Glycerin Derivative of Arginine

Amitose R-PD

"Long-Lasting Moisturizing Effect" for both Skin and Hair

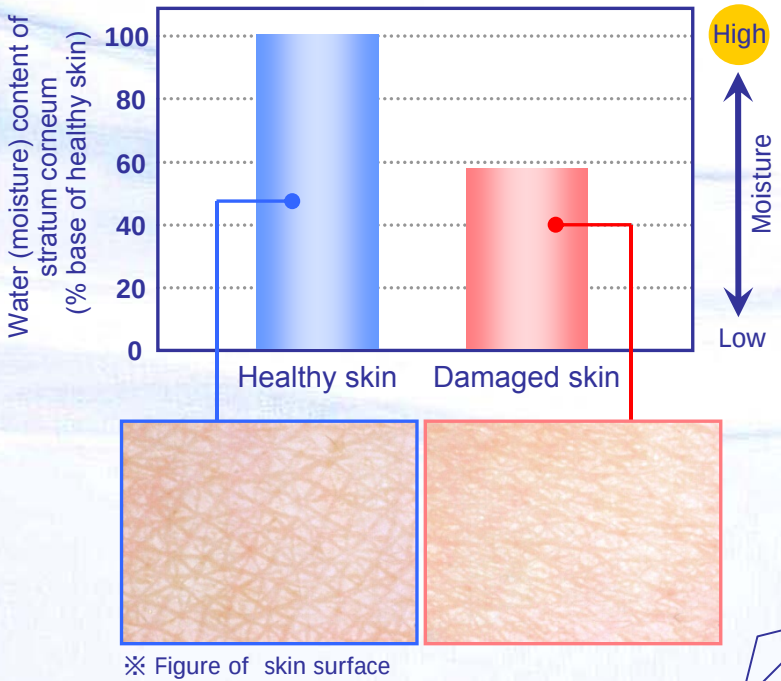
1th edition May 16, 2018

What's Amitose R-PD ?

"Keeping moisture" is closely related to skin and hair beauty.



[Relation between skin condition and moisture]



[Relation between hair condition and moisture]



What's Amitose R-PD ?

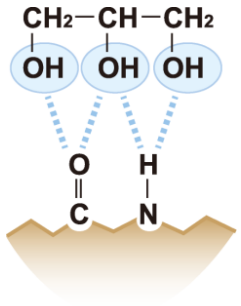
Structural design of Amitose R-PD

Amitose R-PD is a new ingredient made from the combination of Glycerin and Arginine.

Glycerin

High moisturizing effect
Mostly used as moisturizing ingredient

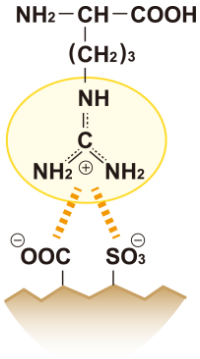
Adsorption power
"Hydrogen bond"
by hydroxyl groups in molecule



Arginine

Moisturizing effect
Amino acid,
Natural moisturizing factor (NMF)

High adsorption power
"Ionic bond"
by guanidino group in molecule

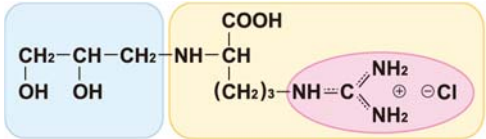


Amitose R-PD

"Long-Lasting Moisturizing Effect"

High moisturizing effect
+
High sustained effect from high adsorption power
Synergy effect of
"Hydrogen bond" and "Ionic bond"

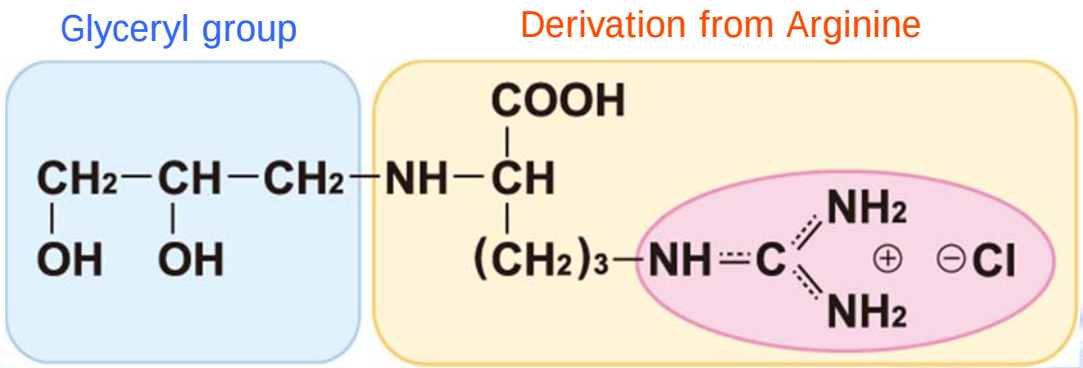
Glyceryl group Derivation from Arginine



※Strength of binding energy : Hydrogen bond < Ionic bond

What's Amitose R-PD ?

Chemical structure and character

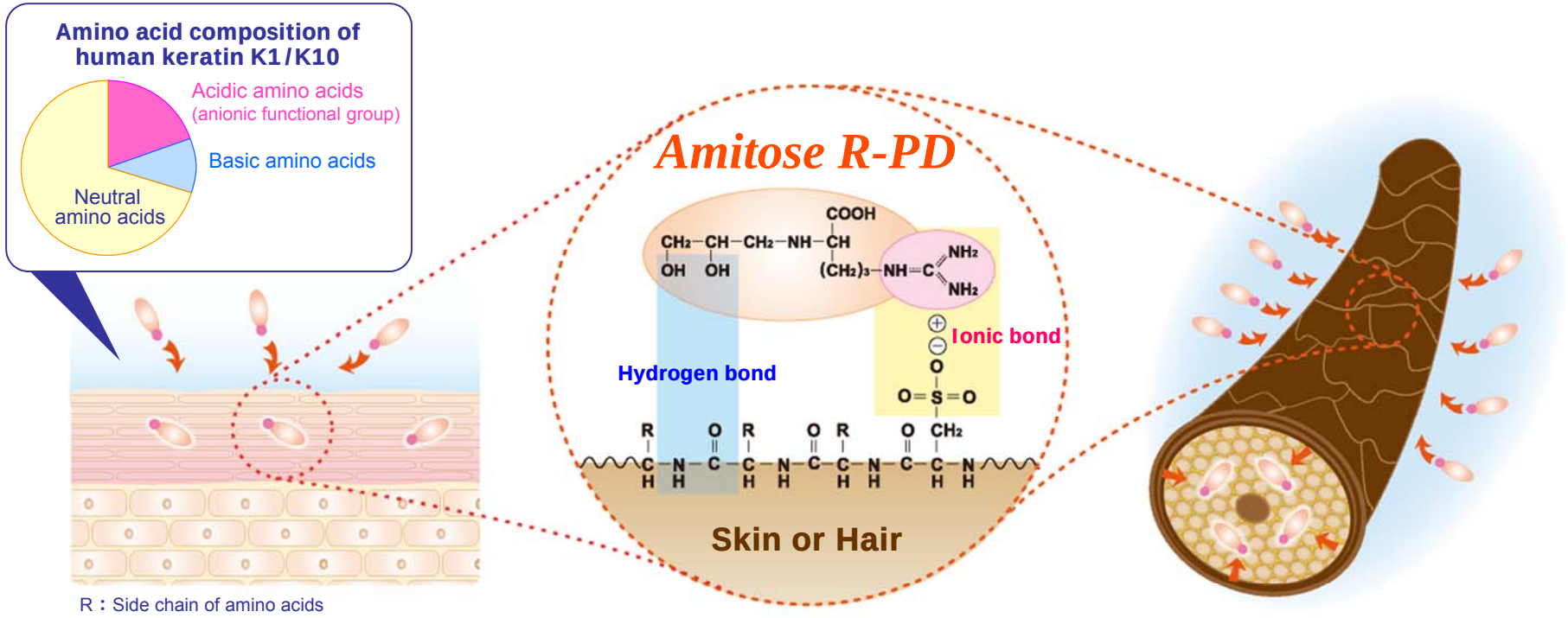


Moisturizing effect + **Adsorption power** → **Long-Lasting Moisturizing Effect**

- ***Amitose R-PD*** closely adsorbs to skin and hair.
  As a result, moisturizing effect continues for a long time.
- ***Amitose R-PD*** contributes to good sensory feeling; "Moist feeling" but "Non sticky feeling".
- ***Amitose R-PD*** gives skin and hair flexibility.
- ***Amitose R-PD*** is safe for use.

Effect of Amitose R-PD

Mechanism of "Long-Lasting Moisturizing Effect" for skin and hair



Amitose R-PD closely adsorbs to skin (stratum corneum) and damaged part of hair(anionic feature) thanks to "Ionic bond" from guanidino group in arginine in addition to "Hydrogen bond" from hydroxyl group in glyceryl group.

That's why it is difficult to rinse off, and moisturizing effect continues for a long time. In case of hair care, *Amitose R-PD* penetrates into inner of hair because of its low-molecular weight, and keeps moisture.

Amitose R-PD

"Long-Lasting Moisturizing Effect" for both Skin and Hair

All-in-One Care



Amitose R-PD

Validation of skin conditioning effect





Effect for skin

Skin conditioning effect

Amitose R-PD improves and keeps the healthy skin condition because of its excellent skin moisturizing effect.

Amitose R-PD

"Long-Lasting Moisturizing Effect"

High moisturizing effect

+

High sustained effect from high adsorption power

Synergy effect of
"Hydrogen bond" and "Ionic bond"

Skin conditioning effect

- Suppression of multilayer desquamation of stratum corneum
- Anti-wrinkle effect
- Suppression of rough skin
- Skin pore tightening effect
- Suppression of inflammation

Effect for skin

Gel

In vivo test

Volunteers

↓ 13 volunteers (20's to 40's)

Evaluation (before use)

↓

Application for 6 weeks

↓ Volunteers applied gel formulae twice a day on their cheeks.

Evaluation (after use)

Test-1; Measurement of water content
in the epidermal stratum corneum

Test-2; Evaluation of suppressing effect
of multilayer desquamation of the stratum corneum

Test-3; Evaluation of
wrinkle, texture, pore and inflammation of skin

(W/W%)

Gel	Control	*Amitose R-PD*
Amitose R-PD	–	1.0
Polyacrylamide, C13-14 Isoparaffin, Laureth-7, Water	2.0	2.0
Phenoxyethanol	0.5	0.5
Citric Acid / Sodium Citrate *	q.s.	q.s.
Water	Up to 100	Up to 100

* Adjusted to pH5.5

〔Measurement instrument〕
Test-1; Corneometer CM-825 (Courage+ Khazaka electronic GmbH)
Test-2; Image-Pro Plus (Media Cybernetics Inc.)
Test-3; VISIA evolution ® (Canfield Scientific Inc.)

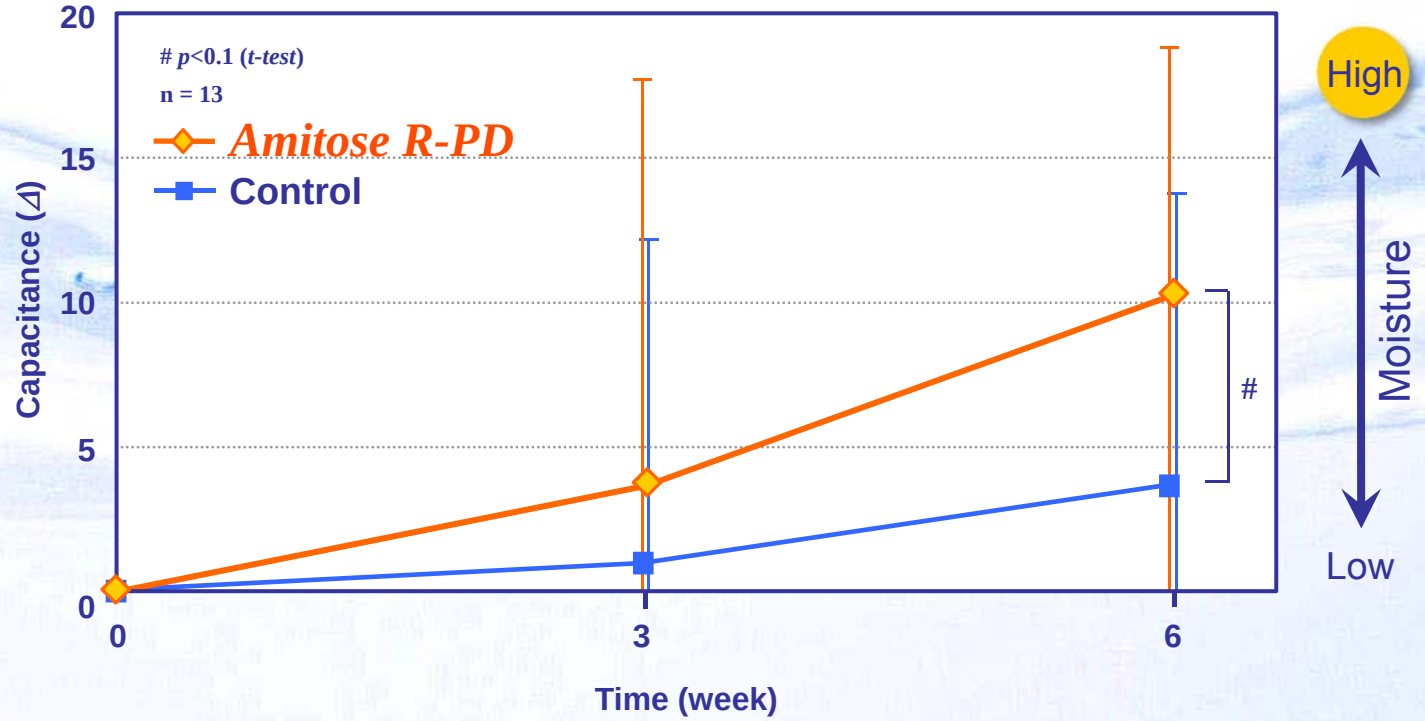
〔Measurement condition〕
Tempereture; 20 ± 2 deg C
Humidity (RH): 40-50%

Effect for skin

Gel (Moisturizing effect)

Amitose R-PD has excellent skin moisturizing effect.

Measurement of water content in the epidermal stratum corneum (*in vivo* test)

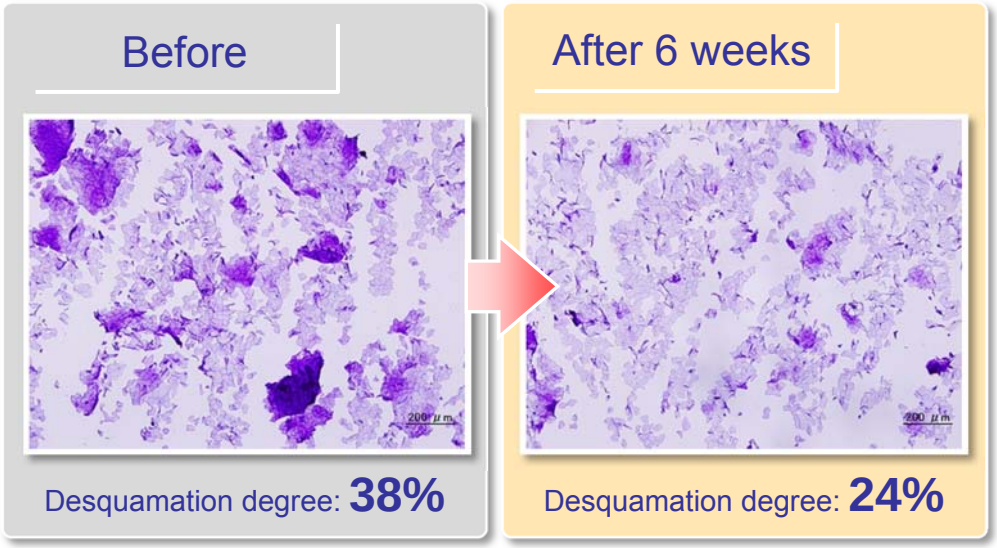


Effect for skin

Gel (Skin conditioning effect by moisturizing)

Amitose R-PD suppresses abnormal cornification and multilayer desquamation of the stratum corneum by the skin moisturizing effect.

Evaluation of suppressing effect of multilayer desquamation of the stratum corneum (*in vivo* test)



"Multilayer desquamation of the stratum corneum" is …

A phenomenon that stratum corneum is peeled off in folds through the tape-stripping process. It is one of the index standard of skin problems.

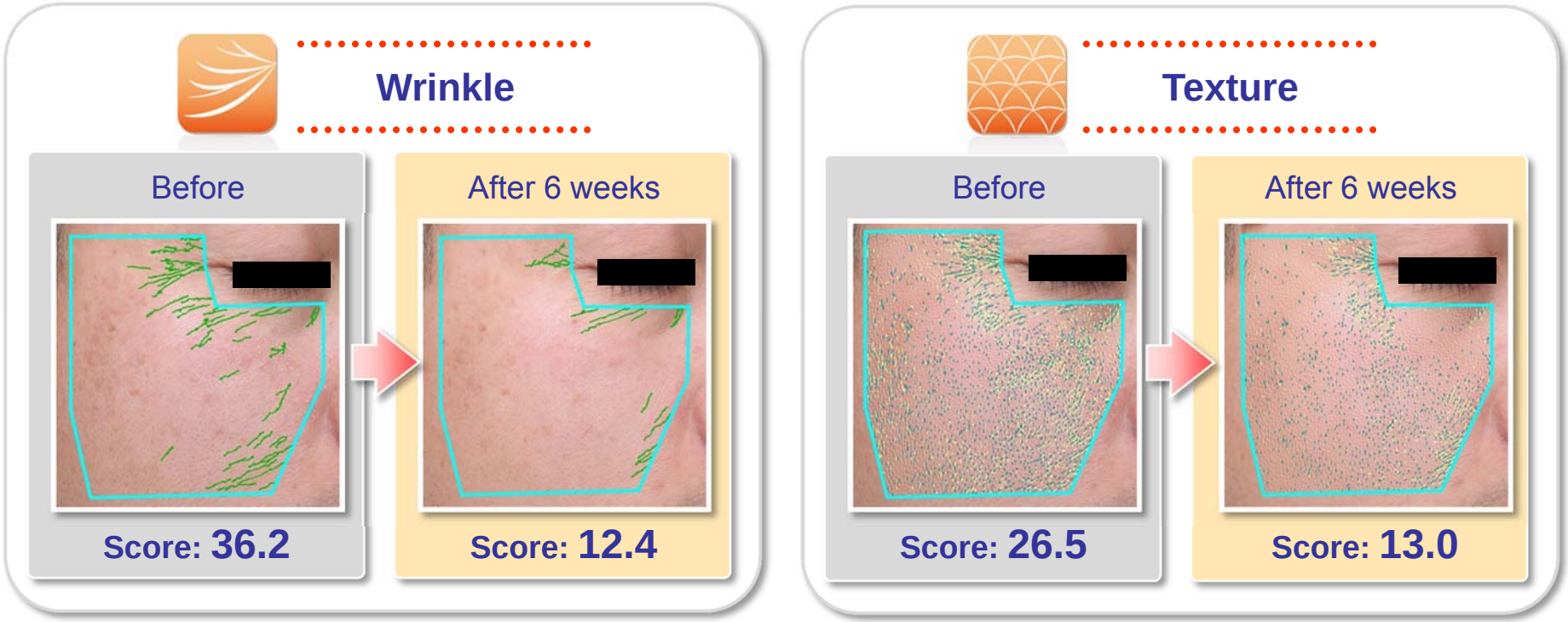
[Experimental method]

Gel containing 1.0% Amitose R-PD was applied on the cheek of a volunteer (20's to 40's) twice a day (morning/ afternoon) for 6 weeks. Then, the stratum corneum (SC) on the cheek was collected by tape-stripping. SC transferred onto a glass slide was stained with 0.5% brilliant green and 1.0% gentian violet for 10 min. After washing with water, the ratio of multilayer desquamation was analyzed for images observed with an optical microscope (BX-51-FL, Olympus) . Degree of multilayer desquamation was calculated by the ratio of area in multilayer desquamation and area in the total SC using the SC measuring program; Image-Pro Plus (Media Cybernetics Inc.)

Effect for skin

Gel (Skin conditioning effect by moisturizing)

Amitose R-PD has anti-wrinkle effect and improves skin texture by the skin conditioning effect resulting from moisturizing.



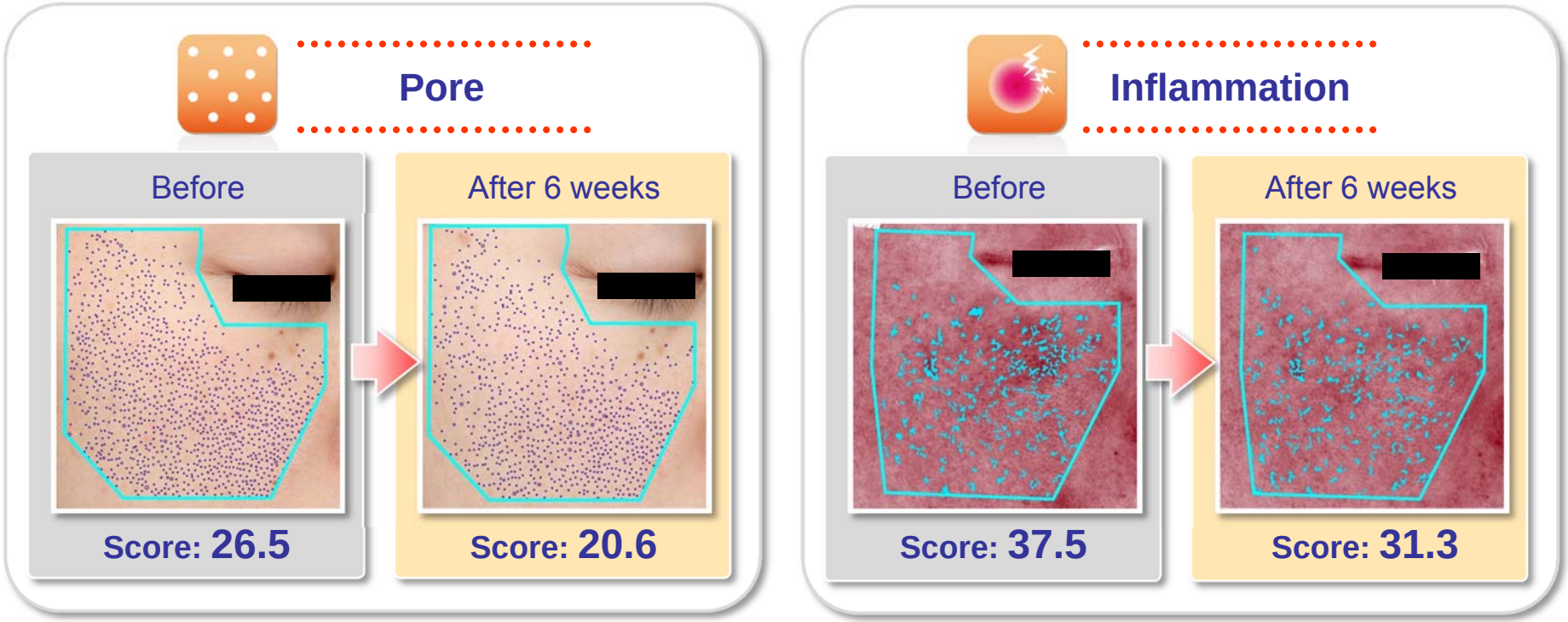
[Experimental method]

Gel containing 1.0% Amitose R-PD was applied on the cheek of a volunteer (20's to 40's) twice a day (morning/ afternoon) for 6 weeks.
Wrinkle score and Texture score were measured by VISIA evolution® (Canfield Scientific Inc.). The green marks in the left figure indicate scanned wrinkle part.
The yellow marks in the right figure indicate scanned cristae cutis and the blue marks indicate scanned sulci cutis of skin.
- Wrinkle score : Calculated value by both the number and the length of wrinkle.
- Texture score : Calculated value by cristae cutis and sulci cutis of skin.

Effect for skin

Gel (Skin conditioning effect by moisturizing)

Amitose R-PD reduces skin pore and suppresses inflammation by the skin conditioning effect resulting from moisturizing.



[Experimental method]

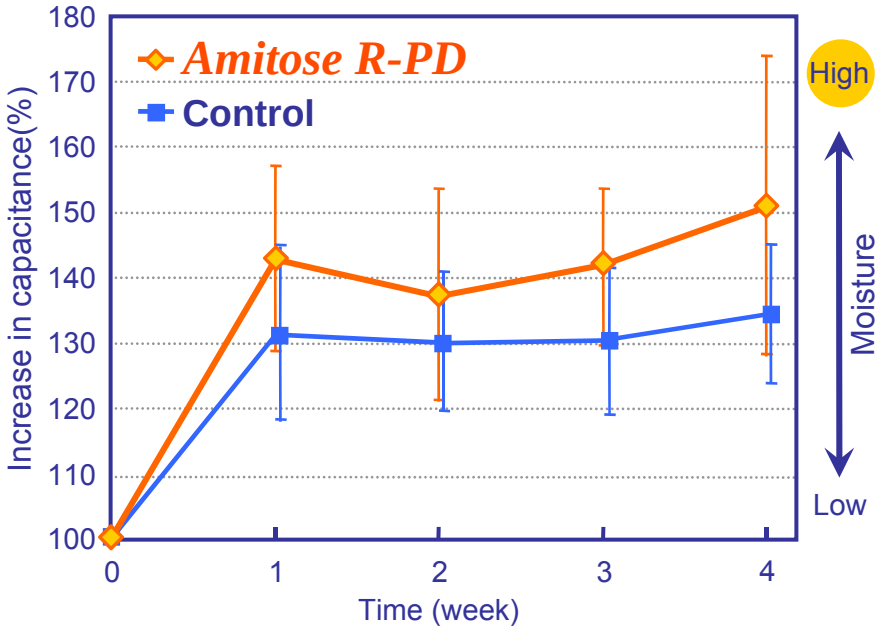
Gel containing 1.0% Amitose R-PD was applied on the cheek of a volunteer (20's to 40's) twice a day (morning/ afternoon) for 6 weeks.
Pore score and red area's score(result from inflammation) were measured by VISIA evolution® (Canfield Scientific Inc.). The violet marks in the left figure indicate scanned pore part. The sky blue marks in the right figure indicate scanned skin reddish part.
- Pore score : Calculated value by both the number and the area of pores.
- Red area's score : Calculated value by the state of inflammation, capillary vessel and acne .

Effect for skin

Cream

Amitose R-PD gives moisture to dry skin and improves the skin condition when formulated in cosmetics.

Measurement of water content in the epidermal stratum corneum (*in vivo* test)



[Experimental method]

Cream containing 3.0% of Amitose R-PD was applied on the forearm of volunteers (20's to 50's) twice a day (morning/afternoon) for 4 weeks. Then water content in the epidermal stratum corneum is measured by using Corneometer CM-825 (Courage+ Khazaka electronic GmbH), and skin condition is observed by using USB microscope (Scalar Corporation).

(W/W%)

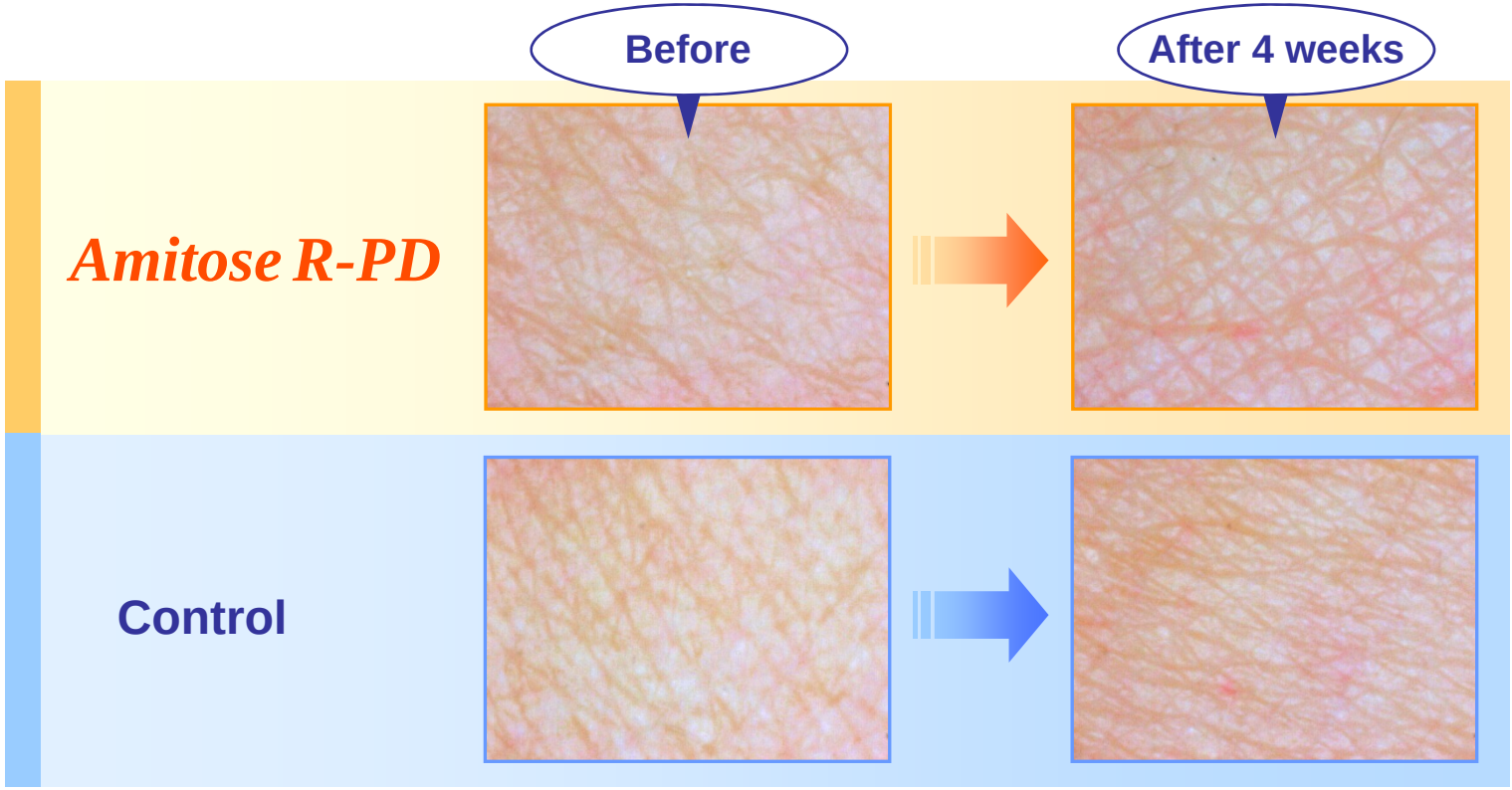
Cream	Control	*Amitose R-PD*
Amitose R-PD	–	**3.0**
PEG-45 Stearate	1.0	1.0
Glyceryl Stearate	3.0	3.0
Hydrogenated Jojoba Oil	2.0	2.0
Cetyl Alcohol	3.5	3.5
Stearic Acid	2.5	2.5
Squalane	7.0	7.0
Petrolatum	2.0	2.0
Dimethicone	1.0	1.0
Phenoxyethanol	1.0	1.0
Water	Up to 100	Up to 100

Effect for skin

Cream

Amitose R-PD gives moisture to dry skin
and improves the skin condition when formulated in cosmetics.

Observation with microscope

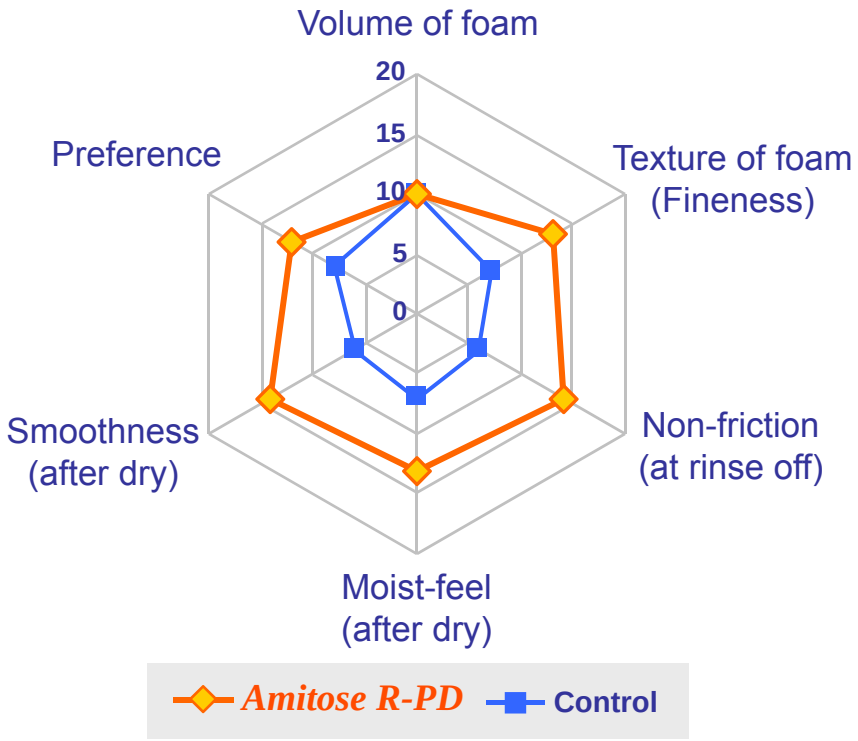


Effect for skin

Face wash

Amitose R-PD keeps adsorbing to skin even after rinse-off and moisturizing effect continues for a long time.

Sensory evaluation



[Experimental method]

10 panelists evaluated the sensory-texture of skin and gave 2 point to a better evaluation item, or 1 point to each items when they feel same sensory texture. The graph shows the sum of total points.



Reference formula No.0226 (W/W%)

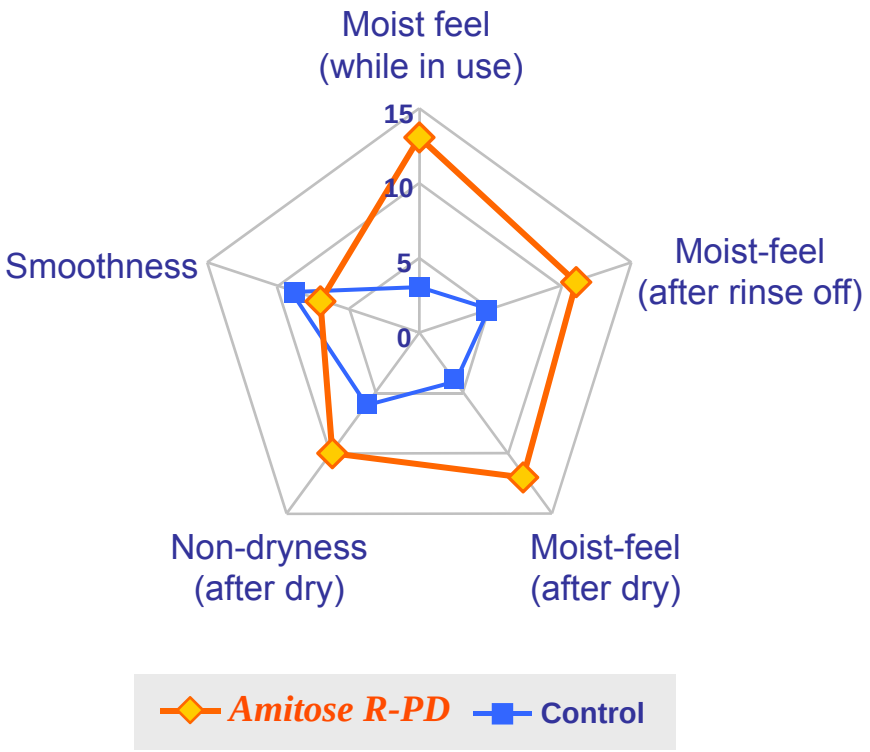
Face wash	Control	*Amitose R-PD*
Amitose R-PD	–	**1.0**
Myristic Acid	7.0	7.0
Palmitic Acid	10.0	10.0
Stearic Acid	10.0	10.0
Lauric Acid	2.0	2.0
Butylene Glycol	10.0	10.0
Glycerin	3.0	3.0
PEG-150 Stearate	2.0	2.0
Cocamide Methyl MEA	2.0	2.0
Phenoxyethanol (90%), Ethylhexylglycerin (10%)	0.5	0.5
Potassium Hydroxide	5.3	5.3
Water	Up to 100	Up to 100

Effect for skin

Facial cleansing gel

Amitose R-PD gives moist-feel both during use and after dry thanks to closely adsorption to skin.

Sensory evaluation



[Experimental method]

8 panelists evaluated the sensory-texture of skin and gave 2 point to a better evaluation item, or 1 point to each items when they feel same sensory texture. The graph shows the sum of total points.



Reference formula No.0224

(W/W%)

Face cleansing gel	Control	*Amitose R-PD*
Amitose R-PD	–	1.0
Promois EFLS *	5.0	5.0
Ethylhexylglycerin	0.5	0.5
Glycerin	18.0	18.0
PEG-20 Glyceryl Triisostearate	5.0	5.0
Caprylic/Capric Triglyceride	Up to 100	Up to 100
Water	1.0	–

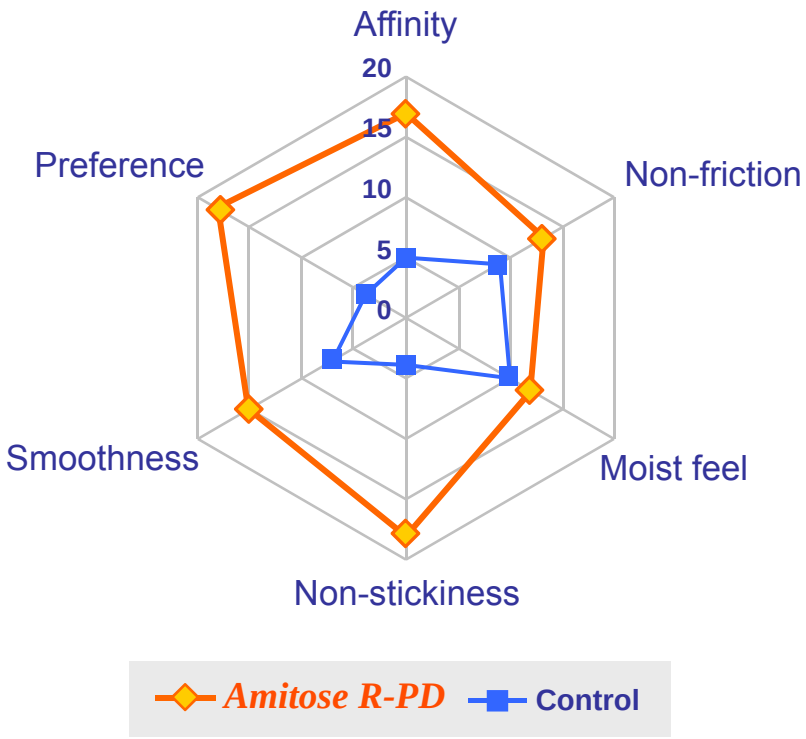
* Sodium Lauroyl Hydrolyzed Silk, Water (SEIWA KASEI)

Effect for skin

Skin toner

Amitose R-PD exhibits skin conditioning effect due to uniform adsorption.

Sensory evaluation



[Experimental method]

11 panelists evaluated the sensory-texture of skin and gave 2 point to a better evaluation item, or 1 point to each items when they feel same sensory texture. The graph shows the sum of total points.



Reference formula No.0225

(W/W%)

Skin ltoner	Control	*Amitose R-PD*
Amitose R-PD	–	**1.0**
Glycerin	8.0	8.0
Butylene Glycol	4.0	4.0
Alcohol	4.0	4.0
Citric acid / Sodium Citrate *	q.s.	q.s.
Phenoxyethanol	0.5	0.5
Water	Up to 100	Up to 100

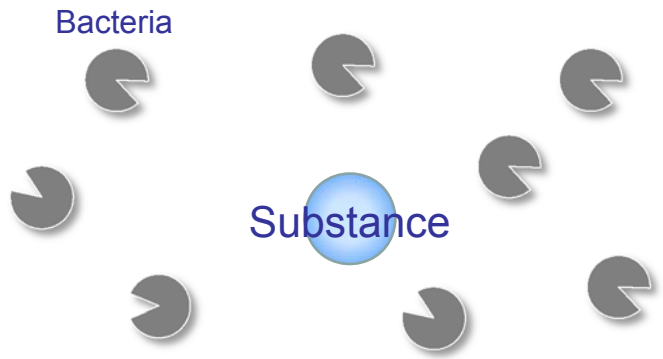
* Adjusted to pH 5.5

Effect for skin

Utilization

"Utilization" is what the specific bacteria use substances as nutrient.

[Utilization]



Increasing bacteria

Utilized by putrefactive bacteria→Become putrid
Utilized by bacteria which stimulate skin
→Induce skin irritation

[Non-utilization]



It doesn't affect
increase of bacteria

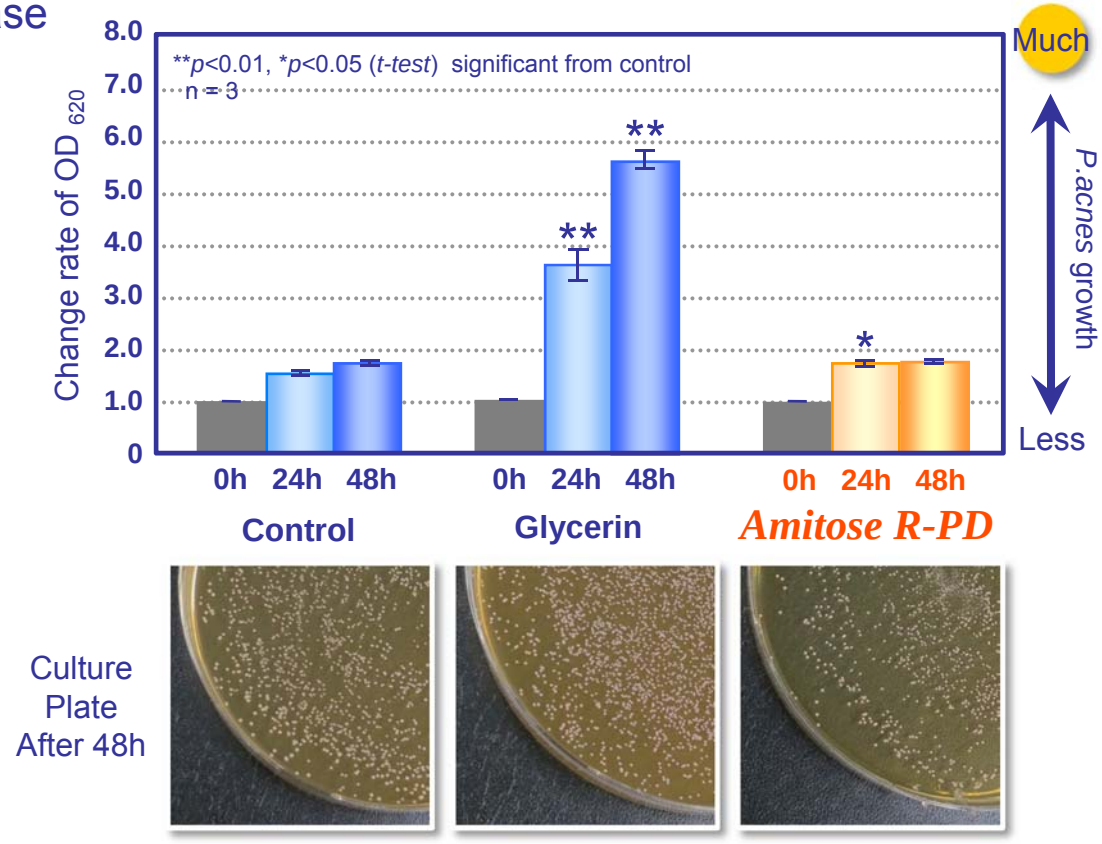
Effect for skin

Utilization by P.acnes

Amitose R-PD isn't utilized by *P.acnes* which causes acne.

- Evaluation of *P.acnes* increase

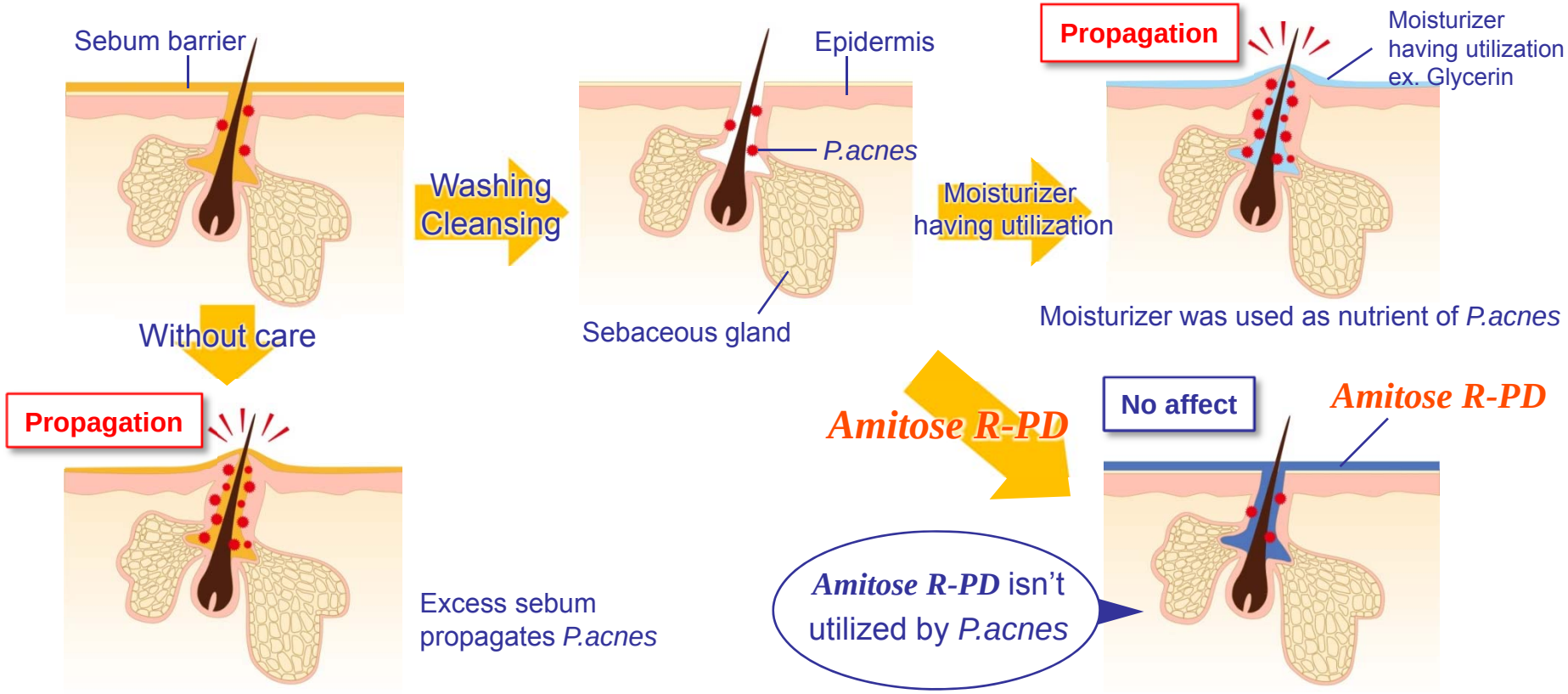
[Experimental method]
GAM semisolid medium with 1.0% sample was mixed with *Propionibacterium acnes* and cultured at 37 deg C for 48 hours under anaerobic condition. At each stage(After mixing, 24 h after, 48 h after), OD_{620} was measured. The culture plates were observed after 48h.



Effect for skin

Utilization by P.acnes

Amitose R-PD isn't utilized by P.acnes, so it minimizes a risk of acnes.



Effect for hair

Amitose R-PD

Validation of hair conditioning effect





Effect for hair

"Long-Lasting Moisturizing effect" for hair

Amitose R-PD closely adsorbs to hair even after washing off and exerts "Long-Lasting Moisturizing Effect".

Confirmation of adsorption to hair

Bleached hair

↓

Treatment

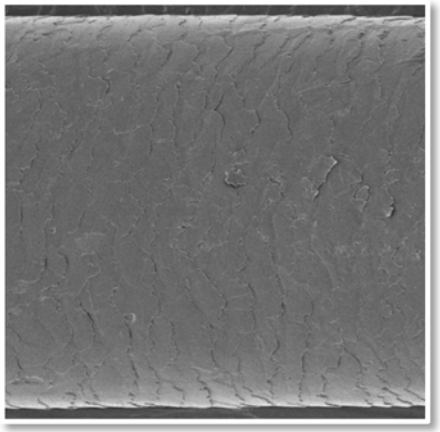
↓

Hair was soaked in 1.0% water solution of Amitose R-PD and shaken at 40 deg C for 10 min.
→ After that, it was washed with 40 deg C running water and dried with towels and a drier.

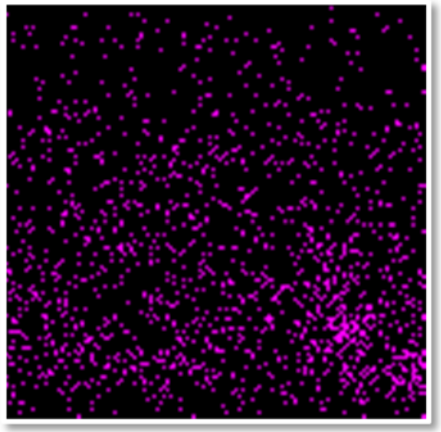
↓

Measurement of adsorption to hair

SEM image



TOF-SIMS image



● *Amitose R-PD*

〔Measurement instrument〕
TOF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry)

Effect for hair

"Long-Lasting Moisturizing effect" for hair

Amitose R-PD closely adsorbs to hair even after washing off and exerts "Long-Lasting Moisturizing Effect".

Measurement of adsorption amount to hair

Bleached hair

↓

Treatment

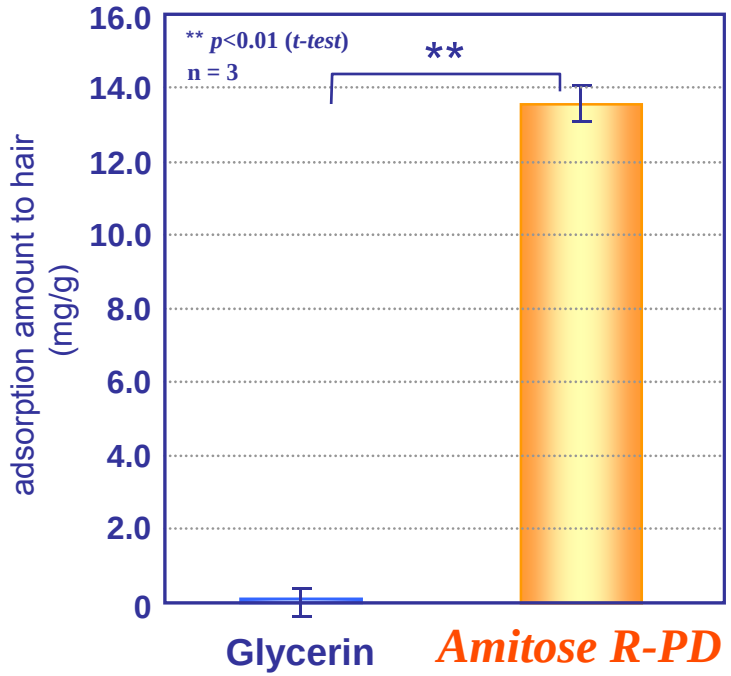
↓

Hair was soaked in 1.0% water solution of Amitose R-PD and shaken at 40 deg C for 10 min.
→ After that, it was washed with deionized water.
Comparison; same treatment was conducted using Glycerin instead of Amitose R-PD.

↓

Measurement of adsorption amount to hair

〔Measurement instrument〕
LC-MS
LCMS-2020 (Shimadzu Co., Ltd.)



Effect for hair

Moisturizing effect

Measurement of secondary transpiration moisture

Bleached hair (Asian)

↓

Treatment (10 times)

↓

Hair tress was soaked in 3% of active solution with agitation at 40 deg C for 10 min.
Control was soaked in deionized water.
After that, they were washed with rapping water and dried with towels and a drier.

↓

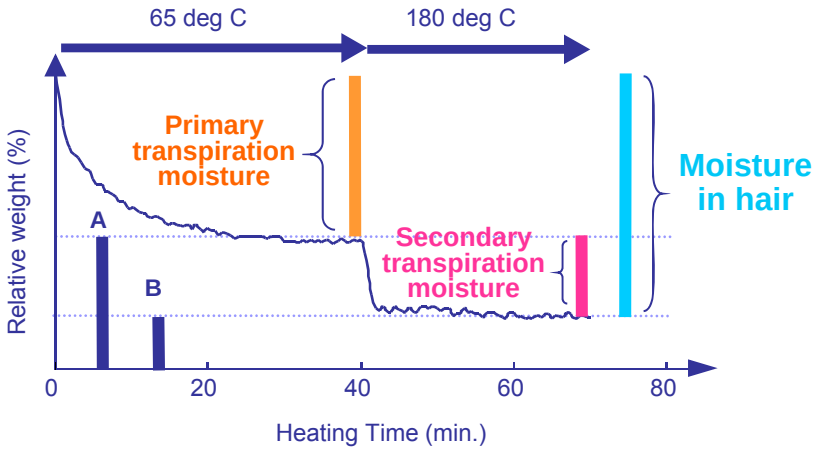
Measurement of secondary transpiration moisture



〔**Measurement instrument**〕
Electric moisture balance
EB-340MOC (Shimadzu Co., Ltd.)

[Experimental method]

Moisturizing effect was evaluated by measurement of moisture inside of the hair. The sample hair was heated at 65 deg C (assumed the temperature of hair-dryer) for 40 min, and then the hair was heated at 180 deg C (assumed the temperature when whole hair moisture transpires) for 30min. As shown in Figure, based on the difference of weights between A and B,the secondary transpiration moisture was calculated according to the below equation.



$$\text{Secondary transpiration moisture (\% dry base)} = \frac{(A-B)}{B} \times 100$$

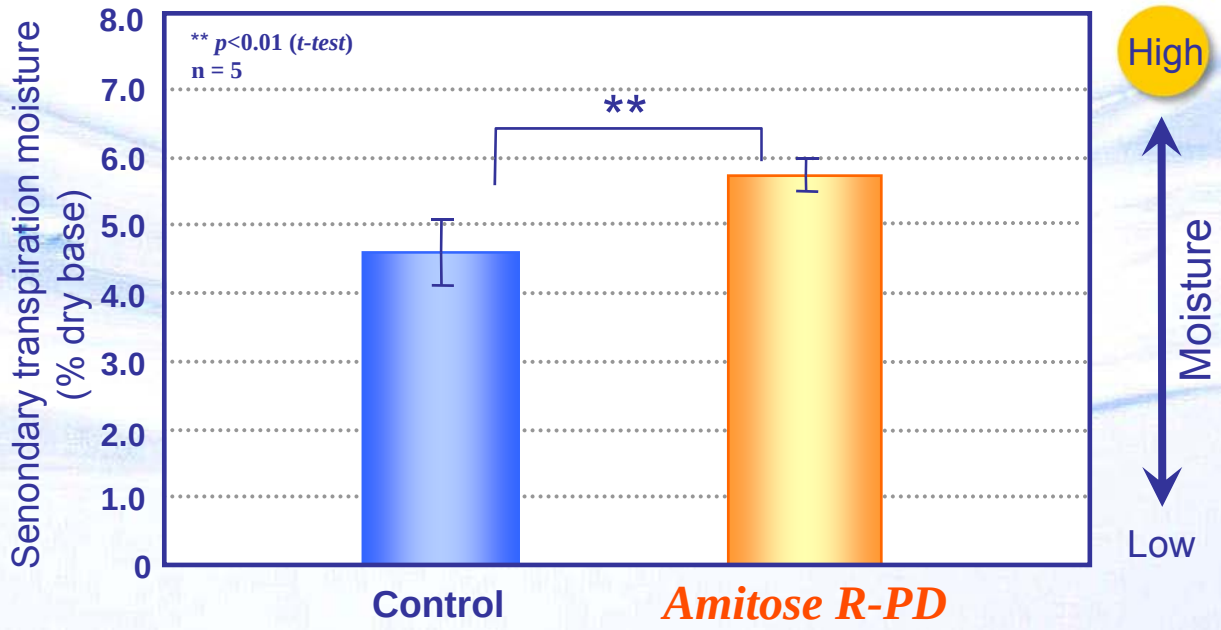
[Reference] Seiji Nagao, Sakiko Uchida, *Fragrance Journal*, special issue, No.17, 169-174 (2000)

Effect for hair

Moisturizing effect

Amitose R-PD closely adsorbs and gives moisture to damaged hair.

- **Measurement of secondary transpiration moisture**



Effect for hair

Improvement of combing character and suppression of static electricity

[Evaluation method]

Bleached hair (Asian)

↓

Averaging combing load

↓ The tresses were divided into 3 tresses that gave the same mean load value.

Shampoo and conditioner (1 time for each)

↓ Shampoo → Washing (in running water) → Conditioner → Washing (in running water) → Drying up
* As the control, hair tresses treated with the control shampoo and conditioner were used.

Combing and Electrostatic measurement

〔Measurement instrument〕
Combing tester (Techno Hashimoto)
〔Measurement condition〕
Temperature: 23 deg C
Humidity (RH): 52%



(W/W%)

Shampoo	Control	*Amitose R-PD*
Amitose R-PD	–	1.0 or 3.0
Sodium Laureth Sulfate(25%), Water	30.0	30.0
Cocamidopropyl Bethaine(30%), Water	10.0	10.0
Cocamide DEA	3.0	3.0
Polyquaternium-10	0.2	0.2
Preservatives	0.5	0.5
Citric Acid	0.1	0.1
Water	Up to 100	Up to 100

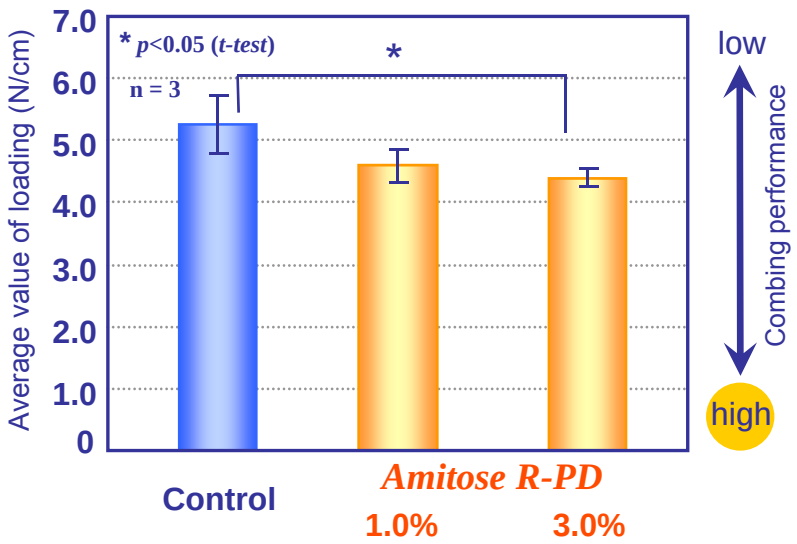
Conditioner	Control	*Amitose R-PD*
Amitose R-PD	–	1.0 or 3.0
Behentrimonium Chloride(80%), Isopropyl Alcohol(20%)	1.0	1.0
Cetearyl Alcohol	3.0	3.0
Cetearyl Alcohol, Cetearyl Glucoside	1.0	1.0
Steareth-20	0.5	0.5
Glycerin	2.0	2.0
Jojoba Seed Oil	2.0	2.0
Preservatives	0.3	0.3
Water	Up to 100	Up to 100

Effect for hair

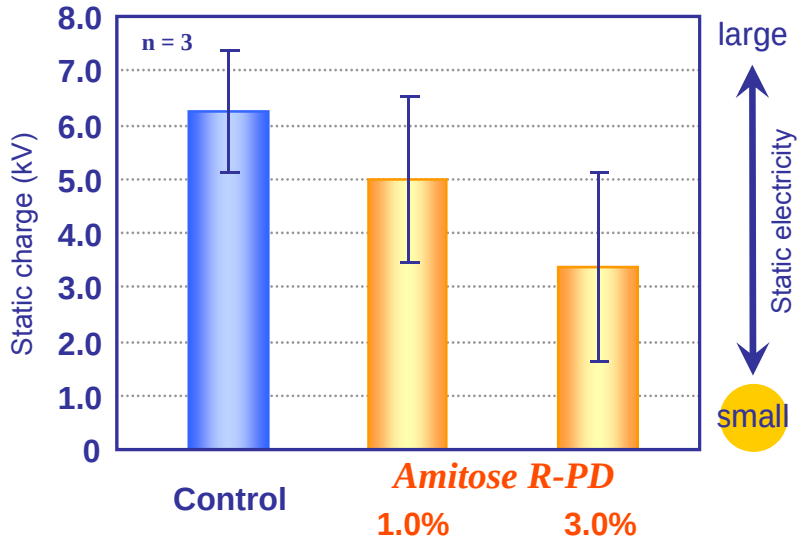
Improvement of combing character and suppression of static electricity

Amitose R-PD improves combing character
and suppresses static electricity of damaged hair.

Combing character



Static electricity



Effect for hair

Anti-hair frizzing effect

Amitose R-PD suppresses hair frizzing in humid conditions.



Amitose R-PD : Apply 10g of 3.3% water solution of Amitose R-PD
Control : Apply 10g of water

[Measurement condition]
Temperature: 26 - 28 deg C
Humidity (RH) : 75 ± 5%

Amitose R-PD

Validation of scalp care effect



Effect for scalp

Scalp care effect

in vivo test

Volunteers

↓ 22 volunteers; male and female in 20's to 60's

Observation and evaluation of scalp

↓

Continuous use of shampoo and conditioner (for 4 weeks)

↓ Once a day

Observation and evaluation of scalp

Observation of scalp; evaluation of dandruff

VAS questionnaire: evaluation of scalp itching

〔**Measurement instrument**〕
Digital microscopy KH-3000 (HIROX Co., Ltd.)

(W/W%)

Shampoo	**Control**	***Amitose R-PD***
Amitose R-PD	—	**1.0**
Promois EFLS-F *1	**37.5**	**37.5**
Sodium Laureth Sulfate (25%), Water	8.0	8.0
PEG-120 Methyl Glucose Dioleate	1.0	1.0
Citric Acid/ Sodium Citrate	0.5	0.5
Polyquaternium-10	0.3	0.3
Methylparaben	0.2	0.2
Water	Up to 100	Up to 100

Conditioner	**Common**
Steartrimonium Chloride (28%), Water	4.5
Behentrimonium Chloride (80%), Isopropyl Alcohol (20%)	1.2
Glyceryl Stearate	1.2
Cetyl Alcohol	4.8
Paraffin	1.8
Octyldodecanol	0.6
Isopropyl Myristate	1.2
Propylparaben	0.1
Methylparaben	0.1
Dimethicone	3.0
Dimethicone(500 cs)	1.0
Water	Up to 100

*1 Sodium Lauroyl Hydrolyzed Silk, Water (SEIWA KASEI)

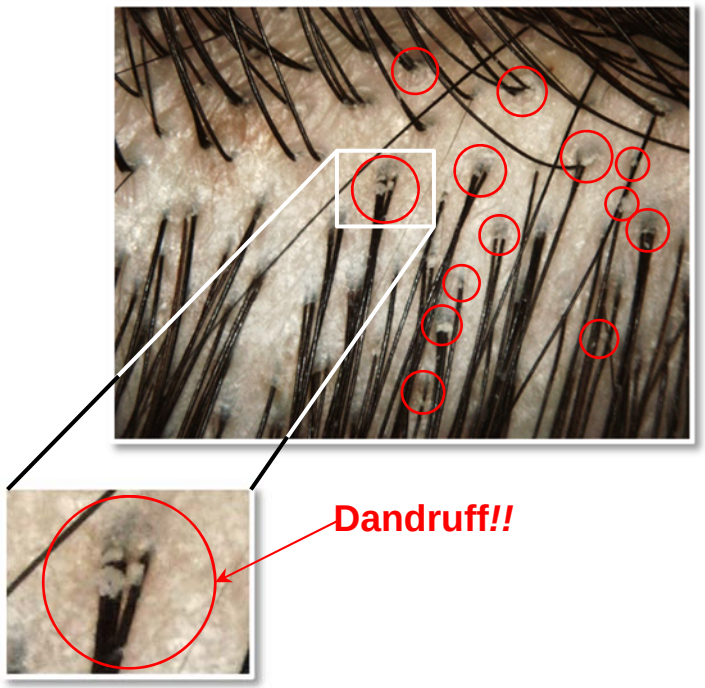
Effect for scalp

Dandruff prevention effect

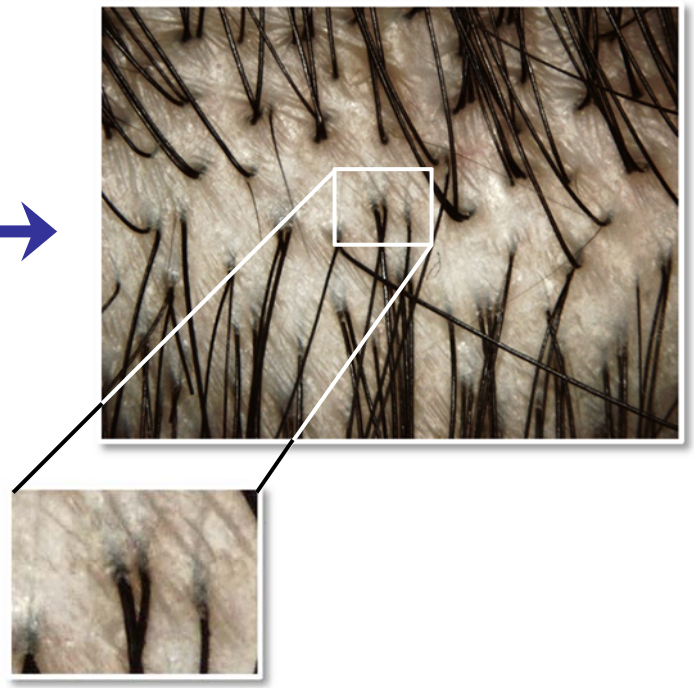
Amitose R-PD suppresses the dryness of scalp by hair washing and prevents dandruff when formulated in shampoo.

- **Observation of scalp**

Before use



After 4 weeks

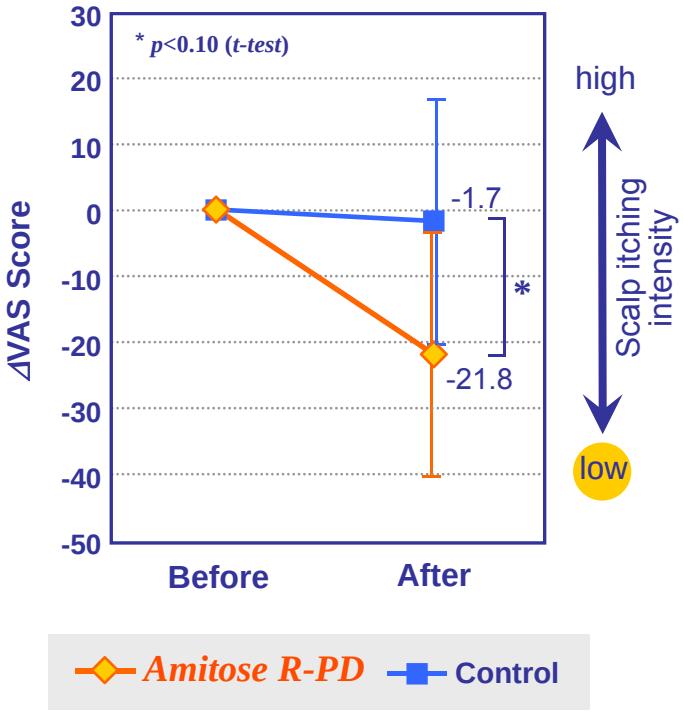


Effect for scalp

Scalp itching improving effect

Amitose R-PD improves scalp itching.

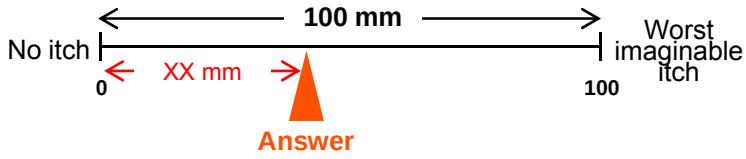
VAS questionnaire about scalp itching (*in vivo* continuous use test)



What's VAS (Visual Analogue Scale) questionnaire ?

Method used to evaluate numerically sensations such as itching:

The VAS is a 10-cm long line, on which subjects indicate the itch intensity by marking the line at the point that corresponds to the degree of their itch, where the beginning of the scale refers to no itch (0 point) and the end of the scale to the worst imaginable itch(10 points). It provides numerical values of the itch intensity from 0 (no itch) to 10 (the worst imaginable itch), and each subjects must indicate a number that corresponds to the perceived itch intensity.



Reference formula

Formulation No. 0224 Cleansing Gel

A	1. Promois EFLS *1	SEIWA KASEI	5.0
	2. Ethylhexylglycerin		0.5
	3. Glycerin		20.0
	4. PEG-20 Glyceryl Triisostearate		5.0
B	5. Caprylic/Capric Triglyceride		Up to 100
C	6. *Amitose R-PD*	SEIWA KASEI	1.0

*1 Sodium Lauroyl Hydrolyzed Silk, Water

〔Preparation〕

1) Heat up A and B separately to 80 deg C.
2) Add B bit by bit to A and stir.
   How to add; Check the surface and if there is no oil droplets, then add B bit by bit.
3) Cool down to 40 deg C.
4) Add C to 3) and stir.



※This formulation has been developed to illustrate the use of our products and to demonstrate their performance without warranties as to freedom from patents.

Reference formula

Formulation No. 0223 Non Build-up Hair Conditioner

A	1. Protesil LH *1	SEIWA KASEI	0.1
	2. Cetearyl Alcohol, Cetearyl Glucoside		1.0
	3. Cetearyl Alcohol		3.0
	4. Glycerin		2.0
	5. Jojoba Seed Oil		2.0
	6. Behentrimonium Chloride (80%), Isopropyl Alcohol (20%)		1.0
	7. Steareth-20		0.5
B	8. Promois KR-30 *2	SEIWA KASEI	1.0
	9. Water		Up to 100
C	10. *Amitose R-PD*	SEIWA KASEI	1.0
	11. Preservatives		0.3

*1 Hydrolyzed Silk PG-Propyl Methylsilanediol Crosspolymer, Water
*2 Hydrolyzed Keratin, Water

〔Preparation〕

1) Mix A and B separately at 80 deg C.
2) Add B to A and stir at 80 deg C.
3) Cool down.
4) Add C and stir until uniformly dispersed.



※This formulation has been developed to illustrate the use of our products and to demonstrate their performance without warranties as to freedom from patents.

Amitose R-PD

China compliant

Preservative free

Glycerin Derivative of Arginine

Composition

INCI name	Chinese INCI name	CAS No.	Composition
Dihydroxypropyl Arginine HCl	二羟丙基精氨酸 HCl	787607-61-8	30%
Water	水	7732-18-5	70%

*This product contains 1.0% of Pentylene Glycol as an additive.

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