CLINICAL EFFICACY TEST REPORT

Sponsor: LabInCube Co., Ltd.

Clinical Trial to Evaluate the Efficacy of 'PLLACUBE PINK VOL.' on skin elasticity and 7 other parameters

HBSE-MGE-24152

Jan. 2025

KSRC Korean Skin Research Center

APPROVAL SIGNATURES

KSRC Korean Skin Research Center conducted the study “Clinical Trial to Evaluate the Efficacy of ‘PLLACUBE PINK VOL.’ on skin elasticity and 7 other parameters” as requested by the sponsor, LabInCube Co., Ltd. and hereby submits this clinical trial report to LabInCube Co., Ltd.

Jan. 2025

KSRC Korean Skin Research Center
President

Chan Yeong Heo, M.D., Ph.D.

Principal Investigator

Myoung Rae Kim

Investigator

Da Hye Kim

STUDY INFORMATION

Title	Clinical Trial to Evaluate the Efficacy of 'PLLACUBE PINK VOL.' on skin elasticity and 7 other parameters		
Test code	HBSE-MGE-24152		
Start date	Nov. 18. 2024	Study completion date	Jan. 14. 2025

Sponsor	Institution name	LabInCube Co., Ltd.
	Representative	Kyung Min Choi
	Contact person	Ji Hee Kim
	Contact	+82 2-2039-0636
	Fax	+82 2-4009-9167
	Email	jihee@labincube.com
	Address	A-304, C2, 45, Yangcheong 4-gil, Ochang-eup, Cheongwon-gu, Cheongju-si, Chungcheongbuk-do, Republic of Korea

Investigation site	Institution name	KSRC Korean Skin Research Center
	Contact person	Da Hye Kim
	Contact	+82 31-712-8520
	Fax	+82 70-4466-4499
	Email	ksrc@koreansrc.com
	Address	Kins Tower 24F, 8, Seongnam-daero 331 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

Principal Investigator	Name	Myoung Rae Kim
	Affiliation	KSRC Korean Skin Research Center
	Address	Kins Tower 24F, 8, Seongnam-daero 331 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Head of institution	Name	ChanYeong Heo, M.D, Ph.D.
	Affiliation	KSRC Korean Skin Research Center
	Address	Kins Tower 24F, 8, Seongnam-daero 331 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Research institute facility information and composition of research personnel		Appendix III

QUALITY ASSURANCE CERTIFICATION

- ☐ Study title: Clinical Trial to Evaluate the Efficacy of 'PLLACUBE PINK VOL.' on skin elasticity and 7 other parameters
- ☐ Study code: HBSE-MGE-24152
- ☐ IRB Approval No.: HBABN01-241030-HR-E0046-02

This study was planned and conducted in accordance with GCP (Good Clinical Practice), MFDS (Ministry of Food and Drug Safety) regulations, and KSRC Korean Skin Research Center's Standard Operating Procedures (SOPs), as confirmed by the quality assurance personnel and submitted to the Principal Investigator.

Type of inspection	Inspection date	Reporting date for Principal Investigator and Quality Assurance Manager
Study Protocol	Oct. 30. 2024	Oct. 30. 2024
Product Information	Oct. 30. 2024	Oct. 30. 2024
IRB Approval	Nov. 01. 2024	Nov. 01. 2024
Recruitment	Nov. 06. 2024 ~ Nov. 17. 2024	Nov. 17. 2024
Test Period	Nov. 18. 2024 ~ Nov. 26. 2024	Nov. 26. 2024
Draft Report	Dec. 06. 2024	Dec. 06. 2024
Final Report (Korean)	Jan. 14. 2025	Jan. 14. 2025
Final Report (English)	Jan. 15. 2025	Jan. 15. 2025

The signature below means that this study was conducted as described above.

Quality Assurance Manager _____
Keon Woo Choi

Principal Investigator _____
Myoung Rae Kim

TABLE OF CONTENTS

REPORT SUMMARY

Title	Clinical Trial to Evaluate the Efficacy of 'PLLACUBE PINK VOL.' on skin elasticity and 7 other parameters		
Test code	HBSE-MGE-24152	Test period	Nov. 18. 2024 ~ Nov. 26. 2024
Test center	KSRC Korean Skin Research Center	Sponsor	LabInCube Co., Ltd.
Purpose	The purpose of this study is to evaluate the skin elasticity and 7 other parameters, including adverse skin reactions of the 'PLLACUBE PINK VOL.'		
Test material	PLLACUBE PINK VOL.		
Study design	1 week application, single test		
Subjects	32 adult volunteers aged 39-59 years (mean 50.03 ± 5.49 years) who met the inclusion criteria and did not meet the exclusion criteria (study completed: 32)		
Method	In this study, the test site (face) was measured at before and after one use of the product, one week of using the product to evaluate the area of non-visible hyperpigmentation area (underlying melasma etc), skin tone (brightness), triple skin tone (dark tone, yellow tone, brown tone), area of visible hyperpigmentation area (melasma, freckles etc), count of visible hyperpigmentation area (melasma, freckles etc), skin density, skin elasticity, melanin of visible hyperpigmentation area (melasma, freckles etc) In addition, subject questionnaires and investigators' observations and interviews were used to assess skin abnormal reactions.		
Statistical analysis	Statistical significance was tested using SPSS Package Program (IBM, USA), with a statistical significance level set at $p<0.05$.		
Result	1. Evaluation of area of non-visible hyperpigmentation area (underlying melasma etc) As a result of the analysis, the rate of change in the area of non-visible hyperpigmentation area (underlying melasma etc) parameter value (Pixel) significantly decreased (improved) by 1.17% after one use of the product, by 2.75% after one week of using the product compared to before the product use ($p<0.05$). 2. Evaluation of skin tone (brightness) As a result of the analysis, the rate of change in the skin tone (brightness) parameter value (L*) significantly increased (improved) by 0.58% after one use of the product, by 2.07% after one week of using the product compared to before the product use ($p<0.05$). 3. Evaluation of triple skin tone (dark tone, yellow tone, brown tone) As a result of the analysis, the rate of change in the triple skin tone (dark tone, yellow tone, brown tone) parameter values (L*, b*, a*) significantly increased or decreased (improved) by 0.45%, 1.66%, and 3.10%, respectively, after one use of the product, by 1.27%, 1.43%, and 6.63%, respectively, after one week of using the product compared to before the product use ($p<0.05$). 4. Evaluation of area of visible hyperpigmentation area (melasma, freckles etc) As a result of the analysis, the rate of change in the area of visible hyperpigmentation area (melasma, freckles etc) parameter value (㎟) significantly decreased (improved) by 5.82% after one use of the product, by 7.32% after one week of using the product compared to before the product use ($p<0.05$).		

	5. Evaluation of count of visible hyperpigmentation area (melasma, freckles etc) As a result of the analysis, the rate of change in the count of visible hyperpigmentation area (melasma, freckles etc) parameter value (Count) significantly decreased (improved) by 0.65% after one use of the product, by 2.13% after one week of using the product compared to before the product use (p<0.05). 6. Evaluation of skin density As a result of the analysis, the rate of change in the skin density parameter value (%) significantly increased (improved) by 26.27% after one use of the product, by 35.56% after one week of using the product compared to before the product use (p<0.05). 7. Evaluation of skin elasticity As a result of the analysis, the rate of change in the skin elasticity parameter value (R2) significantly increased (improved) by 6.71% after one use of the product, by 12.62% after one week of using the product compared to before the product use (p<0.05). 8. Evaluation of melanin of visible hyperpigmentation area (melasma, freckles etc) As a result of the analysis, the rate of change in the melanin of visible hyperpigmentation area (melasma, freckles etc) parameter value (M.I.) significantly decreased (improved) by 4.67% after one use of the product, by 10.44% after one week of using the product compared to before the product use (p<0.05). 9. Evaluation of subject questionnaire In the questionnaire evaluation of the product's efficacy and usability, 100% of the subjects responded positively to all items after one week of the product use. 10. Evaluation of skin abnormal reaction evaluation No skin abnormal reactions were observed in any of the subjects during the study period.
Conclusion	KSRC Korean Skin Clinical Research Center judged that LabInCube Co., Ltd. 'PLLACUBE PINK VOL.' helps to area of non-visible hyperpigmentation area (underlying melasma etc), skin tone (brightness), triple skin tone (dark tone, yellow tone, brown tone), area of visible hyperpigmentation area (melasma, freckles etc), count of visible hyperpigmentation area (melasma, freckles etc), skin density, skin elasticity and melanin of visible hyperpigmentation area (melasma, freckles etc) after one week of using product.

1. Study purpose

The purpose of this study is to evaluate ‘PLLACUBE PINK VOL.’ of LabInCube Co., Ltd. on human skin for the area of non-visible hyperpigmentation area (underlying melasma etc), skin tone (brightness), triple skin tone (dark tone, yellow tone, brown tone), area of visible hyperpigmentation area (melasma, freckles etc), count of visible hyperpigmentation area (melasma, freckles etc), skin density, skin elasticity, melanin of visible hyperpigmentation area (melasma, freckles etc) and adverse skin reactions.

2. Study design

This study was conducted based on 1 week application, single test and the investigators explained the study objective, methods, expected efficacy, and skin abnormal reactions to at least 30 subjects who met the inclusion criteria and did not meet the exclusion criteria. Subjects who expressed willingness to participate in the study signed the informed consent form, and the investigators collected basic information from the subjects.

In this study, the test site (face) was measured at before and after one use of the product, one week of using the product to evaluate the area of non-visible hyperpigmentation area (underlying melasma etc), skin tone (brightness), triple skin tone (dark tone, yellow tone, brown tone), area of visible hyperpigmentation area (melasma, freckles etc), count of visible hyperpigmentation area (melasma, freckles etc), skin density, skin elasticity and melanin of visible hyperpigmentation area (melasma, freckles etc) In addition, subject questionnaires and investigators' observations and interviews were used to assess skin abnormal reactions (Table 1).

Table 1. Study schedule

Measurement item	Before the product use	One use of the product	One week of using product
Informed consent	○	-	-
Inclusion/Exclusion criteria	○	-	-
Demographic Survey	○	-	-
Evaluation of area of non-visible hyperpigmentation area (underlying melasma etc)	○	○	○
Evaluation of skin tone (brightness)	○	○	○
Evaluation of triple skin tone (dark tone, yellow tone, brown tone)	○	○	○
Evaluation of area of visible hyperpigmentation area (melasma, freckles etc)	○	○	○
Evaluation of count of visible hyperpigmentation area (melasma, freckles etc)	○	○	○
Evaluation of skin density	○	○	○
Evaluation of skin elasticity	○	○	○
Evaluation of melanin of visible hyperpigmentation area (melasma, freckles etc)	○	○	○
Evaluation of skin abnormal reations	-	○	○
Questionnaire evaluation	-	-	○
Evaluation of the product Compliance	-	○	○

3. Test product

3-1. Product name and ingredients

Product name	Ingredients
PLLACUBE PINK VOL.	Polylactic Acid, Cellulose Gum, Sodium Hyaluronate, Sodium Chloride, Sodium DNA, Cyclodextrin, Disodium Phosphate, Ethyl Ascorbyl Ether, Sodium Phosphate, Glycerin, Glutathione, Cyanocobalamin, 1,2-hexanediol

3-2. Usage instructions

#1 : Derma Roller (MTS)

#2 : PLLACUBE PINK VOL. (100mg)

1) Day 1, Mix PLLACUBE PINK VOL. (100mg) with sterilized saline 6ml and use Derma Roller (MTS) to apply the mixed PLLACUBE PINK VOL. on face.
2) Day 2~7, evenly apply mixed PLLACUBE PINK VOL. (100mg) with sterilized saline 6ml on face.

3-3. Product formulation

- Freeze drying

3-4. Product color

- Pink

3-5. Management and storage of evaluated products

When receiving a product, enter information such as research code, product name, and sample receipt date on the sample issuance management sheet, and manage it in a sample storage room with temperature and humidity control. After testing is completed, the stored items are stored for approximately 3 years and then disposed of.

4. Study subjects

4-1. Inclusion criteria

① Adult volunteers aged 39 to 59 who met the inclusion and exclusion criteria

② Volunteers with no skin abnormalities (wounds, scars, or tattoos) on the face

③ Healthy volunteers without any acute or chronic physical diseases, including skin disorders

④ Volunteers who can be followed up during the study period

⑤ Volunteers who have been fully explained about the study participation and voluntarily completed and signed the study participation consent form

4-2. Exclusion criteria

① Volunteers who are pregnant, breastfeeding, or planning to become pregnant within 6 months

② Volunteers with skin diseases (severe inflammation, eczema, psoriasis, skin cancer, etc.), skin allergies, sensitive skin, or hypersensitive skin on the test area

③ Volunteers who have used topical antibiotics, immunosuppressants, steroids, or chronic skin disease treatments for more than 1 month to treat skin diseases on the test area

④ Volunteers who have participated in the same study and less than 1 month has passed

⑤ Volunteers who have undergone laser treatment, skin care, tanning, or other procedures on the test area within the past 1 month

⑥ Volunteers who have used the same or similar cosmetics or medications on the test area within 1 month prior to the study start

⑦ Volunteers with chronic debilitating diseases (asthma, diabetes, hypertension, etc.)

⑧ Volunteers who continuously take contraceptives, antihistamines, or anti-inflammatory

⑨ Employees of this clinical research institute

⑩ Other volunteers deemed unsuitable for the study by the investigator's judgment

4-3. Study discontinuation and dropout criteria

① If participation in the study is difficult due to clear adverse reactions:

The reason for discontinuation should be recorded as 'adverse reaction' and the adverse reaction should be described in detail in the case report form

② If the subject voluntarily requests to discontinue participation:
The reason for discontinuation should be recorded as 'withdrawal of consent'

③ If the test product is not used for more than 10% of the total usage or continuously for more than 3 days, the reason for stopping should be recorded as 'Protocol Violation'

④ If the investigator determines that the subject's continued participation in the clinical trial is inappropriate (other criminal acts, illegal acts, etc.): The specific reason should be recorded on the study termination page

⑤ If the subject concurrently uses drugs/medical devices or undergoes surgery/procedures that may affect the safety and efficacy evaluation, as determined by the investigator

⑥ If the subject participates in another clinical trial during this clinical trial period

⑦ If follow-up observation fails

⑧ If the study results cannot be calculated due to reasons other than those listed above (major test items missing at the end of the study, data Deviation s or damage, etc., or if the results cannot be included due to other reasons): The reason for discontinuation should be recorded as 'other'

4-4. Calculation of the number of subjects

This study was conducted by recruiting a minimum of 30 volunteers, which is the minimum number of subjects required recruited and conducted the study (Cosmetic Indication/Advertising Substantiation Test Method Guidelines).

5. Study method

In this study, the subjects washed the test area (face), rested for 20~30 minutes in a constant temperature and humidity room (22 ± 2°C, 50 ± 5%) before participating in the study, day 1, the test product was absorbed the test area (face) using Derma Roller (MTS), once a day for one week and allowed to absorb.

5-1. Evaluation of area of non-visible hyperpigmentation area (underlying melasma etc)
In this study, the test site (face) was photographed using VISIA® CR (Canfield, USA) in optical and UV modes before and after one use of the product, one week of using the product and the area of non-visible hyperpigmentation area (underlying melasma etc) was analyzed through the skin area (size) value (Pixel) using the Image Pro® plus 10 (Media Cybernetics, USA) program on the photographed UV images (Figure 1).

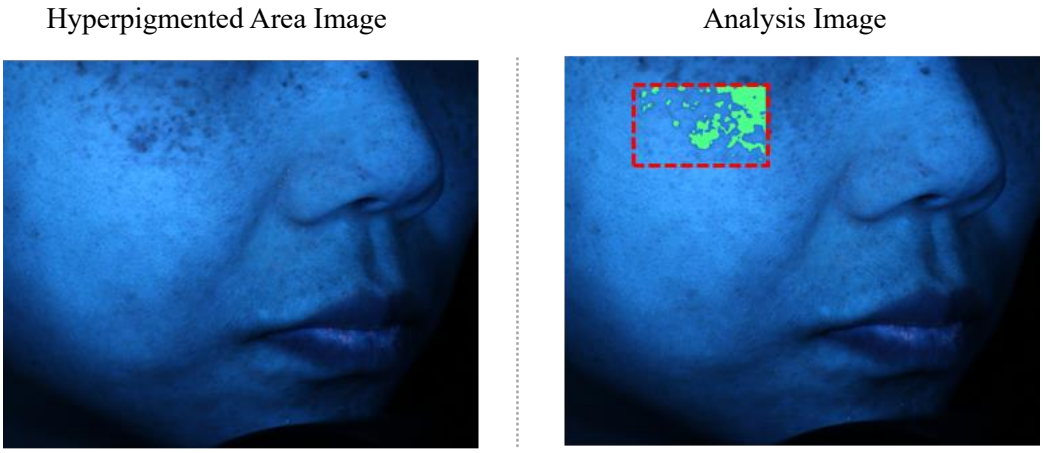


Figure 1. Example image of melanin analysis in non-visibly hyperpigmented areas

5-2. Evaluation of skin tone (brightness)
In this study, the test site (face) was photographed using VISIA® CR) in standard mode before and after one use of the product, one week of using the product and skin tone (brightness) was analyzed through the skin brightness value (L*) using the Image Pro® plus 10 (Media Cybernetics, USA) program on the photographed standard images.

5-3. Evaluation of triple skin tone (dark tone, yellow tone, brown tone)

In this study, the Antera 3D® CS (Miravex Limited, Ireland) was employed to capture images of the test site (face) before and after one use of the product, one week of using the product and triple skin tone (dark tone, yellow tone, brown tone) was a analyzed in Color mode through the parameter values (L*, b*, a*) using the analysis program.

This device reconstructs the topography of the skin's surface in 3D using multi-directional illumination and shading techniques, allowing a comprehensive evaluation of skin surface characteristics (Figure 2).

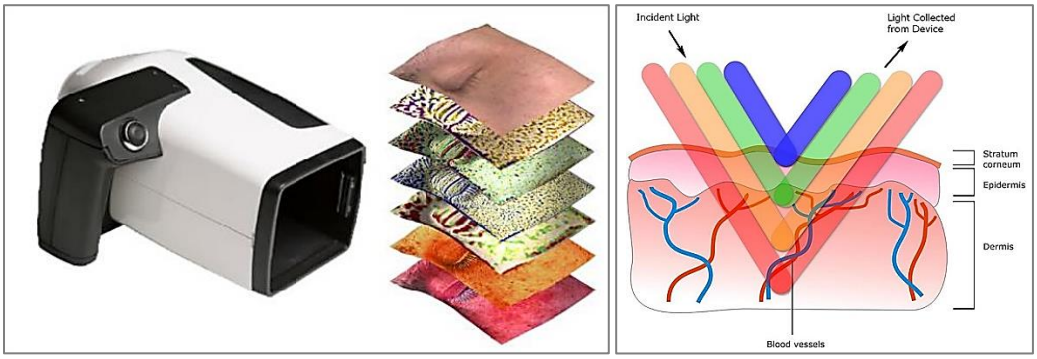


Figure 2. Antera 3D® CS device and measurement principles

5-4. Evaluation of area of visible hyperpigmentation area (melasma, freckles etc)

In this study, the Antera 3D® CS was employed to capture images of the test site (face) before and after one use of the product, one week of using the product and area of visible hyperpigmentation area (melasma, freckles etc) was a analyzed in Pigmentation mode (Hyper-concentraion) through the parameter values (㎟) using the analysis program.

5-5. Evaluation of count of visible hyperpigmentation area (melasma, freckles etc)

In this study, the test site (face) was photographed using VISIA® CR in polarization mode before and after one use of the product, one week of using the product and the count of visible hyperpigmentation area (melasma, freckles etc) was analyzed through the count of visible hyperpigmentation area (melasma, freckles etc) value (Count) using the Image Pro® plus 10 program on the photographed UV images.

5-6. Evaluation of skin density

In this study, the test area (face) was measured using Ultrasound probe of the Derma-Lab® Series SkinLab Combo (Cortex Technology, Denmark) before and after one use of the product, one week of using the product to measure the parameter value (%).

This device is an ultrasound imaging device that measures the responsiveness by projecting acoustic pulses onto the skin and outputs low density as a dark color and high density as a bright color through the intensity of the signal (Figure 3).

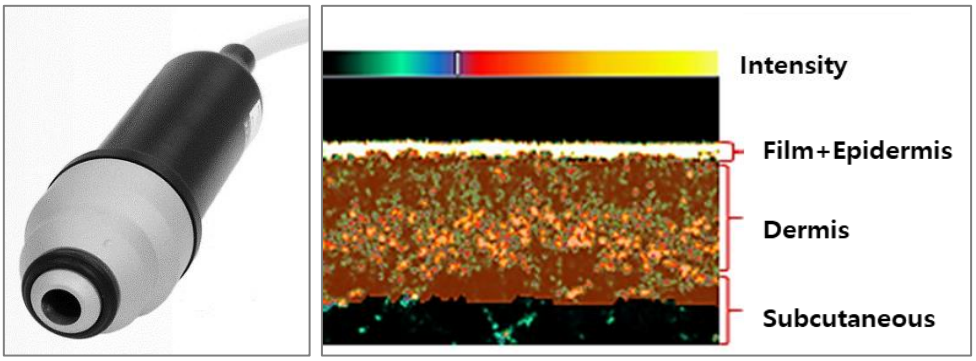


Figure 3. Ultrasound probe and analysis image

5-7. Evaluation of skin elasticity

In this study, the test area (face) was measured using Cutometer® MPA580 (C+K, Germany) before and after one use of the product, one week of using the product to measure the parameter value (R2).

This instrument applies a constant negative pressure of 450 mbar for 2 seconds, capturing three consecutive skin deformations to represent skin elasticity graphically and numerically (Figure 4).

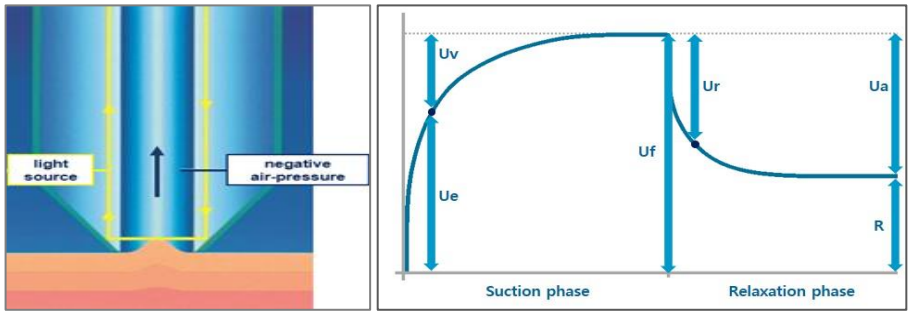


Figure 4. Cutometer® MPA580 Device Principle and Parameters

5-8. Evaluation of melanin of visible hyperpigmentation area (melasma, freckles etc)

In this study, the average value of the melanin amount of the selected cheek area was analyzed before and after one use of the product, one week of using the product, measuring the parameter value (M.I) 3 times using Mexameter® MX18 (C+K, Germany).

The measuring device measures the amount of melanin in the skin based on the principle of reflection and absorption of light (Figure 5). The melanin index is expressed in the Melanin index (M.I).

Figure 5. Mexameter® MX18 Device and Measurement Principle

5-9. Evaluation of subject questionnaire

For the survey on the product's efficacy and usability, the subjects self-evaluated using a 5-point scale (1 point: 'Very Dissatisfied' / 5 points: 'Very Satisfied') after one use of the product, and the responses of 3 to 5 points were adopted as the positive response rate (%).

5-10. Evaluation of skin abnormal reaction

To evaluate abnormal reactions, the investigator observed the subjects' test area at each evaluation time point and recorded and evaluated the condition of the test area through questioning with the subjects. In case of abnormal reactions caused by the product, an adverse reaction report was prepared, and the relationship with the test product was judged by the Principal Investigator.

6. Statistical analysis

① All calculated data are tested for statistical significance using the SPSS Package Program (IBM, USA).

② The normality of the data is verified through the Shapiro-Wilk test and kurtosis & skewness.

③ Comparisons of pre- and post-use results at three or more time points for all evaluations are verified using Repeated Measures ANOVA for parametric data. For non-parametric data ($n<30$), the Wilcoxon signed-rank test is used, and for non-parametric data ($n>30$), the Friedman test is applied ($p<0.05$).

④ The statistical significance level of all data was set at a p value of less than 0.05.

⑤ The rate of change and cleansing rate are calculated as follows:

$$\text{Rate of Change (\%)} = \frac{\left|\text{Before the product use - After one use of the product / One week of using the product}\right|}{\text{Before the product use}} \times 100$$

$$\text{Compared to 100\% before the product use} = 1 + \frac{\left|\text{Before the product use - After one use of the product / One week of using the product}\right|}{\text{Before the product use}} \times 100$$

7. Results

7-1. Subject information

In this study, a total of 32 subjects aged 39 to 59 years (mean 50.03 ± 5.49 years, minimum 39 years, maximum 59 years) who met the inclusion and exclusion criteria participated completed the study according to the protocol. Subject information and characteristics were investigated through a questionnaire (Appendix 1).

7-2. Evaluation of area of non-visible hyperpigmentation area (underlying melasma etc)

As a result of the analysis, the rate of change in the area of non-visible hyperpigmentation area (underlying melasma etc) parameter value (Pixel) significantly decreased (improved) by 1.17% after one use of the product, by 2.75% after one week of using the product compared to before the product use (p<0.05) (Table 2, Figure 6, 7).

Table 2. Statistical analysis of area of non-visible hyperpigmentation area (underlying melasma etc) (Pixel) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		94765.44 ± 14804.19
	One use of the product		93655.03 ± 14148.86
	One week of using product		92161.53 ± 13694.92
	p-value[1]	One use of the product	**0.001***
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**1.17▼**
		Compared to 100% before the product use, after one use of the product	**101.17▼**
		One week of using product	**2.75▼**
		Compared to 100% before the product use, after one week of using product	**102.75▼**

[1]If p<0.05, there is a significant difference compared to before the product use.
[2]A decrease in the mean value (rate of change▼) indicates an improvement, signifying that area of non-visible hyperpigmentation area (underlying melasma etc) reduced.
*Repeated Measures ANOVA

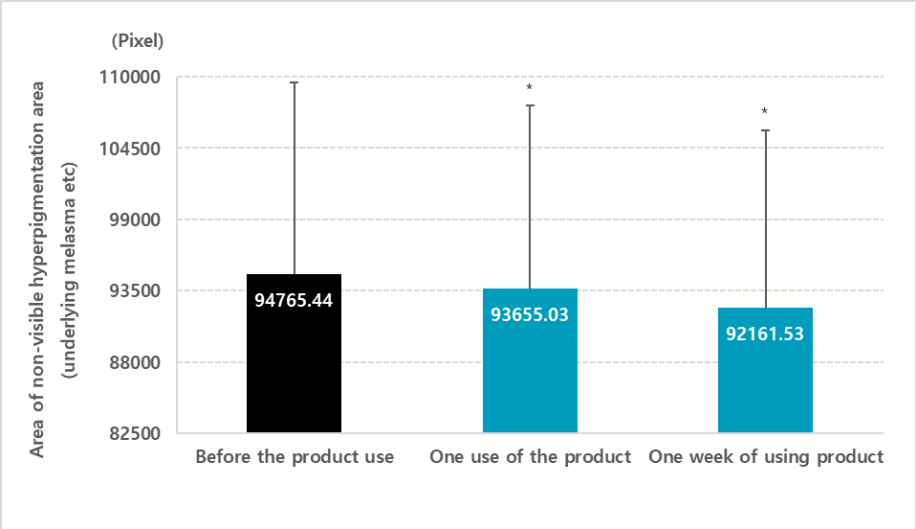


Figure 6. Graph of results for evaluation of area of non-visible hyperpigmentation area (underlying melasma etc)
(Mean ± Deviation, *p*-value $^{*}p<0.05$)

HBSE-24152-20	Before the product use	One use of the product	One week of using product
PLLACUBE PINK VOL.			

Table 7. Image of area of non-visible hyperpigmentation area (underlying melasma etc)

7-3. Evaluation of skin tone (brightness)

As a result of the analysis, the rate of change in the skin tone (brightness) parameter value (L*) significantly increased (improved) by 0.58% after one use of the product, by 2.07% after one week of using the product compared to before the product use (p<0.05) (Table 3, Figure 8, 9).

Table 3. Statistical analysis of skin tone (brightness) (L*) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		74.00 ± 2.10
	One use of the product		74.43 ± 2.03
	One week of using product		75.53 ± 2.05
	p-value[1]	One use of the product	**0.021***
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**0.58▲**
		Compared to 100% before the product use, after one use of the product	**100.58▲**
		One week of using product	**2.07▲**
		Compared to 100% before the product use, after one week of using product	**102.07▲**

[1]If p<0.05, there is a significant difference compared to before the product use.

[2]An increase in the mean value (rate of change▲) indicates an improvement, skin tone (brightness) signifying that increased.

*Repeated Measures ANOVA

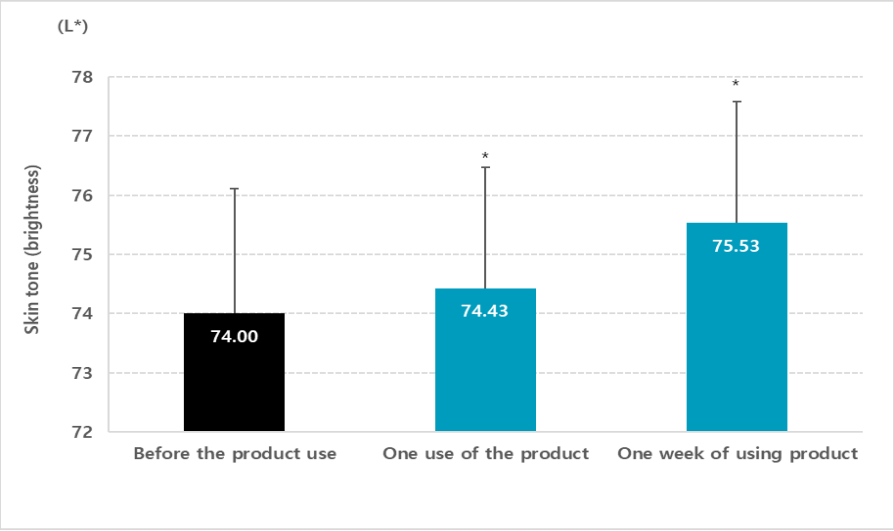


Figure 6. Graph of results for evaluation of skin tone (brightness)
(Mean ± Deviation, p-value *p<0.05)

HBSE-24152-12	Before the product use	One use of the product	One week of using product
PLLACUBE PINK VOL.			

Table 9. Image of skin tone (brightness)

7-4. Evaluation of triple skin tone (dark tone, yellow tone, brown tone)

As a result of the analysis, the rate of change in the triple skin tone (dark tone, yellow tone, brown tone) parameter values (L*, b*, a*) significantly increased or decreased (improved) by 0.45%, 1.66%, and 3.10%, respectively, after one use of the product, by 1.27%, 1.43%, and 6.63%, respectively, after one week of using the product compared to before the product use (p<0.05) (Table 4, Figure 10, 11).

Table 4. Statistical analysis of triple skin tone (dark tone, yellow tone, brown tone) (L*, b*, a*) (N=32)

Test product	Time		(Mean ± Standard deviation)		
			dark tone	yellow tone	brown tone
PLLACUBE PINK VOL.	Before the product use		65.10 ± 2.38	22.30 ± 1.66	11.61 ± 1.38
	One use of the product		65.39 ± 2.43	21.93 ± 1.74	11.25 ± 1.34
	One week of using product		65.93 ± 2.40	21.98 ± 1.74	10.84 ± 1.12
	p-value[1]	One use of the product	**0.001***	**0.000***	**0.000***
		One week of using product	**0.000***	**0.009***	**0.000***
	Rate of change[2]	One use of the product	**0.45▲**	**1.66▼**	**3.10▼**
		Compared to 100% before the product use, after one use of the product	**100.45▲**	**101.66▼**	**103.10▼**
		One week of using product	**1.27▲**	**1.43▼**	**6.63▼**
		Compared to 100% before the product use, after one week of using product	**101.27▲**	**101.43▼**	**106.63▼**

[1]If p<0.05, there is a significant difference compared to before the product use.
[2]An increase in the mean value (rate of change▲) indicates an improvement, dark tone signifying that increased, mean value (rate of change▼) indicates an improvement, yellow tone and brown tone signifying that increased.
*Repeated Measures ANOVA

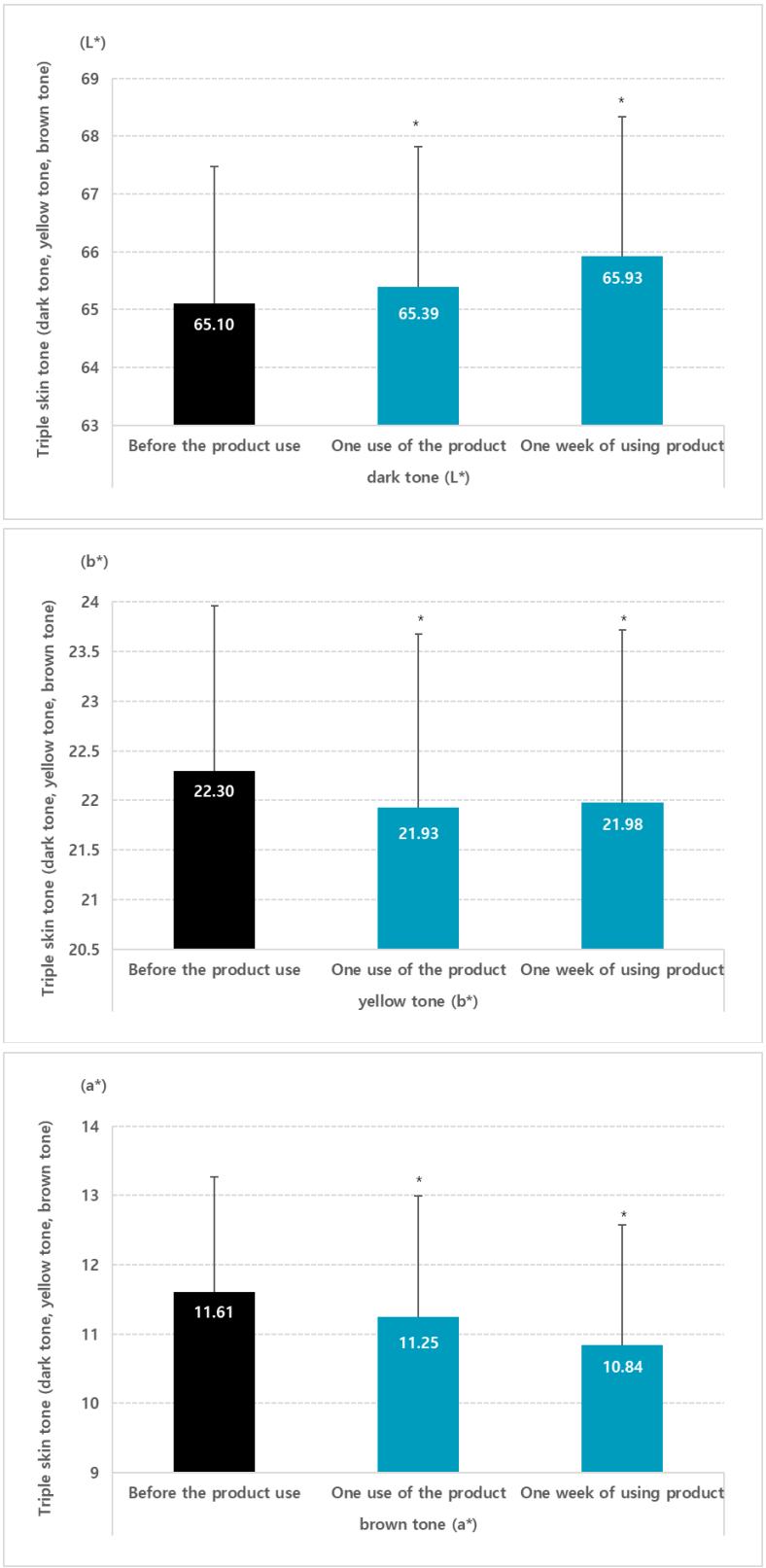


Figure 10. Graph of results for evaluation of triple skin tone (dark tone, yellow tone, brown tone)
(Mean ± Deviation, p-value $^{*}p<0.05$)

HBSE-24152-15	Before the product use	One use of the product	One week of using product
PLLACUBE PINK VOL.			

Figure 11. Image of triple skin tone (dark tone, yellow tone, brown tone)

7-5. Evaluation of area of visible hyperpigmentation area (melasma, freckles etc)

As a result of the analysis, the rate of change in the area of visible hyperpigmentation area (melasma, freckles etc) parameter value (㎟) significantly decreased (improved) by 5.82% after one use of the product, by 7.32% after one week of using the product compared to before the product use (p<0.05) (Table 5, Figure 12, 13).

Table 5. Statistical analysis of area of visible hyperpigmentation area (melasma, freckles etc) (㎟) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		289.25 ± 44.99
	One use of the product		272.41 ± 48.84
	One week of using product		268.09 ± 55.25
	p-value[1]	One use of the product	**0.000***
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**5.82▼**
		Compared to 100% before the product use, after one use of the product	**105.82▼**
		One week of using product	**7.32▼**
		Compared to 100% before the product use, after one week of using product	**107.32▼**

[1]If p<0.05, there is a significant difference compared to before the product use.

[2]A decrease in the mean value (rate of change▼) indicates an improvement, area of visible hyperpigmentation area (melasma, freckles etc) signifying that reduced.

*Repeated Measures ANOVA

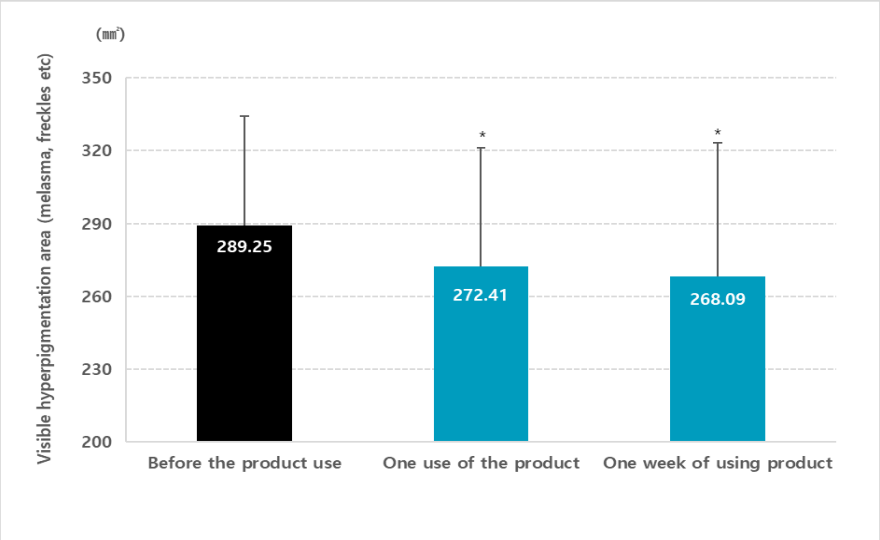


Figure 12. Graph of results for area of visible hyperpigmentation area (melasma, freckles etc)
(Mean ± Deviation, *p*-value $^{*}p<0.05$)

HBSE-24152-32	Before the product use	One use of the product	One week of using product
PLLACUBE PINK VOL.			

Table 13. Image of area of visible hyperpigmentation area (melasma, freckles etc)

7-6. Evaluation of count of visible hyperpigmentation area (melasma, freckles etc)

As a result of the analysis, the rate of change in the count of visible hyperpigmentation area (melasma, freckles etc) parameter value (Count) not significantly by 0.65% after one use of the product, however it significantly decreased (improved) by 2.13% after one week of using the product compared to before the product use (p<0.05) (Table 6, Figure 14, 15).

Table 6. Statistical analysis of count of visible hyperpigmentation area (melasma, freckles etc) (Count) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		1096.36 ± 204.64
	One use of the product		1089.18 ± 199.89
	One week of using product		1073.02 ± 204.45
	p-value[1]	One use of the product	0.097
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**0.65▼**
		Compared to 100% before the product use, after one use of the product	**100.65▼**
		One week of using product	**2.13▼**
		Compared to 100% before the product use, after one week of using product	**102.13▼**

[1]If p<0.05, there is a significant difference compared to before the product use.

[2]A decrease in the mean value (rate of change▼) indicates an improvement, count of visible hyperpigmentation area (melasma, freckles etc) that reduced.

*Repeated Measures ANOVA

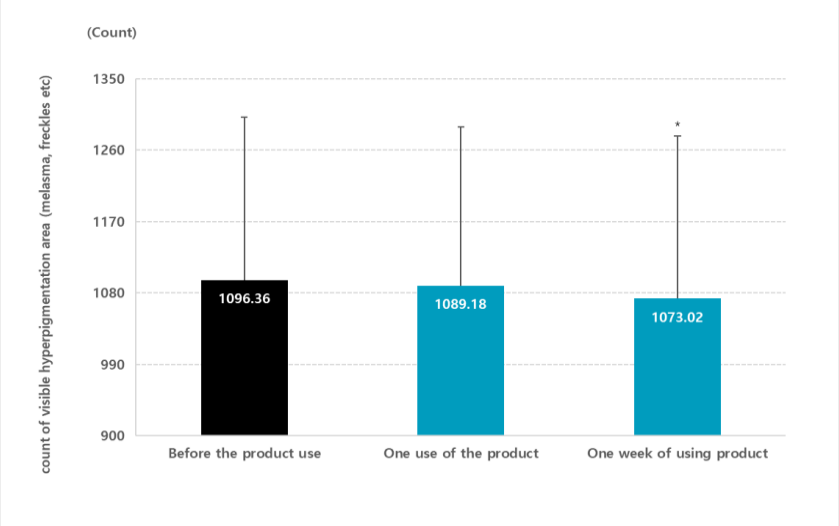


Figure 14. Graph of results for evaluation of count of visible hyperpigmentation area (melasma, freckles etc) (Mean ± Deviation, p-value $^{*}p$<0.05)

HBSE-24152-31	Before the product use	One use of the product	One week of using product
PLLACUBE PINK VOL.			

Table 15. Image of count of visible hyperpigmentation area (melasma, freckles etc)

7-7. Evaluation of skin density

As a result of the analysis, the rate of change in the skin density parameter value (%) significantly increased (improved) by 26.27% after one use of the product, by 35.56% after one week of using the product compared to before the product use (p<0.05) (Table 7, Figure 16, 17).

Table 7. Statistical analysis of skin density (%) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		21.09 ± 1.12
	One use of the product		26.63 ± 1.07
	One week of using product		28.59 ± 1.26
	p-value[1]	One use of the product	**0.000***
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**26.27▲**
		One week of using product	**35.56▲**

[1]If p<0.05, there is a significant difference compared to before the product use.

[2]An increase in the mean value (rate of change▲) indicates an improvement, skin density signifying that increased.

*Repeated Measures ANOVA

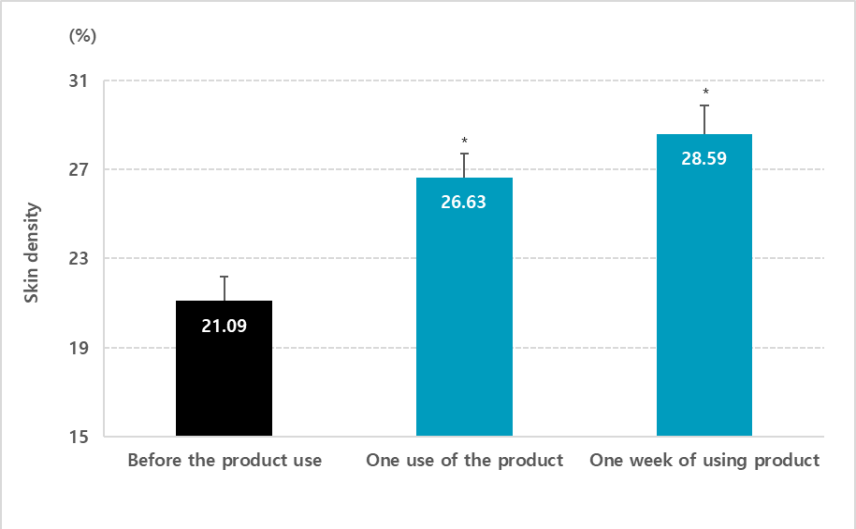


Figure 16. Graph of results for evaluation of skin density
(Mean ± Deviation, p-value $^{*}p<0.05$)

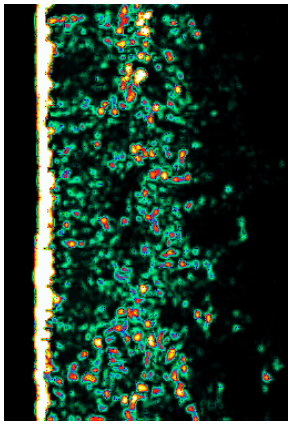
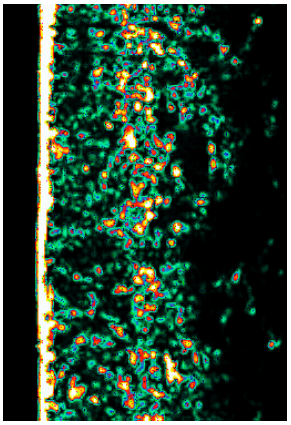
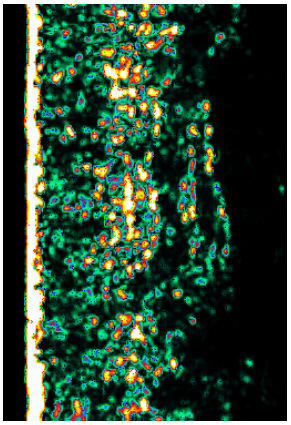
HBSE-24152-32	Before the product use	One use of the product	One week of using product
PLLACUBE PINK VOL.			

Figure 17. Image of skin density

7-8. Evaluation of skin elasticity

As a result of the analysis, the rate of change in the skin elasticity parameter value (R2) significantly increased (improved) by 6.71% after one use of the product, by 12.62% after one week of using the product compared to before the product use (p<0.05) (Table 8, Figure 18).

Table 8. Statistical analysis of skin elasticity (R2) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		60.23 ± 6.52
	One use of the product		64.27 ± 6.28
	One week of using product		67.83 ± 7.36
	p-value[1]	One use of the product	**0.000***
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**6.71▲**
		One week of using product	**12.62▲**

[1]If p<0.05, there is a significant difference compared to before the product use.

[2]An increase in the mean value (rate of change▲) indicates an improvement, skin elasticity signifying that increased.

*Repeated Measures ANOVA

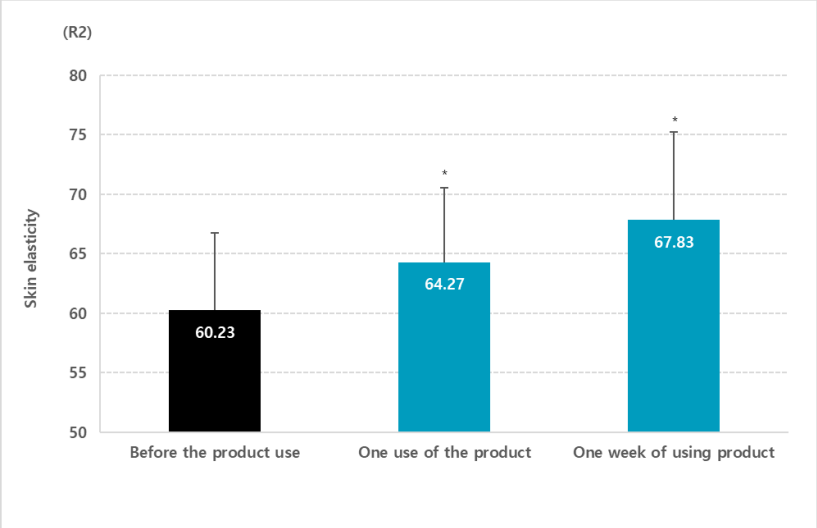


Figure 18. Graph of results for evaluation of skin elasticity
(Mean ± Deviation, p-value *p<0.05)

7-9. Evaluation of melanin of visible hyperpigmentation area (melasma, freckles etc)

As a result of the analysis, the rate of change in the melanin of visible hyperpigmentation area (melasma, freckles etc) parameter value (M.I.) significantly decreased (improved) by 4.67% after one use of the product, by 10.44% after one week of using the product compared to before the product use (p<0.05) (Table 9, Figure 19).

Table 9. Statistical analysis of melanin of visible hyperpigmentation area (melasma, freckles etc) (M.I.) (N=32)

Test product	Time		(Mean ± Standard deviation)
PLLACUBE PINK VOL.	Before the product use		183.93 ± 27.87
	One use of the product		175.34 ± 26.85
	One week of using product		164.72 ± 26.18
	p-value[1]	One use of the product	**0.000***
		One week of using product	**0.000***
	Rate of change[2]	One use of the product	**4.67▼**
		One week of using product	**10.44▼**

[1]If p<0.05, there is a significant difference compared to before the product use.

[2]A decrease in the mean value (rate of change▼) indicates an improvement, melanin of visible hyperpigmentation area (melasma, freckles etc) signifying that reduced.

*Repeated Measures ANOVA

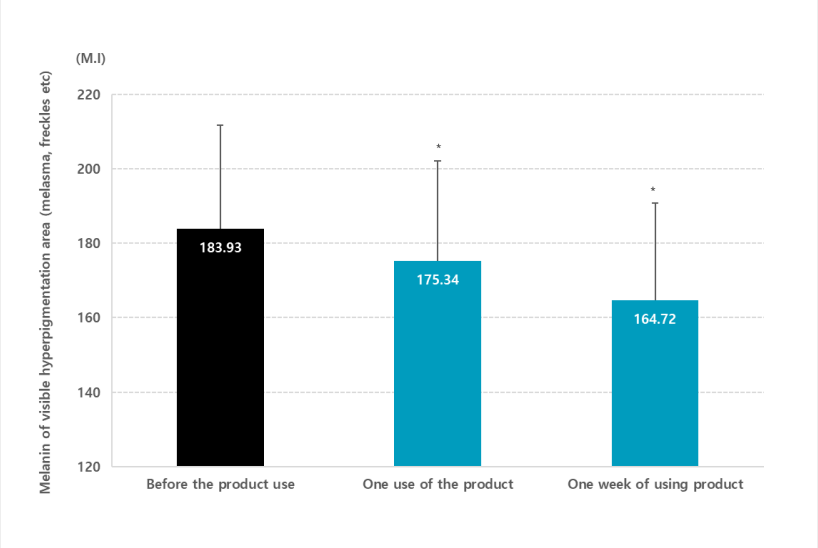


Figure 19. Graph of results for evaluation of skin tone (brightness)
(Mean ± Deviation, p-value $^{*}p$<0.05)

7-10. Evaluation of subject questionnaire

In the questionnaire evaluation of the product's efficacy and usability, 100% of the subjects responded positively to all items after one week of using product (Table 10, Figure 20).

Table 10. Results of questionnaire evaluation on efficacy and usability of PLLACUBE PINK VOL. (N=32)

Item	[1]Number of answers (n)	[2]Response Rate (%)
It seems area of non-visible hyperpigmentation area (underlying melasma etc) improved after using the product.	32	**100.00**
It seems skin tone (brightness) and triple skin tone (dark tone, yellow tone, brown tone) improved after using the product.	32	**100.00**
It seems area and count of visible hyperpigmentation area (melasma, freckles etc) improved after using the product.	32	**100.00**
It seems skin density improved after using the product.	32	**100.00**
It seems skin elasticity improved after using the product.	32	**100.00**
I am satisfied that the product is not irritating to the skin during use the product.	32	**100.00**
I am satisfied with the product's absorbency.	32	**100.00**
The product spreads well.	32	**100.00**
I am satisfied with the product overall.	32	**100.00**

※ Rating scale; 1 point: 'Very dissatisfied', 2 points: 'Dissatisfied', 3 points: 'Neutral', 4 points: 'Satisfied', 5 points: 'Very satisfied'
[1]Number of responses (n): Number of subjects who selected 3, 4 or 5 points
[2]Response rate (%): Number of subjects who selected 3, 4 or 5 points / Total number of subjects x 100

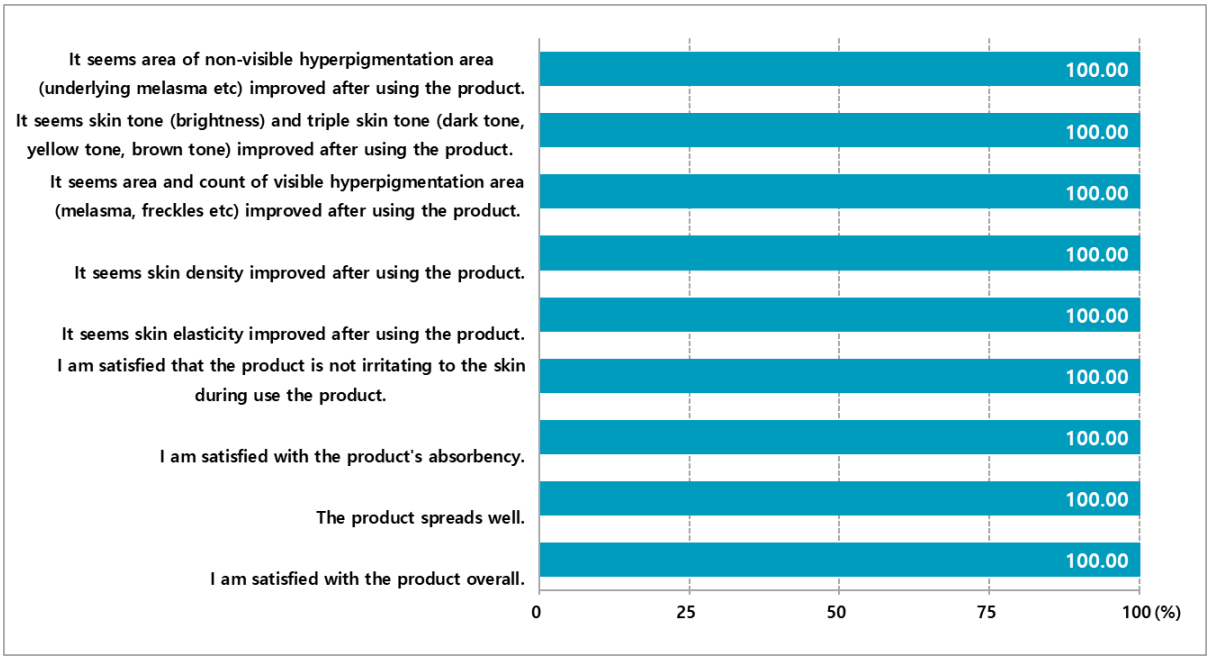


Figure 20. Questionnaire evaluation graph on efficacy and usability (Response rate %)

7-11. Evaluation of skin abnormal reaction

No skin abnormal reactions were observed in any of the subjects during the study period.

8. Conclusion

KSRC Korean Skin Clinical Research Center judged that LabInCube Co., Ltd. 'PLLACUBE PINK VOL.' helps to area of non-visible hyperpigmentation area (underlying melasma etc), skin tone (brightness), triple skin tone (dark tone, yellow tone, brown tone), area of visible hyperpigmentation area (melasma, freckles etc), count of visible hyperpigmentation area (melasma, freckles etc), skin density, skin elasticity and melanin of visible hyperpigmentation area (melasma, freckles etc) after one week of using product.

9. References

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APPENDIX

APPENDIX I. Result data

1-1. Information of subjects

Identification Code	Age	Sex	1)Skin type	2)Hydration	3)Sebum	4)Smoking	5)Duration of UV exposure	6)Irritability	7)Stinging	8)Adverse effects	9)Skin Change	10)Menstrual cycle
24152-01	51	F	4	2	2	1	2	2	2	2	2	2
24152-02	59	F	1	2	2	1	1	2	2	2	2	2
24152-03	41	F	4	2	2	1	1	1	2	2	1	1
24152-04	53	F	2	2	2	1	2	2	2	2	3	2
24152-05	44	F	1	2	2	1	2	2	2	2	2	2
24152-06	57	F	1	3	2	1	2	2	2	2	3	2
24152-07	56	F	1	2	2	1	2	2	2	2	2	2
24152-08	52	F	1	3	3	1	1	2	2	2	3	2
24152-09	53	F	1	2	2	1	2	2	2	2	2	2
24152-10	39	F	4	2	2	1	1	2	2	2	2	2
24152-11	59	F	1	2	2	1	1	2	2	2	2	2
24152-12	48	F	4	2	2	1	2	2	2	2	1	2
24152-13	51	F	4	3	3	1	2	2	2	2	2	2
24152-14	50	F	4	3	2	1	1	2	2	2	2	2
24152-15	52	F	1	3	2	1	1	2	2	2	2	2
24152-16	46	F	2	3	3	1	2	2	2	2	2	2
24152-17	45	F	2	3	2	1	3	2	2	2	2	2
24152-18	53	F	2	2	2	1	2	2	2	2	2	2
24152-19	55	F	1	3	3	1	2	2	2	2	3	2
24152-20	56	F	2	2	2	1	3	2	2	2	3	2
24152-21	51	F	1	2	2	1	1	2	2	2	2	2
24152-22	47	F	3	3	1	1	2	2	2	2	2	2
24152-23	42	F	4	2	2	1	1	2	2	2	2	2
24152-24	42	F	1	3	2	1	1	2	2	2	2	2
24152-25	41	F	4	2	1	1	2	2	2	2	2	2

24152-26	50	F	2	2	2	1	1	2	2	2	1	2
24152-27	52	F	1	3	3	1	1	2	2	2	2	2
24152-28	53	F	4	2	2	1	1	2	2	2	3	2
24152-29	48	F	1	2	2	1	1	2	2	2	2	2
24152-30	52	F	1	3	2	1	2	2	2	2	2	2
24152-31	57	F	1	3	3	1	2	2	2	2	3	2
24152-32	46	F	1	3	2	1	2	2	2	2	2	2

1)Skin type: 1.Dry; 2.Normal; 3.Oily; 4.Nomal to oily; 5.Problematic 2)Hydration: 1.Sufficient; 2.Normal; 3.Dry 3)Sebum: 1.Glossy; 2.Normal; 3.Matt 4)Smoking: 1.None smoking; 2.Less than 10 pieces; 3.More than 10 pieces; 4.More than one pack; 5)Time of UV exposure a day: 1.Less than 1hr; 2.1-3hr; 3.More than 3hr; 6)Is your skin easily irritated by the environment: 1.Yes; 2.No; 7)Stinging: 1.Yes; 2.No; 8) Adverse effects: 1.Yes; 2.No; 9)Skin change: 1.Yes; 2.No; 3.Not applicable(Male/Menopause); 10) Menstrual cycle: 1.A week before; 2.Having period; 3.Within a week; 4.Ect 5.Not applicable(Male/ Menopause)

1-2. Evaluation of area of non-visible hyperpigmentation area (underlying melasma etc) (Pixel)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	125864.00	119004.00	119053.00
24152-02	95044.00	92726.00	92874.00
24152-03	99380.00	97109.00	94150.00
24152-04	73213.00	72927.00	71010.00
24152-05	104715.00	101240.00	101180.00
24152-06	105295.00	101879.00	101788.00
24152-07	93941.00	95863.00	92918.00
24152-08	91511.00	91118.00	89832.00
24152-09	108118.00	108157.00	103384.00
24152-10	115707.00	115717.00	113362.00
24152-11	86943.00	87121.00	85340.00
24152-12	99668.00	96943.00	95873.00
24152-13	95649.00	95703.00	94417.00
24152-14	86386.00	84799.00	85114.00
24152-15	89977.00	85223.00	83233.00
24152-16	85854.00	86185.00	85257.00
24152-17	84582.00	83652.00	83777.00
24152-18	77586.00	75411.00	73010.00
24152-19	76449.00	77430.00	75023.00
24152-20	56940.00	57945.00	57171.00
24152-21	94433.00	94340.00	94402.00
24152-22	115969.00	115636.00	113532.00
24152-23	89431.00	88284.00	88669.00
24152-24	77300.00	77432.00	77788.00
24152-25	93549.00	92772.00	90881.00
24152-26	96581.00	95650.00	92820.00
24152-27	81089.00	81461.00	80741.00

24152-28	120950.00	120045.00	112491.00
24152-29	99620.00	98636.00	96401.00
24152-30	98543.00	96149.00	93814.00
24152-31	113973.00	113256.00	112445.00
24152-32	98234.00	97148.00	97419.00

1-3. Evaluation of skin tone (brightness) (L*)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	75.59	76.09	78.76
24152-02	73.41	74.50	75.14
24152-03	70.61	71.91	74.74
24152-04	75.79	76.28	76.35
24152-05	75.77	75.84	75.98
24152-06	70.29	70.48	70.80
24152-07	72.99	73.55	75.61
24152-08	74.47	74.49	78.28
24152-09	74.60	74.74	75.14
24152-10	74.62	75.50	76.03
24152-11	72.60	72.83	73.88
24152-12	71.35	72.13	73.21
24152-13	74.49	74.53	74.91
24152-14	70.31	70.38	71.04
24152-15	73.20	75.92	75.46
24152-16	73.93	71.02	75.06
24152-17	75.59	76.10	77.49
24152-18	76.02	76.07	77.60
24152-19	75.82	76.47	76.81
24152-20	75.51	75.13	77.01
24152-21	72.79	72.86	73.68
24152-22	72.33	73.15	74.14
24152-23	73.46	74.86	75.68
24152-24	79.20	79.20	79.98
24152-25	74.39	75.05	76.35
24152-26	69.63	71.25	72.58
24152-27	73.30	73.81	74.05

24152-28	75.87	75.97	76.85
24152-29	73.73	74.31	75.38
24152-30	76.57	74.66	77.98
24152-31	73.77	75.94	74.35
24152-32	75.90	76.72	76.52

1-4. Evaluation of triple skin tone (dark tone, yellow tone, brown tone) (L*, b*, a*)

Identification code	PLLACUBE PINK VOL.								
	Dark tone			Yellow tone			Brown tone		
	Before the product use	One use of the product	One week of using product	Before the product use	One use of the product	One week of using product	Before the product use	One use of the product	One week of using product
24152-01	67.50	68.00	68.70	23.70	23.40	23.30	12.80	12.00	11.80
24152-02	66.00	66.30	66.50	26.60	26.30	25.30	14.60	14.50	11.60
24152-03	64.30	64.50	65.60	21.90	21.30	21.00	12.50	11.70	11.40
24152-04	62.30	62.40	62.90	24.00	23.80	23.60	11.20	11.10	11.00
24152-05	66.10	65.50	66.40	22.70	22.40	22.60	11.00	10.90	10.90
24152-06	61.90	61.20	62.60	23.00	22.40	22.40	11.00	10.80	10.70
24152-07	66.00	66.30	66.80	21.10	20.00	19.80	13.80	13.30	12.20
24152-08	64.70	65.20	65.30	22.80	22.60	22.90	9.49	9.37	9.04
24152-09	67.70	67.60	67.80	23.20	22.80	22.60	13.30	12.60	12.00
24152-10	65.40	65.80	65.90	19.90	19.60	19.70	11.40	11.00	10.90
24152-11	66.20	66.50	66.60	24.50	24.20	24.30	12.60	12.50	12.50
24152-12	64.50	64.70	64.50	22.90	22.30	22.70	13.10	12.70	13.10
24152-13	63.00	63.00	63.60	22.50	22.30	22.20	11.00	10.60	10.50
24152-14	63.00	63.80	64.00	23.40	23.30	24.10	12.40	11.80	11.70
24152-15	61.60	61.70	63.30	20.10	19.80	21.20	12.00	11.20	10.80
24152-16	64.90	65.00	66.10	20.40	20.20	20.10	11.30	11.20	10.90
24152-17	67.20	67.30	68.50	22.30	22.30	22.00	11.30	11.30	10.90
24152-18	65.50	65.60	65.50	21.60	21.60	21.50	10.50	10.20	10.50
24152-19	70.90	71.50	71.00	22.00	21.80	22.00	8.32	7.91	8.30
24152-20	66.40	66.50	66.90	22.80	22.20	22.20	10.30	10.30	9.84
24152-21	64.90	65.20	65.20	21.60	21.50	22.30	12.90	12.20	11.60
24152-22	64.40	64.60	64.60	22.50	22.40	22.50	11.90	11.80	11.80
24152-23	62.60	63.30	63.60	22.00	21.30	21.60	12.40	10.50	9.74
24152-24	70.70	71.00	72.70	20.60	18.90	18.10	9.96	9.54	9.62
24152-25	61.20	61.30	61.50	23.70	23.60	23.40	10.20	10.10	10.10
24152-26	64.30	65.50	66.00	23.00	22.60	23.10	12.90	12.80	11.10

24152-27	63.00	63.10	63.60	24.00	23.60	23.60	11.00	10.60	10.20
24152-28	64.70	66.30	66.80	23.70	23.40	23.50	10.90	10.40	9.63
24152-29	63.20	64.30	65.00	20.30	20.30	20.30	11.10	11.10	10.90
24152-30	63.50	63.60	65.40	18.20	18.10	18.10	9.62	9.24	8.48
24152-31	67.80	68.00	68.70	22.60	22.40	22.40	11.70	11.60	10.90
24152-32	67.70	67.90	68.20	19.90	19.20	19.00	13.10	13.00	12.30

1-5. Evaluation of area of visible hyperpigmentation area (melasma, freckles etc) (㎟)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	214.00	185.00	176.00
24152-02	311.00	288.00	272.00
24152-03	243.00	214.00	205.00
24152-04	239.00	216.00	205.00
24152-05	226.00	193.00	188.00
24152-06	316.00	304.00	312.00
24152-07	312.00	300.00	305.00
24152-08	257.00	254.00	233.00
24152-09	304.00	286.00	273.00
24152-10	267.00	224.00	220.00
24152-11	331.00	310.00	320.00
24152-12	332.00	319.00	312.00
24152-13	291.00	282.00	269.00
24152-14	314.00	282.00	303.00
24152-15	223.00	222.00	238.00
24152-16	249.00	229.00	225.00
24152-17	330.00	325.00	303.00
24152-18	257.00	245.00	273.00
24152-19	317.00	283.00	277.00
24152-20	341.00	338.00	331.00
24152-21	312.00	291.00	327.00
24152-22	294.00	290.00	313.00
24152-23	326.00	317.00	312.00
24152-24	280.00	267.00	182.00
24152-25	285.00	254.00	244.00
24152-26	278.00	255.00	251.00
24152-27	341.00	336.00	331.00

24152-28	322.00	306.00	279.00
24152-29	342.00	339.00	333.00
24152-30	159.00	152.00	125.00
24152-31	300.00	268.00	299.00
24152-32	343.00	343.00	343.00

1-6. Evaluation of count of visible hyperpigmentation area (melasma, freckles etc) (Count)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	1321.07	1310.15	1247.58
24152-02	1263.20	1235.12	1261.18
24152-03	727.16	751.97	705.49
24152-04	862.40	862.39	860.66
24152-05	953.49	934.22	906.70
24152-06	1064.38	1060.35	1013.90
24152-07	1202.34	1227.03	1207.71
24152-08	1068.38	1070.37	1119.53
24152-09	837.78	819.93	809.15
24152-10	1179.49	1172.90	1135.20
24152-11	864.55	862.32	872.00
24152-12	1077.36	1050.66	1006.30
24152-13	1253.41	1236.30	1235.23
24152-14	1092.78	1079.55	1077.53
24152-15	1232.29	1199.91	1203.23
24152-16	727.32	696.65	671.00
24152-17	1266.34	1278.18	1264.01
24152-18	1178.69	1218.12	1166.09
24152-19	787.15	796.04	754.05
24152-20	1074.85	1061.80	1044.68
24152-21	1607.89	1593.29	1551.80
24152-22	1323.23	1320.31	1293.51
24152-23	1015.77	994.10	1019.27
24152-24	1001.55	1011.22	990.24
24152-25	1209.21	1203.63	1180.25
24152-26	951.34	989.29	912.46
24152-27	879.81	861.06	863.88

24152-28	1170.87	1169.71	1129.40
24152-29	1405.86	1321.66	1401.27
24152-30	1036.25	1056.38	1013.54
24152-31	1293.63	1287.02	1267.90
24152-32	1153.70	1122.15	1151.96

1-7. Evaluation of skin density (%)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	21.20	24.90	26.20
24152-02	20.10	25.20	27.60
24152-03	21.00	25.90	27.60
24152-04	22.70	27.40	29.20
24152-05	21.90	29.00	31.60
24152-06	20.40	26.90	28.10
24152-07	20.20	26.60	28.40
24152-08	19.50	26.20	27.70
24152-09	19.70	27.50	29.70
24152-10	22.90	28.70	30.50
24152-11	19.20	26.50	27.90
24152-12	20.50	27.10	29.80
24152-13	21.40	26.70	28.30
24152-14	21.40	25.50	26.80
24152-15	21.80	26.40	28.00
24152-16	21.20	27.20	28.90
24152-17	18.40	25.50	27.00
24152-18	20.40	26.90	28.10
24152-19	21.70	25.70	28.00
24152-20	22.10	26.40	28.60
24152-21	23.40	27.30	28.80
24152-22	20.80	26.80	28.80
24152-23	21.10	26.70	28.20
24152-24	22.80	26.20	28.90
24152-25	20.20	26.10	27.20
24152-26	21.80	27.10	29.40
24152-27	21.20	27.90	30.30

24152-28	22.10	26.00	27.50
24152-29	20.60	27.10	29.40
24152-30	20.60	24.00	28.40
24152-31	20.90	28.60	31.70
24152-32	21.80	26.20	28.30

1-8. Evaluation of skin elasticity (R2)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	67.13	70.97	81.60
24152-02	60.57	62.80	64.73
24152-03	68.13	72.47	83.10
24152-04	69.87	76.10	77.10
24152-05	66.30	70.47	77.50
24152-06	66.73	69.80	73.53
24152-07	56.77	61.67	67.60
24152-08	63.57	64.90	68.53
24152-09	66.37	73.70	75.50
24152-10	62.53	65.60	66.00
24152-11	70.00	73.13	75.87
24152-12	68.17	68.30	74.53
24152-13	57.13	65.20	68.00
24152-14	55.03	60.47	62.27
24152-15	66.23	68.73	78.43
24152-16	53.83	59.97	64.80
24152-17	52.03	58.60	62.10
24152-18	63.90	67.03	69.00
24152-19	65.03	67.13	67.20
24152-20	49.73	55.60	55.83
24152-21	61.03	67.13	68.10
24152-22	52.40	56.73	63.07
24152-23	53.17	54.33	54.77
24152-24	65.00	67.87	68.40
24152-25	48.30	53.77	54.47
24152-26	60.13	61.70	66.63
24152-27	52.57	56.00	61.90

24152-28	55.10	59.60	59.73
24152-29	59.23	65.67	66.57
24152-30	49.40	52.23	60.73
24152-31	59.70	64.27	65.53
24152-32	62.20	64.67	67.30

1-9. Evaluation of melanin of visible hyperpigmentation area (melasma, freckles etc) (M.I)

Identification code	PLLACUBE PINK VOL.		
	Before the product use	One use of the product	One week of using product
24152-01	209.67	205.00	200.67
24152-02	190.67	185.33	177.33
24152-03	160.00	149.00	137.00
24152-04	236.67	226.67	219.00
24152-05	174.67	161.33	153.00
24152-06	248.00	239.67	225.67
24152-07	165.67	154.33	124.67
24152-08	202.33	188.33	170.67
24152-09	181.33	166.33	161.00
24152-10	187.67	174.33	169.33
24152-11	212.00	205.67	185.67
24152-12	150.00	147.00	143.00
24152-13	192.00	181.00	176.67
24152-14	178.00	171.67	166.00
24152-15	138.67	132.33	123.67
24152-16	135.67	130.00	126.33
24152-17	168.00	165.67	153.33
24152-18	187.00	172.00	160.33
24152-19	198.67	186.00	179.33
24152-20	217.67	204.33	182.33
24152-21	217.00	206.00	194.00
24152-22	194.33	184.67	173.00
24152-23	185.67	180.67	173.67
24152-24	128.67	124.33	121.00
24152-25	159.67	153.33	146.00
24152-26	193.00	186.33	178.67
24152-27	165.33	154.33	144.00

24152-28	199.33	192.33	181.67
24152-29	166.33	164.00	156.67
24152-30	175.00	162.33	139.67
24152-31	159.00	156.33	144.00
24152-32	208.00	200.33	183.67

1-10. Questionnaire evaluation by subjects / efficacy and usability (After one week of using product)

Identification code	It seems area of non-visible hyperpigmentation area (underlying melasma etc) improved after using the product.	It seems skin tone (brightness) and triple skin tone (dark tone, yellow tone, brown tone) improved after using the product.	It seems area and count of visible hyperpigmentation area (melasma, freckles etc) improved after using the product.	It seems skin density improved after using the product.	It seems skin elasticity improved after using the product.
24152-01	4	4	4	4	5
24152-02	5	5	4	5	5
24152-03	3	4	3	4	4
24152-04	3	3	3	4	4
24152-05	5	5	5	5	5
24152-06	4	5	5	4	5
24152-07	4	4	4	5	5
24152-08	5	5	5	5	5
24152-09	4	4	4	4	4
24152-10	4	4	4	5	5
24152-11	4	5	4	4	5
24152-12	4	5	4	5	5
24152-13	4	4	3	4	4
24152-14	4	4	4	4	4
24152-15	4	4	4	5	4
24152-16	4	5	4	5	5
24152-17	4	4	4	4	4
24152-18	3	3	3	4	4
24152-19	3	3	3	3	4
24152-20	4	4	4	5	5
24152-21	4	5	4	4	5

24152-22	4	4	3	4	4
24152-23	4	4	3	4	4
24152-24	4	4	3	4	4
24152-25	3	3	3	3	4
24152-26	4	4	4	5	5
24152-27	4	5	5	5	5
24152-28	4	4	4	5	5
24152-29	4	4	4	4	4
24152-30	5	5	5	5	5
24152-31	4	4	3	4	4
24152-32	4	4	5	4	5

Identification code	I am satisfied that the product is not irritating to the skin during use the product.	I am satisfied with the product's absorbency.	The product spreads well.	I am satisfied with the product overall.
24152-01	5	4	4	4
24152-02	5	5	5	5
24152-03	4	4	4	4
24152-04	4	4	4	4
24152-05	5	5	4	5
24152-06	5	5	4	5
24152-07	5	5	4	5
24152-08	5	5	5	5
24152-09	4	4	4	4
24152-10	5	4	5	5
24152-11	5	4	5	5
24152-12	4	5	5	5
24152-13	4	4	4	4
24152-14	5	5	5	4
24152-15	5	4	4	4
24152-16	5	5	5	5
24152-17	5	5	5	4
24152-18	4	4	4	4
24152-19	4	4	4	4
24152-20	5	5	5	5
24152-21	5	5	5	5
24152-22	4	4	4	4
24152-23	4	4	4	4

24152-24	4	3	3	4
24152-25	3	3	3	4
24152-26	5	5	5	5
24152-27	5	5	5	5
24152-28	5	4	4	4
24152-29	4	4	4	4
24152-30	5	5	5	5
24152-31	5	4	4	4
24152-32	4	4	5	5

APPENDIX II. Image data

APPENDIX III. Research facilities and members

Company name	KSRC Korean Skin Research Center CO., LTD		
Location	24F, 8, Seongnam-daero 331beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea		
Principal Investigator	Myoung Rae Kim		
President	Chan Young Heo, M.D., Ph.D.		
Number of employee	45 members	**Area**	694 m^2

Classification	**Lists**	
Evaluation lists	Cosmetic safety evaluation	
	Evaluation of functional cosmetics efficacy	
	Evaluation of cosmetics efficacy	
	Usability evaluation	
	Evaluation of hair and scalp	
	Functional food evaluation	
	In vitro evaluation	
Major equipment	Cutometer MPA 580 2 ㎜ Probe	Constant temperature and humidity
	Corneometer CM825	Electronic scale (PX224KR)
	Antera 3D CS V.3	VECTRA 3D
	Epsilon E100	Folliscope 5.0
	Moisturemeter D	Folliscope 2.8
	Tewameter TM HEX	FLIR Systems T630 sc
	Primos-CR	DSLR
	Visia-CR 2.3	Oral Chroma
	F-ray	InBody
	Skin glossy meter GL200	Mexameter MX 18
	USB-225	Skin-pH-meter PH905
	Spectrophotometer (CM26dG)	Mark Vu
	Q-RAY	Tensile tester (UTM)
	DermaLab Ultrasound	Electrostatic meter (FMX-003)
	Infrared Irradiator (Infralux 300)	3D LifeViz Micro
	Dermavision beauty edition	Ghost in the Mirror

1) President: Heo Chan Yeong, M.D., Ph.D.

[Education and Career]

2010.	Ministry of Health and Welfare, Medical Device Clinical Research Center, Director
2012.	Ministry of Food and Drug Safety, Medical Device Safety Monitoring Center, Director
2011.~2016	Korea Testing Laboratory, u-Health Medical Device Reliability Evaluation Technology Development, Senior Research Engineer
2008.~Now	Seoul National University Bundang Hospital (SNUBH), Department of Plastic Surgery, Director
2009.~Now	Seoul National University (SNU), Department of Plastic and Reconstructive Surgery, Prof.
2017.~Now	SNU, Interdisciplinary Program in Bioengineering, Prof.
2019.~Now	SNUBH, Regenerative Medicine Center, Director
2019.~Now	KSRC Korean Skin Research Center CO., LTD., CEO

[Thesis]

C Pak, J Lim, BK Kim, HW Kim, SY Park, GH Mun, JT Kim, JH Jeong, CY Heo. Portable Ultrasonic Surgery System for Chronic Wounds: A Multicenter Randomized Controlled Clinical Trial and In Vitro Characterization. *Journal of Wound Management and Research* **2019**; 15(1), 5-10.

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KH Min, JH Kim, HJ Park, HS Chung, CY Heo. The skin-tightening effects of 1,444-nm Nd:YAG laser on human skin: an in vivo study. *Aesthetic Plast Surg* **2014**; 38(3): 585-591

JH Jeong, JM Hong, CS Pak, JH Kim, CY Heo. Treatment of Axillary Osmidrosis Using a Laser With a 1,444-nm Wavelength. *Dermatol Surg* **2014**; 40(8): 851-857

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2) Principal Investigator: Myoung Rae Kim

[Education and Career]

1996. ~ 2003.	Bachelor of Science, Life Science, Konkuk University
2003. ~ 2005.	Master of Science, Medical life science, Catholic University
2023 ~ Now	Sungkyunkwan University (SKKU), Interdisciplinary Program in Biocosmetics
2006. ~ 2007.	Researcher / SK bioland Co. Ltd., Research planning team
2007. ~ 2009.	Senior researcher / Dermapro Co. Ltd., Skin Research Center
2009. ~ 2012.	Researcher / Coway Co. Ltd., Cosmetic R&D, EA team
2012. ~ 2016.	Senior researcher / Coway Co. Ltd., Cosmetic R&D, EA team
2016. ~ 2018.	Senior researcher / Coway Co. Ltd., Cosmetic R&D, TD team
2018. ~ 2018.	Senior researcher / Coway Co. Ltd., Cosmetic R&D, QC TFT
2018. ~ 2019.	General manager / Coway Co. Ltd., Cosmetic Business Division
2021. ~ 2022.	P&K Skin Research Center, Principal Research Engineer
2022. ~ 2023.	Human Skin Clinical Trial Center, Clinical Trial Division Head
2023. ~ 2023.	JEJUIUCC, Skin Research Center, Technical Advice
2024. ~ Now	KSRC Korean Skin Clinical Research Center, Director

3) Quality Assurance (QA): Keon Woo Choi

[Education and career]

2012.02	Graduated from Department of Clinical Pathology, Konyang University
2017.02~2022.02	Researcher, Department of Molecular Genetics, The Catholic University of Korea
2022.02	Graduated from the Graduate School of Biomedical Health Sciences, The Catholic University of Korea, Ph.D.
2022.08 ~ Now	KSRC Korean Skin Clinical Research Center, Junior Researcher, Non-Clinical Research Department

4) Su Ye Jo

[Education and Career]

2018.02	Hallym University, Department of Biomedical, Bachelor of Science
2018. ~ 2019.	Ellead Skin and Bio Research Institute Co., Ltd., Researcher
2019. ~ 2022.	Korea Institute of Dermatological Sciences, Assistant Researcher
2022. ~ 2023.	Oracle Skin Clinical Trial Center, Senior Researcher
2024.08~ Now	KSRC Korean Skin Clinical Research Center, Senior Researcher

5) Min Ji Seo

[Education and career]

2017.02	Daejon Health University, Department of Cosmetic Science
2017.01 ~ 2019.05	IEC Korea Co., Ltd. Safety team, Researcher
2020.07 ~ 2023.09	Human Skin Clinical Trial Center, Clinical Trial 2 Team, Team Leader
2024.07 ~ Now	KSRC Korean Skin Research Center, Team Leader

6) Song Hee Han

[Education and Career]

2015.08	Sejong University, Department of Biotechnology, Bachelor of Engineering
2016. ~ 2022.	Korea Institute of Dermatological Sciences, Assistant Manager
2024.09~ Now	KSRC Korean Skin Research Center, Senior Researcher

7) Do Eun Kim

[Education and career]

2019.08	Yeungnam University, School of Biotechnology, Major of Biotechnology, Bachelor of Science
2019.10 ~ 2023.08	P&K Skin Research Center Co., Ltd., Assistant Researcher
2023.08 ~ 2024.03	Jeisys Medical Co., Ltd., Practice Support Team, Assistant
2024.06 ~ Now	KSRC Korean Skin Research Center, Assistant Researcher

8) Dahye Kim

[Education and Career]

2018.02 ~2022.02	Mokwon University, Department of Biopharmaceutical Chemistry

2022.02 ~2024.02	Ellead Skin and Bio Research Institute Co., Ltd., Researcher
2024.10 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

9) Hee jae Mun

[Education and Career]

2023.02.	Dongguk University, Department of Biopharmaceutical Engineering
2023.04 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

10) Se Ri Kwon

[Education and Career]

2022.02.	CHA University, Department of Medical Bio Science, Bachelor of Science
2019.02 ~2019.08	Dasol Cosmetics Research Institute, Researcher
2023.06 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

11) Jun Ho Go

[Education and Career]

2021.02	Keimyung University, Major in Biological Sciences, Bachelor of Science
2019.07 ~ 2020.02	Purumeda co., Ltd, Production/Quality control, Assistant
2021.04 ~ 2021.07	Dasol Food Analysis Laboratory co., Ltd, Physico-chemistry analysis Researcher
2021.08 ~ 2023.03	Korea Bio Analysis Laboratory co., Ltd, Physico-chemistry analysis Researcher
2023.06 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

12) Hee Jin Hwang

[Education and Career]

2021.02	Cheongju University, Department of Pharmaceutical Engineering, Bachelor of Engineering
2020. ~ 2022.	Medica Korea co., Ltd, Central Research Institute Pharmaceutical Researcher
2022. ~ 2023.	Dasan Pharmaceutical co., Ltd, Central Research Institute Pharmaceutical Assistant Researcher
2023.09 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

13) Seung Hyun Moon

[Education and Career]

2017.08	Jeju University, Department of Chemistry, Bachelor of Science
2019.08	Jeju University, Department of Chemistry, Master of Science.
2019. ~ 2021.	Jejutechnopark, Lava seawater support center, Researcher

2023. ~ 2023.	Jeju University, Cosmetic science center, Researcher
2024.01 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

14) So Young Jeon

[Education and Career]

2021.02	Konyang University, Department of Nursing, Bachelor of Nursing
2024.02 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

15) Na in Kim

[Education and Career]

2020.08	Chosun University, Department of Biochemical Engineering, Bachelor of Engineering
2022.08	Graduate School of Chosun University, Department of Chemical Engineering, Master of Engineering
2024.02 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher

14) Ji Hyun Lee

[Education and Career]

2021.02	Gachon University, Department of Biological Sciences
2023.08	The Catholic University of Korea, Department of Biomedicine & Health Sciences, Master of Science
2021.02 ~ 2023.12	Seoul St. Mary′s Hospital, Department of Diagnostic Laboratory Medicine, Researcher
2024.06 ~ Now	KSRC Korean Skin Research Center, Researcher

15) Ji Bin Kim

[Education and Career]

2019.02	Ewha Womans University, Department of Food&Nutrition, Bachelor of Science
2021.02	Ewha Womans University, Department of Food&Nutrition, Master of Science
2022.10 ~ 2023.05	Bundang Seoul National University Hospital, Department of Hematology and Oncology, Researcher
2024.09 ~ Now	KSRC Korean Skin Clinical Research Center, Researcher