CLINICAL ((non) human test) STUDY REPORT

Human Co., Ltd. Skin Clinical Trial Center

AG Health

Product :	[morefill Anti Hair Loss shampoo]
Report No :	HM-R23-0418
Reported :	09th May 2024

Authentication

	[morefill Anti Hair Loss shampoo]
Assessment	Improvement of scalp dryness and itchiness
	Improvement of skin density in hairline area
	Improvement of number of hairs shed
	Improvement of root volume on the top of the head
	Improving effect of scalp pH
	Improvement of hair elasticity
	Improvement of hair volume
	Improvement of hair moisture content
	Improvement of hair gloss
	Cleansing effect of hair fine dust simulant

The Human Skin Clinical Trial Center conducted this test, which was requested by Benton Inc. Cosmetics in accordance with the GCP (Good Clinical Practice) guideline, relevant regulations of the Ministry of Food and Drug Safety (MFDS) and Human Skin Clinical Trial Center's standard operating procedure (SOP), and report the result as follows:

09th May 2024

Institute :   Human Skin Clinical   President   Heejung Jung *(signature)*
                   Trial Center

Study Director :   Human Skin Clinical   Dermatologist   Wonkyu Hong *(signature)*
                   Trial Center

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Content

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Information of the study request

Title	A clinical study to evaluate the efficacy of [morefill Anti Hair Loss shampoo] on the improvement of scalp dryness and itchiness, improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH after 4 weeks of use on human application test and on the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, cleansing effect of hair fine dust simulant after one-time use on non-human application test.
Report No	HM-P23-0418
Study period	10th January 2024 ~ 07th February 2024
Report date	09th May 2024

Institute	**Name**	Human Co., Ltd. Skin Clinical Trial Center
	Address	1005~1008, 24, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea
	Agency director	Heejung Jung
	Study director	Wonkyu Hong / Dermatologist
	Researcher in charge	Hajeong Nam Researcher
	Tel.	+82-70-5222-9534
	e-mail	nhj@humanethic.co.kr

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Sponsor	Name	AG Health
	Address	1101, Trade tower 511, Yeongdong-daero, Gangnam-gu, Seoul, Republic of Korea
	President	Kwang Auh
	Monitor	Jiye Han
	Tel.	+82-2-834-5182
	e-mail	jyhan@ag-health.com

Reliability assurance

Title	A clinical study to evaluate the efficacy of [morefill Anti Hair Loss shampoo] on the improvement of scalp dryness and itchiness, improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH after 4 weeks of use on human application test and on the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, cleansing effect of hair fine dust simulant after one-time use on non-human application test.
Report No	HM-P23-0418
Study period	10th January 2024 ~ 07th February 2024

This study was conducted under the experimental protocol in consulted with the sponsor, in compliance with the regulations of GCP (Good Clinical Practice) guideline, MFDS (Ministry of Food and Drug Safety), and with standard operation procedure (SOP) of the Human Skin Co., Ltd. Skin Clinical Trial Center.

In addition, it is confirmed that this report was reviewed and found that it accurately reflected the results obtained during the study by a quality assurance.

1. Following basic documentations stored? (Select all that apply)

■ Experimental protocol   ■ Contract   ■ Informed consent Form (ICF)

■ Case Report Form (CRF)   ■ Researcher resume   ■ Explanation for subject

□ Code Breaking procedure   ■ Subject compensation   □ Reports of serious adverse
                               regulation   event

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2. The number of subjects and test substance

Division	The number of subjects	
Planned	≥20	
Enrolled	23	
Drop-out	0	
Completed	23	
Division	**The number of substance**	
Planned	Improvement of hair elasticity	Human hair tress (black) 20 pieces
	Improvement of hair volume	Human hair tress (black) 20 pieces
	Improvement of hair moisture content	Human hair tress (black) 20 pieces
	Improvement of hair gloss	Human hair tress (black) 20 pieces
	Cleansing effect of hair fine dust simulant	Human hair tress (white) 40 pieces (Test group: 20 pieces, Control group: 20 pieces)

3. Did the study proceed according to the study protocol?

   ■ Yes   □ No

4. Did the study proceed according to the Standard Operation Procedure (SOP)?

   ■ Yes   □ No

5. Did all subjects sign and date their handwritten consent to participate in the approved study?

   ■ Yes   □ No

   (If receiving consent from a substitute: □ Yes □ No, reason:＿＿＿＿＿＿＿＿＿＿＿)

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6. Had there been any Adverse Event occurrence, severity, or specific changes to note?

(If yes, attach and submit)

☐ Yes ■ No

7. Was the following subject's information filled in the Case Report Form (CRF) (Multiple choices)?

■ Subject initial ■ Date of birth ■ Subject gender ■ Subject age

8. Were the various documents related to the clinical study stored in a separate safe place?

■ Yes ☐ No

09th May 2024

Study Director   Wonkyu Hong *(signature)*

Quality Assurance   Hongsuk Kim *( )*

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Summary of the results

Title	A clinical study to evaluate the efficacy of [morefill Anti Hair Loss shampoo] on the improvement of scalp dryness and itchiness, improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH after 4 weeks of use on human application test and on the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, cleansing effect of hair fine dust simulant after one-time use on non-human application test.
Institute	Human Skin Co., Ltd. Skin Clinical Trial Center
Study code	HM-P23-0418
Study period	10th January 2024 ~ 07th February 2024
Reported	09th May 2024
Objective	This study is to evaluate the efficacy of one type of cosmetic on the improvement of scalp dryness and itchiness, improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH after 4 weeks of use on human application test and on the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, cleansing effect of hair fine dust simulant after one-time use on non-human application test.

	No.*	Name of the product	Formulation
Investigational product	240104-E-1	morefill Anti Hair Loss shampoo	Light yellow-colored transparent liquid

Identification code of the investigational product by Human Co., Ltd

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Methods	The test subject visited and waited for more than 30 minutes under controlled conditions constant temperature (22±2°C) and humidity (50±5%) conditions to sufficiently stabilize the skin before participating in the test. Before and after 4 weeks of the test product use, the transepidermal water loss (g/㎡h), itchiness score (Score) in the scalp area were measured to evaluate the improvement of scalp dryness and itchiness. Before and after 4 weeks of the test product use, the skin density (Density), number of hair shed (ea) in hairline area, the root volume angle (°) on the top of the head, the pH in the scalp area were measured to evaluate the improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH. In addition, before and after one-time use of the test product, the hair flexural strength (N/cm^2), hair area (pixel), hair moisture content (%), gloss area (pixel) were analyzed using human hair tress (black) to evaluate the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, and before and after applying the fine dust simulant, after one-time use of the test product, the fine dust simulant area (pixel) was analyzed in comparison using human hair tress (white) to evaluate the cleansing effect of hair fine dust simulant.

Results	➢ Human application test
	✓ After 4 weeks of use

➢ Human application test

✓ After 4 weeks of use

- The transepidermal water loss (g/m²h) in the scalp area was significantly decreased.

- The itchiness score (Score) in the scalp area was significantly decreased.

- The skin density (Density) in hairline area was significantly increased.

- The number of hair shed (ea) was significantly decreased.

- The root volume angle (°) on the top of the head was significantly increased.

- The pH in the scalp area was significantly decreased.

➢ Non-human application test

✓ After one-time use

- The hair flexural strength (N/cm^2) in the human hair tress (black) was significantly increased.

- The hair area (pixel) in the human hair tress (black) was significantly increased.

- The hair moisture content (%) in the human hair tress (black) was significantly increased.

- The gloss area (pixel) in the human hair tress (black) was significantly increased.

- The fine dust simulant area (pixel) was significantly decreased in both the test group and the control group after one-time use in comparison with after applying the fine dust simulant, however the amount of the decrease in fine dust simulant area (pixel) was significantly higher in the test group than the control group.

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Conclusion	[morefill Anti Hair Loss shampoo] requested by AG Health is considered to be helpful with after 4 weeks of use 1) improvement of scalp dryness and itchiness, 2) improvement of skin density in hairline area, 3) improvement of number of hair shed, 4) improvement of root volume on the top of the head, 5) improving effect of scalp pH, after one-time use 6) improvement of hair elasticity, 7) improvement of hair volume, 8) improvement of hair moisture content, 9) improvement of hair gloss, 10) cleansing effect of hair fine dust simulant.

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1. Study object

This study is to evaluate the efficacy of [morefill Anti Hair Loss shampoo] on the improvement of scalp dryness and itchiness, improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH after 4 weeks of use on human application test and on the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, cleansing effect of hair fine dust simulant after one-time use on non-human application test.

2. Study background

This test included more than 20 people of healthy Korean female adult over the age of 19 years old. Before and after 4 weeks of the test product use, the transepidermal water loss (g/m^2h), itchiness score (Score) in the scalp area were measured to evaluate the improvement of scalp dryness and itchiness. Before and after 4 weeks of the test product use, the skin density (Density), number of hair shed (ea) in hairline area, the root volume angle (°) on the top of the head, the pH in the scalp area were measured to evaluate the improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH. In addition, before and after one-time use of the test product, the hair flexural strength (N/cm^2), hair area (pixel), hair moisture content (%), gloss area (pixel) were analyzed using human hair tress (black) to evaluate the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, and before and after applying the fine dust simulant, after one-time use of the test product, the fine dust simulant area (pixel) was analyzed in comparison using human hair tress (white) to evaluate the cleansing effect of hair fine dust simulant.

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3. Study schedule and design

Table 1.   Study schedule

Request of study	26th December 2023
Contract	03rd January 2024
Delivery of the investigational product	03rd January 2024
Subjects recruitment and study preparation	09th January 2024
Experimental schedule	10th January 2024~ 07th February 2024
Report issue date (Korean)	21st February 2024
Report issue date (English)	09th May 2024

Table 2.   Human application test study design

period	Assessment	Device	Data
After 4 weeks	Improvement of scalp dryness and itchiness	Vapometer VAS assessment	Data Data
	Improvement of skin density in hairline area	DUB® SkinScanner	Image, Data
	Improvement of number of hair shed	DSLR	Image, Data
	Improvement of root volume on the top of the head	DSLR	Image, Data
	Improving effect of scalp pH	pH meter	Data

Table 3.   Non-human application test study design

period	Assessment	Device	Data
After one-time use	Improvement of hair elasticity	MultiTest-dV	Data
	Improvement of hair volume	DSLR	Image, Data
	Improvement of hair moisture content	FD-660	Data
	Improvement of hair gloss	DSLR	Image, Data
	Cleansing effect of hair fine dust simulant	DSLR	Image, Data

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4. Investigational product

Table 4.   Investigational product

Type	1 type of cosmetic
Name of test product	morefill Anti Hair Loss shampoo
Formulation	Light yellow-colored transparent liquid
Identification code	240208-E-1
Quantity supplied	30ea
Date of receipt	2024. 01. 04
Analytical control	Sponsor should provide information about the test product. Chemical analysis in order to confirm the stability and physical properties of test products will not be provided.
Storage	Investigational product is stored for 180 days from the date of issuance of the test result report at the temperature range of 5°C ~ 25°C away from heat and direct sunlight. Investigational product will be discarded if there is no specific request from the sponsor after the expiration of this storage period.
Application area	Human application test: scalp and hair Non-human application test: human hair tress
Duration/Frequency	Human application test: used once a day for 4 weeks. Non-human application test: used once on a test day
Application method	Application according to the method provided by sponsor -

5. Study subject

5.1. Inclusion criteria

- Healthy Korean female adult over the age of 19
- Subjects who have signed consent form voluntarily after being informed sufficiently on the objectives of study and all related contents
- Subjects who are healthy without acute and chronic diseases including skin disorders
- Subjects who can be observed and traced throughout the entire study period

5.2. Exclusion criteria

- Subjects who are and/or have plan of pregnant or breast-feeding
- Subjects who infectious skin disease, atopic dermatitis, or scalp psoriasis on the scalp or face
- Subjects who have used antibacterial agents, immunosuppressant, other chronic skin disease treatments, and dandruff shampoos to treat the scalp area within the past month
- Subjects who confirmed HIV infection or syphilis infection, which can cause scalp dandruff or hair loss
- Subjects who skin cancer or a history of skin cancer
- Subjects who have psychiatric disease and infectious skin disease
- Subjects who have used an ointment containing steroids for more than 1 month
- Subjects who participated in the similar test within the past 6 months
- Subjects who have sensitive and hypersensitive skin
- Subjects who have skin disorders on the test site such as moles, pimples, red spots, scalds (burns), hemotelangiosis, and scars
- Subjects who have used cosmetics or drugs on the test site with similar efficacy within the past 3 months
- Subjects who received treatment from dermatologist or aestheticians on the test

site within the past 6 months

- Those who are employed in this clinical trial center
- Those who are considered as a nonqualified person by judge or the investigator

5.3.   Discontinuation and elimination criteria

Subjects who participated in this test can stop or withdraw at any time, and if the following reasons occur, the test subject is excluded from the test and the test results. If a test subject was dropped, the investigator specified the reason among the items below, recorded any other unusual information, and reported it to the test director.

（1） Voluntary withdrawal by the subject

（2） Violation of the protocol

（3） Occurrence of adverse event or seriously adverse event on the test site

（4） Failure to follow up on the subject

（5） Others

5.4.   Ethical conduct of study

This human use test was conducted in order to protect the rights, safety, and welfare of test subjects in accordance with the spirit of the Helsinki Declaration and the contents of the GCP guidelines. The researchers faithfully implemented the following to ensure the safety of the test subjects.

（1） During the test, the principal investigator and the investigator should do their best to the safety of the test subject, and in the event of an adverse reaction, take prompt and appropriate measures to minimize the reaction.

（2） If the subject reports skin irritation or adverse reactions by the test product during the test, immediately wipe the investigational product and, if symptoms do not improve, obtain a dermatological evaluation and appropriate treatment by the test manager.

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（3） If an adverse reaction occurs despite the normal test procedure, seek appropriate dermatological treatment.

（4） In case of any other abnormal skin reaction, the principal investigator and the investigator take appropriate measures together with the dermatological evaluation and record the case in detail.

5.5. Subject's obligation

- The application method and restrictions of the test product are faithfully implemented and follow the assessment schedule.
- All symptoms occurring during the test period should be reported in detail and without exception.
- During this test period, all questions, questionnaires, and questions should be written with integrity and honesty.
- Subject diary should be brought to the center during visit.

5.6. Prohibition and restriction

- Subjects should be prohibited to take any medication (including traditional medicines) or cosmetics that contains aspirin, anti-inflammatory, anti-histamines, and steroid during study period.
- Subject should follow the same skin care or make-up regimes during study period.
- Any aesthetic or dermatological procedures are prohibited during study period.
- Subjects should avoid higher sun exposure activities such as outdoor swimming, skiing, mountain climbing, and long-term travel during the test period.

5.7. Confidentiality of information and duty of good faith

- The confidentiality of test subjects participating in this test is guaranteed. However, test data could be used for medical, academic research or marketing purposes to the extent that the identity of the subject is not revealed.
- Test subjects must keep the information in confidential until the test is completed.
- Test subjects participating in this test must fill out the data sincerely and honestly.
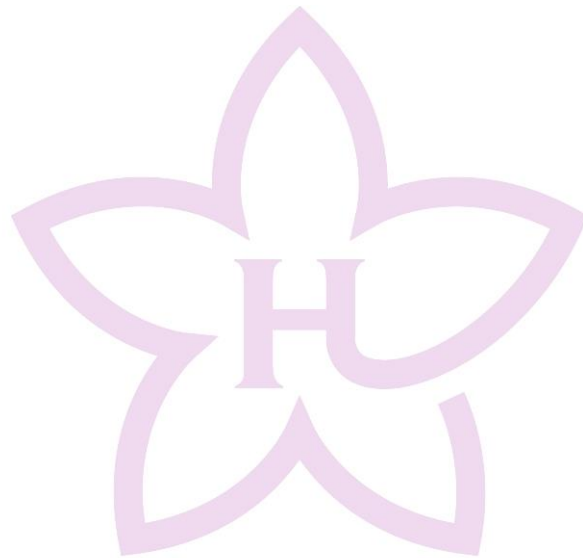
6. Test procedure

All measurement and assessment were carried out in a controlled environment with a constant temperature (22±2°C) and humidity (50±5%), ensuring the absence of air flow or direct sunlight. It allowed the test subjects' skin to stabilize.

6.1. Assessment of improvement of scalp dryness and itchiness

6.1.1. Assessment of transepidermal water loss of scalp

Vapometer (Delfin Technologies Ltd., Finland) is a device that assesses transepidermal water loss (TEWL), an index of moisture loss through the epidermis. Although a certain amount of water evaporation occurs as part of normal skin metabolism, when the skin barrier function is impaired, water loss increases, and leadings rise of the measured value.

In this test, Vapometer was used to measure the transepidermal water loss (g/㎡h) in the scalp area before and after 4 weeks of the test product use.

6.1.2. Assessment of itchiness score of scalp

Participants were asked to assess the classification of itchiness on a 4-point scale before and after 4 weeks of the test product use. The average score was calculated to evaluate the improvement of degree of itchiness (Table 5).

Table 5. Classification of the degree of itchiness

Score	Subjective evaluation of scalp itchiness by test subject
0	No itchiness at all
1	Mild itchiness
2	Severe itchiness
3	Intense itchiness
4	Very intense itchiness

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The significant results of two evaluation factors, the transepidermal water loss (g/㎡h) and itchiness score (Score), suggest they could help in improving the scalp dryness and itchiness.

6.2. Assessment of improvement of skin density in hairline area

DUB® SkinScanner (tpm taberna pro medicum GmbH, Germany) is used for imaging and measuring and analyzing the skin and dermal layers using ultrasound technology. It is a 22MHz high-resolution ultrasonic imaging device that able to analyses image skin layers such as changes in skin including blood vessels, density of the dermal layer using collagen fiber reflectance, and changes in dermal cells to antioxidants (Fig.1).

Fig 1. DUB® SkinScanner image
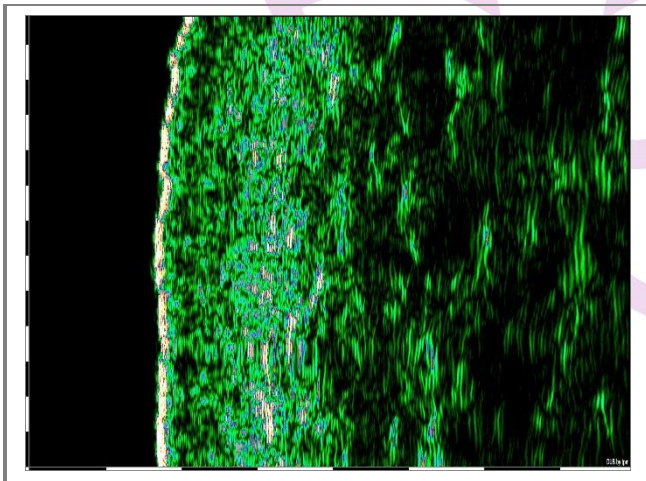
In this test, DUB® SkinScanner was used to take an image of hairline area and then the skin density (Density) was measured before and after 4 weeks of the test product use.

6.3. Assessment of improvement of number of hair shed

In this test, the test subject divided the hair into 3 parts using a hair brush and combed 20 times to each of the left, center, and right parts. After combining a total of 60 times, the number of hair shed (ea) was evaluated before and after 4 weeks of the test product use (Fig 2).

Fig 2. DSLR image

Before	After 4 weeks

6.4. Assessment of improvement of root volume on the top of the head

In this test, DSLR (Cannon Inc., Japan) was used to take an image of the top of the head area and then the root volume angle (°) was analyzed using Image pro 10 (Media Cybernetics, Inc., USA) before and after 4 weeks of the test product use (Fig 3).

Fig 3. DSLR image

Original image	Analysis image
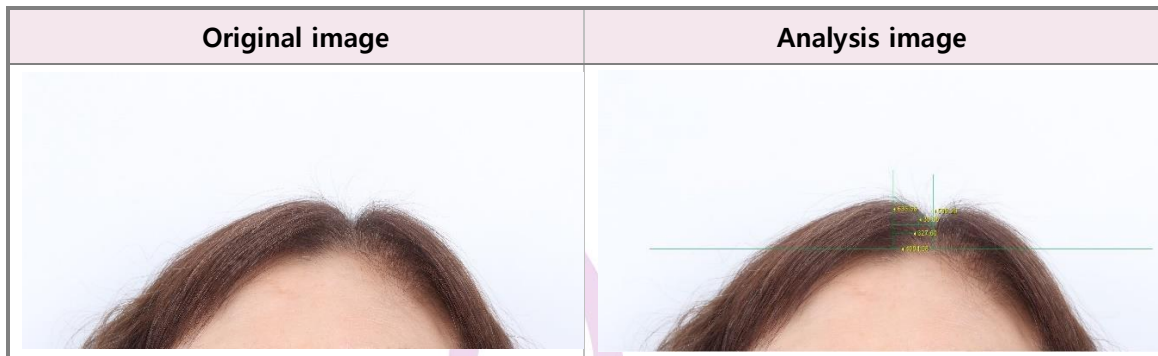
6.5. Assessment of improving effect of scalp pH

Skin pH meter (Cosmomed Medical Beauty GmbH, Germany) is a device used to measure skin pH, consisting of a pH probe, pH 4.01 buffer solution, and distilled water (D.W.). The basic principle involves measuring the voltage generated from the ion exchange reaction of hydrogen ions on the surface of a glass electrode. The measured results are displayed on the Skin-O-Mat device.

In this test, Skin pH meter was used to measure the pH value in the scalp area before and after 4 weeks of the test product use.

6.6. Assessment of improvement of hair elasticity

MultiTest-dV (Mecmesin Ltd., United Kingdom) is a device used for tensile and compression testing, capable of load control, distance control, and measuring tensile forces on samples.

In this test, MultiTest-dV was used to measure the hair flexural strength (N/cm^2) of the human hair tress (black) before and after 4 weeks of the test product use.

6.7. Assessment of improvement of hair volume

In this test, DSLR was used to take an image of the human hair tress (black) and then the gloss area (pixel) was analyzed using Image pro 10 before and after one-time use of the test product (Fig 4).

Fig 4. DSLR image

Before	After one-time use

6.8. Assessment of improvement of hair moisture content

FD-660 (KETT, Japan) is an infrared moisture analyzer device capable of measuring moisture content. It utilizes a heating and drying method similar to the fundamental principle of moisture determination by loss on drying, followed by mass measurement which enables to measure moisture content using infrared technology.

In this test, FD-660. was used to measure the hair moisture content (%) of the human hair tress (black) before and after one-time use of the test product.

6.9. Assessment of improvement of hair gloss

In this test, DSLR was used to take an image of human hair tress (black) and then the gloss area (pixel) was analyzed using Image pro 10 before and after one-time use of the test product.

Fig 5. DSLR image

Before	After one-time use

6.10. Assessment of cleansing effect of hair fine dust simulant

Dino-Lite Premier AM3113T (AnMo Electronics Co., Ltd., Taiwan) is a USB type microscope with minimum of 20X to a maximum of 200X magnification depending on the distance to the subject

Fig 6. Dino-Lite image

Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use

In this test, Dino-Lite was used to take an image of human hair tress (white) and then the fine dust simulant area (pixel) was analyzed using Image pro 10 before and after applying of the Carbon black fine dust simulant (average particle diameter "less than 10μm"), after one-time use of the test product.

6.11. Self-report questionnaire

After using the test product, subjects subjectively fill out the questionnaire survey provided by the sponsor.

6.12. Assessment of skin adverse reaction

The investigator confirmed the occurrence of adverse skin reactions during the test period and the use of concomitant drugs that may affect the test. In the event of an adverse reaction, the investigator immediately informs the investigator, and the investigator determines whether to continue participating in the test after appropriate consideration.

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6.13. Data analysis and interpretation

To verify the statistical significance before and after using the test product, statistical analysis was conducted using Embedded on SPSS Statistics 26. Significance was confirmed when the probability value was $p < 0.05$ within the 95% confidence interval.

The results derived from device evaluation were presented in terms of mean and standard deviation as continuous variables, while the survey evaluation results were conveyed through frequency and percentage as categorical variables.

The normality of the data was verified using the Shapiro-Wilk test. For data with two measurement points, if normality was satisfied, Paired t-test (parametric method) was conducted. Otherwise, the Wilcoxon signed rank test (non-parametric method) was used.

6.14. Calculation method for the improvement rate

The calculation method for the improvement rate between each data is as follows.

$$\text{Improvement rate (\%)} = \frac{|\,(\text{After-Before})\,|}{\text{Before}} * 100$$

$$\text{Improvement rate compared to before use (\%)} = 1 + \frac{|\,(\text{After-Before})\,|}{\text{Before}} * 100$$

The calculation method for the cleansing rate between each data is as follows.

Cleansing rate

$$(\%) = \frac{|\,(\text{After-After applying the fine dust simulant})\,|}{\text{Before applying the fine dust simulant-After applying the fine dust simulant}} * 100$$
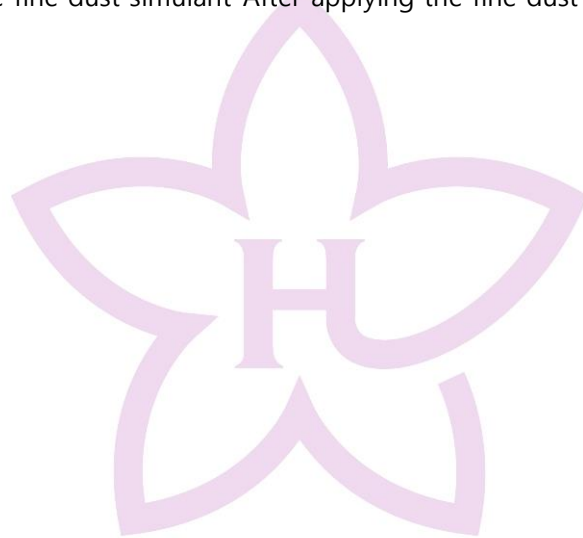
7. Study result

7.1. Characteristics of subjects

In this test, 23 test subjects who met all the criteria were recruited, with no subjects eliminated. Therefore, all 23 subjects were included in the result analysis The average age of the subjects was 51.5 years old, the maximum age was 68 years old, and the minimum age was 35 years old (Table 6).

Table 6. **Subject characteristics questionnaire result**

Details	Type	Participant	Total	Percentage(%)
Gender	Female	23	23	100.0%
	Male		0	0.0%
Age	20-29	23	0	0.0%
	30-39		2	8.7%
	40-49		7	30.4%
	50-59		9	39.1%
	60-69		5	21.7%

AGE DISTRIBUTION OF TEST SUBJECT

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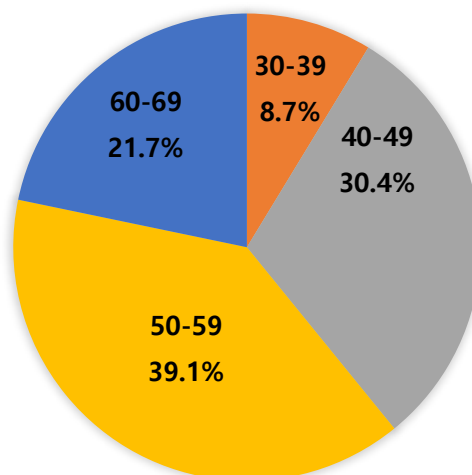
7.2. Assessment result of human application test

7.2.1. Assessment result of improvement of scalp dryness and itchiness

The transepidermal water loss (g/m²h) in the scalp area was significantly decreased after 4 weeks of use in comparison with pre-application (Table 7).

Table 7. Transepidermal water loss results by Vapometer

| Period	Area, assessment	Scalp, Transepidermal water loss (g/m^{2}h)
Before		10.17±2.14
After 4 weeks		6.51±1.68
Significance probability[1]	Before - After 4 weeks	**<0.001**
Improvement rate	Before - After 4 weeks	35.99%
	Before (100%) - After 4 weeks	135.99%

N=23 (No. 01~23), (Mean±Standard deviation)

[1]p-value: Significant probability, Paired t-test (p<0.05, comparison to initial value).

Significant difference (p<0.05, comparison to initial value).

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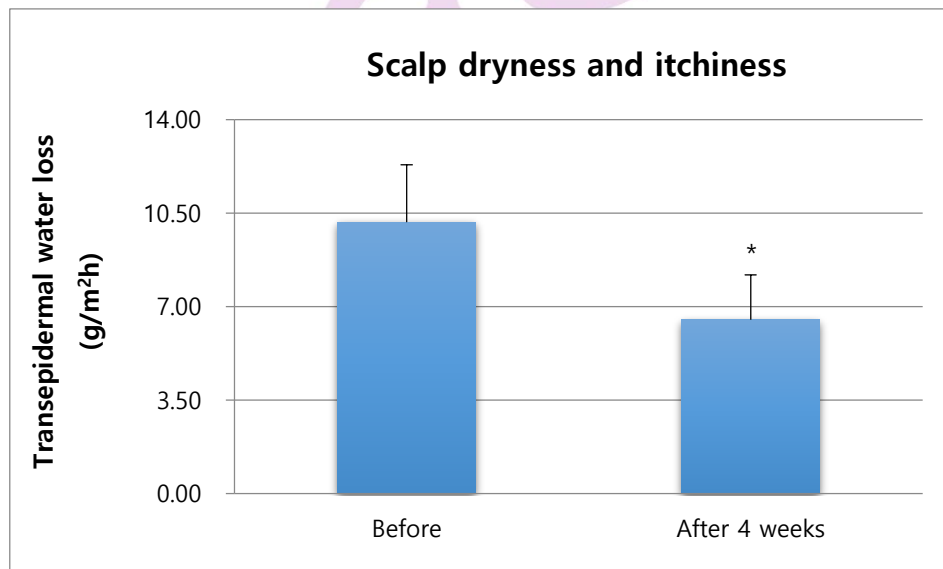
The itchiness score (Score) in the scalp area was significantly decreased after 4 weeks of use in comparison with pre-application (Table 8).

Table 8. Scalp itchiness score results

	N=23 (No. 01~23), (Mean±Standard deviation)	
Period	Area, assessment	Scalp, Itchiness score (Score)
Before		3.22±0.42
After 4 weeks		1.13±0.63
Significance probability[1]	Before - After 4 weeks	**<0.001**
Improvement rate	Before - After 4 weeks	64.91%
	Before (100%) - After 4 weeks	164.91%

[1]p-value: Significant probability, Wilcoxon signed rank test (p<0.05, comparison to initial value).
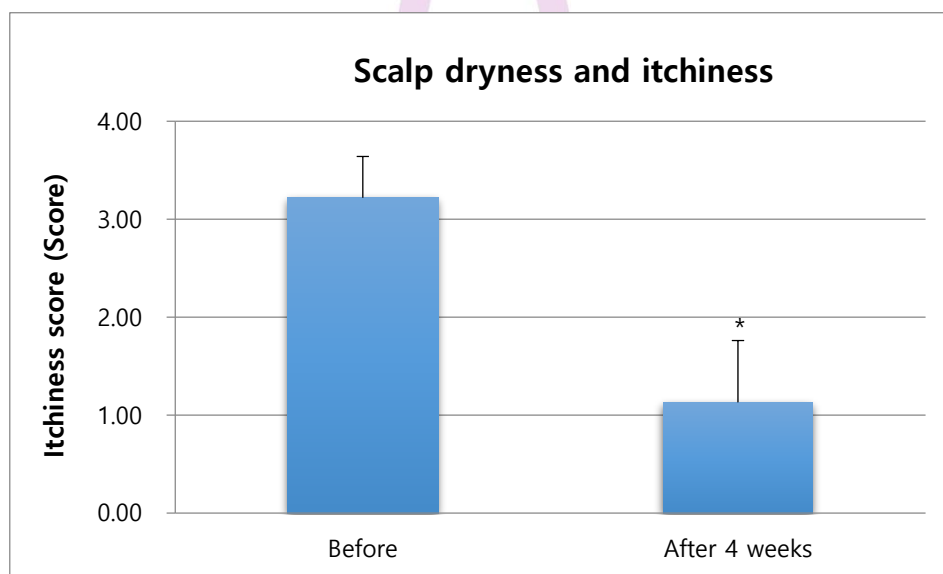
*Significant difference (p<0.05, comparison to initial value).

7.2.2. Assessment result of improvement of skin density in hairline area

The skin density (Density) in hairline area was significantly increased after 4 weeks of use in comparison with pre-application (Table 9, Fig 7).

Table 9. Skin density results by DUB® SkinScanner
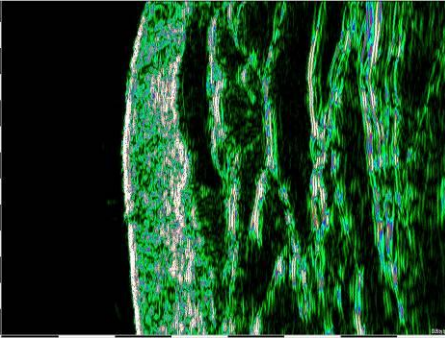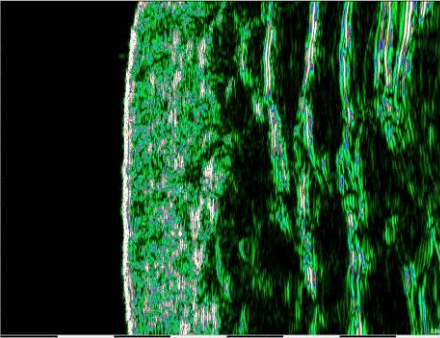
		N=23 (No. 01~23), (Mean±Standard deviation)
Period	Area, assessment	Hairline, Skin density (Density)
Before		68.63±7.77
After 4 weeks		72.41±7.73
Significance probability[1]	Before - After 4 weeks	**<0.001**
Improvement rate	Before - After 4 weeks	5.51%
	Before (100%) - After 4 weeks	105.51%

[1]p-value: Significant probability, Wilcoxon signed rank test (p<0.05, comparison to initial value).
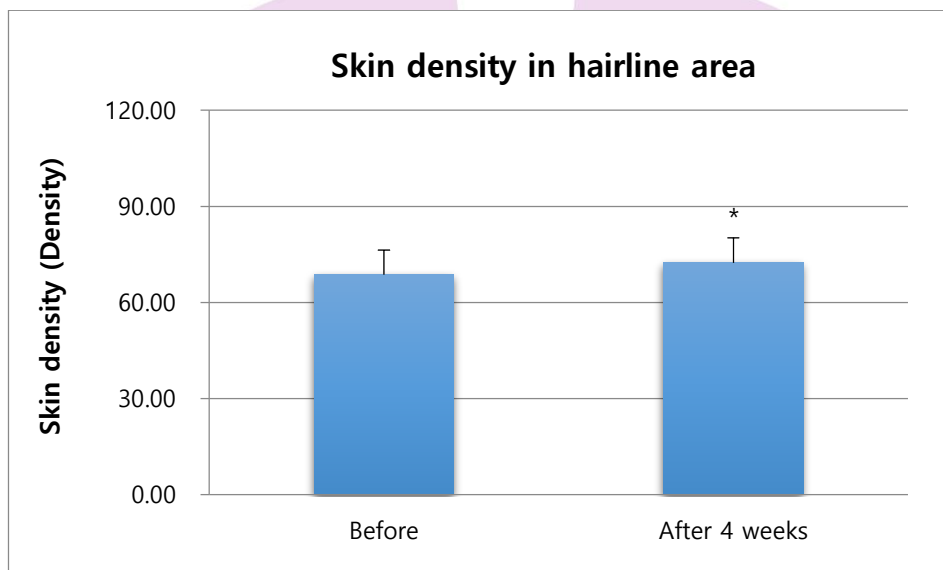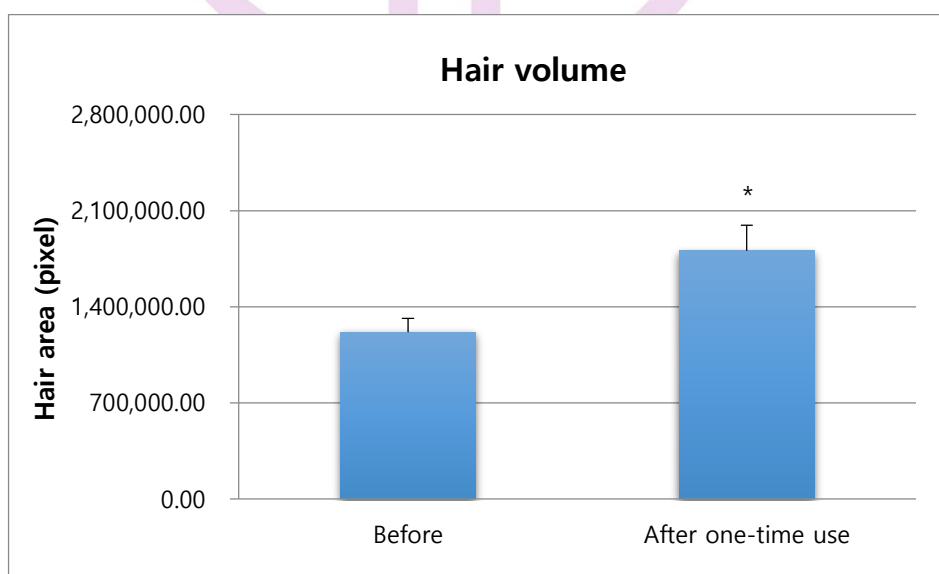

Significant difference (p<0.05, comparison to initial value).

Fig 7.   Skin density in hairline area image by DUB® SkinScanner

No. 23	Before	After 4 weeks
Image		

7.2.3. Assessment result of improvement of number of hair shed

The number of hair shed (ea) was significantly decreased after 4 weeks of use in comparison with pre-application (Table 10, Fig 8).

Table 10. Number of hair shed results

		N=23 (No. 01~23), (Mean±Standard deviation)
Period	**Area, assessment**	**Number of hair shed (ea)**
Before		20.48±13.05
After 4 weeks		6.78±3.06
Significance probability[1)]	**Before - After 4 weeks**	**<0.001**
Improvement rate	**Before - After 4 weeks**	66.89%
	Before (100%) - After 4 weeks	166.89%

[1)]p-value: Significant probability, Wilcoxon signed rank test ($p < 0.05$, comparison to initial value).

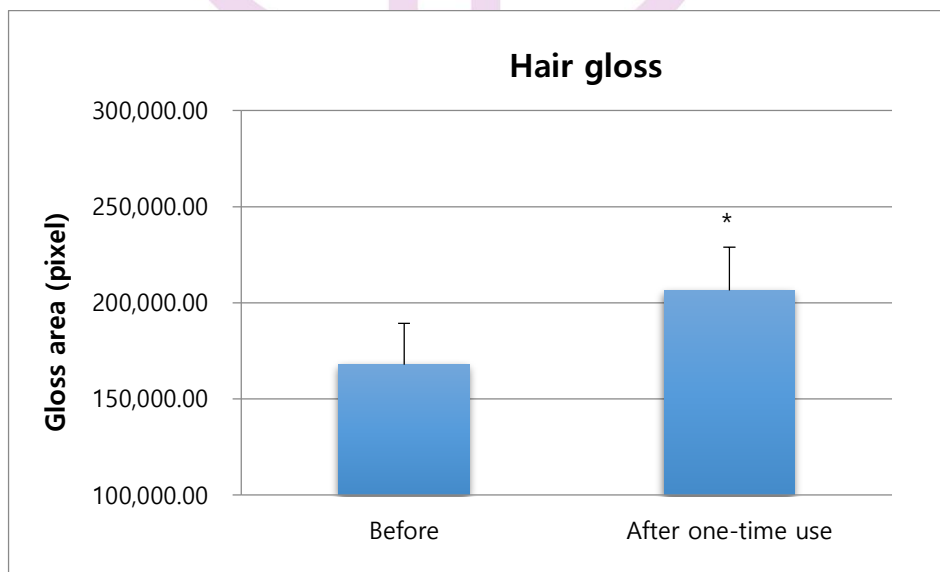*Significant difference ($p < 0.05$, comparison to initial value).*

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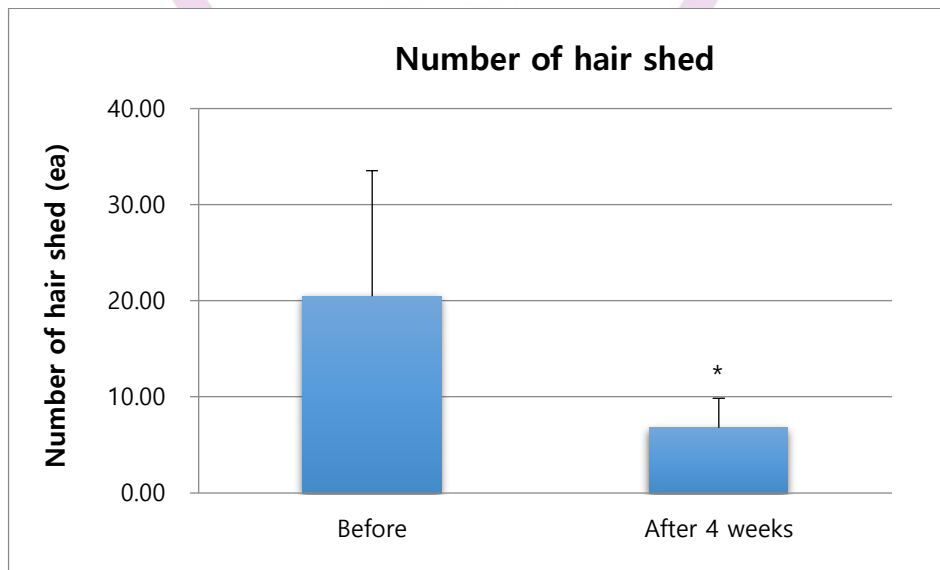
Fig 8.   Number of hair shed image by DSLR

No. 10	Before	After 4 weeks
Image		
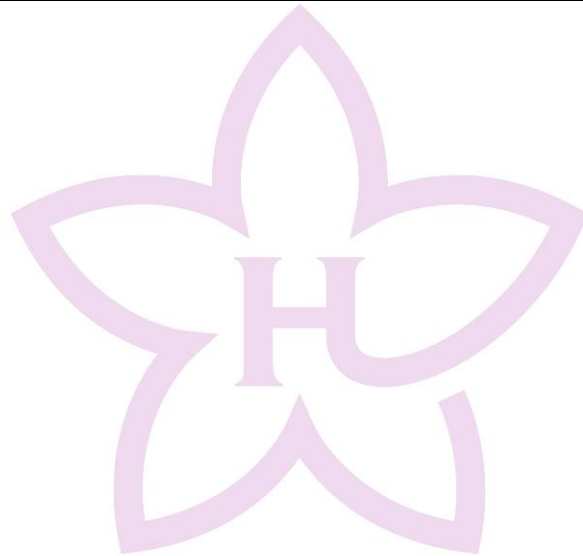
7.2.4. Assessment result of improvement of root volume on the top of the head

The root volume angle (°) on the top of the head was significantly decreased after 4 weeks of use in comparison with pre-application (Table 11, Fig 9).

Table 11. Root volume angle (°) results by DSLR

		N=23 (No. 01~23), (Mean±Standard deviation)
Period	**Area, assessment**	**Top of the head, Root volume angle (°)**
Before		20.59±5.77
After 4 weeks		25.63±6.68
Significance probability[1)]	**Before - After 4 weeks**	**<0.001**
Improvement rate	**Before - After 4 weeks**	24.48%
	Before (100%) - After 4 weeks	124.48%

[1)]p-value: Significant probability, Paired t-test ($p < 0.05$, comparison to initial value).

Root volume on the top of the head

*Significant difference ($p < 0.05$, comparison to initial value).

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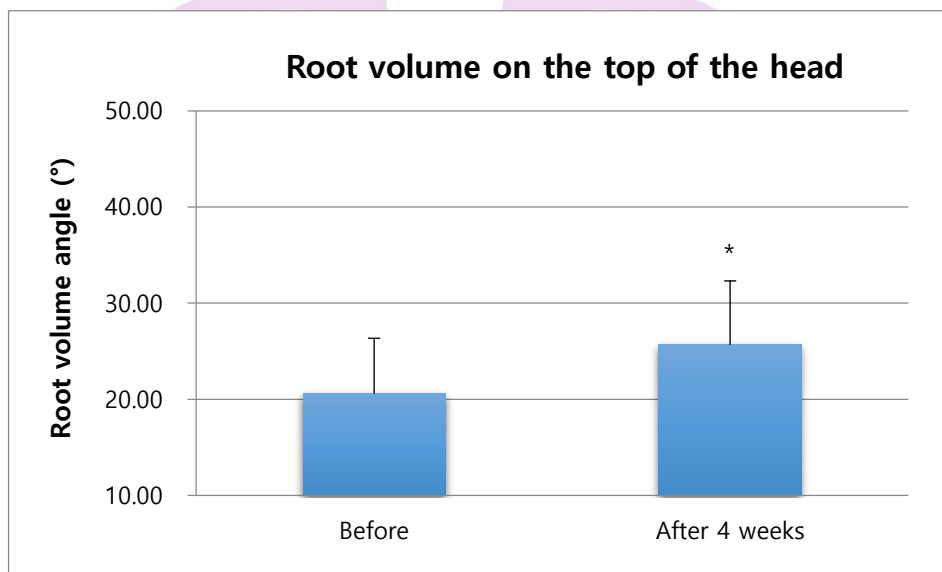
Fig 9.   Root volume on the top of the head image by DSLR

No. 11	Before	After 4 weeks
Image		
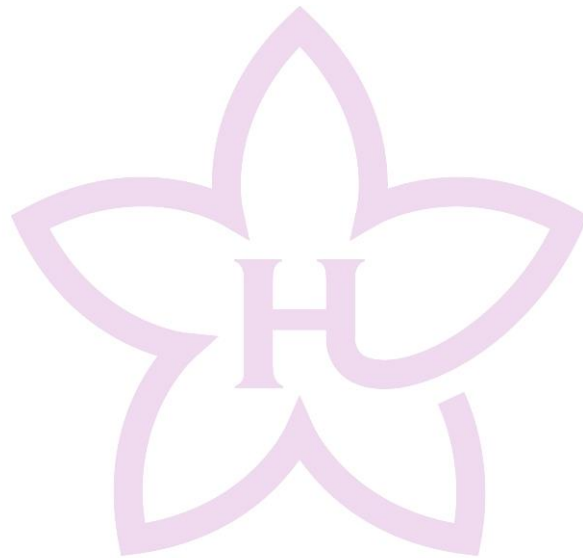
7.2.5. Assessment result of improving effect of scalp pH

The pH in the scalp was significantly decreased after 4 weeks of use in comparison with pre-application (Table 12).

Table 12. pH results by pH meter

Period	Area, assessment	Scalp, pH
		N=23 (No. 01~23), (Mean±Standard deviation)
Before		6.83±0.19
After 4 weeks		5.59±0.54
Significance probability[1]	Before - After 4 weeks	**<0.001**
Improvement rate	Before - After 4 weeks	18.16%
	Before (100%) - After 4 weeks	118.16%

[1]p-value: Significant probability, Paired t-test (p<0.05, comparison to initial value).

*Significant difference (p<0.05, comparison to initial value).
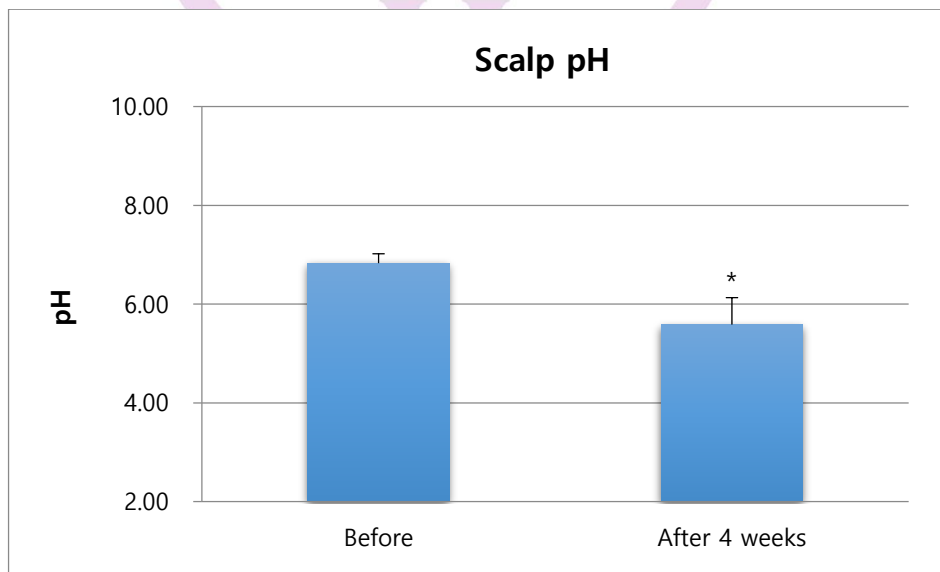
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7.3. Assessment result of non-human application test

7.3.1. Assessment result of improvement of hair elasticity

The hair flexural strength (N/cm^2) in human hair tress (black) was significantly increased after one-time use in comparison with pre-application (Table 13).

Table 13. Hair flexural strength results by MultiTest-dv

		N=20 (No. 01~20), (Mean±Standard deviation)
Period	Area, assessment	Human hair tress (black), Hair flexural strength (N/cm^2)
Before		0.451±0.152
After one-time use		0.597±0.186
Significance probability[1]	Before – After one-time use	**<0.001**
Improvement rate	Before – After one-time use	32.37%
	Before(100%) – After one-time use	132.37%

[1]p-value: Significant probability, Paired t-test (p<0.05, comparison to initial value).
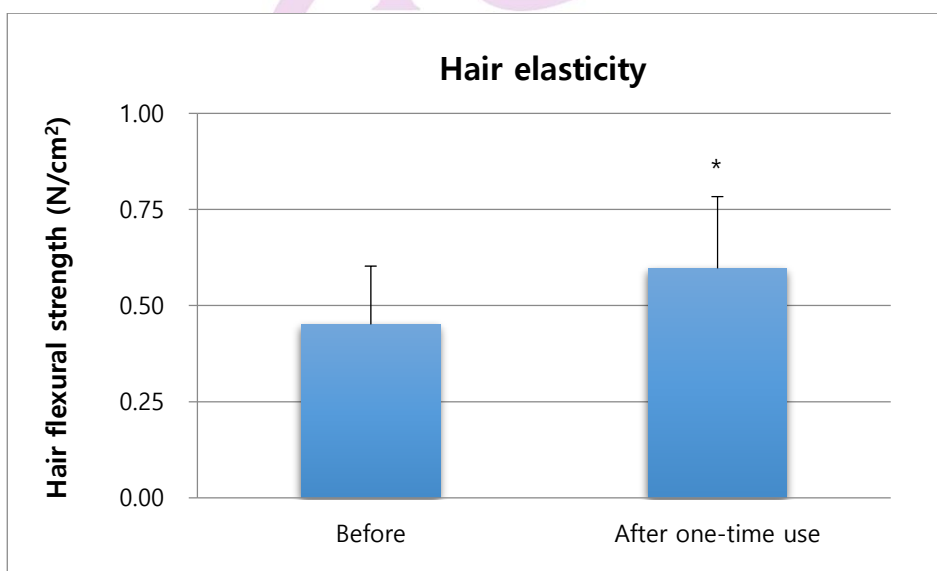
*Significant difference (p<0.05, comparison to initial value).

7.3.2. Assessment result of improvement of hair volume

The hair area (pixel) in human hair tress (black) was significantly increased after one-time use in comparison with pre-application (Table 14, Fig 10).

Table 14. Hair area results by DSLR

		N=20 (No. 01~20), (Mean±Standard deviation)
Period	Area, assessment	Human hair tress (black), Hair area (pixel)
Before		1214981.30±101111.36
After one-time use		1807076.65±186693.47
Significance probability[1]	Before – After one-time use	**<0.001**
Improvement rate	Before – After one-time use	48.73%
	Before(100%) – After one-time use	148.73%

[1]*p-value: Significant probability, Paired t-test (p<0.05, comparison to initial value).*

Significant difference (p<0.05, comparison to initial value).

Fig 10. Hair volume image by DSLR

No. 18	Before	After one-time use
Image		

7.3.3. Assessment result of improvement of hair moisture content

The hair moisture content (%) in human hair tress (black) was significantly increased after one-time use in comparison with pre-application (Table 15).

Table 15. Hair moisture content results by FD-660

		N=20 (No. 01~20), (Mean±Standard deviation)
Period	Area, assessment	Human hair tress (black), Hair moisture content (%)
Before		15.81±5.71
After one-time use		27.83±6.67
Significance probability[1]	Before – After one-time use	**<0.001**
Improvement rate	Before – After one-time use	76.03%
	Before(100%) – After one-time use	176.03%

[1]*p-value: Significant probability, Wilcoxon signed rank test (p<0.05, comparison to initial value).*
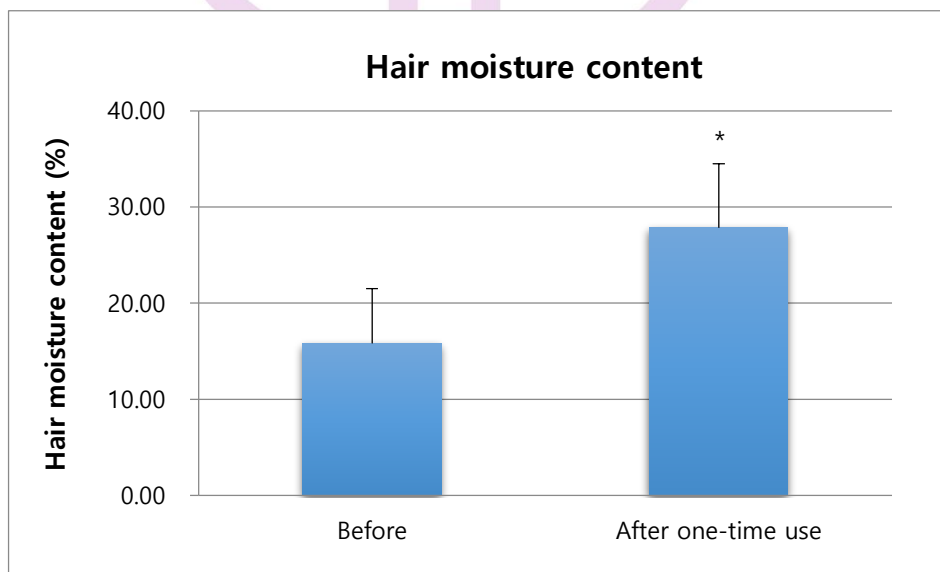
Significant difference (p<0.05, comparison to initial value).

7.3.4. Assessment result of improvement of hair gloss

The gloss area (pixel) in human hair tress (black) was significantly increased after one-time use in comparison with pre-application (Table 16, Fig 11).

Table 16. Gloss area results by DSLR

	Area, assessment	N=20 (No. 01~20), (Mean±Standard deviation)
Period		Human hair tress (black), Gloss area (pixel)
Before		167818.45±21556.47
After one-time use		206459.00±22408.85
Significance probability[1]	Before – After one-time use	**<0.001**
Improvement rate	Before – After one-time use	23.03%
	Before(100%) – After one-time use	123.03%

[1]p-value: Significant probability, Paired t-test (p<0.05, comparison to initial value).

Significant difference (p<0.05, comparison to initial value).

Fig 11. Hair gloss image by DSLR

No. 10	Before	After one-time use
Image		
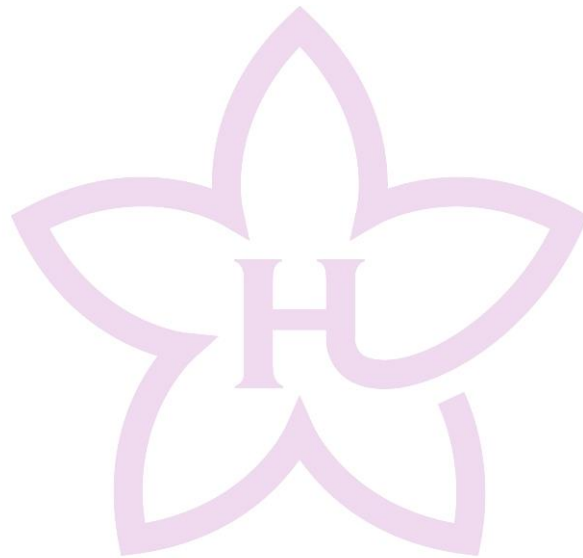
7.3.5. Assessment result of cleansing effect of hair fine dust simulant

The fine dust simulant area (pixel) in human hair tress was significantly increased after applying the fine dust simulant in comparison with before applying the fine dust simulant, the fine dust simulant area (pixel) in human hair tress was significantly decreased after one-time use in comparison with after applying the fine dust simulant (Table 17, Fig 12).

Table 17. Fine dust simulant area results by Dino-Lite

	N=20 (No. 01~20), (Mean±Standard deviation)
Area, assessment Period	Human hair tress (white), Fine dust simulant area (pixel)
Before applying the fine dust simulant	875.85±253.61
After applying the fine dust simulant	37056.80±12694.46
After one-time use	3688.90±1167.52
Significance probability[1] Before applying the fine dust simulant - After applying the fine dust simulant	<0.001
After applying the fine dust simulant – After one-time use	<0.001
Cleansing rate After applying the fine dust simulant – After one-time use	92.23%

[1]p-value: Significant probability, Paired t-test (p<0.05, comparison to initial value).

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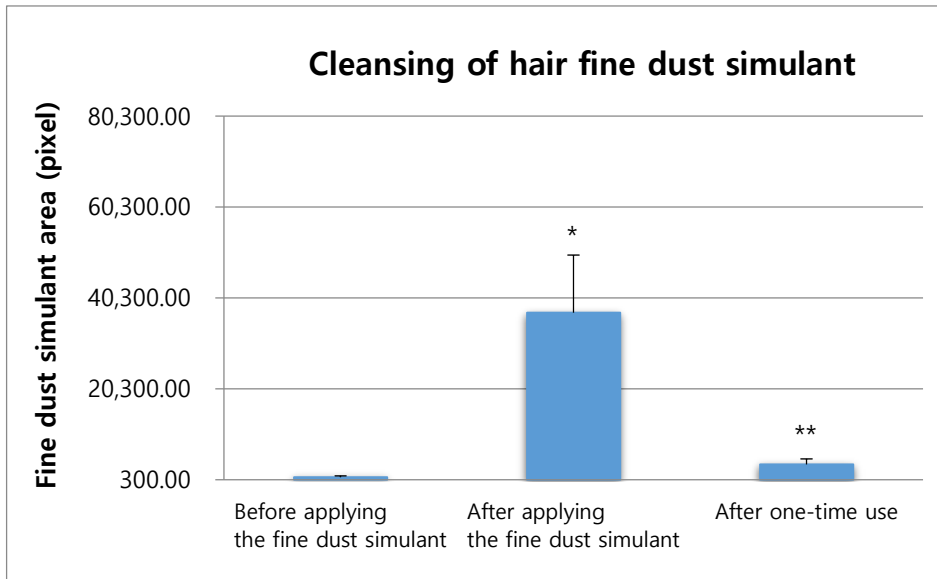
Significant difference (p<0.05, comparison to initial value).

Fig 12.   Cleansing effect of hair fine dust simulant image by Dino-Lite

No. 20	Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use
Image			

7.4. Self-report questionnaire result (After 4 weeks of use)

Self-questionnaire on efficacy and quality of product was conducted after 4 weeks of the test product use and the results of analysis are as follow (Table 18).

Table 18. Result of self-report questionnaire

Satisfaction in test product's efficacy	After 4 weeks Satisfaction rate (4+5+6)*
1. The scalp dryness and itchiness seem to be improved.	100.0%
2. The skin density in the hairline area seems to be improved.	95.7%
3. The number of hair shed seems to be decreased.	95.7%
4. The root volume of the top of the head area seems to be improved.	100.0%
5. The scalp pH seems to be improved.	100.0%
Satisfaction in test product's quality	**After 4 weeks Satisfaction rate (4+5+6)***
1. The feeling of using the product is good.	100.0%
2. The fragrance of the product is good.	100.0%
3. I am willing to recommend it to others.	100.0%
4. The product is satisfying in general.	100.0%

* Answer scale
1: Very disagree
2: Disagree
3: Slightly disagree
4: Slightly agree
5: Agree
6: Very agree

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Satisfaction in test product's efficacy (After 4 weeks)

Satisfaction rate

1. The scalp dryness and itchiness seem to be improved.
2. The skin density in the hairline area seems to be improved.
3. The number of hair shed seems to be decreased.
4. The root volume of the top of the head area seems to be improved.
5. The scalp pH seems to be improved.

Satisfaction in test product's quality (After 4 weeks)

Satisfaction rate

1. The feeling of using the product is good.
2. The fragrance of the product is good.
3. I am willing to recommend it to others.
4. The product is satisfying in general.

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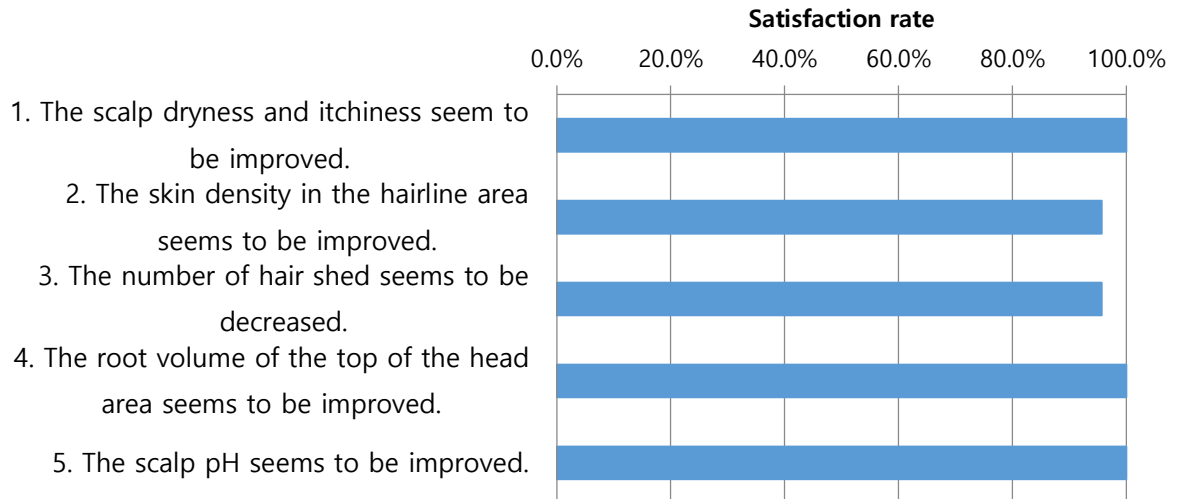
7.5. Assessment result of skin adverse reaction

7.5.1. Evaluation of skin adverse reactions by the person in charge of the test

No skin adverse reactions to allergic contact dermatitis or irritant contact dermatitis were reported or observed after using the test product on subjects during this study.

7.5.2. Skin adverse reaction self-report by survey of test subjects

As a result of conducting a questionnaire evaluation on the test subjects separately from the evaluation of adverse reactions by the person in charge of the test, no special adverse reactions were observed (Table 19).

(During the test period, the conducted the test with the safety of the test subject as a top priority, notified the test subject that if a skin abnormality occurs due to this test or test product, necessary examination and treatment can be requested to the test requesting agency.)

Table 19.   Evaluation result of test subject skin adverse reaction

	N=23 (No. 01~23)
Skin adverse reaction	**After 4 weeks**
1. Erythema (redness)	0
2. Edema (swelling)	0
3. Squama (keratin)	0
4. Itching	0
5. Tingling sensations (pain)	0
6. Burning sensation	0
7. Stiffness	0
8. Tingling	0

0: None, 1: Slight, 2: Moderate, 3: Severe

- Cases of side effects, etc: 0

- Details of treatment and compensation measures for side effects: 0

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8. Conclusion and discussion

This study is to evaluate the efficacy of [morefill Anti Hair Loss shampoo] on the improvement of skin density in hairline area, improvement of number of hair shed, improvement of root volume on the top of the head, improving effect of scalp pH after 4 weeks of use on human application test and on the improvement of hair elasticity, improvement of hair volume, improvement of hair moisture content, improvement of hair gloss, cleansing effect of hair fine dust simulant after one-time use on non-human application test.

In this test, 23 test subjects who met all the criteria were recruited, with no subjects eliminated. Therefore, all 23 subjects were included in the result analysis. The average age of the subjects was 51.5 years old, the maximum age was 68 years old, and the minimum age was 35 years old. The results of the test subject characteristics summarized on page 56. No skin adverse reactions to allergic contact dermatitis or irritant contact dermatitis were reported or observed after using the test product on subjects during this study.

This self-report questionnaire result (After 4 weeks of use)

1) 100.0% of test subjects agreed that the scalp dryness and itchiness seemed to be improved.

2) 95.7% of test subjects agreed that the skin density in the hairline area seemed to be improved.

3) 95.7% of test subjects agreed that the number of hair shed seemed to be improved.

4) 100.0% of test subjects agreed that the root volume on the top of the head seemed to be improved.

5) 100.0% of test subjects agreed that the scalp pH seemed to be improved.

6) 100.0% of test subjects agreed that the feeling of using the product was good.

7) 100.0% of test subjects agreed that the fragrance of the product was good.

8) 100.0% of the test subjects agreed that they were willing to recommend it to others.

9) 100.0% of the test subjects agreed that the product was satisfying in general.

The clinical trial conclusions of this test

➢ Human application test

✓ After 4 weeks of use

- The transepidermal water loss (g/m²h) in the scalp area was significantly decreased.

- The itchiness score (Score) in the scalp area was significantly decreased.

- The skin density (Density) in the hairline area was significantly increased.

- The number of hair shed (ea) was significantly decreased.

- The root volume angle (°) on the top of the head was significantly increased.

- The pH in the scalp area was significantly decreased.

➢ Non-human application test

✓ After one-time use

- The hair flexural strength (N/cm^2) in the human hair tress (black) was significantly increased.

- The hair area (pixel) in the human hair tress (black) was significantly increased.

- The hair moisture content (%) in the human hair tress (black) was significantly increased.

- The gloss area (pixel) in the human hair tress (black) was significantly increased.

- The fine dust simulant area (pixel) was significantly decreased in both the test group and the control group after one-time use in comparison with after applying the fine dust simulant, however the amount of the decrease in fine dust simulant area (pixel) was significantly higher in the test group than the control group

According to the above results, [morefill Anti Hair Loss shampoo] requested by AG

Health is considered to be helpful with

after 4 weeks of use

1)   improvement of scalp dryness and itchiness,

2)   improvement of skin density in hairline area,

3)   improvement of number of hair shed,

4)   improvement of root volume on the top of the head,

5)   improving effect of scalp pH,

after one-time use

6)   improvement of hair elasticity,

7)   improvement of hair volume,

8)   improvement of hair moisture content,

9)   improvement of hair gloss,

10) cleansing effect of hair fine dust simulant.
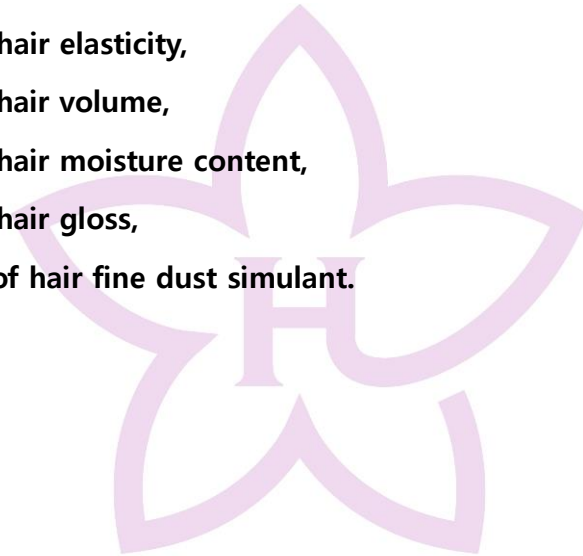
9. Appendix

Appendix 1. Components of investigational product

[morefill Anti Hair Loss shampoo]
Water, Sodium C14-16 Olefin Sulfonate, Coco-Betaine, Glycerin, Caffeine, Niacinamide, Sodium Cocoyl Isethionate, Olive Oil Glycereth-8 Esters, Tetradecene, Polyquaternium-10, Citric Acid, Hydroxyacetophenone, Hexadecene, Coco-glucoside, Coconut Acid, Ethylhexylglycerin, Sodium Isethionate, Disodium EDTA, 1,2-Hexanediol, Viola Hamiltoniana Extract, Sodium Chloride, Epigallocatechin Gallate, Butylene Glycol, Ginkgo Biloba Leaf Extract, Biotin, Vitis Vinifera (Grape) Fruit Extract, Camellia Sinensis Catechins, Rosmarinus Officinalis (Rosemary) Leaf Oil, Cedrus Deodara Wood Oil, Pogostemon Cablin Oil
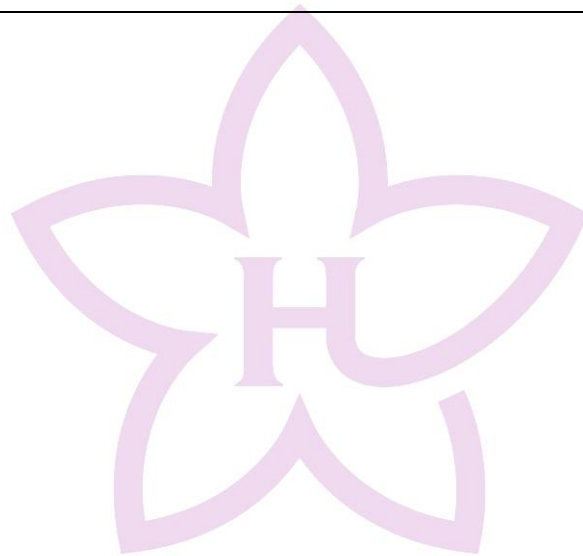
Appendix 2.   Subject's characteristics data

No.	Initial	Gender	Age
01	HKS	F	53
02	CHJ	F	48
03	LMR	F	35
04	JNM	F	54
05	KJY	F	47
06	KSH	F	52
07	KSY	F	53
08	PSH	F	52
09	PSY	F	62
10	CHJ	F	63
11	HSS	F	68
12	KSY	F	41
13	HJY	F	45
14	KSO	F	57
15	OSS	F	46
16	KHJ	F	50
17	CYS	F	39
18	KYI	F	50
19	YSS	F	40
20✓	YSK	F	54
21	JHS	F	63
22	KHS	F	67
23	KJY	F	45

)

Appendix 3.   Assessment result data of improvement of scalp dryness and itchiness

No.	Scalp	
	Transepidermal water loss (g/m²h)	
	Before	After 4 weeks
01	13.33	10.30
02	14.03	6.57
03	8.37	7.40
04	9.73	6.20
05	8.17	5.07
06	7.83	5.30
07	9.43	7.30
08	9.67	7.27
09	8.67	4.57
10	7.87	5.07
11	10.57	8.54
12	10.53	7.20
13	12.87	7.67
14	12.10	8.50
15	8.57	2.73
16	14.77	6.87
17	8.60	6.17
18	11.03	6.23
19	11.17	6.77
20	10.47	6.33
21	11.13	8.50
22	7.43	5.27
23	7.57	4.00

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No.	Improvement rate (%)
	Transepidermal water loss (g/m²h)
	After 4 weeks
01	22.75%
02	53.21%
03	11.55%
04	36.30%
05	37.96%
06	32.34%
07	22.61%
08	24.83%
09	47.31%
10	35.59%
11	19.15%
12	31.65%
13	40.41%
14	29.75%
15	68.09%
16	53.50%
17	28.29%
18	43.50%
19	39.40%
20	39.49%
21	23.65%
22	29.15%
23	47.14%

No.	Scalp	
	Itchiness score (Score)	
	Before	**After 4 weeks**
01	3.00	1.00
02	3.00	1.00
03	3.00	1.00
04	3.00	1.00
05	3.00	1.00
06	3.00	1.00
07	3.00	1.00
08	3.00	0.00
09	3.00	1.00
10	4.00	1.00
11	3.00	1.00
12	3.00	1.00
13	4.00	1.00
14	4.00	1.00
15	3.00	1.00
16	3.00	0.00
17	3.00	2.00
18	3.00	2.00
19	3.00	2.00
20	3.00	1.00
21	4.00	1.00
22	3.00	1.00
23	4.00	3.00

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No.	Improvement rate (%)
	Itchiness score (Score)
	After 4 weeks
01	66.67%
02	66.67%
03	66.67%
04	66.67%
05	66.67%
06	66.67%
07	66.67%
08	100.00%
09	66.67%
10	75.00%
11	66.67%
12	66.67%
13	75.00%
14	75.00%
15	66.67%
16	100.00%
17	33.33%
18	33.33%
19	33.33%
20	66.67%
21	75.00%
22	66.67%
23	25.00%

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Appendix 4.   Assessment result data of improvement of skin density in hairline area

No.	Hairline	
	Skin density (Density)	
	Before	After 4 weeks
01	80.55	80.83
02	61.15	62.62
03	73.98	77.70
04	70.28	76.57
05	58.36	58.55
06	72.40	75.05
07	55.68	63.09
08	75.19	75.76
09	75.94	78.16
10	66.76	69.28
11	67.98	71.20
12	76.40	78.99
13	75.67	81.53
14	72.73	77.29
15	67.90	74.33
16	70.29	73.00
17	60.86	63.91
18	68.49	75.66
19	58.48	66.92
20	69.19	76.57
21	50.32	52.26
22	73.95	76.34
23	75.88	79.85

No.	Improvement rate (%)
	Skin density (Density)
	After 4 weeks
01	0.35%
02	2.40%
03	5.03%
04	8.95%
05	0.33%
06	3.66%
07	13.31%
08	0.76%
09	2.92%
10	3.77%
11	4.74%
12	3.39%
13	7.74%
14	6.27%
15	9.47%
16	3.86%
17	5.01%
18	10.47%
19	14.43%
20	10.67%
21	3.86%
22	3.23%
23	5.23%

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Appendix 5.   Assessment result data of improvement of number of hair shed

No.	Number of hair shed (ea)	
	Before	After 4 weeks
01	22.00	11.00
02	16.00	10.00
03	13.00	9.00
04	14.00	8.00
05	14.00	6.00
06	15.00	9.00
07	9.00	4.00
08	15.00	3.00
09	5.00	3.00
10	52.00	8.00
11	30.00	5.00
12	19.00	8.00
13	26.00	6.00
14	18.00	1.00
15	19.00	9.00
16	16.00	8.00
17	13.00	5.00
18	20.00	7.00
19	8.00	4.00
20	46.00	6.00
21	15.00	6.00
22	13.00	5.00
23	53.00	15.00

No.	Improvement rate (%)
	Number of hair shed (ea)
	After 4 weeks
01	50.00%
02	37.50%
03	30.77%
04	42.86%
05	57.14%
06	40.00%
07	55.56%
08	80.00%
09	40.00%
10	84.62%
11	83.33%
12	57.89%
13	76.92%
14	94.44%
15	52.63%
16	50.00%
17	61.54%
18	65.00%
19	50.00%
20	86.96%
21	60.00%
22	61.54%
23	71.70%

Appendix 6.   Assessment result data of improvement of root volume on the top of the head

No.	Top of the head	
	Root volume angle (°)	
	Before	After 4 weeks
01	15.85	17.88
02	15.83	17.89
03	18.08	21.63
04	20.22	26.93
05	14.05	16.37
06	26.27	30.32
07	27.25	32.26
08	21.24	24.43
09	21.37	28.39
10	21.22	25.94
11	32.33	40.27
12	19.00	30.82
13	10.60	19.42
14	15.92	17.26
15	15.92	17.81
16	14.89	20.46
17	18.93	24.25
18	23.47	32.13
19	21.93	29.32
20	14.43	18.95
21	28.80	33.35
22	25.27	29.45
23	30.81	33.87

No.	Improvement rate (%)
	Root volume angle (°)
	After 4 weeks
01	12.81%
02	13.01%
03	19.63%
04	33.18%
05	16.51%
06	15.42%
07	18.39%
08	15.02%
09	32.85%
10	22.24%
11	24.56%
12	62.21%
13	83.21%
14	8.42%
15	11.87%
16	37.41%
17	28.10%
18	36.90%
19	33.70%
20	31.32%
21	15.80%
22	16.54%
23	9.93%

Appendix 7.   Assessment result data of improving effect of scalp pH

No.	Scalp	
	pH	
	Before	After 4 weeks
01	6.90	5.33
02	6.53	4.57
03	6.93	5.87
04	6.53	5.07
05	7.03	5.73
06	6.50	5.63
07	6.63	6.00
08	6.80	5.03
09	7.03	6.10
10	6.80	5.43
11	6.93	5.10
12	6.63	6.00
13	6.90	5.13
14	7.00	6.17
15	6.87	6.00
16	7.20	6.73
17	6.80	5.00
18	6.70	5.40
19	7.10	6.20
20	7.00	5.87
21	6.90	6.00
22	6.70	4.70
23	6.70	5.57

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No.	Improvement rate (%)
	pH
	After 4 weeks
01	22.71%
02	30.10%
03	15.38%
04	22.45%
05	18.48%
06	13.33%
07	9.55%
08	25.98%
09	13.27%
10	20.10%
11	26.44%
12	9.55%
13	25.60%
14	11.90%
15	12.62%
16	6.48%
17	26.47%
18	19.40%
19	12.68%
20	16.19%
21	13.04%
22	29.85%
23	16.92%

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Appendix 8. Assessment result data of improvement of hair elasticity

No.	Human hair tress (black)	
	Hair flexural strength (N/cm^2)	
	Before	After one-time use
01	0.297	0.311
02	0.194	0.348
03	0.265	0.289
04	0.231	0.418
05	0.448	0.604
06	0.586	0.752
07	0.433	0.736
08	0.519	0.867
09	0.548	0.572
10	0.288	0.361
11	0.369	0.461
12	0.372	0.541
13	0.510	0.786
14	0.516	0.749
15	0.656	0.731
16	0.456	0.652
17	0.555	0.699
18	0.703	0.828
19	0.702	0.766
20	0.373	0.461

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No.	Improvement rate (%)
	Hair flexural strength (N/cm^2)
	After one-time use
01	4.71%
02	79.38%
03	9.06%
04	80.95%
05	34.82%
06	28.33%
07	69.98%
08	67.05%
09	4.38%
10	25.35%
11	24.93%
12	45.43%
13	54.12%
14	45.16%
15	11.43%
16	42.98%
17	25.95%
18	17.78%
19	9.12%
20	23.59%

Appendix 9. Assessment result data of improvement of hair volume

No.	Human hair tress (black)	
	Hair area (pixel)	
	Before	After one-time use
01	1217582.00	1648693.00
02	1333834.00	1688722.00
03	1135236.00	1530129.00
04	1320402.00	2261177.00
05	1123349.00	1670138.00
06	1281681.00	1721507.00
07	1130242.00	1687398.00
08	1187681.00	1669780.00
09	1326090.00	1821235.00
10	1290499.00	1687398.00
11	1241087.00	2034344.00
12	1324380.00	1645313.00
13	1147719.00	1996062.00
14	1053955.00	1907823.00
15	1210858.00	1893602.00
16	1078559.00	1773333.00
17	1120671.00	1755099.00
18	1425828.00	2127323.00
19	1227619.00	1931355.00
20	1122354.00	1691102.00

No.	Improvement rate (%)
	Hair area (pixel)
	After one-time use
01	35.41%
02	26.61%
03	34.79%
04	71.25%
05	48.67%
06	34.32%
07	49.30%
08	40.59%
09	37.34%
10	30.76%
11	63.92%
12	24.23%
13	73.92%
14	81.02%
15	56.39%
16	64.42%
17	56.61%
18	49.20%
19	57.33%
20	50.67%

Appendix 10. Assessment result data of improvement of hair moisture content

No.	Human hair tress (black)	
	Hair moisture content (%)	
	Before	After one-time use
01	13.80	30.35
02	14.89	29.98
03	16.10	32.13
04	19.20	25.92
05	37.26	51.77
06	15.92	29.31
07	18.15	27.91
08	12.42	25.31
09	12.82	26.10
10	12.95	25.32
11	13.93	22.20
12	14.59	23.70
13	10.79	21.38
14	17.34	28.07
15	20.54	29.78
16	10.98	25.30
17	14.86	23.73
18	15.58	33.93
19	11.11	23.62
20	12.99	20.82

No.	Improvement rate (%)
	Hair moisture content (%)
	After one-time use
01	119.93%
02	101.34%
03	99.57%
04	35.00%
05	38.94%
06	84.11%
07	53.77%
08	103.78%
09	103.59%
10	95.52%
11	59.37%
12	62.44%
13	98.15%
14	61.88%
15	44.99%
16	130.42%
17	59.69%
18	117.78%
19	112.60%
20	60.28%

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Appendix 11. Assessment result data of improvement of hair gloss

No.	Human hair tress (black)	
	Gloss area (pixel)	
	Before	After one-time use
01	149171.00	195436.00
02	159215.00	211682.00
03	214238.00	224844.00
04	144075.00	261874.00
05	156963.00	211401.00
06	146973.00	187177.00
07	148196.00	198769.00
08	141690.00	158622.00
09	176227.00	196397.00
10	194425.00	229230.00
11	199115.00	207824.00
12	193316.00	226811.00
13	179792.00	224258.00
14	144674.00	174288.00
15	171807.00	206036.00
16	167919.00	210917.00
17	148453.00	184174.00
18	175248.00	193582.00
19	188129.00	219479.00
20	156743.00	206379.00

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No.	Improvement rate (%)
	Gloss area (pixel)
	After one-time use
01	31.01%
02	32.95%
03	4.95%
04	81.76%
05	34.68%
06	27.35%
07	34.13%
08	11.95%
09	11.45%
10	17.90%
11	4.37%
12	17.33%
13	24.73%
14	20.47%
15	19.92%
16	25.61%
17	24.06%
18	10.46%
19	16.66%
20	31.67%

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Appendix 12. Assessment result data of cleansing effect of hair fine dust simulant

No.	Human hair tress (white)		
	Fine dust simulant area (pixel)		
	Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use
01	1153.00	41525.00	3366.00
02	1216.00	52041.00	2306.00
03	539.00	38912.00	2505.00
04	858.00	34105.00	4465.00
05	739.00	37749.00	5286.00
06	805.00	58575.00	3374.00
07	1104.00	17227.00	3225.00
08	636.00	35912.00	3016.00
09	1193.00	41070.00	2678.00
10	918.00	41498.00	4243.00
11	678.00	24096.00	4779.00
12	1109.00	21104.00	2285.00
13	806.00	57009.00	5963.00
14	973.00	13290.00	1902.00
15	1127.00	39333.00	5138.00
16	793.00	34669.00	3273.00
17	364.00	27714.00	3081.00
18	1079.00	28949.00	4704.00
19	443.00	40610.00	5018.00
20	984.00	55748.00	3171.00

No.	Cleansing rate (%)
	Fine dust simulant area (pixel)
	After one-time use
01	91.89%
02	95.57%
03	93.56%
04	86.91%
05	86.00%
06	94.24%
07	81.28%
08	91.60%
09	93.48%
10	89.78%
11	80.17%
12	89.17%
13	89.54%
14	85.69%
15	86.94%
16	90.56%
17	88.88%
18	83.75%
19	87.64%
20	94.31%

Appendix 13.   Self-report questionnaire (After 4 weeks of use)

	Subject's number																						
Satisfaction in test product's efficacy	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
1. The scalp dryness and itchiness seem to be improved.	5	5	6	5	6	5	6	6	5	6	5	4	6	5	5	6	5	5	5	6	6	5	5
2. The skin density in the hairline area seems to be improved.	5	6	6	5	6	5	6	5	5	6	5	3	5	5	5	6	4	4	5	6	6	5	5
3. The number of hair shed seems to be decreased.	5	5	6	5	6	5	6	6	5	6	5	4	6	5	5	6	5	5	5	6	6	3	5
4. The root volume of the top of the head area seems to be improved.	5	6	6	5	6	5	6	5	5	5	5	4	6	5	5	6	5	6	4	6	6	4	5
5. The scalp pH seems to be improved.	5	6	6	5	6	5	6	5	5	6	6	4	5	5	5	6	5	5	5	6	6	4	5
Satisfaction in test product's quality	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
1. The feeling of using the product is good.	5	6	6	5	6	5	6	6	5	6	6	5	6	5	6	6	5	6	5	6	6	5	6
2. The fragrance of the product is good.	4	6	6	5	5	5	6	5	5	6	6	5	5	5	6	6	4	6	4	6	6	5	6
3. I am willing to recommend it to others.	5	6	6	5	5	5	6	6	5	6	5	5	6	5	6	6	5	5	5	6	6	5	5
4. The product is satisfying in general.	5	6	6	5	5	5	6	6	5	6	5	5	6	5	6	6	5	5	5	6	6	5	6

* Answer scale

1: Very disagree

2: Disagree

3: Slightly disagree

4: Slightly agree

5: Agree 6: Very agree

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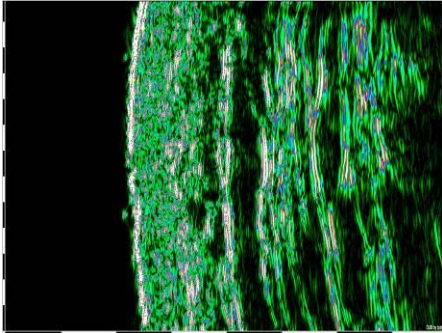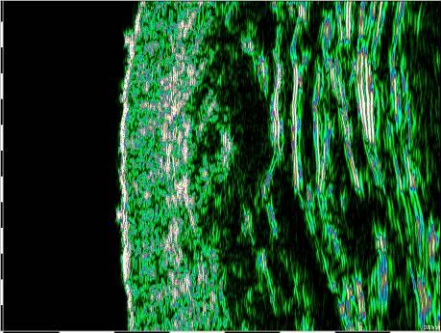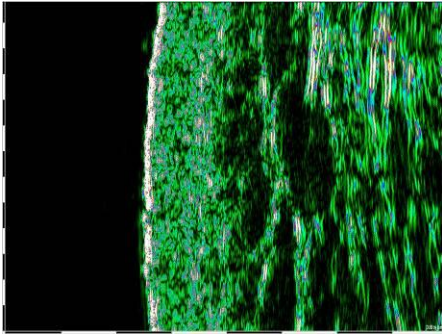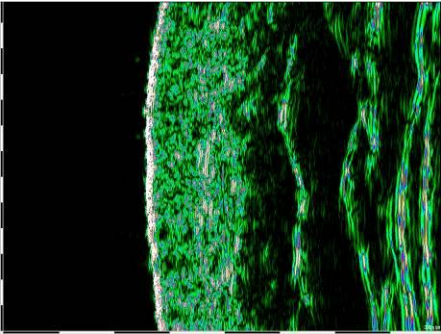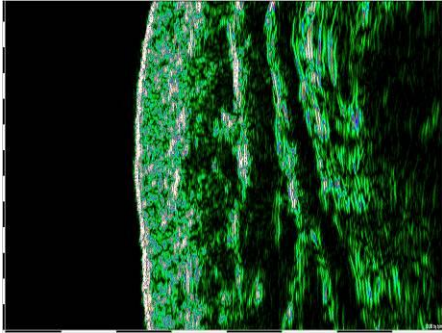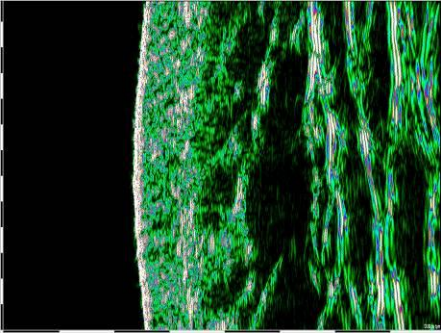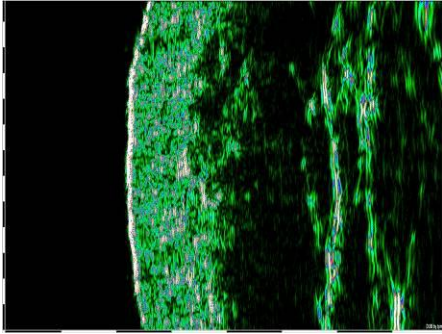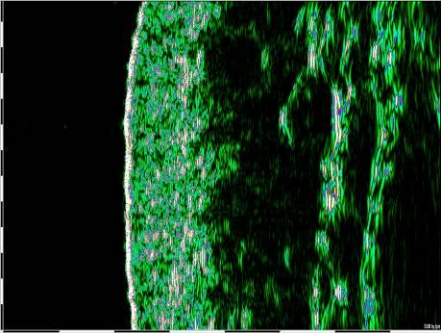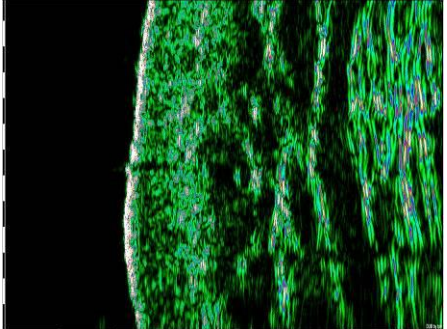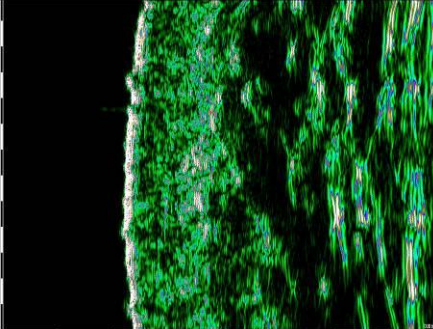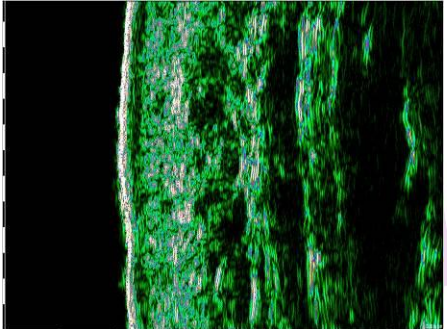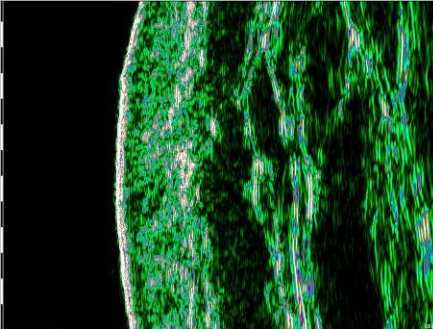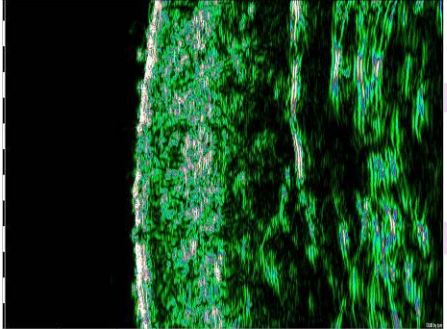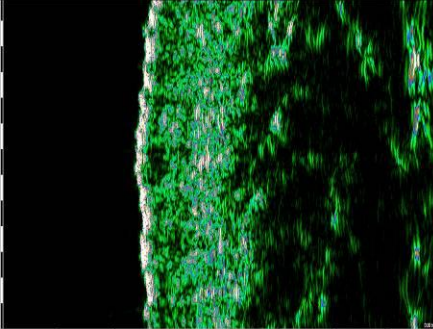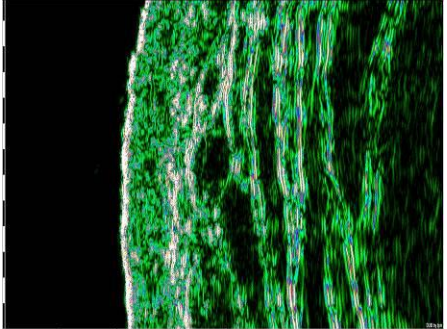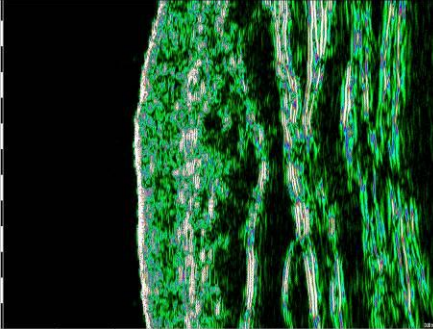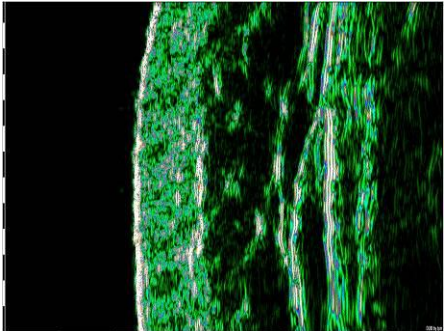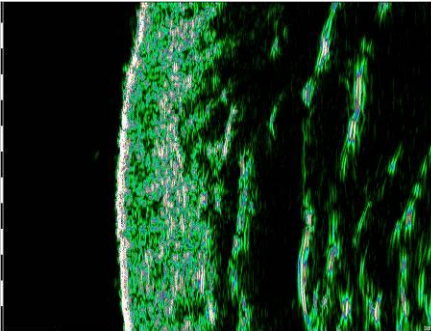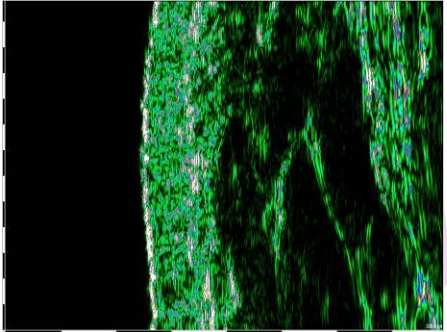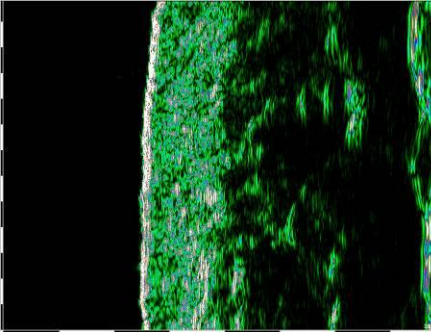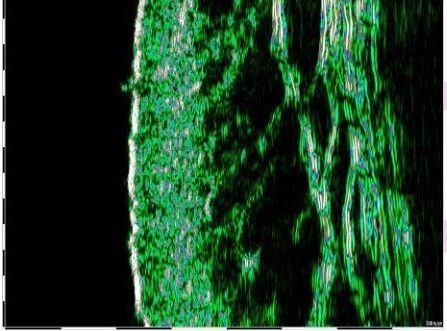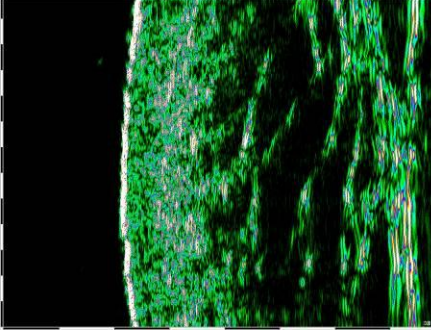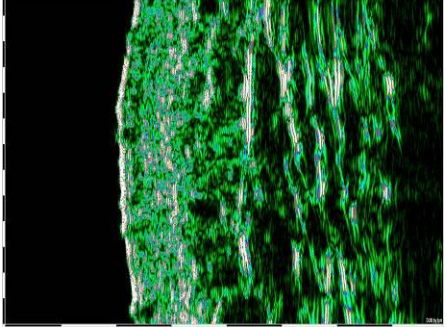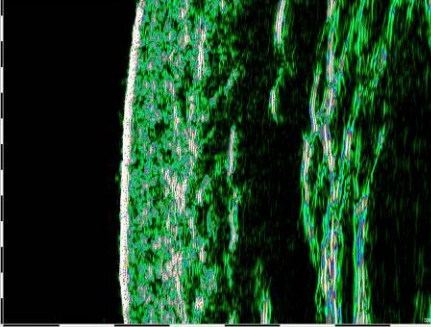
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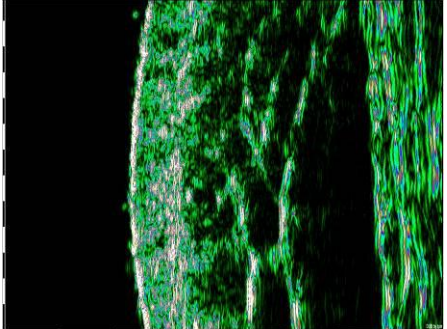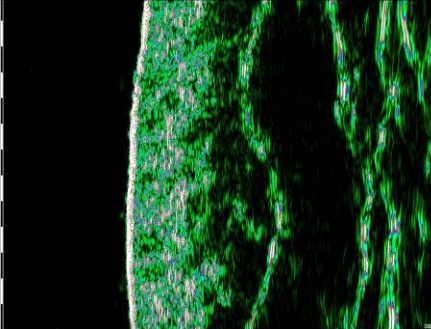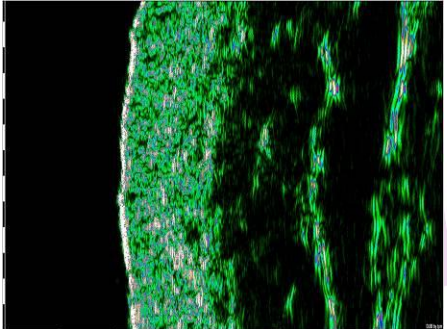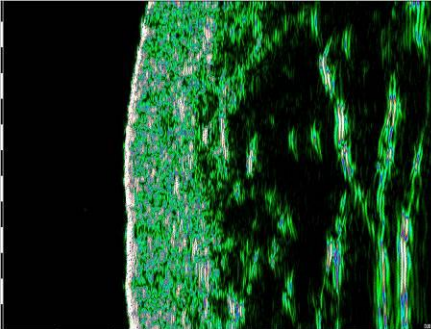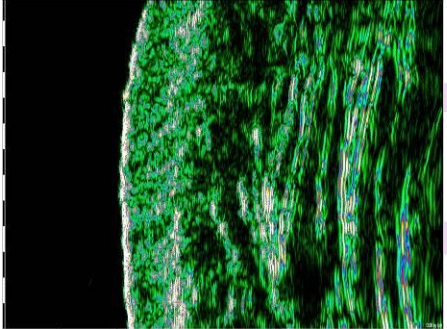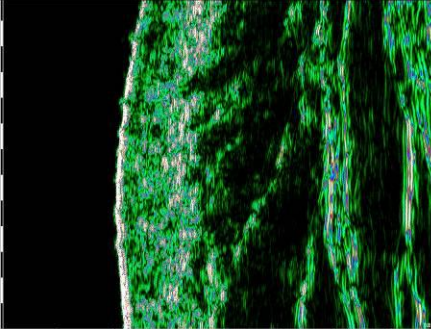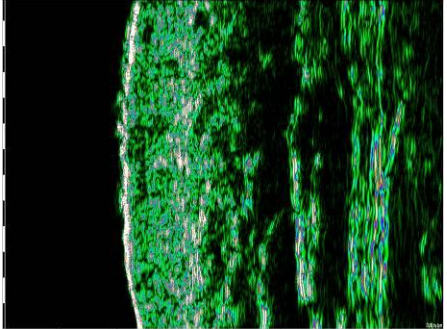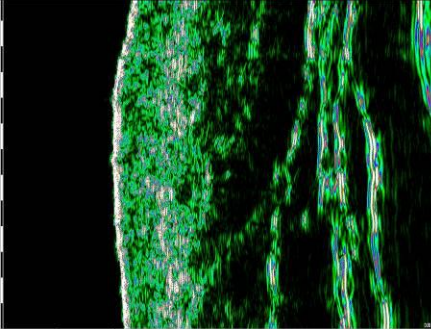
DUB® SkinScanner	Skin density in hairline area image	
Period	Before	After 4 weeks
No. 01		
No. 02		
No. 03		
No. 04		
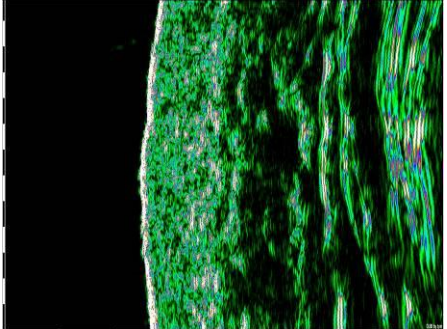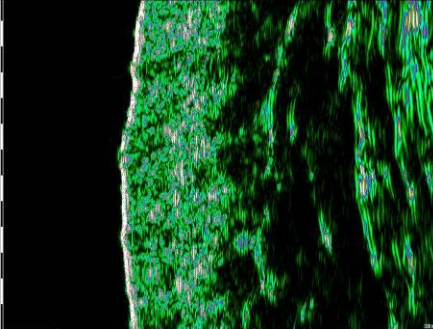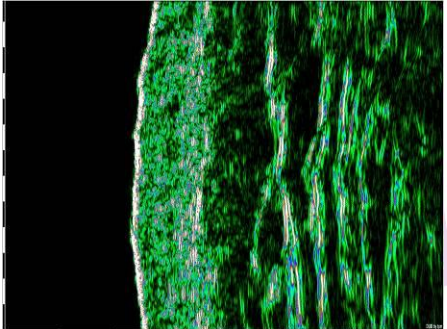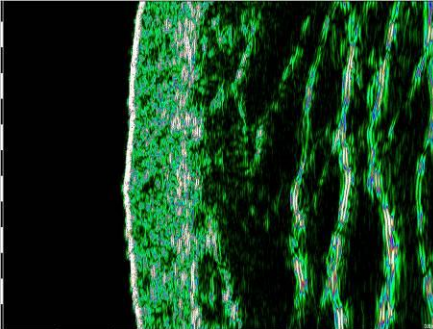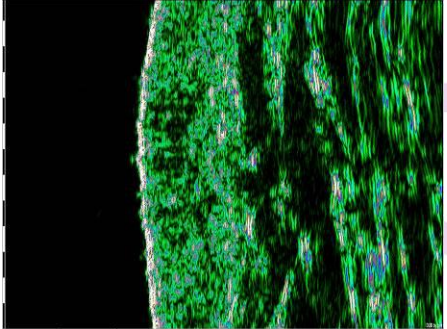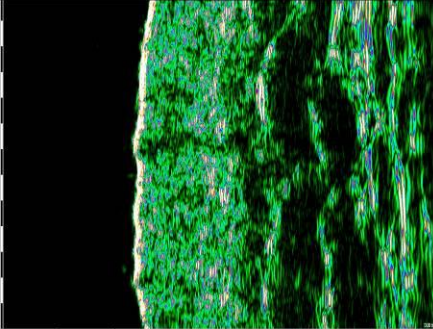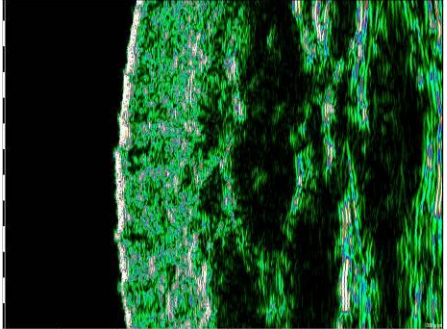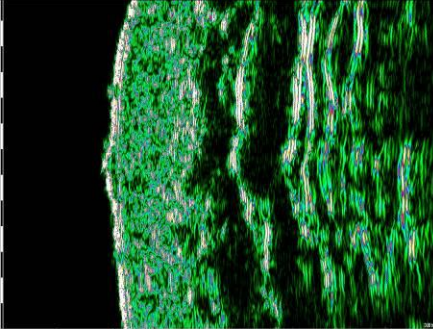
DUB® SkinScanner	Skin density in hairline area image	
Period	Before	After 4 weeks
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No. 06		
No. 07		
No. 08		
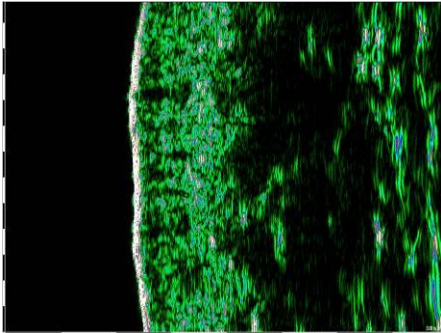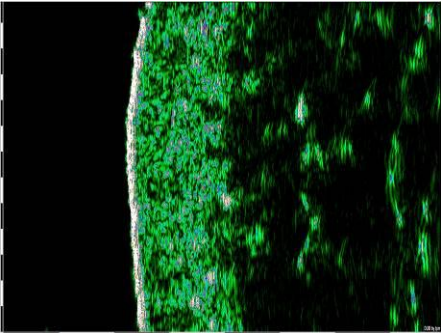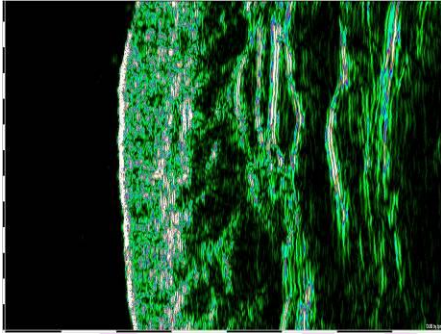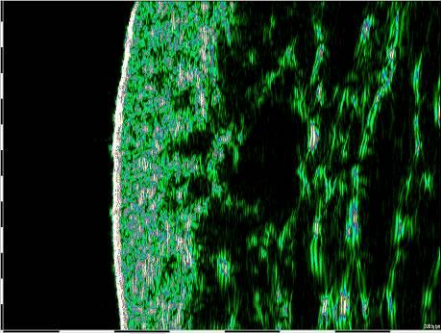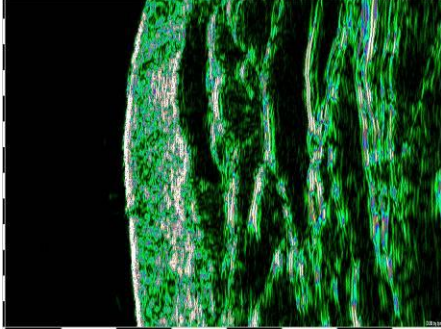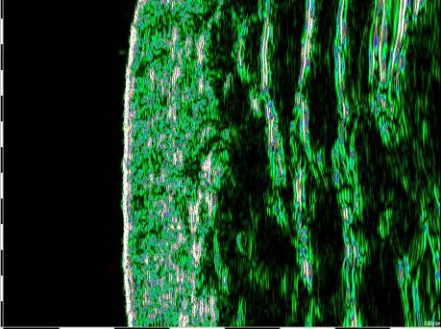
DUB® SkinScanner	Skin density in hairline area image	
Period	Before	After 4 weeks
No. 09		
No. 10		
No. 11		
No. 12		

DUB® SkinScanner	Skin density in hairline area image	
Period	Before	After 4 weeks
No. 13		
No. 14		
No. 15		
No. 16		

DUB® SkinScanner	Skin density in hairline area image	
Period	Before	After 4 weeks
No. 17		
No. 18		
No. 19		
No. 20		

DUB® SkinScanner	Skin density in hairline area image	
Period	Before	After 4 weeks
No. 21		
No. 22		
No. 23		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Number of hair shed image	
Period	Before	After 4 weeks
No. 01		
No. 02		
No. 03		
No. 04		

DSLR	Number of hair shed image	
Period	Before	After 4 weeks
No. 05		
No. 06		
No. 07		
No. 08		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Number of hair shed image	
Period	**Before**	**After 4 weeks**
No. 09		
No. 10		
No. 11		
No. 12		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Number of hair shed image	
Period	Before	After 4 weeks
No. 13		
No. 14		
No. 15		
No. 16		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Number of hair shed image	
Period	Before	After 4 weeks
No. 17		
No. 18		
No. 19		
No. 20		

DSLR	Number of hair shed image	
Period	Before	After 4 weeks
No. 21		
No. 22		
No. 23		

DSLR	Root volume on the top of the head image	
Period	Before	After 4 weeks
No. 01		
No. 02		
No. 03		
No. 04		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Root volume on the top of the head image	
Period	Before	After 4 weeks
No. 05		
No. 06		
No. 07		
No. 08		

DSLR	Root volume on the top of the head image	
Period	Before	After 4 weeks
No. 09		
No. 10		
No. 11		
No. 12		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Root volume on the top of the head image	
Period	Before	After 4 weeks
No. 13		
No. 14		
No. 15		
No. 16		

DSLR	Root volume on the top of the head image	
Period	Before	After 4 weeks
No. 17		
No. 18		
No. 19		
No. 20		

DSLR	Root volume on the top of the head image	
Period	Before	After 4 weeks
No. 21		
No. 22		
No. 23		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Hair volume image	
Period	Before	After one-time use
No. 01		
No. 02		
No. 03		
No. 04		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Hair volume image	
Period	Before	After one-time use
No. 05		
No. 06		
No. 07		
No. 08		

DSLR	Hair volume image	
Period	Before	After one-time use
No. 09		
No. 10		
No. 11		
No. 12		

DSLR	Hair volume image	
Period	Before	After one-time use
No. 13		
No. 14		
No. 15		
No. 16		

DSLR	Hair volume image	
Period	Before	After one-time use
No. 17		
No. 18		
No. 19		
No. 20		

DSLR	Hair gloss image	
Period	Before	After one-time use
No. 01		
No. 02		
No. 03		
No. 04		

DSLR	Hair gloss image	
Period	Before	After one-time use
No. 05		
No. 06		
No. 07		
No. 08		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Hair gloss image	
Period	**Before**	**After one-time use**
No. 09		
No. 10		
No. 11		
No. 12		

DSLR	Hair gloss image	
Period	Before	After one-time use
No. 13		
No. 14		
No. 15		
No. 16		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

DSLR	Hair gloss image	
Period	Before	After one-time use
No. 17		
No. 18		
No. 19		
No. 20		

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

Dino-Lite	Cleansing effect of hair fine dust simulant image		
Period	Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use
No. 01			
No. 02			
No. 03			
No. 04			
No. 05			

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

Dino-Lite	Cleansing effect of hair fine dust simulant image		
Period	Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use
No. 06			
No. 07			
No. 08			
No. 09			
No. 10			

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

Dino-Lite	Cleansing effect of hair fine dust simulant image		
Period	Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use
No. 11			
No. 12			
No. 13			
No. 14			
No. 15			

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

Dino-Lite	Cleansing effect of hair fine dust simulant image		
Period	Before applying the fine dust simulant	After applying the fine dust simulant	After one-time use
No. 16			
No. 17			
No. 18			
No. 19			
No. 20			

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

Facilities and faculty involved in the study

■ Institute			
Name	Human Co., Ltd. Skin Clinical Trial Center		
Address	1005~1008, 24, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea		
President	Heejung Jung		
Study director	Wonkyu Hong / Dermatologist		
Tel.	070-5222-9663	**FAX**	070-7500-9650
e-mail	cosmetic0206@naver.com		

■ Purpose of establishment of test agency
This institution was established to evaluate the safety, effectiveness, and functionality of test product by performing clinical study, providing results of related tests as well as technical information.

■ Clinical study items	
Cosmetics safety evaluation and research	Functional cosmetics evaluation and research
Cosmetics efficacy evaluation and research	Quasi-drugs evaluation and research
Skin related product evaluation and research	Functional food evaluation and research

■ Facilities		
A thermo-hygrostat	VECTRA XT	Mark-Vu
F-ray	DSLR (Cannon EOS 80D)	Antera 3D
DUB® SkinScanner	Epsilon E100	Electronic scale
Cutometer® dual MPA 580	Corneometer® CM825	Sebumeter® SM815
Tewameter TM300	VISIA-7	PRIMOS CR
Moisturemeter D	Vapometer	SkinGlossmeter
SkinColorCatch	Skin pH meter	FLIR E75
Kong Camera	Dino-Lite Digital Microscope	Folliscope
Fine dust injection system	Infrared Moisture Analyzer	Bathtub
Infrared Sauna System	IR lamp	Black D-Squame
Static meters	Ballistometer	Clean bench
Incubator	Auto clave	Water Purification System
DERMAVISION Beauty Edition	MulteTest-dV	-

HUMAN
Human Co., Ltd. Skin Clinical Trial Center

Researchers CV

■ **Director of the agency**

Heejung Jung / CEO

Education	2004	Graduated from Department of Environmental Engineering, Konkuk University, bachelor of engineering
Career	2018 ~ 2020	Head of Skin Clinical Trial Center, OATC Co., Ltd.
	2020 ~ present	CEO of Human Skin Clinical Trial Center

Reliability review of whitening function evaluation using transparent film mapping

Blue light blocking test device patent registration[10-2346709]

Patent registration of anti-dust performance test device and method[10-2019883]

Patent application for portable cosmetic container[10-2019-0052712]

Patent application for cosmetics sterilizer[10-2019-0080854]

Patent application for cosmetic container with temperature control[10-2019-0084935]

Patent application for skin heavy metal measuring device[10-2019-0168852]

Cereal skin type analysis and patent application for customized cosmetics manufacturing device[10-2020-0068940]
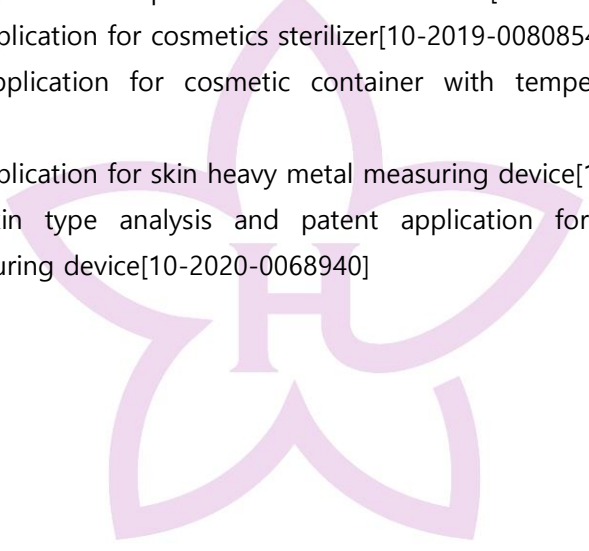
■ **Test manager**

Wonkyu Hong / Dermatologist

Education	2004	Graduated from Inha University School of Medicine, Bachelor of Medicine
	2004 ~ 2005	Intern of Inha University Hospital
	2005 ~ 2009	Resident of Inha University Hospital
	2007	Graduated from Inha University School of Medicine, Master of Medicine
Career	2004	Acquired Doctor's License (License number: 83931)
	2009	Acquired dermatologist (License number: 1771)
	2009 ~ 2012	Associate Chairman of Hansen Welfare Association Jeonbuk Branch
	2013 ~ 2015	Representative Director of Pyeongtaek Human Dermatology
	2013 ~ present	Adjunct Professor of Dermatology Class, Inha University
	2016	Representative Director of Cheongna Human Dermatology
	2018	Research Director of Human Cosmetic
	2018	Adjunct Professor of International St. Mary's Hospital
	2018 ~ 2020	Research Director of Skin Clinical Trial Center, OATC Co., Ltd.
	2020 ~ present	Research Director of Human Skin Clinical Trial Center
Society activities		Regular member of Korean Society of Dermatology
		Regular member of the Korean Society for Acne Research
		Regular member of Korean Hair Research Society
		Regular member of Association of Korean Dermatologists
	2018 ~ present	Intelligence member of Association of Korean Dermatologists
	2018 ~ present	Planning policy member of Association of Korean Dermatologists

■ **Reliability assurance officer**

Hongsuk Kim / Dermatologist

Education	2001	Graduated from Dong-A University College of Medicine, Bachelor of Medicine
	2001 ~ 2002	Intern of Dong-A University Hospital
	2002 ~ 2006	Resident of Dong-A University Hospital
	2004	Master of Dermatology, Dong-A University College of Medicine, Master of Medicine
Career	2001	Acquired Doctor's License(License number: 72561)
	2006	Acquired dermatologist (License number: 1629)
	2006 ~ 2009	Manager, Jeju Special Self-Governing Province Branch, Korea Hansen Welfare Association
	2010 ~ 2011	Manager of Nohyung Beautiful Dermatology
	2011 ~ 2012	Representative Manager of Dermatology, Seoul Clinic
	2014 ~ present	Adjunct Professor of Dermatology Class, Dong-A University,
	2012 ~ present	Representative director of Wine Dermatology Plastic Surgery
	2015 ~ present	Clinical Instructor of Department of Medical Beauty, Chungcheong University
	2016 ~ present	Clinical Instructor of Cosmetics Consulting Professional Association
	2020 ~ present	Human Skin Clinical Trial Center Reliability assurance officer
Society activities		Publication director of the Korean Society for Anti-aging Dermatology
		Director of the Korean Society for Skin Type Research
		Director of the Korean Society of Cosmetics and Cosmetology
		Regular member of Korean Society of Dermatology
		Regular member of Korean Society of Dermatology Surgery
		Regular member of Korean Medical Society for Cosmetics
		Regular member of Korean Laser Society
		Regular member of the Korean Society for Psoriasis
		Regular member of the Korean Society for Acne Research
		Regular member of Korean Society of Vitiligo
		Regular member of the Korean Atopic Dermatitis Association

■ **Researchers**

Hyounghoon Hwang / Clinical Trial Division Head

Education	2006	Yonsei University, Biological sciences, Bachelor of Science
Career	2007 ~ 2014	DERMAPRO Ltd., Research Engineer
	2014 ~ 2020	GFC Life Science, KDRI., Senior Research Engineer
	2020 ~ 2022	KSRC Korean Skin Research Center, Senior Research Engineer
	2023 ~ present	Human Skin Clinical Trial Center, Clinical Trial Division Head

Suhyun Lee / Senior Researcher

Education	2014 ~ 2018	Semyung University, Oriental Cosmetic Sciences
Career	2017 ~ 2022	Semyung Clinical Trial center Assistant Researcher
	2022 ~ 2023	AllLive Clinical trial Research Center, Senior Researcher
	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Senior Researcher

Soyeon Kim / Senior Researcher

Education	2013 ~ 2015	Shin Ansan University, Department of Food and Life Sciences
Career	2015 ~ 2021	DERMAPRO Ltd. Researcher
	2021 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Team Leader

Minhwa Lee / Senior Researcher

Education	2013 ~ 2017	Dongguk University, Department of Biotechnology, Bachelor of Science
Career	2018 ~ 2021	Korea Institute of Dermatological Sciences, Researcher
	2021 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Senior Researcher

Eunseok Lee / Chief researcher

Education	2009 ~ 2011	Shin Ansan University
	2018	Academic Creditbank System, business adminstration
Career	2011 ~ 2021	Dermapro Skin Research Center, Chief researcher
	2021 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Chief researcher

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Suyeong Kim / Chief researcher

Education	2013	Jeju National University Graduate School, Department of Chemistry, Master of Sciences
Career	2014 ~ 2022	Ami cosmetic, Research Engineer
	2022 ~ 2022	Chief researcher / KSRC Korean Skin Research Center
	2023 ~ present	Human Skin Clinical Trial Center, Chief researcher

Jisoo Kim / Chief researcher

Education	2014 ~ 2018	Hoseo University, Cosmetic Science, Bachelor of Science
Career	2018 ~ 2020	KC Skin Research Center, Researcher
	2020 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Chief researcher

Heejin Lim / Chief researcher

Education	2017 ~ 2021	Kyungsung University, chemistry department, Bachelor of Science
Career	2021 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Chief researcher

Hyunjung Woo / Chief researcher

Education	2017 ~ 2021	Inje University, Department of Pharmaceutical Engineering, Bachelor of Engineering
Career	2021 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Chief researcher

Eunyoung Kang / Researcher

Education	2020	Dong-A University Graduate School, Department of Chemical Engineering, Advanced Chemical Engineering, Bachelor of Engineering
Career	2021~ 2022	Researcher / KSRC Korean Skin Research Center
	2023 ~ present	Human Skin Clinical Trial Center, Researcher

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Gahyeon Kim / Researcher

Education	2018 ~ 2022	Bucheon University, Department of Beauty Care
Career	2022 ~ 2023	OATC Skin Clinical Test Center, Researcher
	2023 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Researcher

Dahyeon Kim / Researcher

Education	2018 ~ 2022	Bucheon University, Department of Beauty Care
Career	2022 ~ 2023	OATC Skin Clinical Test Center, Researcher
	2023 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Researcher

Subin Hwang / Researcher

Education	2020 ~ 2023	Doowon University, Department of Beauty art
Career	2022 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Researcher

Yesol Lee / Researcher

Education	2015 ~ 2017	Jaeneung University, Department of Cosmetics Science
Career	2024 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Researcher

Geanah Ko / Researcher

Education	2019 ~ present	Seowon University, Department of Biocosmetics
Career	2024 ~ present	Human Skin Clinical Trial Center, Clinical Trial Team, Researcher

Yejin Kim / Senior Researcher

Education	2013 ~ 2017	Seowon University Graduate School of Industry of Cosmetics Engineering
	2018 ~ 2022	Seowon University, Bachelor of Science in Department of Cosmetics Engineering
Career	2016 ~ 2020	P&K Skin Research Center, Assistant Research Engineer
	2020 ~ 2022	Seowon Skin Research Center, Senior Researcher
	2022 ~ 2023	AllLive Clinical trial Research Center, Senior Researcher
	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Senior Researcher

Boram Heo / Senior Researcher

Education	2017 ~ 2020	Konkuk University Future Knowledge Education Center, Department of K-beauty Industrial Convergence, Bachelor of Science
Career	2017 ~ 2019	Korea Institute of Dermatological Sciences, Researcher
	2019 ~ 2022	PNK Skin Clinical Research Center, Researcher
	2022 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Senior Researcher

Soyoung Park / Chief researcher

Education	2013 ~ 2018	Gachon University, Department of Chemical & Biological Engineering, Bachelor of Science
Career	2018 ~ 2023	Korea Institute of Dermatological Sciences, Chief researcher
	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Chief researcher

Gahyun Lee / Chief researcher

Education	2013 ~ 2019	Dongguk University, Department of Food Science & Biotechnology, Bachelor of Science
Career	2019 ~ 2023	Korea Institute of Dermatological Sciences, Chief researcher
	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Chief researcher

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Human Co., Ltd. Skin Clinical Trial Center

Yukyeong Lee / Chief researcher

| Education | 2015 ~ 2019 | Semyung University, Department of Oriental Bio Convergence Science, Bachelor of Science |
| Career | 2020 ~ present | Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Chief researcher |

Youngseo Kim / Researcher

Education	2016 ~ 2020	Jungwon University, Department of Medical Beauty Care
Career	2021 ~ 2022	Korea Institute of Dermatological Sciences, Researcher
	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Sumin Lee / Researcher

| Education | 2021 ~ 2023 | Konkuk University Future Knowledge Education Center, of K-Department beauty Industrial Convergence, Bachelor of Science |
| Career | 2022 ~ present | Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher |

Minjeong Seo / Researcher

| Education | 2019 ~ 2023 | Eulji University, Department of Beauty and Cosmetic Science |
| Career | 2022 ~ present | Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher |

Kyungeun Kim / Researcher

Education	2019~2020	Osan Univerity, Beauty and Cosmetics Affiliation Department of Skin and Cosmetics
	2021 ~ 2023	Mokwon Univerity, Department of Cosmetics Engineering, Bachelor of Science
Career	2022 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Seonyoung Kim / Researcher

Education	2018 ~ 2022	Mokwon Univerity, Department of Cosmetics Engineering
Career	2022 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Jieun Kim / Researcher

Education	2018 ~ 2022	Mokwon Univerity, Department of Cosmetics Engineering
Career	2022 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Hajeong Nam / Researcher

Education	2013 ~ 2016	Shinsung University, Department of Hotel Cooking associate degree
	2022 ~ present	Konkuk University Future Knowledge Education Center, Department of K-beauty Industrial Convergence, Bachelor of Science
Career	2022 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Dahyeon Kim / Researcher

Education	2016 ~2020	Konyang University, Department of Medical Beauty
Career	2021 ~ 2022	Dermacosmetic Clinical Trial Center, Clinical Trial Team, Researcher
	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Sieun Lee / Researcher

Education	2019 ~ 2023	Gwangju Women's University, Department of Cosmetics Science
Career	2023 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

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HyeonJi Lee / Researcher

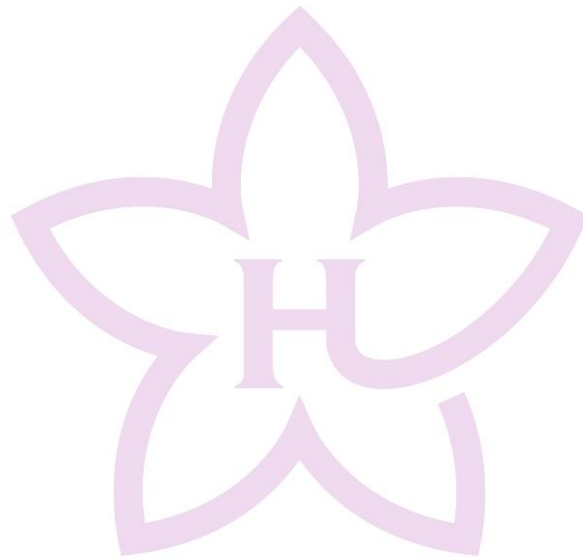|		
Education	2020 ~ 2024	Daejeon University, Department of Beauty Design
Career	2024 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

Semin Choi / Researcher

Education	2018 ~ 2022	Dona-A University, Department of Chemistry
Career	2024 ~ present	Human Ethic Skin Clinical Trial Center, Clinical Trial Team, Researcher

List of scientific publications

■ **Researchers**

No.	Journal
1	Bohee Yang, Wongyu Hong, Sunghyup Han, Jiwon Byeon, Heejin Song, Seunggyun In, Kwangsung Choi, Jeonghyun Shin. Skin Granulomas associated with Common Variable Immunodeficiency. Journal of Korean Society of Dermatology. 2011:49(7):601-605
2	Heejin Song, Sunghyup Han, Jiwon Byeon, Wongyu Hong, Hyunsook Lee, Jeonghyun Shin, Kwangsung Choi. Sodium Tetradecyl Sulfate 3 Cases of Mucosal Cyst treated with Sclerotherapy. Journal of Korean Society of Dermatology. 2008:46(9):1249-1252
3	Sunghyup Han, Heejin Song, Wongyu Hong, Hyunsook Lee, Jeonghyun Shin, Kwangsung Choi. A Case of Sister Mary Joseph node. Journal of Korean Society of Dermatology. 2008:46(8):1103-1107
4	Heejin Song, Wongyu Hong, Hyunsook Lee, Jeonghyun Shin, Sunyoung Moon, Kwangsung Choi. A Case of Pregnant Woman Tsutsugamushi Disease treated with Azithromycin. Journal of Korean Society of Dermatology. 2008:46(6):859-861
5	Wongyu Hong, Jeonghyun Shin, Kwangsung Choi. Effect of Topical Treatment with Anthralin in Patients with Refractory Alopecia Areata having a Wide Range of Hair Loss. Journal of Korean Society of Dermatology. 2008:46(5):641-647
6	Heejin Song, Sunghyup Han, Wongyu Hong, Hyunsook Lee, Kwangsung Choi, Jeonghyun Shin. A Case of Rheumatic Neutrophil Dermatitis. Journal of Korean Society of Dermatology. 2008:46(4):514-516
7	Wongyu Hong, Jeonghyun Shin, Kwangsung Choi. Clinical Treatment Effect of Germinated Brown Rice Phellinus linteus in Atopic Dermatitis. Korea Journal of Herbology. 2008:23(1):103~108
8	Heejin Song, Wongyu Hong, Hyunsook Lee, Kwangsung Choi, Jeonghyun Shin. A Case ofMacular Amyloidosis Presented as Depressed Patches on the Face. Journal of Korean Society of Dermatology. 2008:46(2):285-288
9	Hyunsook Lee, Sunghyup Han, Heejin Song, Wongyu Hong, Jeonghyun Shin, Kwangsung Choi. A Case of Lichenoid Drug Eruption by Allopurinol. Journal of Korean Society of Dermatology. 2008:46(1);130-133
10	Wongyu Hong, Heejin Song, Hyunsook Lee, Jongrok Lee, Jeonghyun Shin, Kwangsung Choi. A Case of Cowen Syndrome. Journal of Korean Society of Dermatology. 2007:45(8);829-831

11	Hyeyoung Lee, Wongyu Hong, Jeonghyun Shin, Juyoung Noh, Jongrok Lee. A Case of Umbilical Omphalomesenteric Duct Polyp. Journal of Korean Society of Dermatology. 2006:44(11);1342-1344
12	Hyunsook Lee, Wongyu Hong, Jongrok Lee, Jeonghyun Shin, Kwangsung Choi, Yuchan Kim. A Case of Acrosyringeal Nevus. Journal of Korean Society of Dermatology. 2006:44(6);751-753
13	Wongyu Hong, Hyunsook Lee, Jongrok Lee, Kwangsung Choi, Jeonghyun Shin, Yuchan Kim. 2 Cases of Pilomatricoma with Bullous Appearance. Journal of Korean Society of Dermatology. 2006:44(3);330-333
14	Hyunsook Lee, Wongyu Hong, Seunggyun In, Jongrok Lee, Jeonghyun Shin, Kwangsung Choi. A Case of Dermatomyositis Associated with Scarring Alopecic Patches. Journal of Korean Society of Dermatology. 2006:44(2);250-252
15	Wongyu Hong, Jeonghyun Shin, Kwangsung Choi. Effect of Anthralinn Immunotherapy in Patients with Alopecia Areata having a Wide Range of Hair Loss. Journal of Korean Society of Dermatology. 2009:42(9);1130-1137
16	Heejin Song, Wongyu Hong, Sunghyup Han, Jiwon Byeon, Hyunsook Lee, Kwangsung Choi, Jeonghyun Shin. Acral Angioosteoma Cutis. American Journal of Dermatopathology. 2010:32(5):477-478
17	Heejin Song, Sunghyup Han, Wongyu Hong, Hyunsook Lee, Jeonghyun Shin, Kwangsung Choi. Paraneoplastic bullous pemphigoid: Clinical disease activity correlated with enzyme-linked immunosorbent assay index for the NC16A domain of BP180. Journal of Dermatology. 2009:36:66-68
18	Jiwon Byeon, Sunghyup Han, Heejin Song, Wongyu Hong, Hyunsook Lee, Jeonghyun Shin, Kwangsung Choi. A case of supraumbilical skin rash after chemoembolization for hepatocellular carcinoma. Journal of the European Academy of Dermatology and Venereology. 2009:23(12):1458-1459
19	Wongyu Hong, Heejin Song, Hyunsook Lee, Jeonghyun Shin, Kwangsung Choi. Hobnail haemangioma associated with a secondary sexual characteristic. Journal of the European Academy of Dermatology and Venereology. 2009:23:465-466
20	Heejin Song, Wongyu Hong, Hyunsook Lee, Kwangsung Choi, Jeonghyun Shin. Herpes zoster complicated by delayed intracranial haemorrhage. Clinical and Experimental Dermatology. 2009:34:518-540
21	Sunghyup Han, Heejin Song, Wongyu Hong, Hyunsook Lee, Kwangsung Choi,Jeonghyun Shin. Rhabdomyomatous mesenchymal hamartoma of the vagina. Pediatric Dermatology. 2009:26(6):753-755

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22	Sunghyup Han, Heejin Song, Wongyu Hong, Hyunsook Lee, Kwangsung Choi, Jeonghyun Shin. A case of adult blaschkitis with features of interface dermatitis. British Journal of Dermatology. 2008:159:231–266
23	Heejin Song, Wongyu Hong, Hyunsook Lee, Jeonghyun Shin, Kwangsung Choi. Intramuscular lipoma of the sternocleidomastoid muscle. J Eur Acad Dermatol Venereol. 2008:22:363–404
24	Hyunsook Lee, Heejin Song, Wongyu Hong, Jeonghyun Shin, Kwangsung Choi. Pseudoxanthoma elasticum-like papillary dermal elastolysis with solar elastosis. J Eur Acad Dermatol Venereol. 2008:22:363–404
25	Shingu Park, Uicheol Lee, Wongyu Hong, Heejin Song, Jeonghyun Shin. A Case of Occupational Allergic Contact Dermatitis due to PVC Hose. Journal of Occupational Health. 2008:50:197-200
26	Jeonghyun Shin, Wongyu Hong, Heejin Song, Kwangsung Choi, Yuchan Kim. Atypical Acute Graft-Versus-Host Disease. American journal of dermatopathology. 2007:29;576-577
27	Byun JW, Hong WK, Han SH, Song HJ, Lee HS, Choi GS, Shin JH. Red scrotum syndrome: successful treatment with oral doxycycline. International Journal of Dermatology. 2012;51(3):362-363

■ **Quality Assurance**

No.	Journal
1	Sentinel Lymph Node Biopsy and Staging of Melanoma Using Lymphoscintigraphy and Gamma-probe
2	Preference of Near-erythemogenic Narrow-band UVB Phototherapy in Psoriasis and Change of Dendritic Cells and Chemokines
3	Effectiveness of Amniotic Membrane Patch in the Treatment of Chronic Ulcers
4	Effects of Keratinocyte Growth Factor (KGF), Epidermal Growth Factor (EGF), and Extracellular Calcium on the Growth of Cultured Psoriatic Keratinocytes
5	Photodynamic Therapy of Actinic Keratoses Using 585nm Dye Laser and Variable Lights
6	A Clinical Analysis of the Risk Factors of Varicose Veins in Korean
7	A Case of Churg-Strauss Syndrome Associated with Small Bowel Perforationfollowing High Dose Systemic Steroid Intravenous Injection
8	A Case of Muticentric Reticulohistiocytosis Misdiagnosed As Rheumatoid Arthritis
9	A Case of Pigmented Clear Cell Acanthoma
10	A Case of SAPHO Syndrome in a Palmoplantar Pustulosis Patient
11	A Case of Xanthoma Disseminatum with Diabetes Insipidus
12	A Case of Chilblain Lupus Erythematosus Associated with Antibodies to SSA/Ro
13	A Case of Primary Mucinous Carcinoma of the Skin
14	A Case of ALK-negative Systemic Anaplastic Large Cell Lymphoma
15	CD4-/CD56+/CD123+ Hematodermic neoplasm showing early liver metastasis