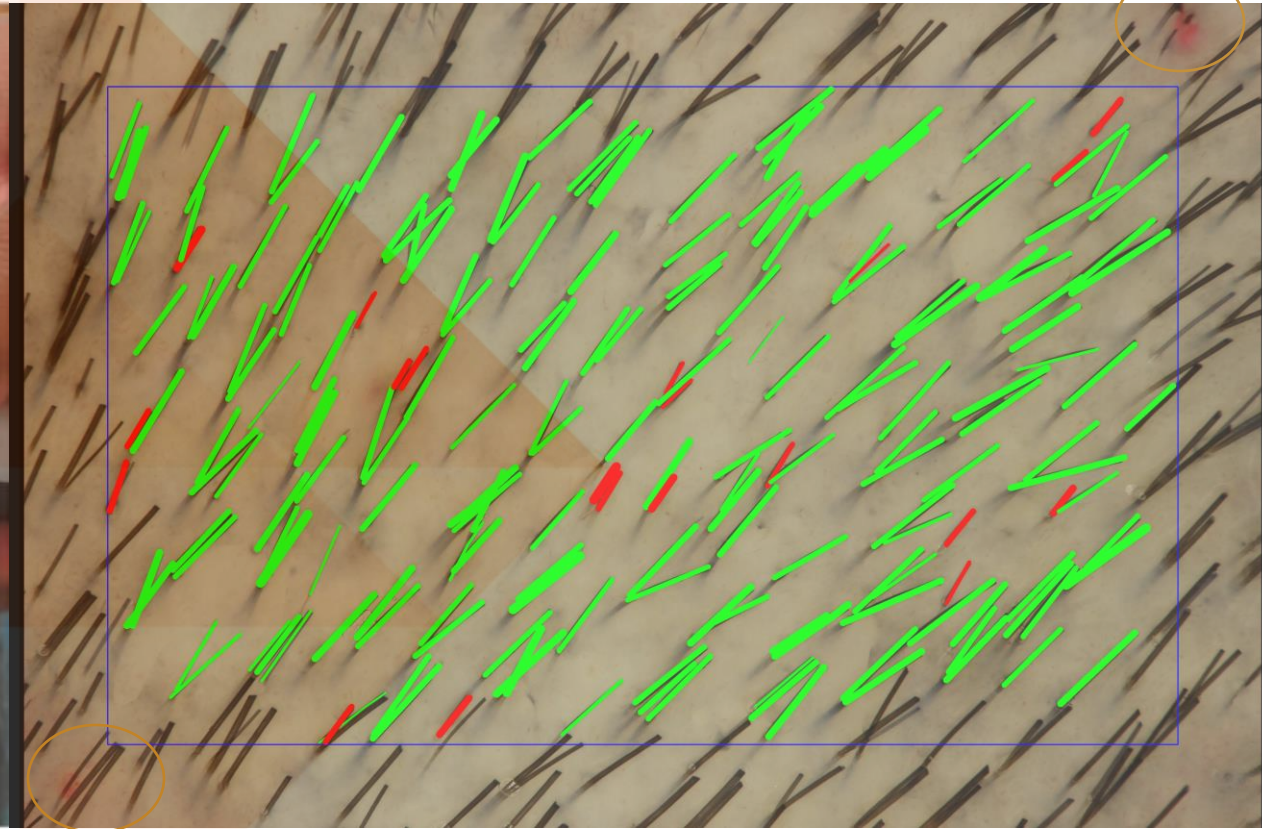


Image Analysis of Hair



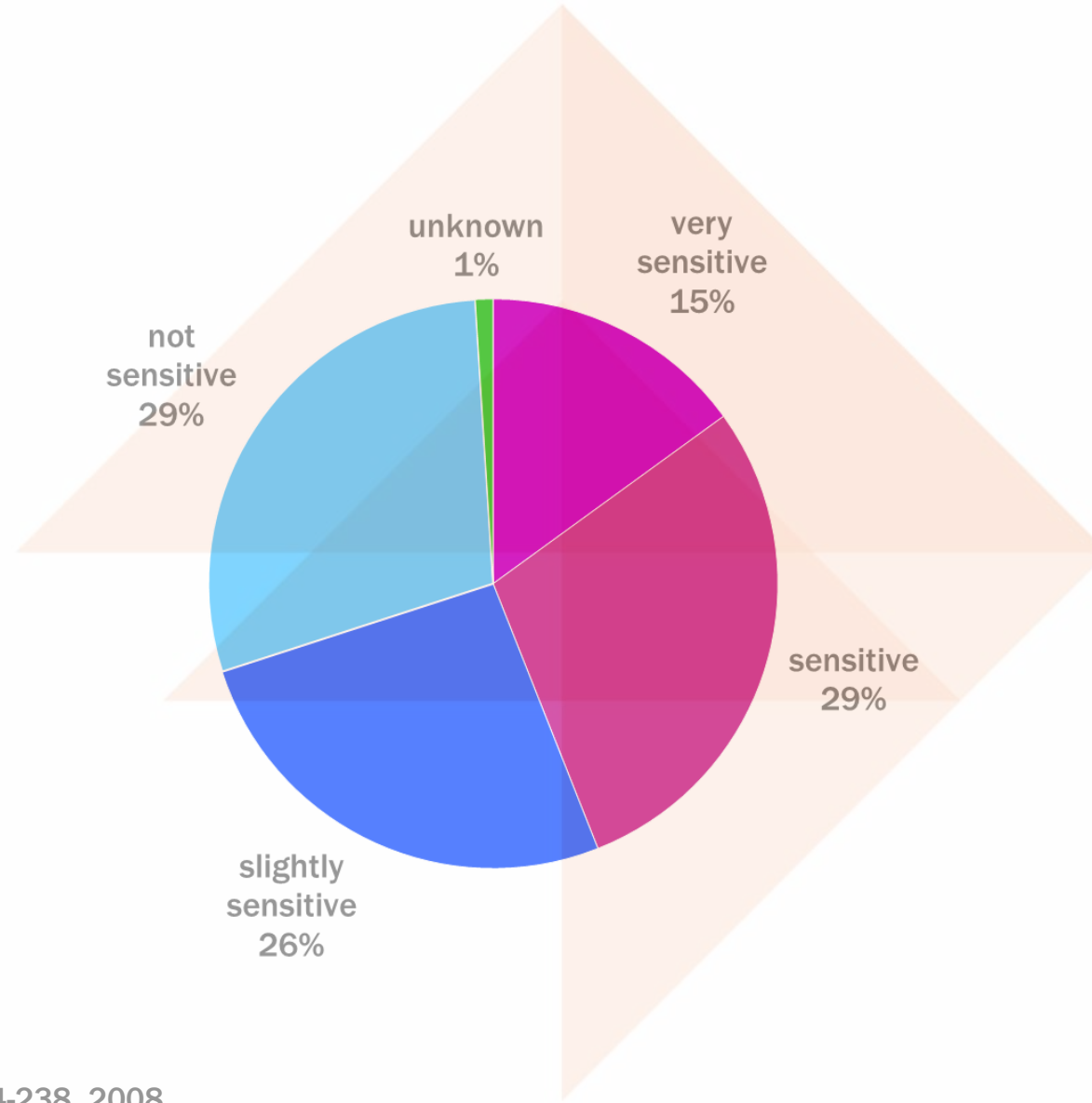
# Scalp Health

- The skin of the human scalp is a very specific body site
- Approx. 25% of our hairs are located on our head
- Epidermal thickness similar to other body sites
- Sebum rich region; high density of hair follicles and sebaceous glands
- High number of sweat glands
- Very good blood supply

Sensation  
Attractiveness  
Well-Being



# Sensitive Scalp



# Treatment of Dry/Sensitive Scalp

- Mild detergent combinations
- Reduction of shampoo amount
- Reduction of wash frequency
- Re-fatting shampoos
- Avoidance of mechanical stress

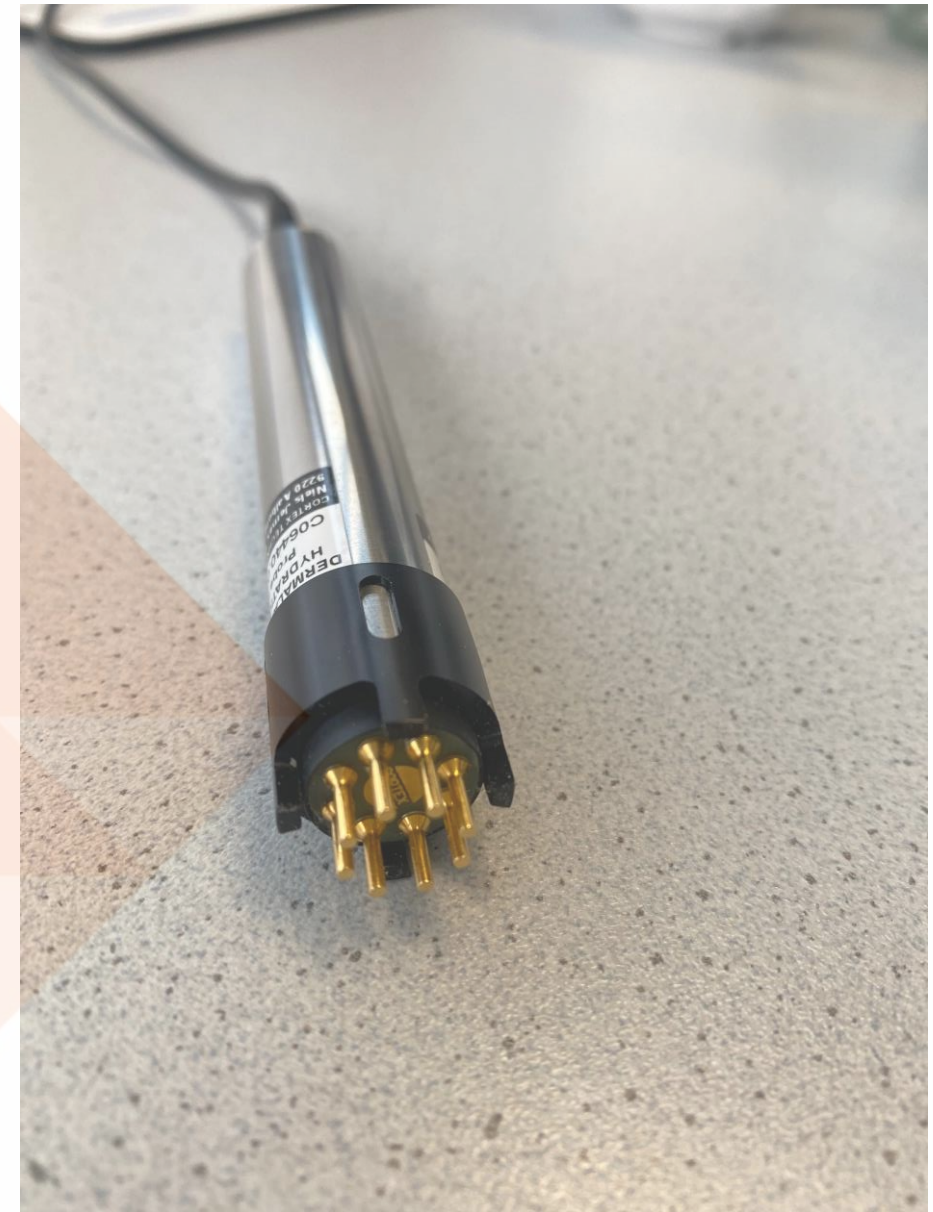
## Possible Claims

- Anti-Itching
- Soothing
- Scalp friendly
- Suitable for sensitive scalp



# Dry Scalp

- The purpose of a is to assess the efficacy of a hair care product regime for improving dry and itchy scalp after 2 weeks of usage.
- Possible Parameters:
  - Dermatological assessment of skin status: erythema, dryness, scaling, fissures, papules, pustules, edema, vesicles, weeping
  - Subjective parameters: itching, burning, tension, tickling, feeling of dryness
  - Measurement of skin hydration on scalp [DermaLab with Pin Probe]
  - Self-assessment questionnaire
- **Special Measurements with Raman on Scalp possible**
- **Microbiome Analysis on Scalp**



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## Other Measurements on Scalp

- Skin barrier status
- Sebum content
- Transepidermal water loss
- pH value
- Skin color or blood flow on the scalp





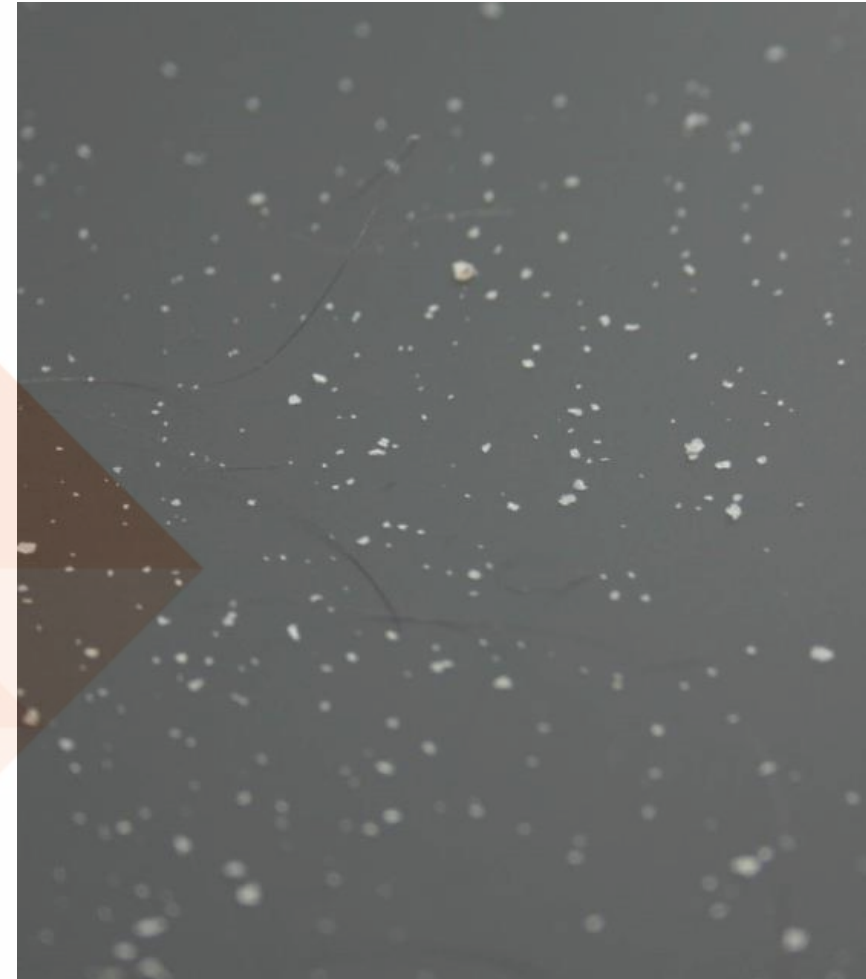
# Dry Scalp and Dandruffs

- Skin constantly produces new skin cells and sheds old cells to stay healthy
- Dandruff can occur when this cycle of skin renewal speeds up. This leads to patches of dead skin forming on the scalp that come away into the hair



# Protection and Repair of the Scalp

- Anti-Dandruff Efficacy
- The purpose of a study is to assess the efficacy of a hair care leave on product at improving dry scalp presenting white flakes (Dry dandruff) after 4-6 weeks of usage.
- Dandruff Scoring [visual grading]
- Combing-out of loose flakes and Images [HiRIS]
- Image analysis
- Self- assessment of itching and burning
- **Special Measurements with Raman on Scalp possible**
- **Microbiome Analysis on Scalp**

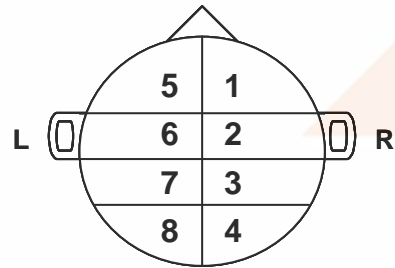


# Visual Expert Grading

Billhimer dandruff score:

0 = none

- 1-2 = mild
- 3-4 = moderate
- 5-6 = marked
- 7-8 = severe
- 9-10 = heavy



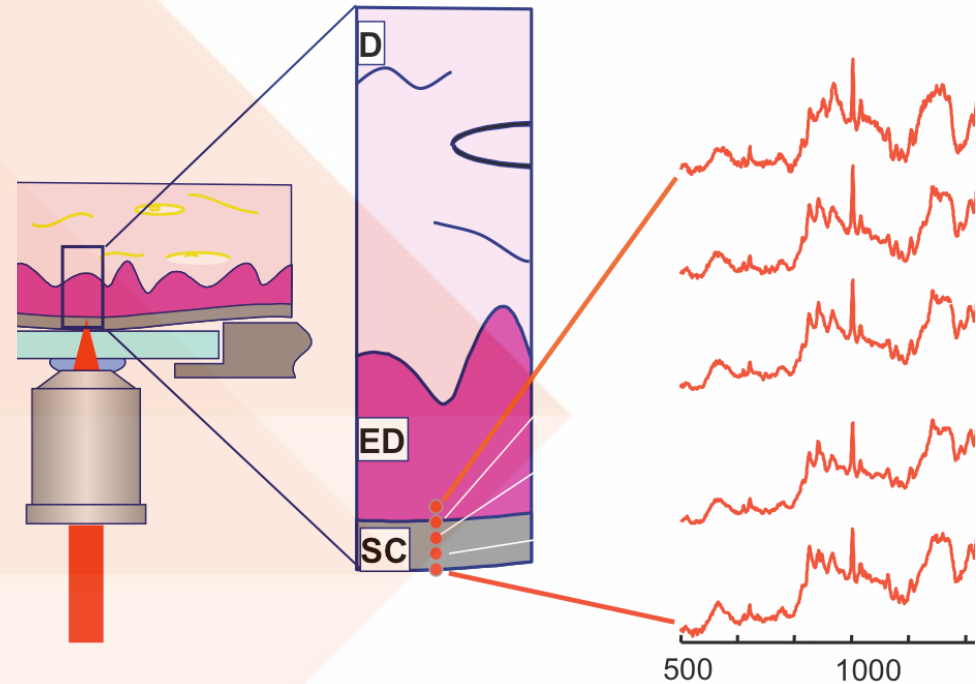
# Confocal Raman Spectroscopy

- As it is densely covered with hair, direct in vivo measurements on scalp are difficult
- Confocal Raman Spectroscopy, can be used to measure directly on the hairy scalp by using a thin focused laser beam
- The purpose of a possible study is to provide information about the effects of wash substances on the amount of NMF (Natural Moisturizing Factors) and Lipids in SC in vivo in real time



# Raman Measurements

- Non-invasive method
- Using the „Raman methods“, light scattering to identify the molecules
- Allows to analyse the composition of the skin
- Can analyse multiple parameters in one measurement



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# Raman Measurements on the Scalp

- **Thickness of Stratum Corneum**
- **Natural Moisturizing Factors (NMF) & Barrier Lipids**
  - **NMF**
    - Free Amino Acids
    - Lactate
    - Urea
  - **Lipids**
    - Ceramides
- **Skin penetration of biomolecules, i.e. active ingredients, pharmacological products**

# Study Set Up



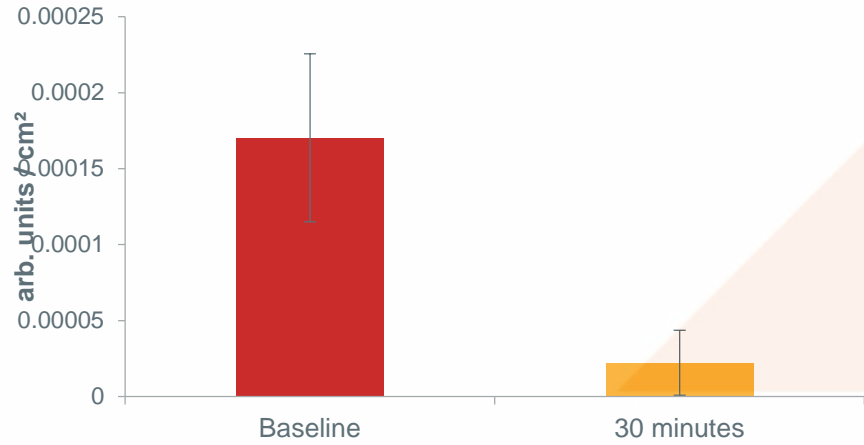
Preparation of Test Area



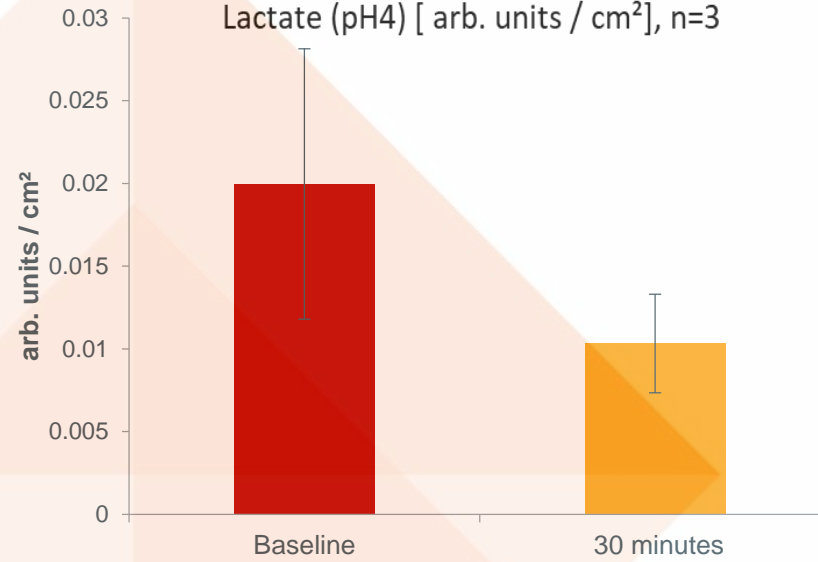
Adapter for Scalp Measurements

# Results for Standard Shampoo Study

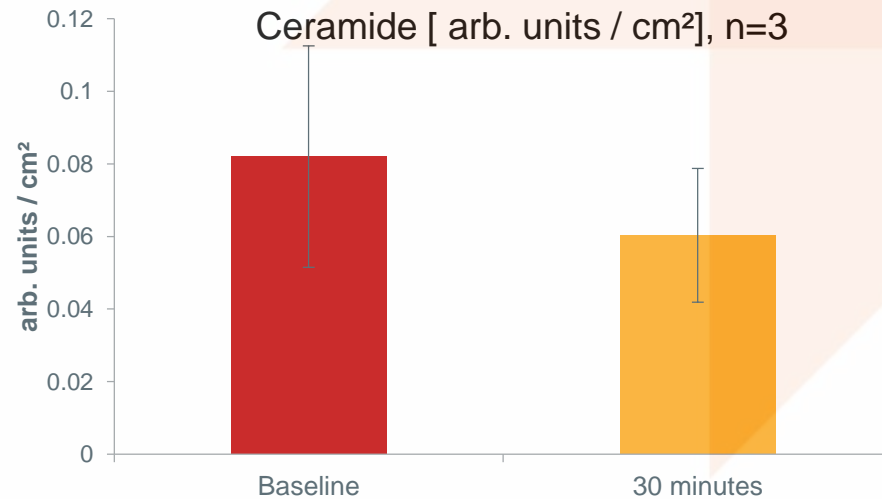
NMF [ arb. units / cm<sup>2</sup>], n=3



Lactate (pH4) [ arb. units / cm<sup>2</sup>], n=3



Ceramide [ arb. units / cm<sup>2</sup>], n=3





# Raman on Scalp Measurements

- Confocal Raman Spectroscopy is a promising innovative technology to investigate the status of the human scalp barrier *in vivo* in real time
- Significant wash out effect of NMFs and Lipids caused by shampoo application
- Challenging and time consuming method due to the test area



Claim support for hair care products regarding mildness and skin care properties can be obtained reliably with this advanced method

# What is a Healthy Microbiome?

- **Healthy skin has a healthy microbiome**

- Antimicrobial peptides of the skin and commensals limit the growth of bacteria and fungi on the skin
- An acidic pH on skin surface also limits overgrowth
- Higher growth of specific microbes is often related to diseased skin / impaired barrier (e.g. Staph. aureus in atopic dermatitis)

- Healthy skin microbiota have a **specific biodiversity and evenness of microbes distribution**

- The **Shannon Diversity Index** is an objective parameter to characterize biodiversity and evenness of distribution

- No change of Shannon index => One important indicator that the microbiome is still maintained in good health

# Microbiome Analysis - CLAIMS

- Swabbing on scalp possible
- Microbiome friendly
  - Cosmetics should maintain the skins health
  - This means cosmetic treatment should maintain a healthy microbiome
  - Studies testing versus untreated healthy control should show that the microbiota under investigation is not significantly modified
- Microbiological analysis are also possible



# Take Away Message



**Skinification and Aging hair** should have a substantial part in **companies claim development**



The topic of **dry scalp, dandruffs** and **sensitive scalp** is affecting the consumers



A combination of **in vitro and in vivo studies** will give you a great advantage for your products



Thank you for your time

QUESTIONS?