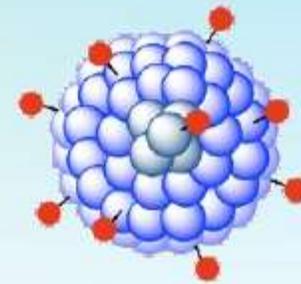




Hangzhou Rebtech Novel Material Co., Ltd.

Retinal (RAL): Elevenfold Retinol



NanoActive RAL

Retinal converts to retinoic acid 11 times faster than retinol



Why choose retinal instead of its retinoids ?



01



Retinal is more easily absorbed and utilized, faster and more thoroughly.

02



After clinical validation, retinal acts 11 times faster than retinol.

03



Retinal was 1000 times more effective than retinol in stimulating collagen production but was milder to the skin.

04



Retinal is not sun-sensitizing and does not have an increased risk of UVA/UVB damage or pigmentation (such as retinol), so it can be incorporated into your day care plan.

05



Retinal is safe to use during pregnancy or lactation.

06



Studies have shown that only retinal and retinoic acid (not retinol) can actually stimulate fibroblasts to produce dermal collagen.

05



The inflammation and DNA damage caused by retinoic acid and retinol make retinal become the effective and sun-safe natural vitamin A of choice (retinyl retinoate is the best choice among derivatives).

Vitamin A



Vitamin A CHEMISTRY

- Vitamin A occurs in two forms in food

Retinoids

Retinol

Retinal

Retinoic acid

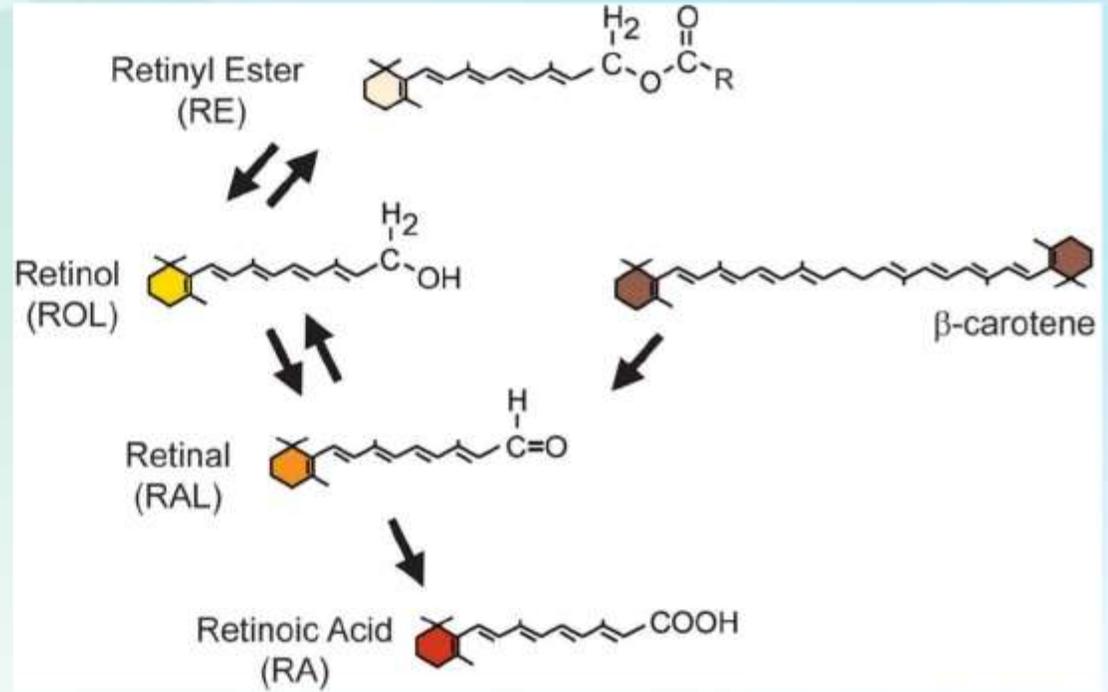
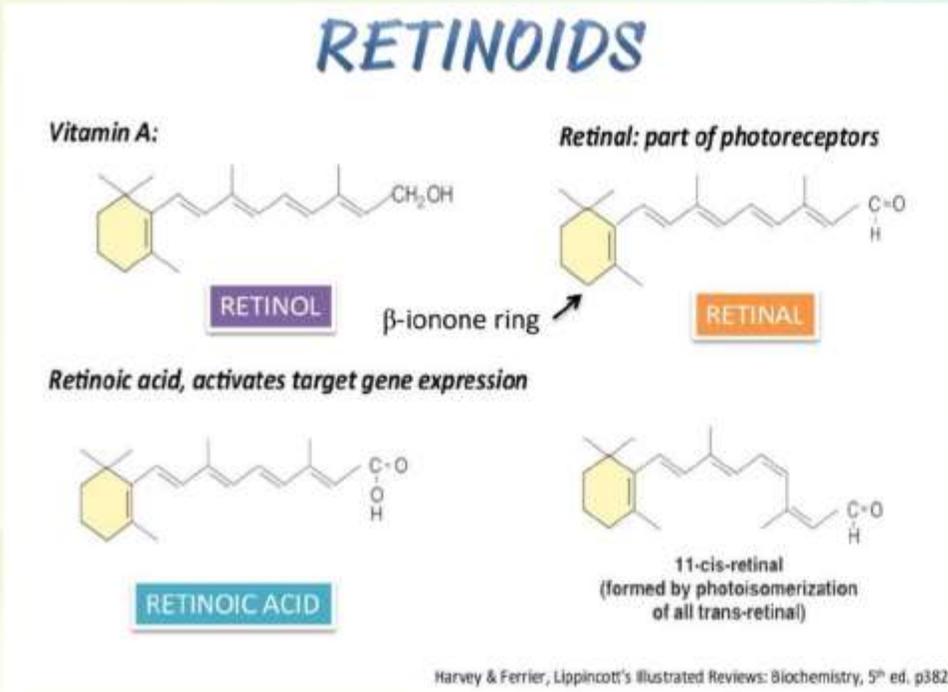
Carotenes

α - carotene

β - carotene

γ - carotene

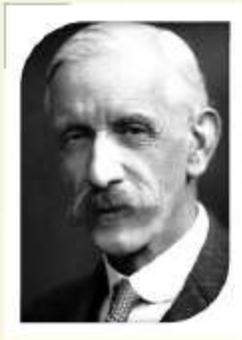
Retinoids



Function of vitamin A in human body



Vitamin A and Nobel Prize



Frederick Gowland Hopkins

In 1912, Frederick Gowland Hopkins proved that unknown cofactors found in milk were necessary for the growth of rats. They called the fat-soluble vitamin A factor. Hopkins won the Nobel Prize in 1929 for this discovery.



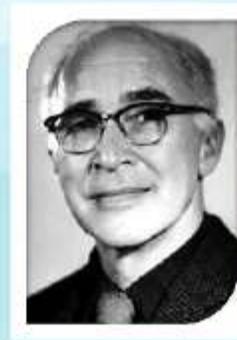
Paul Karrer

Swedish chemist Paul Karrer expounded the structure of vitamin A and won the Nobel Prize for chemistry in 1937.



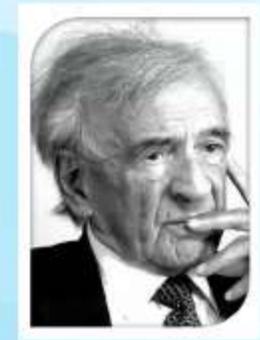
Richard Kuhn

German chemist Richard Kuhn won the Nobel Prize for chemistry in 1938 because of identifying the structure of carotene.



George Wald

In 1940, George Wald demonstrated that the combination of retinal and rhodopsin produced rhodophane. This is one of three color-sensitive pigments in the cones of two kinds of optic nerve cells on retinal. And the production of retinal is related to vitamin A. In 1967, Swedish scientists Ragnar Arthur Granit and Halden Hartlin, George Wald in the United States shared the Nobel Prize in medicine and physiology.

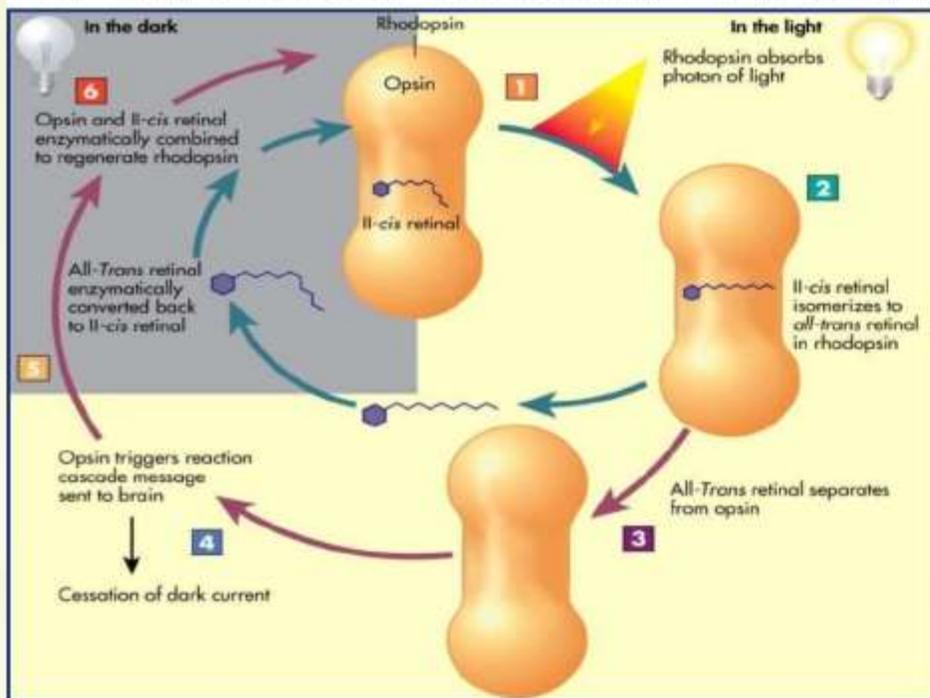


Torsten Wiesel

Torsten Wiesel won the Nobel Prize in 1981 because of dark adaptation research. Bright light will run out of rhodopsin stored in the rods. After a few minutes, rhodopsin is resynthesized and vision roved. This period of time is called the dark adaptation time.



WALD'S VISUAL CYCLE



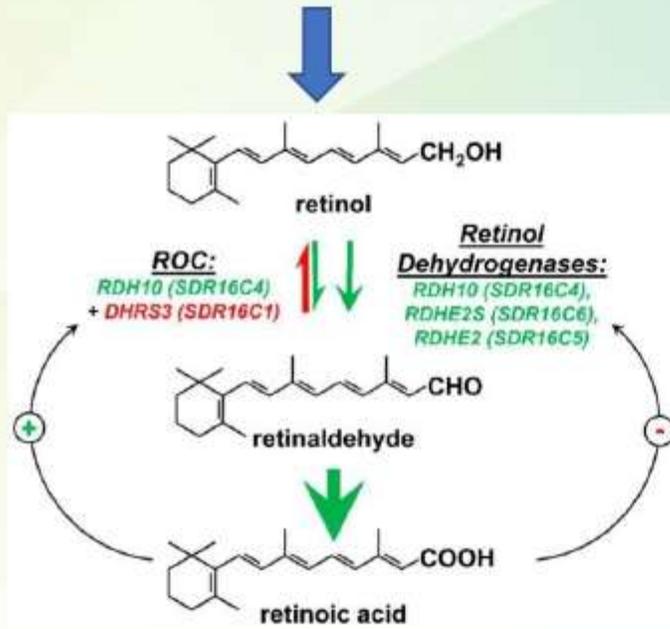
Retinal and visual sensoty

Visual pigment of all the animals with retinal 1 or retinal 2 for chromophores

All-trans-retinal can be catalyzed into 11-cis-retinal by retinene isomerase. 11-cis-retinal can become rhodopsin in combination with opsins. 11-cis-retinal transforms into all-trans-retinal after rhodopsin encounters light. Because of the change of configuration, causing the stimulation of retinal. And rhodopsin is not stable after exposures to light, quickly decomposes into opsins and all-trans-retinal, starts the whole cycle again.

Retinol ester,retinol,retinal and retinoic acid in vivo transformation

Retinol Esters



One-step conversion: retinal is a direct precursor of retinoic acid.

Two-step conversion: retinol is converted to retinal and from retinal to retinoic acid.

Three-step conversion: retinol ester is converted to retinol, then from retinol to retinal, and finally from retinal to retinoic acid.

The closer a compound is to retinoic acid, the easier it is to convert and the more effective it is.



VitaminA is the absolute gold standard when it comes to anti-aging skin care



Boost the production of collagen and elastin, making the skin plump and youthful.



Increase cell renewal rate and make the skin surface smoother.



Reduce melanin production and make skin color more evenly.



Reduce sebum production and minimize the dormation of defects.



Contribute to UV repair, which is contrary to popular belief.



Retinol esters

Include retinol acetate, retinol palmitate and retinol propionate. Although they are the weakest retinoids (because they must be converted to retinol, retinal and finally retinoic acid), they are effective at very high concentrations.

Vitamin A active substance commonly used in skin care products

Retinol

Common over-the-counter retinoids. Formulation of 0.1-0.25% is an appropriate starting point and can be improved to 0.5% or 1% once tolerance is established. (Note: 2% is the maximum allowable concentration in the United States and 1% in Canada.)

Retinal

The direct precursor of retinoic acid is not only more active than retinol, but also acts 11 times faster than retinol. The formulation concentration is usually 0.05% or 0.1%.



AA ester, RR ester

A retinate that is 8 times more active than retinol but less irritating.

Hydroxypinacolone retinoate (HPR)

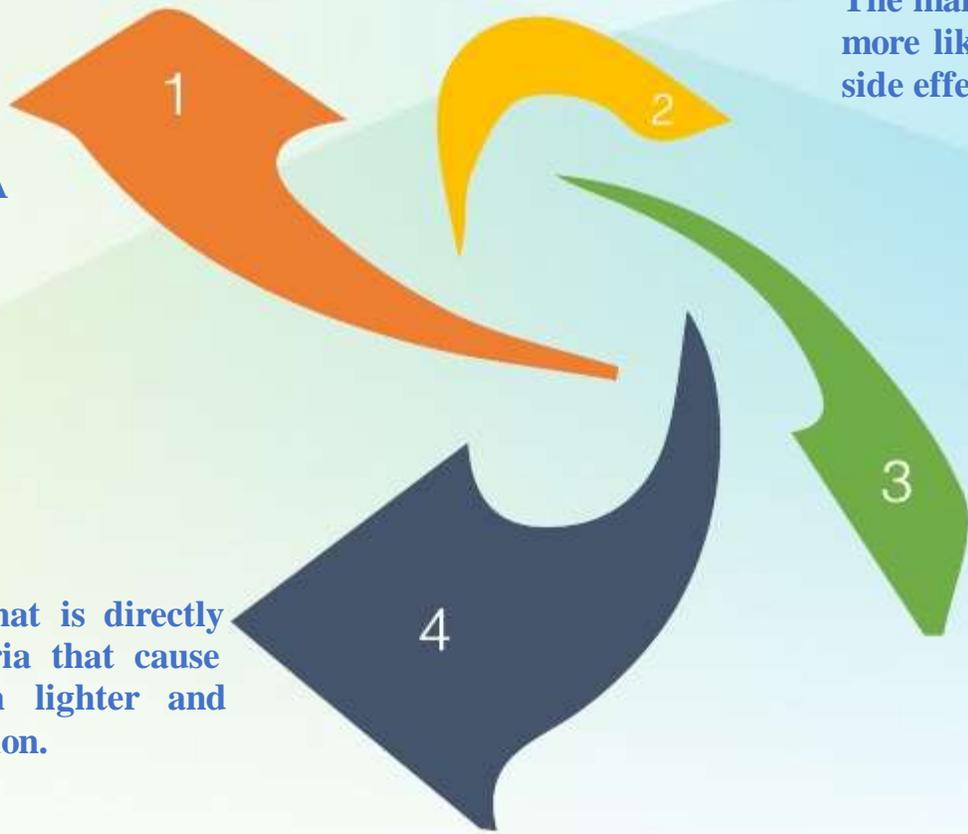
Another type of retinate is nearly as strong as prescription retinol but produces little irritation. (Note: in Canada, HPR is no longer allowed in pharmacies because it is now classified as a derivative of retinoic acid).

Retinal (RAL)



Retinal is a rare form of vitamin A that is more active than retinol.

Retinal is the only vitamin A that is directly antibacterial, targeting the bacteria that cause skin blemishes. Make your skin lighter and have a healthier, brighter complexion.



The main difference is that retinal works more like retinoic acid, but without the side effects of retinoic acid.

Retinal works 11 times faster than retinol, providing anti-aging, glowing and cleansing benefits to the skin.

The main difference between retinal and retinol



Retinal has antibacterial properties and is very suitable for the muscle with oil pox.



Retinol is two steps away from retinoic acid,while retinal is just one step away.(meaning:faster,better)



Literature has shown that the activity of retinol is only one-thirtieth that of retinoic acid,which has similar biological activity to retinoic acid.



Retinal is gentler on the skin than retinol.



Both can improve skin quality and complexion.



Retinal has multidirectional metabolism,and the excess RAL can be rapidly reduced to retinol,stored and inactivated in the form of retinol,while the “reverse metabolism”of retinoic acid does not exist.





Retinal for skin care

01

Promote epidermal cell metabolism,make skin more smooth and ruddy.

02

Enhance collagen synthesis,inhibit MMP,and reduce the decomposition of its own protein.

03

Reduce UV damage to collagen.

04

Inhibition of tyrosinase,reduce the production of melanin,while promoting metabolism,accelerate the disappearance of melanin.

05

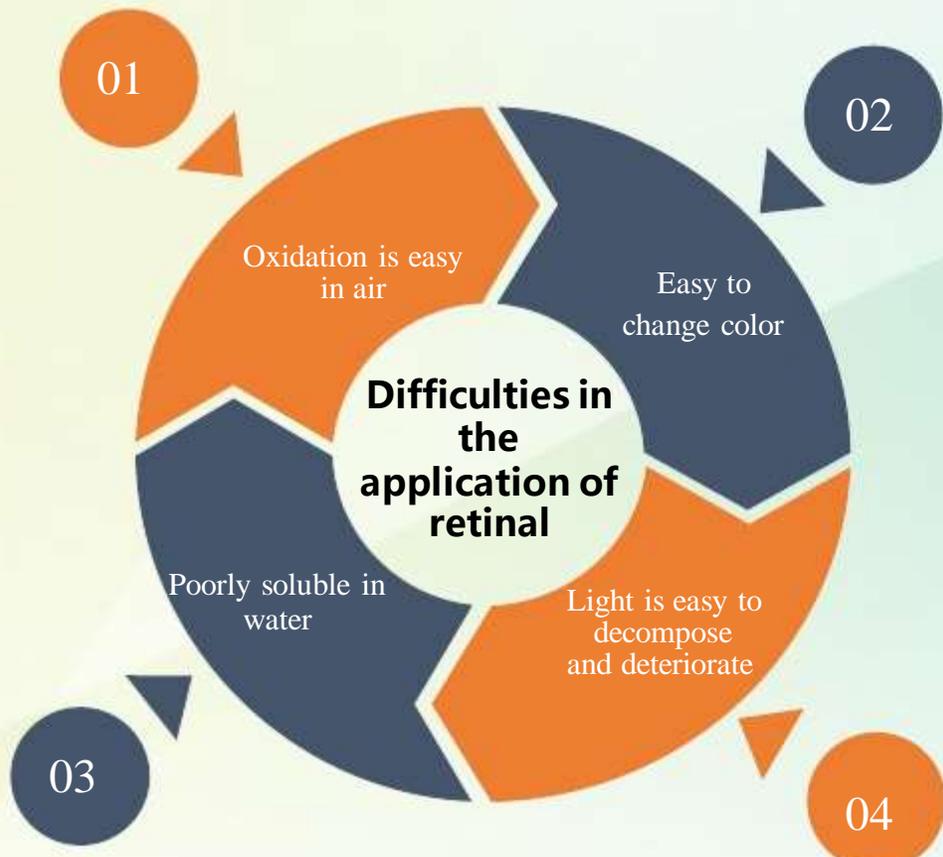
Remove redness.

06

Tighten up skin,anti-wrinkle and anti-aging.

07

Multiple mechanism acne treatment,repair blain to imprint.



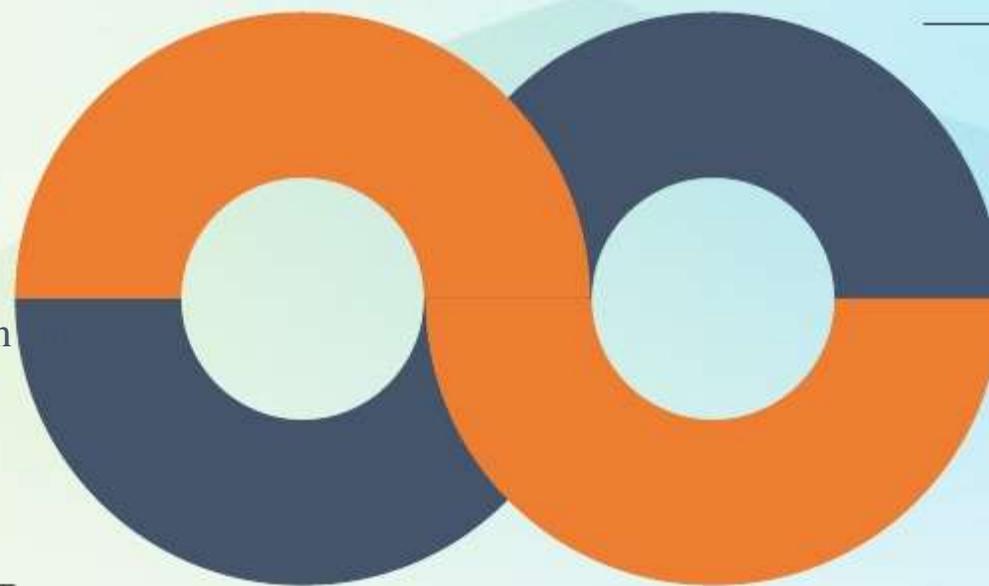
Although RAL is effective in skin care products, its use is limited due to its own shortcomings.

CHALLENGE



Solution

NanoActive RAL is a new type of nano-carrier system technology(NDDS).Retinal and vitamin C are liposome-encapsulation



INCI: retinal,ascorbic acid(vitamin C),Phospholipids,caprylic/capric triglyceride,glycerin,water.

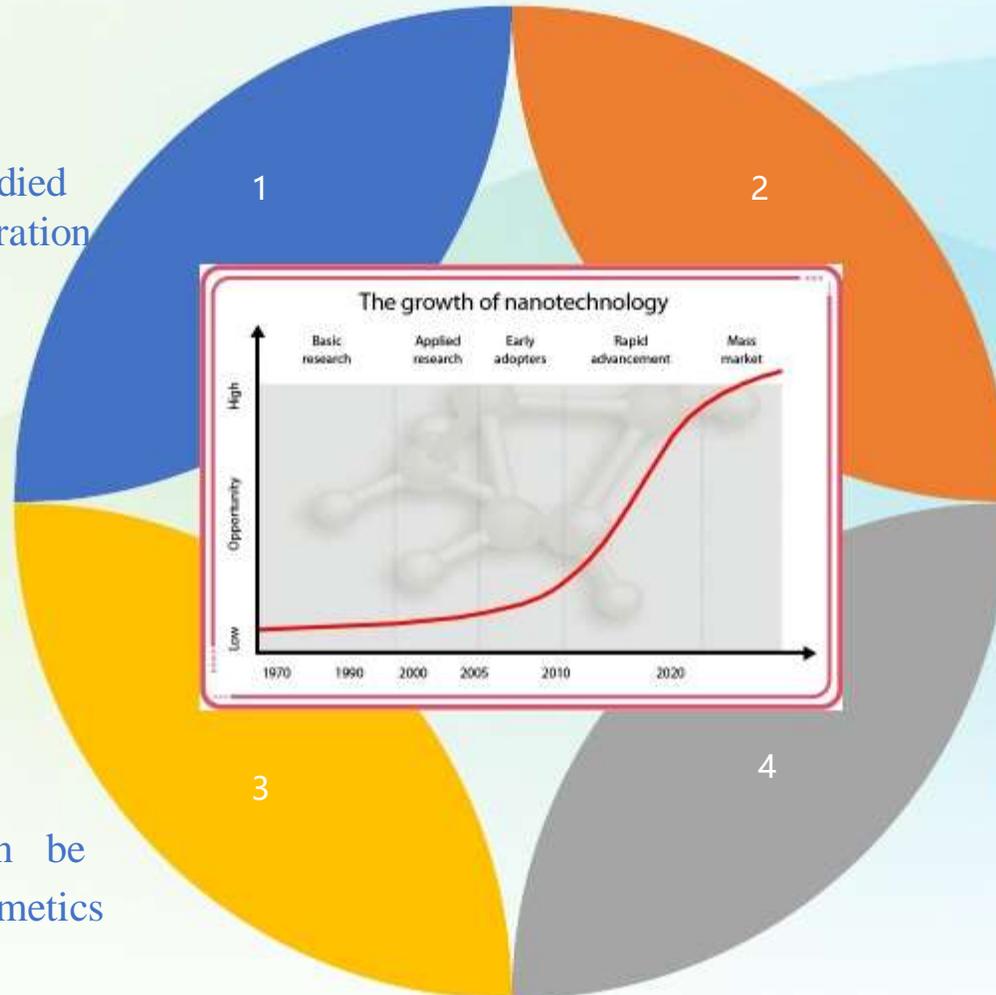
Nano Carrier Technology

- One of the most widely studied and applied new preparation technology.

- Nano-Bioactives are new products developed by nano-carrier system.

- Nano-carrier technology can be applied in medicine, food, cosmetics and other fields.

- Improve the solubility, stability, irritant and odor of bioactive substances, and has unique biological effects.





A new generation of cosmetic ingredients(NGCI)

Nano wraps bioactive raw materials

The target of action is clear

The composition and contene are clear

Ensure bioactive formulations

Clear mechanism of action

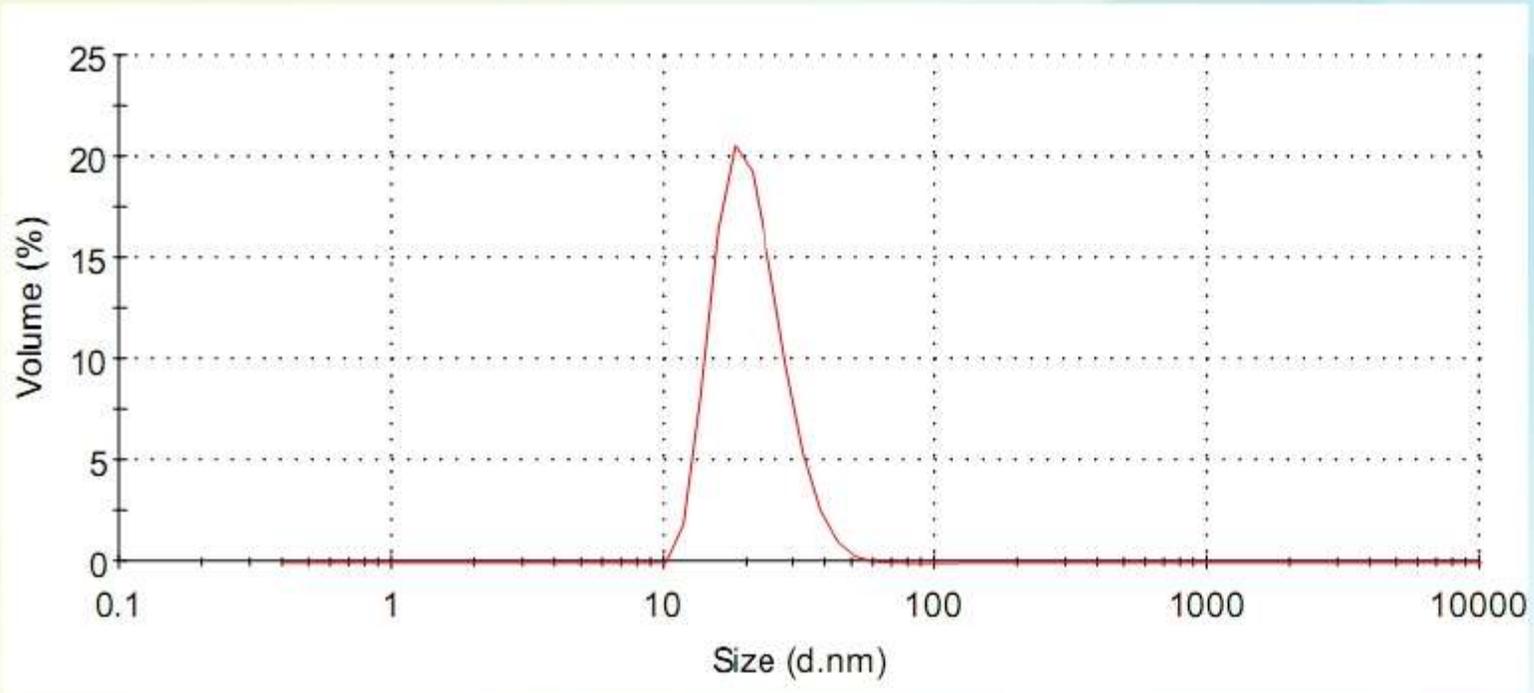
- good solubility
- stable,do not change color
- easy to absorb



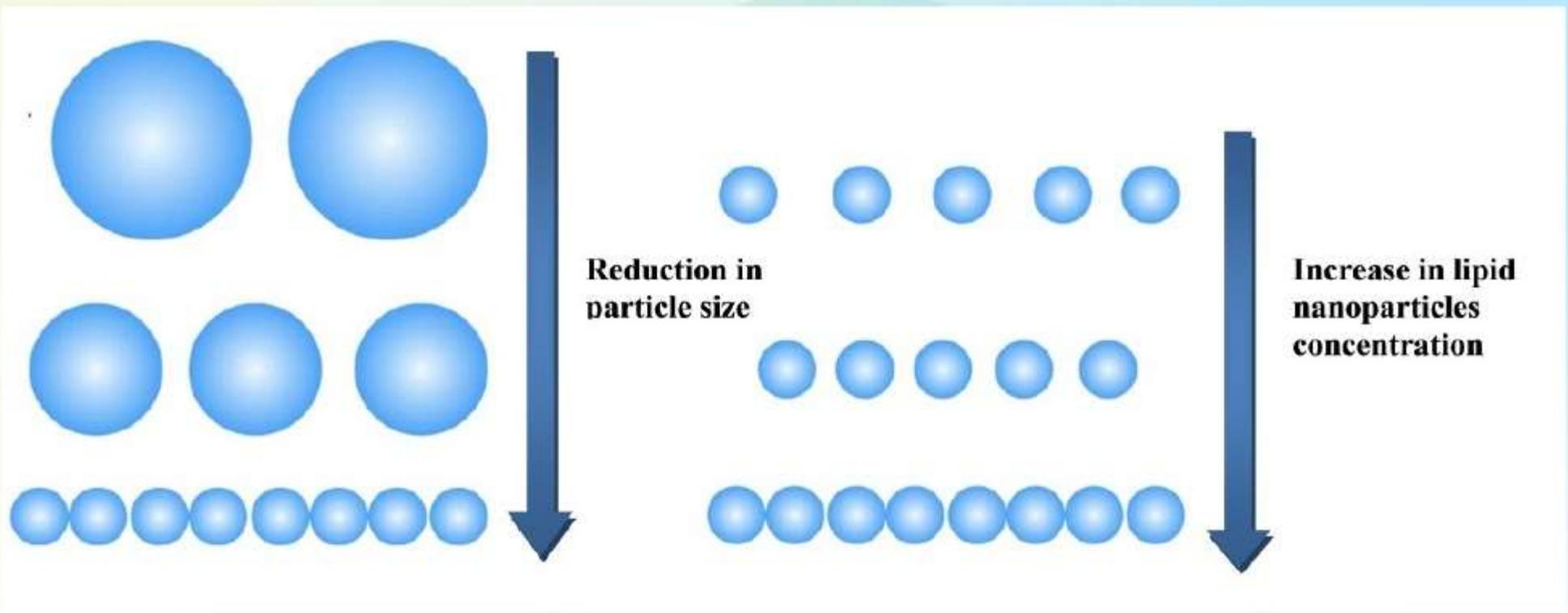
The perfect combination of traditional medicine,modern biotechnology and nanotechnology

NanoActive RAL

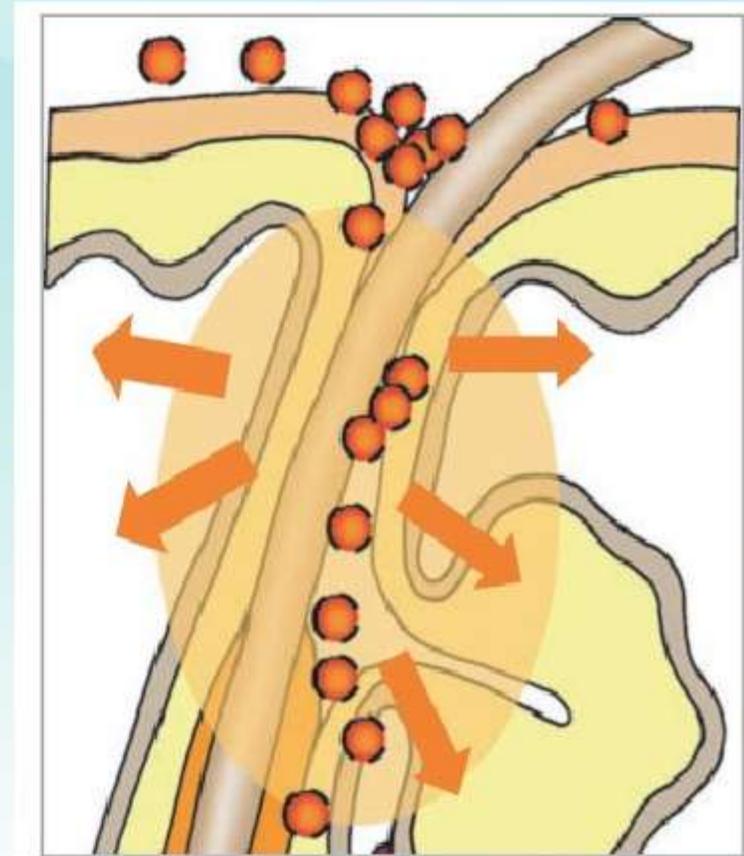
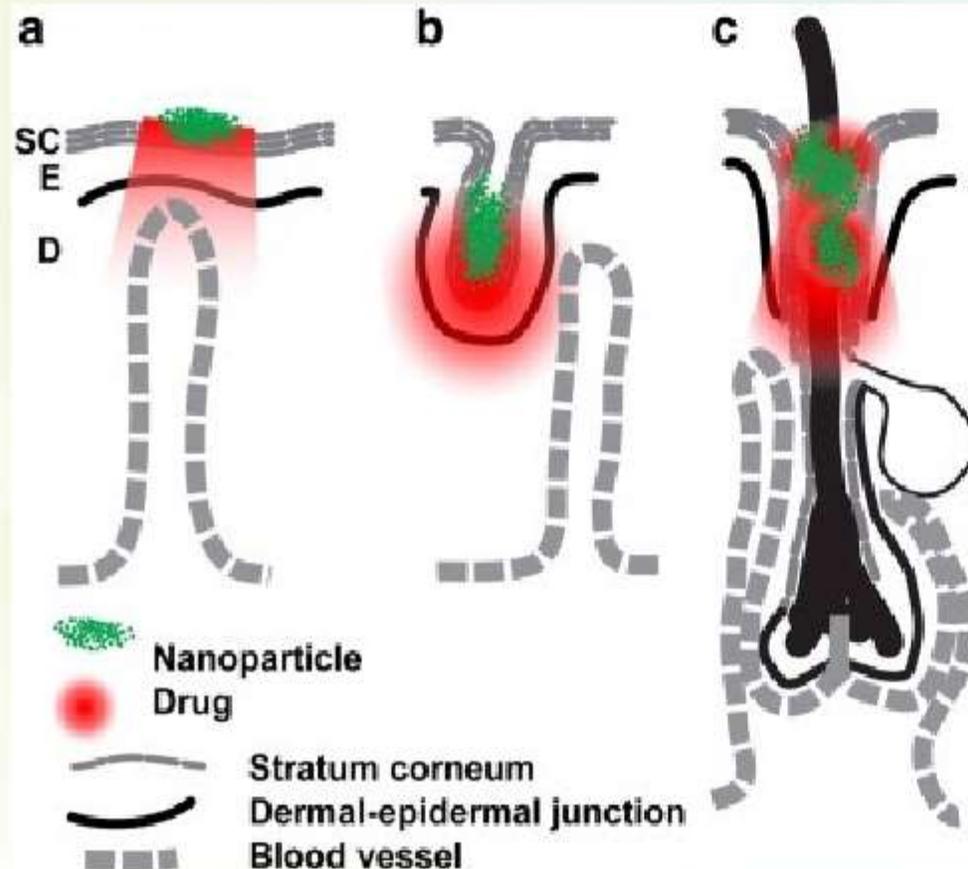
Product characterization



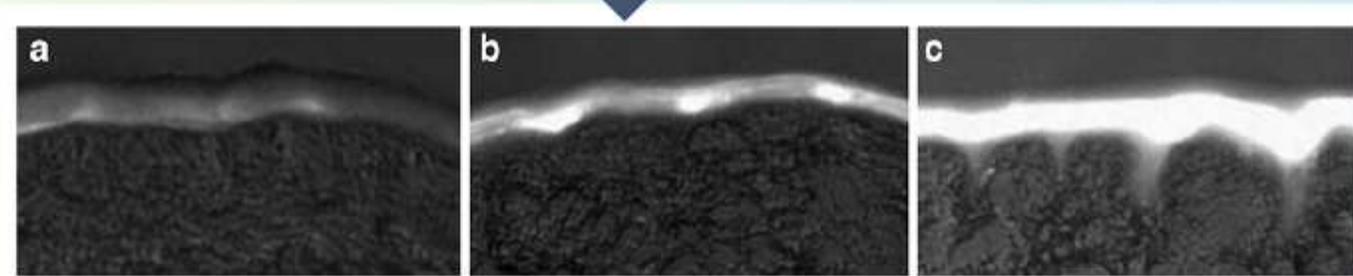
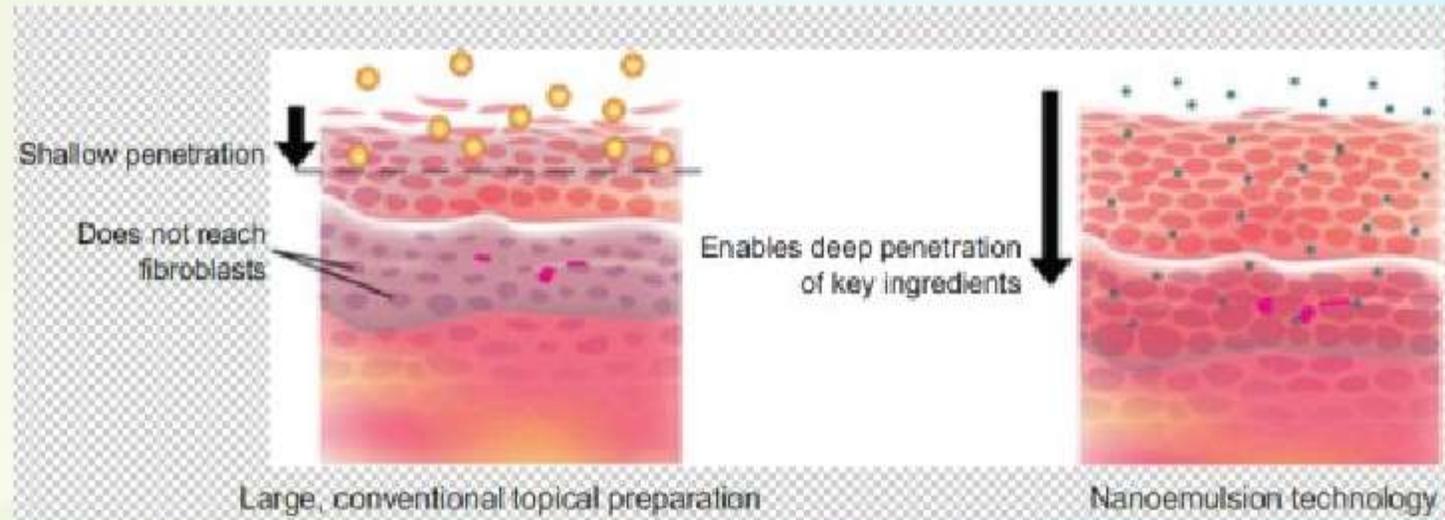
[Unique closing effect]



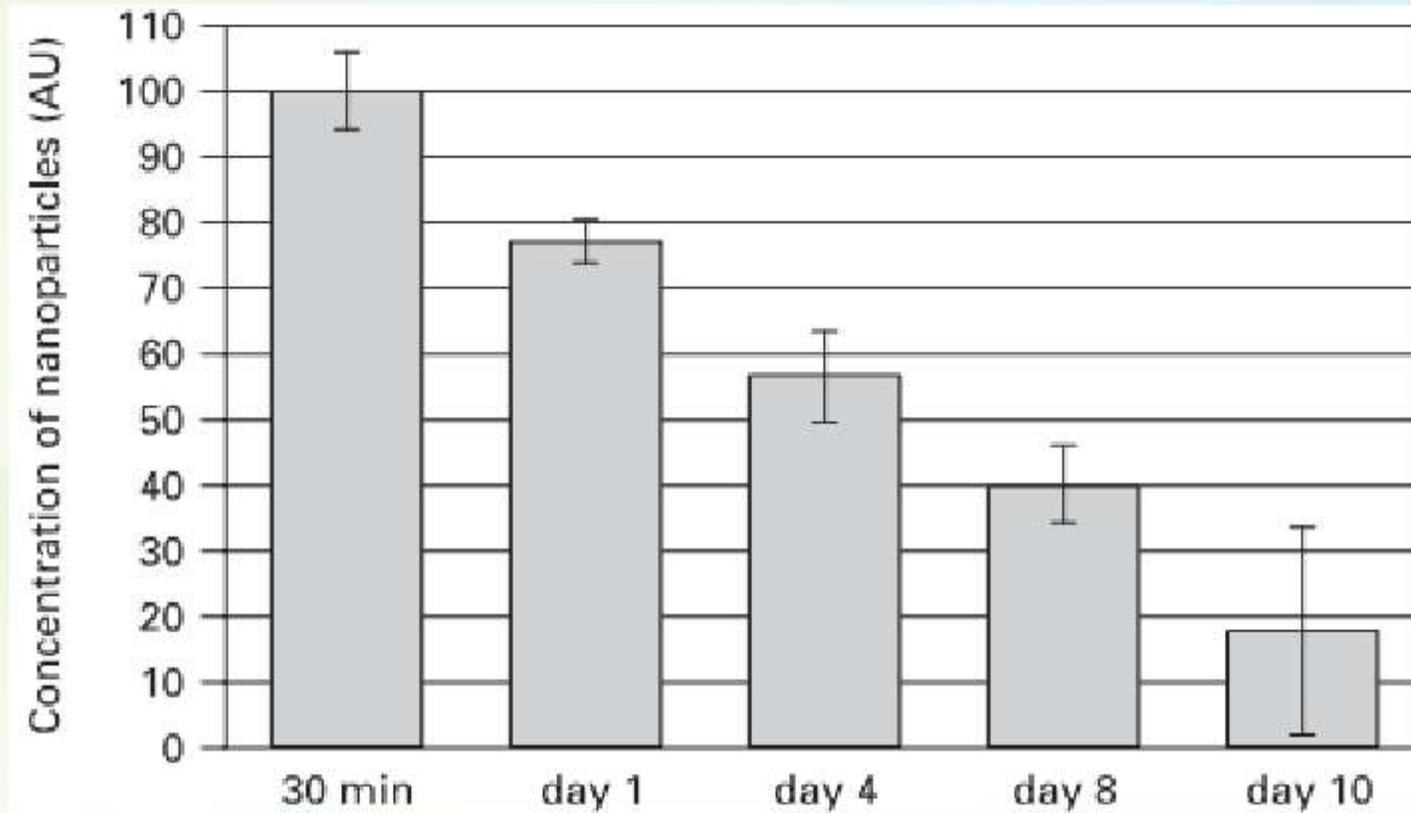
Targeted absorption by hair follicles



The smaller the particle size, the deeper the penetration and the greater the amount



Hair follicle storage, slow release up to 10 days



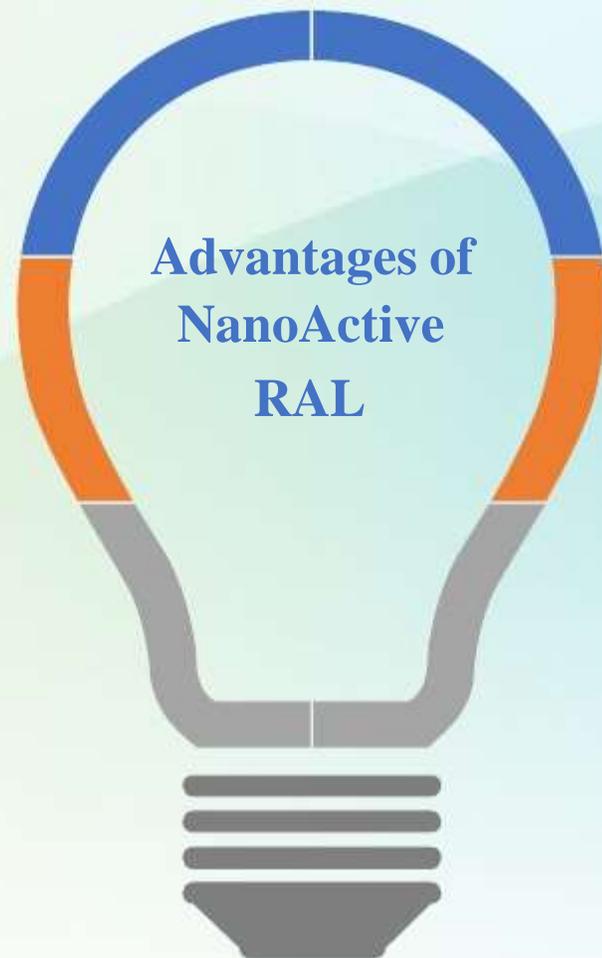
Skin Pharmacol Physiol 2006;19:232–236



The bioavailability of retinal was greatly improved by nano-carrier retinal.



NanoActive RAL is coated with phospholipid bilayer with particle size less than 30nm with vitamin C, which is synergistic to better repair the skin barrier.



Advantages of NanoActive RAL



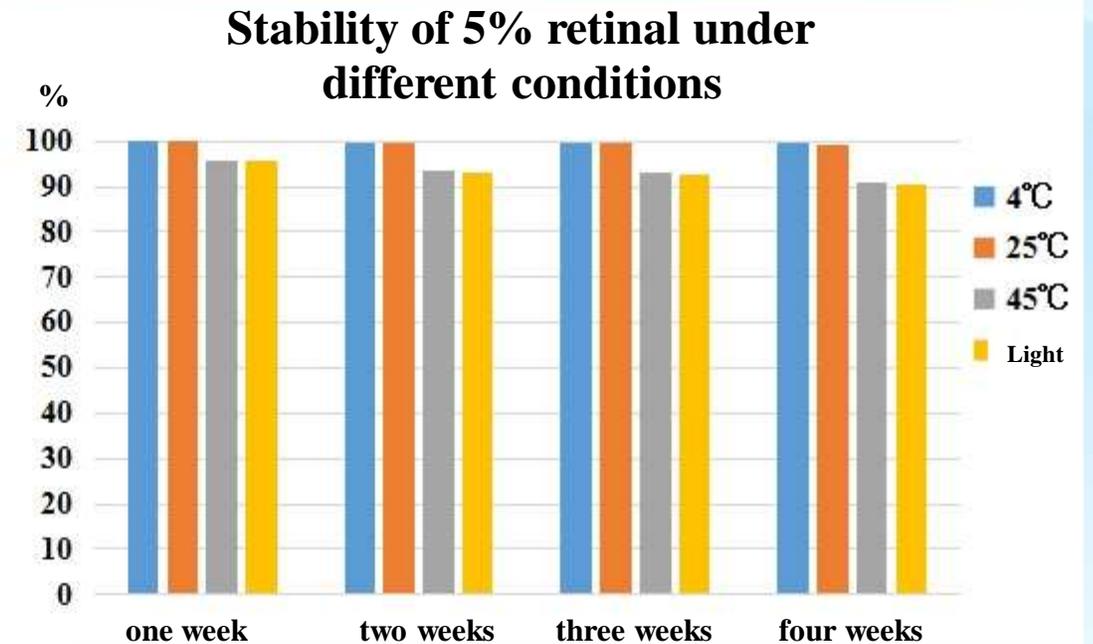
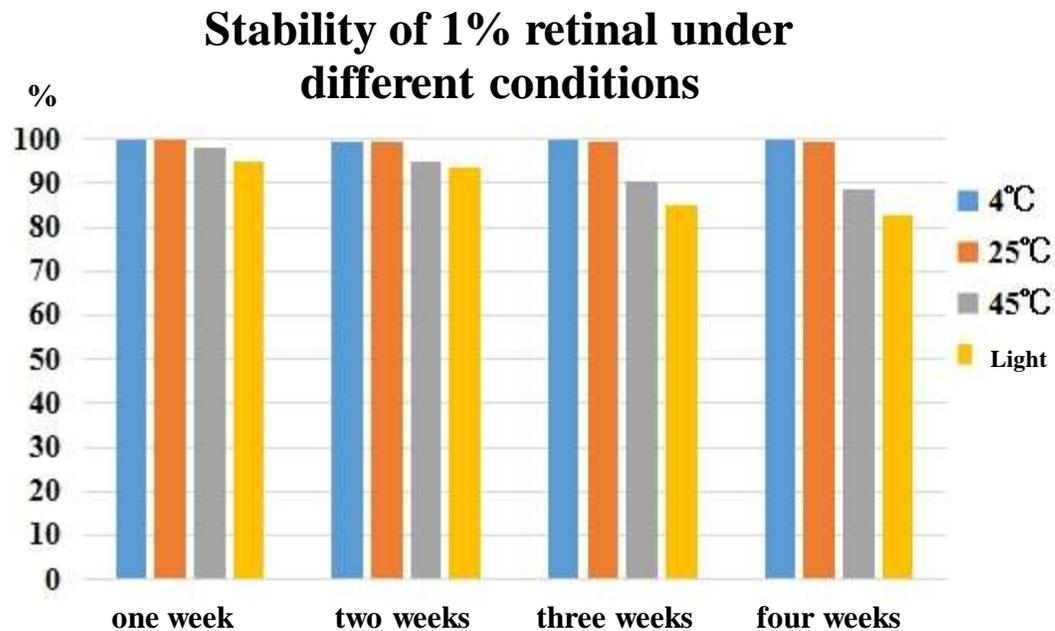
It protects retinal from the influence of external environmental factors, and solves the problems of stimulation, stability and dissolution.



Product transparency, good stability, not easy to change color, easy to use.

NanoActive RAL Advantage

Stability test : the 1% and 5% nanoactive RAL were stored at 4°C, room temperature(25°C),45°C and under light conditions for 4 weeks,respectively.The content was measured once a week,and the statistical data were analyzed.

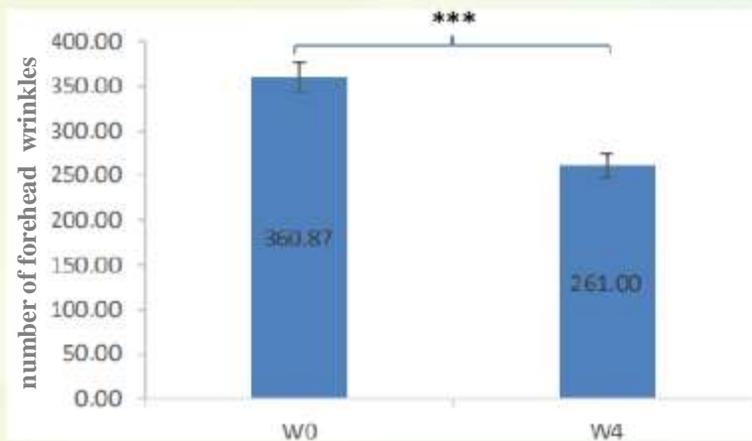


Conclusion:the stability of 1% and 5% Nanoactive RAL are good at 4°C and room temperature 25 °C.

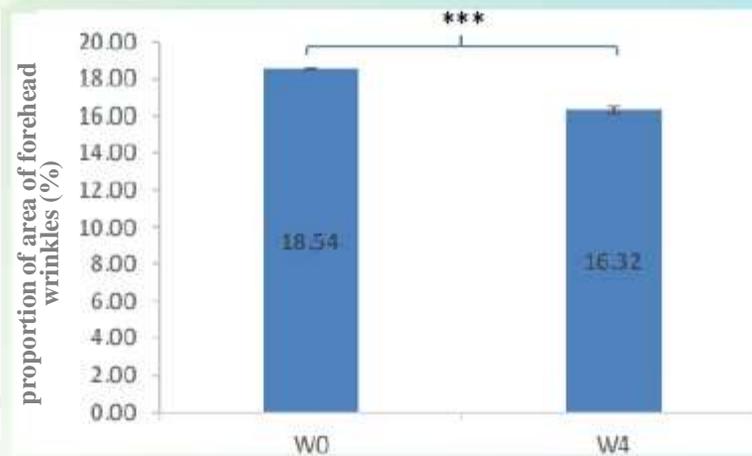
NanoActive RAL Human Body Test (anti-wrinkle and anti-aging)

Clinical trials: 30 female subjects aged 35-55 years old, were selected to use the product for 4 weeks, twice a day, once in the morning and once in the evening, on the whole face, and then tested with instruments. Before and after the test, the effect of product on improving crow's feet and forehead lines and whitening was verified. (ns shows $P > 0.05$, * shows $0.01 \leq p < 0.05$; ** shows $0.001 \leq p < 0.01$, *** shows $p < 0.001$)

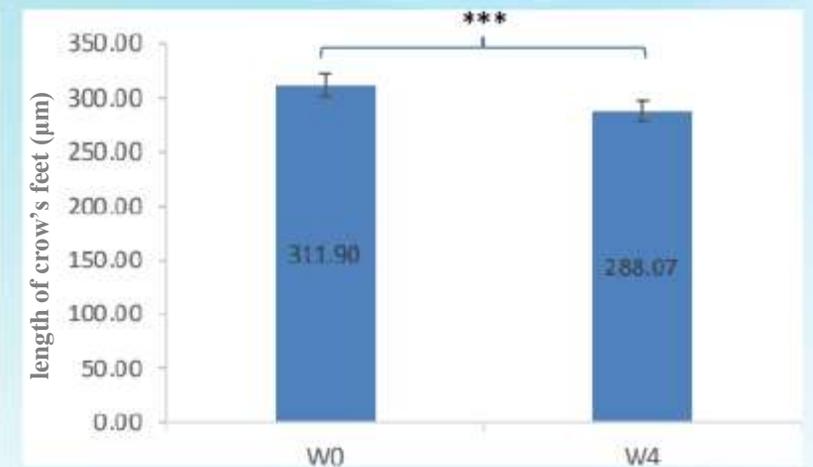
Comparison and analysis of the number of forehead wrinkles before and after



Comparison and analysis of the proportion of area of forehead wrinkles before and after



Comparison and analysis of the length of forehead wrinkles before and after



After using the test sample for 4 weeks, compared with before using, the number, area and length of forehead wrinkles in the test area were significantly reduced ($P < 0.001$). The results showed that the sample could reduce the number, area and length of forehead wrinkles for 4 weeks.

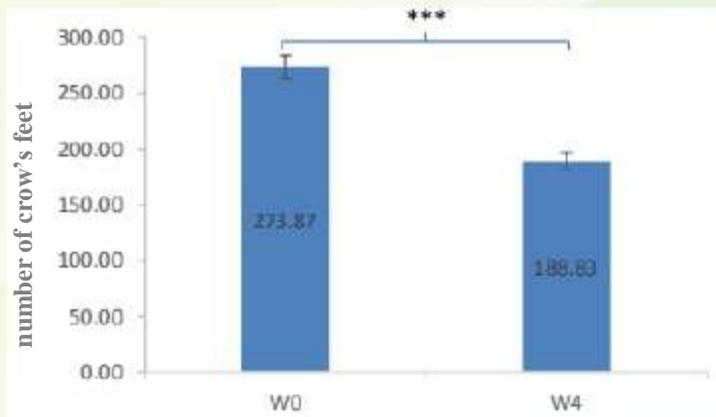
NanoActive RAL Human Body Test (anti-wrinkle and anti-aging)



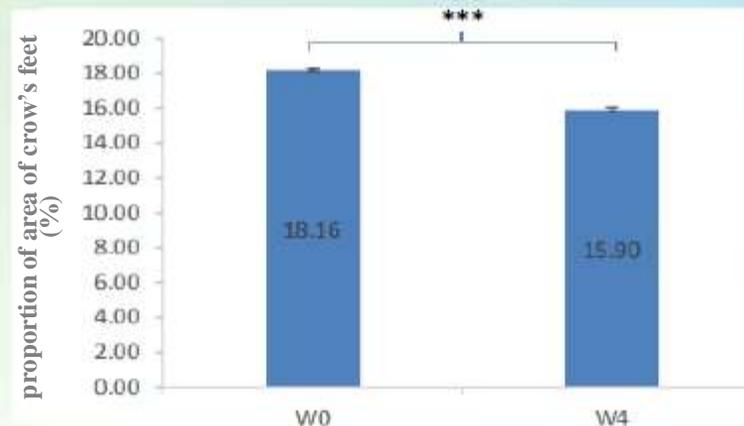
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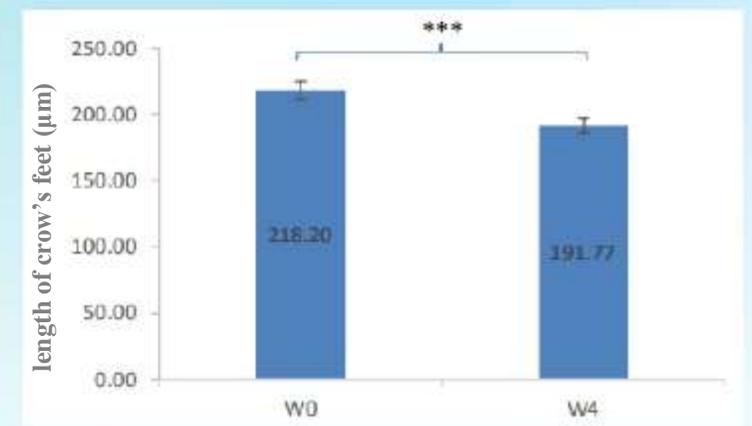
Comparison and analysis of the number of crow's feet before and after



Comparison and analysis of the proportion of area of crow's feet before and after

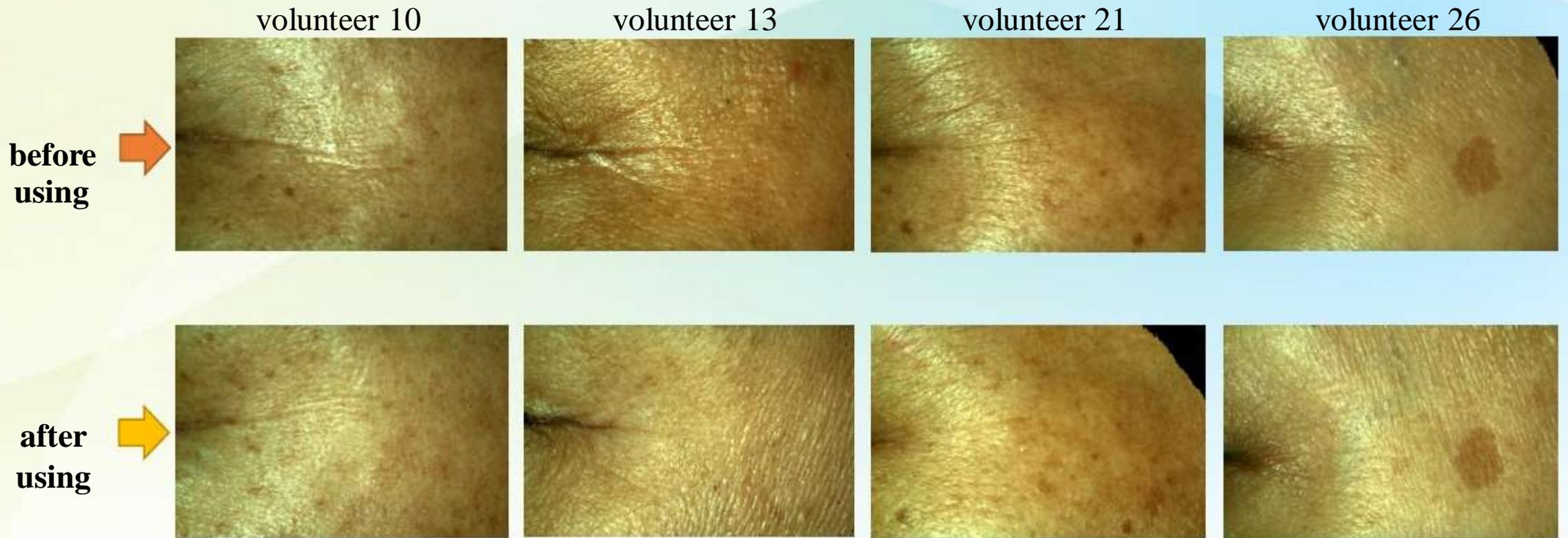


Comparison and analysis of the length of crow's feet before and after



After using the test sample for 4 weeks, compared with before using, the number, area and length of crow's feet in the test area were significantly reduced ($P < 0.001$). The results showed that the sample could reduce the number, area and length of crow's feet for 4 weeks.

NanoActive RAL Human Body Test (anti-wrinkle and anti-aging)

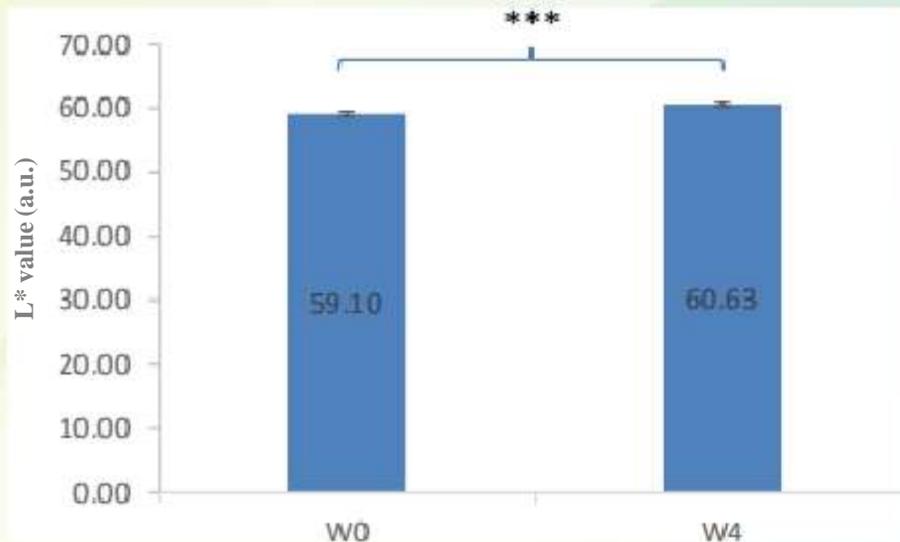




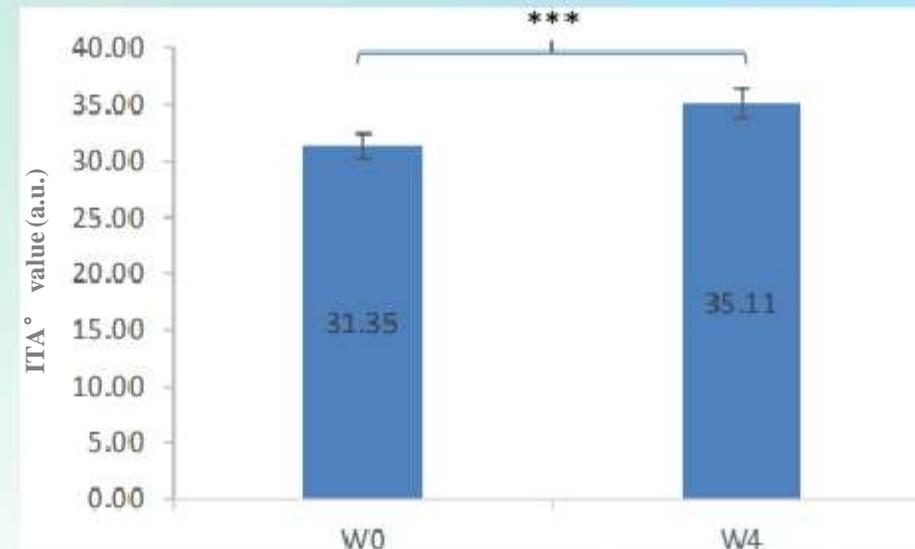
NanoActive RAL Human Body Test (whitening)

Clinical trials: 30 female subjects aged 35-55 years old, were selected to use the product for 4 weeks, twice a day, once in the morning and once in the evening, on the whole face, and then tested with instruments. Before and after the test, the effect of product on improving crow's feet and forehead lines and whitening was verified. (ns shows $P > 0.05$, * shows $0.01 \leq p < 0.05$; ** shows $0.001 \leq p < 0.01$, *** shows $p < 0.001$)

Comparison and analysis of the L* value of skin before and after



Comparison and analysis of the ITA° value of skin before and after



After using the test sample for 4 weeks, compared with before using, the L* and ITA° values in the test area were significantly increased ($P < 0.001$; $P < 0.001$). The results showed that the sample had whitening effect.

NanoActive RAL Human Body Test

before using



after using



NanoActive RAL Human Body Test

before using



after using



In this subject group (30 people), used “nano-encapsulated retinal essence” after 4 weeks, the self-evaluation results of the subjects on the product:

NanoActive RAL Human
Body Test

- 1 96.7% of subjects were satisfied or very satisfied with the product.
- 2 90.0% of subjects were satisfied or very satisfied with the effect of the product to make the skin more delicate and smooth.
- 3 93.3% of subjects were satisfied or very satisfied with the effect of the product to make the skin tighter and more elastic.
- 4 93.3% of subjects were satisfied or very satisfied with the effect of brightening skin tone and improving skin luster.
- 5 90.0% of subjects were satisfied or very satisfied with the improvement of the current fine lines.
- 6 90.0% of subjects were satisfied or very satisfied with the moisturizing effect.
- 7 83.3% of subjects were satisfied or very satisfied with the whitening effect.
- 8 93.3% of subjects agreed or strongly agreed that the product was easy to absorb.
- 9 86.7% of subjects agreed or strongly agreed that the product was non-sticky.
- 0 93.3% of subjects agreed or strongly agreed that the product was mild and non-irritating (such as tingling, burning, etc.).



Clinical study on retinal skin care products (reference II)

Retinal is the best treatment for light damage!

“Efficacy of Topical 0.05% Retinaldehyde in Skin Aging by Ultrasound and Rheological Techniques”

Diridollou, S., Vienne, M.P., *Dermatology*, 1999;199(suppl 1):37-41.

The gist of the study:forty patients took part in the year-long study,which showed retinal significantly increased skin thickness and elasticity.

Clinical study on retinal skin care products (reference I)

Retinal is very well tolerated!

“Tolerance of Topical Retinaldehyde in Humans”

Sachsenberg, E.M , Dermatology, 1999; (suppl1)199:61-63.

Main points

- The study showed that most of the 357 patients tested had a much better tolerance for retinal than RA.
- Unlike the phototoxic and inflammatory potential of retinoic acid, none of the 45 patients tested alone showed phototoxic effects.
- Overall, the side effects of retinal were almost as low as those of placebo, compared with a much higher irritation associated with retinoic acid.

Retinal is just as effective as retinoic acid, no stimulation!

“Profilometric Evaluation of Photodamage after Retinaldehyde and Retinoic Acid Treatments”

Creidi, P., Vienne, M.P., J.Am Acad Dermatol, 1998; 39: 960-965.



Clinical study on retinal skin care products (reference III)



Main points

Abstract: The study showed that retinal was very effective in reducing facial wrinkles.

In this double-blind study, retinal was just as effective as retinoic acid, with fewer side effects.



Clinical study on retinal skin care products (reference IV)

Retinal is low irritant,so patient compliance is good!

“Tolerance Profile of Retinol, Retinaldehyde and Retinoic Acid under Maximized and Long-Term Clinical Conditions”

Fluhr, J.W., Vienne, M.P., Dermatology 1999; 199(suppl 1):57-60

Main points

- In this study,retinal stimulated 355 patients at a much lower rate than retinoic acid.
- Patients treated with retinal were much more compliant and had fewer side effects than those treated with retinic acid.



Clinical study on retinal skin care products (reference V)

Retinal is a powerful skin remodeler!

“Repair of UVA-Induced Elastic Fiber and Collagen Damage by 0.05% Retinaldehyde Cream in an Ex-Vivo Human Skin Model”

Boisnic, S., Branchet-Gumila, M.C., ,
Dermatology, 1999; 199(suppl 1):43-48.



Main points

This study of human skin showed that all UVA treated skin had significant damage to collagen and elastin, and all the damage was repaired with 0.05% retinal.

Clinical study on retinal skin care products (reference VI)

Retinal has a great effect on wrinkles!

“Clinical Use of Topical Retinaldehyde on Photaged Skin”

Creidi, P., Humbert, Ph.,

Dermatology 1999; 199(suppl 1):

49-52.



Main points

- ◆ 85 photodamaged patients were treated with 0.05% retinal, and the improvement in coarse and fine wrinkles was rated from “moderate” to “slight”.
- ◆ 85 patients in the study saw substantial improvements in facial redness and swelling, while most reported brighter, glowing skin. The study also showed that the vast majority of patients had improved hydration and reduced grease and roughness.

Clinical study on retinal skin care products (reference VII)

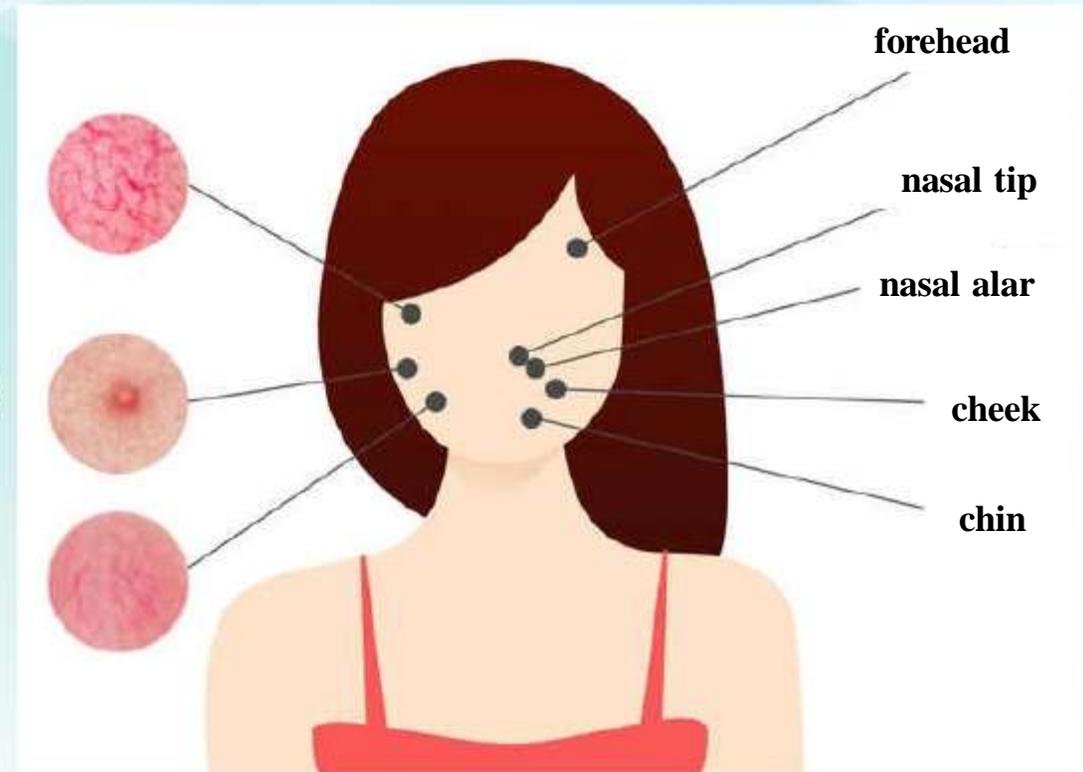
Retinal is a very effective treatment for rose acne!

“Retinaldehyde Alleviates Rosacea”

Vienne, M.P., Ochando, N., Dermatology 1999;
199(suppl 1):53-56.

Main points

In this study of 23 people, 75% of rosacea patients had reduced redness and swelling, and only one sensitive skin type had side effects (they were mild).



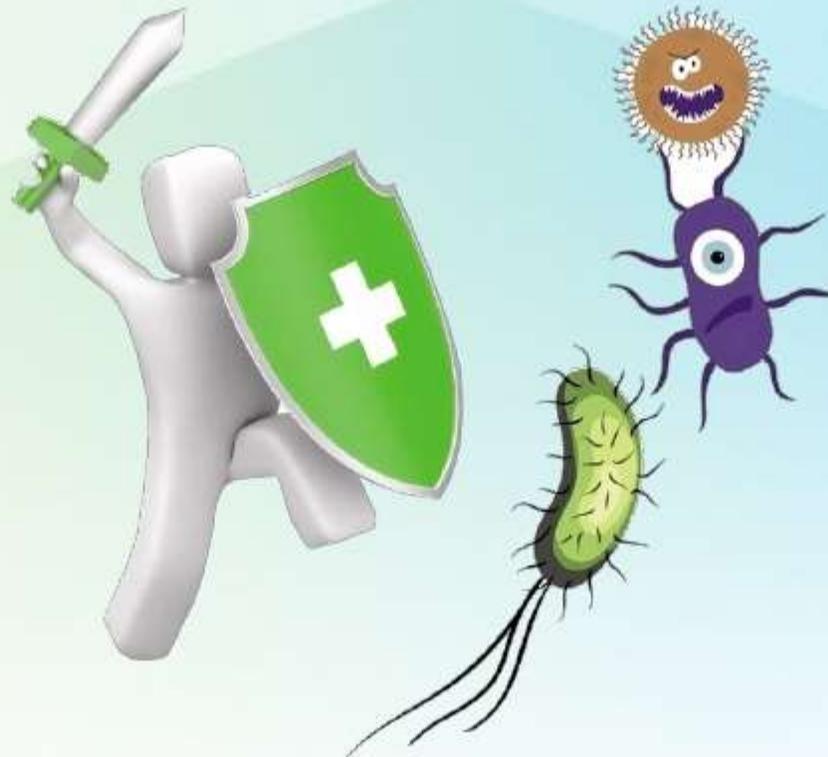
Clinical study on retinal skin care products (reference VIII)

Retinal can be antibacterial, retinoic acid is not ok!

“Antibacterial Activity of
Retinaldehyde against *P. Acnes*”

Pechere, M., Pechere, J.C., ,

Dermatology 1999; 199(suppl 1):29-31.



Main points

The study showed that retinal was very effective in reducing the number of propionibacterium acnes. All-trans retinoic acid has no direct antibacterial effect.

Clinical study on retinal skin care products (reference IV)



Retinal is a great treatment for acne!

“Comedolytic Effect of Topical Retinaldehyde in the Rhino Mouse Model”

Fort-Lacoste, L., Verscheure, Y., *Dermatology* 1999; 199 (suppl 1):33-35.

Main points

Retinal and retinoic acid had statistically similar keratinolytic effects and were less irritating

Clinical study on retinal skin care products (reference X)

Retinal normalizes VEGF and helps hide capillaries (remove red spots)!

“Effects of Retinoids on Vascular Endothelial Growth Factor Production by Cultured Human Skin Keratinocytes”

Lachgar, S., Chalveron, M.,
Dermatology 1999; 199(suppl 1):24-27



Main points

- Retinal modulates VEGF, which increases in a variety of skin conditions.
- Retinal's normalizing ability makes it the best choice for the treatment of actinic keratosis, dermatosis, and rose acne.

Clinical study on retinal skin care products (reference XI)

Retinal metabolism

“Metabolism of Retinaldehyde”

Sorg, O., Didierjean, L., Dermatology 1999; 199(Suppl 1): 13-17

**Main
points**



Retinal is the chemical form closest to retinic acid (vitamin A compounds) and is rapidly converted to retinic acid.

Retinal is stored by the skin and is easy to use, unlike retinoic acid, which cannot be stored and therefore becomes an irritant.

Clinical study on retinal skin care products (reference XII)

Retinal is the best vitamin A compound!

“Topical Natural Retinoids”

Saurat, J.H., Sorg, O., Dermatology 1999; 199(suppl 1):1-2

Main points



The average permeability of Retinoids was 2%, meaning that 98% of the retinoids lodged on the surface of the skin causing irritation.



Retinoic acid is not stored in the skin, so any excess retinoic acid is a source of irritation.



Retinal is a precursor of retinoic acid and is rapidly converted to retinoic acid in the skin to maximize RA receptor stimulation.

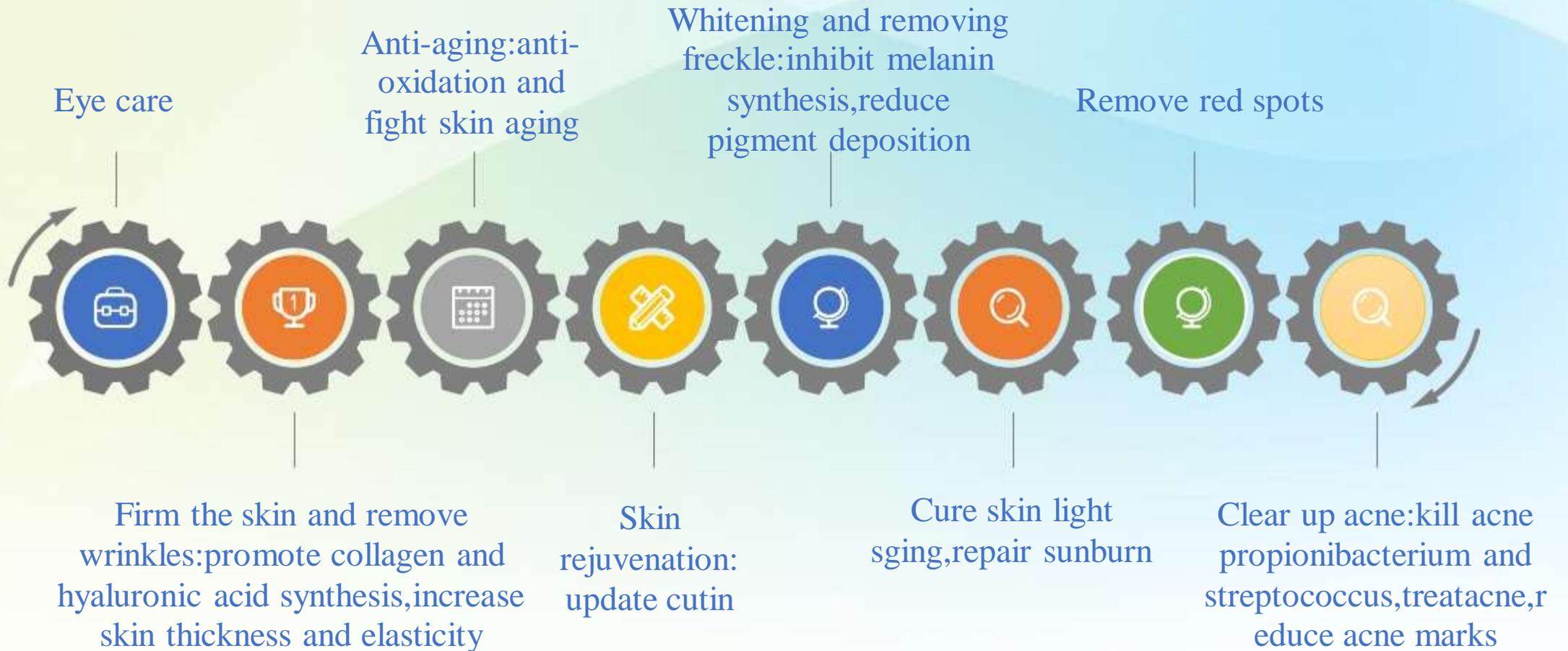


Unused retinal is stored by the skin for future use.



The preferred form of retinal is all-trans retinal.

NanoActive RAL Application



Product Description



INCI:

retinal,ascorbic
acid(vitaminC),



Appearance:

yellowish-orange
viscous liquid



Odor:

characteristic



pH:

5.0-8.0



Retinal content:

≥5.0%

Phospholipids,caprylic/capric
triglyceride,glycerin,water.

Formulation guidance

Appropriate PH: 3.0-6.5

Recommended amount: 1-5%

Solubility: water-soluble, oil-soluble

Usage: add at the end of the formula

Others: generally used for night care products, daily products need to add light protection agent, packaging materials should choose opaque packaging as far as possible.



REB TECHNOLOGY®

Market case:





Market case:



Market case:





INNOVATION CREATE BEAUTY

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Email: Maggie@hzrebtech.com