

Gwhite VC-IP

Skin-friendly, Refreshing Skin

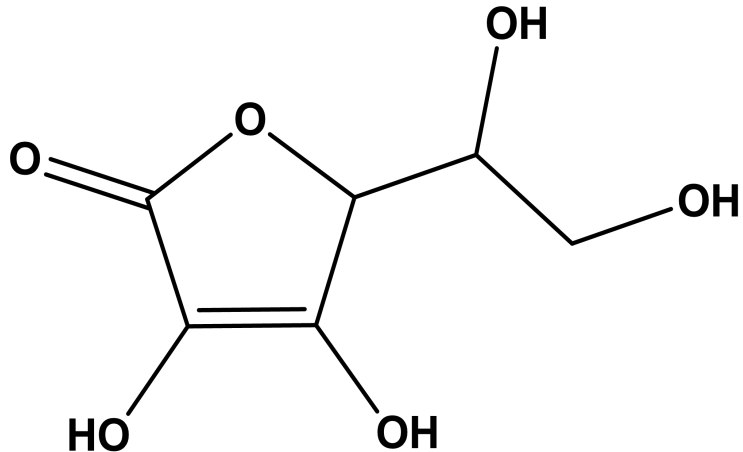
JAKA+

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Development Background

Vitamin C

also named Ascorbic acid



| Benefit to skin

Multiple benefits such as Photoprotection against UVA and UVB, promoting new collagen formation, inhibiting melanin production, and improving various kinds of skin inflammation.

| Difficult to apply formulas

- Due to its hydrophilic nature, VC may penetrate poorly into the skin.
- High pH or temperature, the presence of oxygen, and catalysis by metal ions may accelerate VC degradation, which is usually accompanied by a yellowish discoloration.

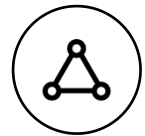
Appearance of 「Skin-compatible VC」

Ascorbyl tetraisopalmitate esterifies the hydroxyl group based on the molecular structure of Vitamin C (as shown below), enhancing the affinity of the VC molecule to the skin.

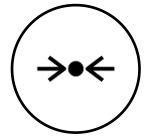


Table 1 Summary of the stability, percutaneous absorption, and therapeutic characteristics of AA and its derivatives.

Advantages



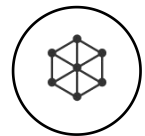
Physiological pH, good stability



Efficiently converts into prototype VC



Excellent transdermal performance



Comprehensive effects: photoprotection, promotion of collagen synthesis, inhibition of melanin synthesis, etc.

	Ascorbic acid (AA)	Sodium ascorbyl phosphate (SAP)	Magnesium ascorbyl phosphate (MAP)	Ascorbyl palmitate (AA-PAL)	Ascorbyl tetraiso-palmitate (VC-IP)	Ascorbyl glucoside (AA-2G)	Ascorbyl 2-phosphate 6-palmitate (APPS)	3-O-Ethyl ascorbate (EAC)
Stability	If pH < 3.5 in aqueous solutions; Anhydrous	Yes at pH7	Yes at pH7	Similar to AA	Yes pH < 5	Yes	Yes at pH7	No data
Percutaneous absorption	Yes Human <i>ex vivo</i> (as solution or microparticles)	Yes Animal <i>ex vivo</i> (but limited)	Yes Animal <i>ex vivo</i> (but limited)	Yes Animal <i>in vivo</i> (formulation dependent)	Yes Human <i>ex vivo</i> > MAP (trade publication)	Yes <i>in vitro</i>	Yes Animal <i>in vivo</i>	Yes Animal <i>ex vivo</i> > AA-2G
Conversion	N/A	No data	Yes <i>in vitro</i>	No data	Yes <i>in vitro</i>	Yes <i>in vitro</i>	Yes <i>in vitro</i>	No data
Photoprotection	Yes Human <i>in vivo</i>	Yes Human <i>in vivo</i> < AA	No data	Yes Animal <i>in vivo</i>	<i>In vitro</i> data	Yes Human <i>in vivo</i> < SAP	No data	No data
Cutaneous neocollagenesis	Yes Human <i>in vivo</i>	Yes <i>in vitro</i> < MAP	Yes <i>in vitro</i> ≡ AA	Yes <i>in vitro</i>	Yes <i>in vitro</i> (trade publication)	Yes <i>in vitro</i>	No data	No data
Inhibition of melanogenesis	Yes Human <i>in vivo</i>	Yes Human <i>in vivo</i> (trade publication)	Yes Human <i>in vivo</i>	No data	Yes Human <i>in vivo</i> (trade publication)	Yes <i>in vitro</i>	Yes Human <i>in vivo</i>	Yes Human <i>in vivo</i>

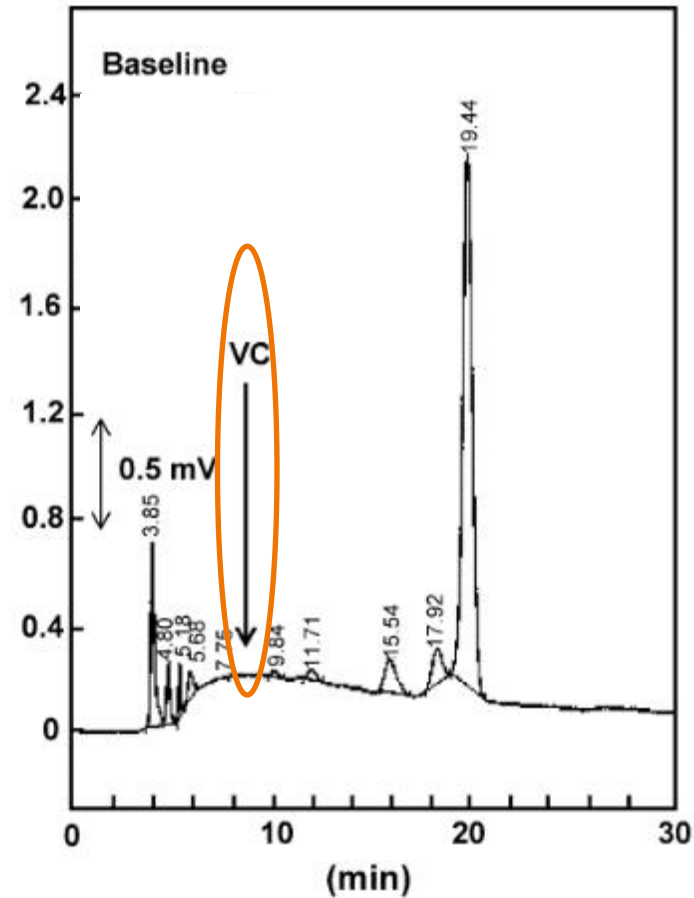
VC-IP

Transdermal conversion

rates up to **84%**

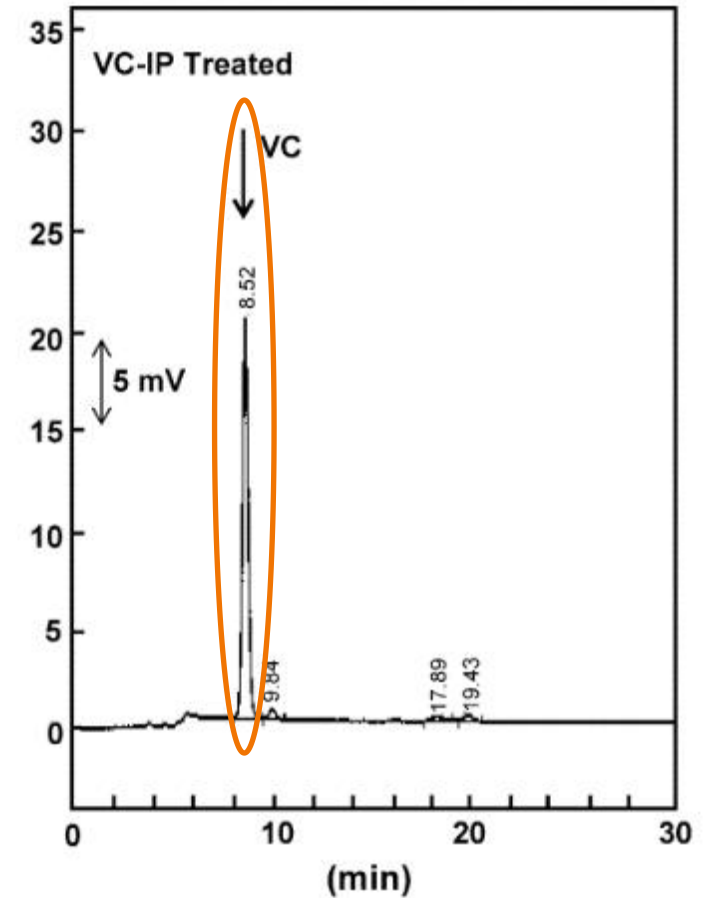
- Method: Using a TEST skin LSE-high LSE003 and HPLC to analyze
- Results: VC-IP-treated skin homogenates contained 694.8 ± 197.5 nmol/cm² of vitamin C; meanwhile, the amount of VC-IP in the skin was 133.3 ± 28.1 nmol/cm²
- Conclusion: The reconstructed skin model converted 84% of VC-IP into vitamin C.

No treatment ▼



× no peak detected

Treated with VC-IP ▼

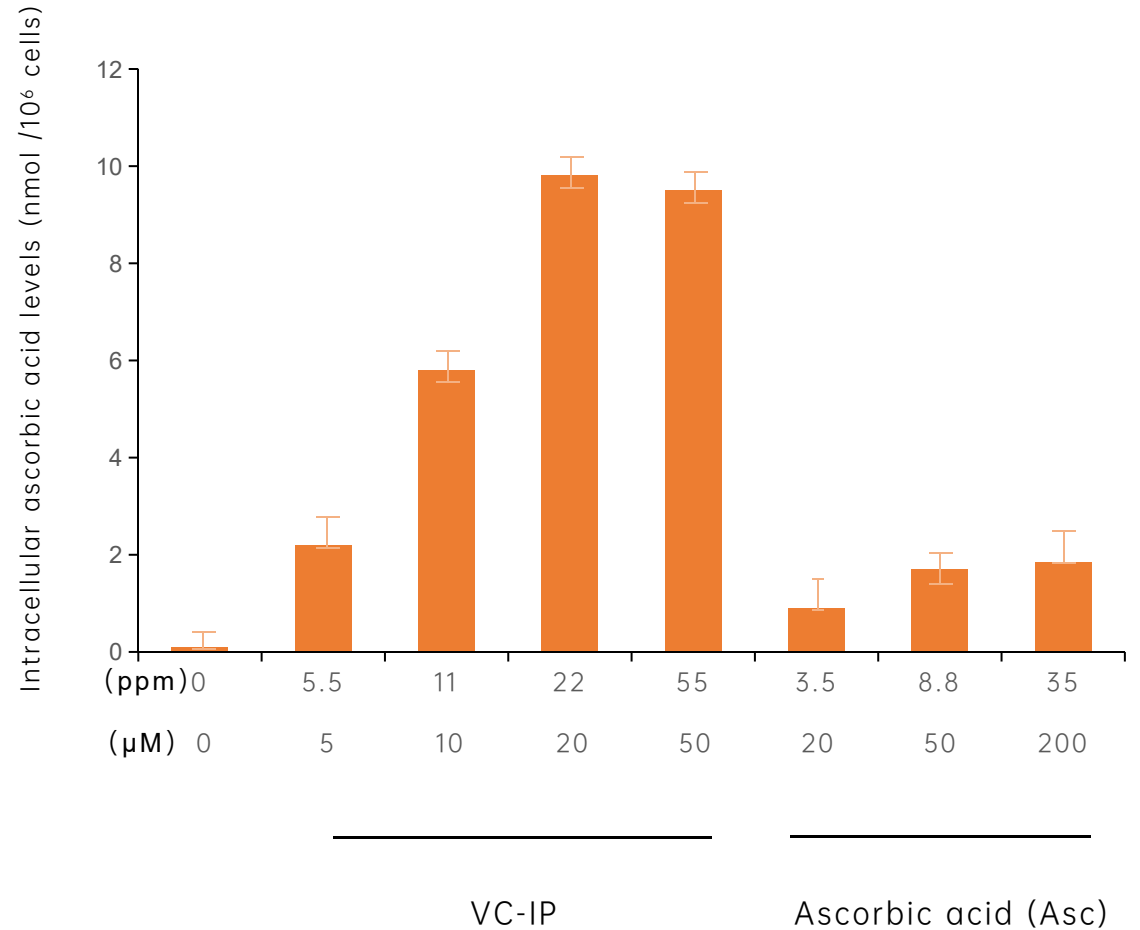


✓ peak detected

VC-IP

Efficiently converted into prototype VC intracellularly

- Method: Detect VC-IP or intracellular Asc of NHDF cells that are treated with Asc through HPLC and UV/coulometric electrochemical detector;
- Result: The intracellular Asc (ascorbic acid) concentrations of VC-IP pre-treatment (5, 10, 20, and 50 μM) were 2.18, 5.48, 10.15, and 9.46 nmol/ 10^6 cells respectively; The intracellular Asc (ascorbic acid) concentrations of Asc pre-treatment (20, 50 and 100 μM) were 0.86, 1.42 and 1.29 nmol/ 10^6 cells respectively;
- Conclusion:
 - (1) Sustaining the conversion of VC-IP enhances the level of intracellular Asc;
 - (2) Indicating that VC-IP has the potential to cross the cell membrane and to be converted to the major antioxidant Asc.



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Efficacy Data

- ▶ Anti-oxidation
- ▶ Anti-wrinkle
- ▶ Brightening
- ▶ UV protection

Anti-oxidation

Intracellular hydrogen peroxide levels



Experimental protocol:

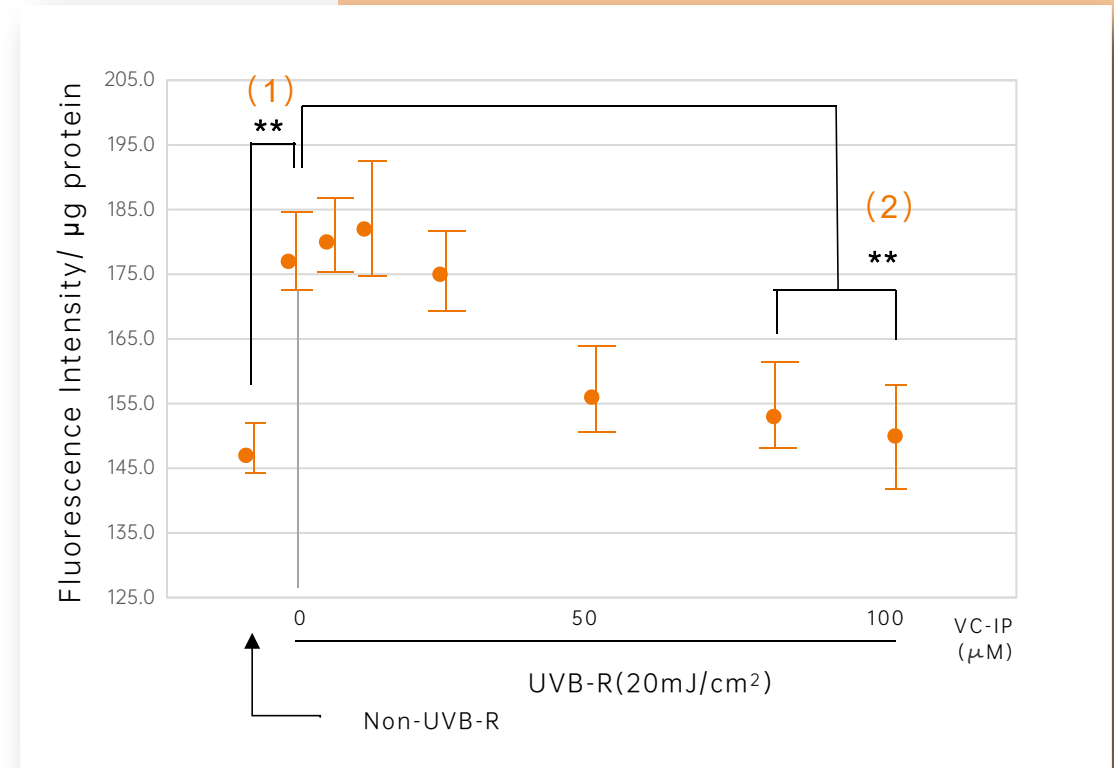
After VC-IP treatment, HaCaT cells were irradiated with 100 mJ/cm² of UVB for 24h. Intracellular hydrogen peroxide levels were measured and expressed as fluorescence intensity.



Conclusion:

- (1) Intracellular peroxide levels significantly increased by 120% with UVB treatment;
- (2) Intracellular peroxides could be eliminated by VC-IP pretreatment dose-dependently.

Vertical coordinate: fluorescence intensity
The greater the fluorescence intensity, the greater the amount of hydrogen peroxide within the cell.



Anti-oxidation

Oxidative stress modeling



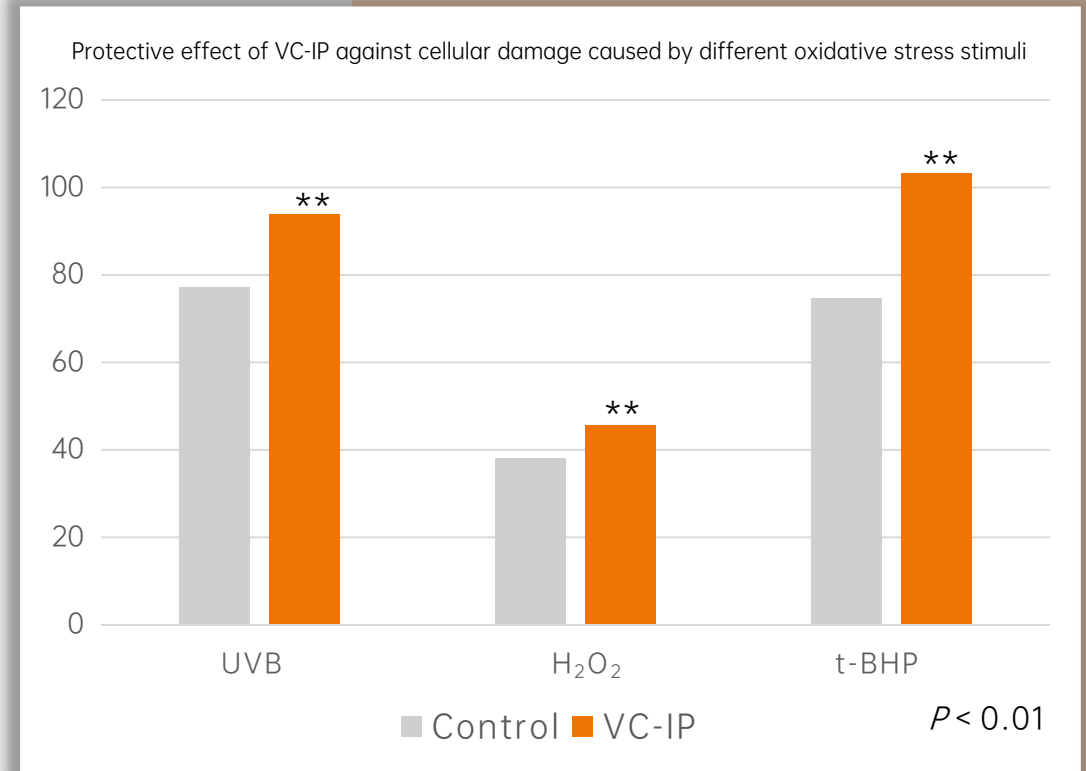
Experimental protocol:

The protective effect of VC-IP against cellular damage was tested by inducing oxidative stress with UVB, H₂O₂ (hydrogen peroxide), and t-BHP (tert-butyl hydroperoxide).



Conclusion:

100μM VC-IP could significantly increase viability after the treatment with UVB, H₂O₂ and t-BHP.



*Vertical coordinate: cell viability (%)

Anti-oxidation

ROS generation induced by UVA



Experimental protocol:

The cells were pretreated with 88 ppm VC-IP for 3h and then irradiated with UVA (100 J/cm²). Intracellular ROS levels were quantified using the CDCFH method at 5, 10, and 30min after UVA irradiation.

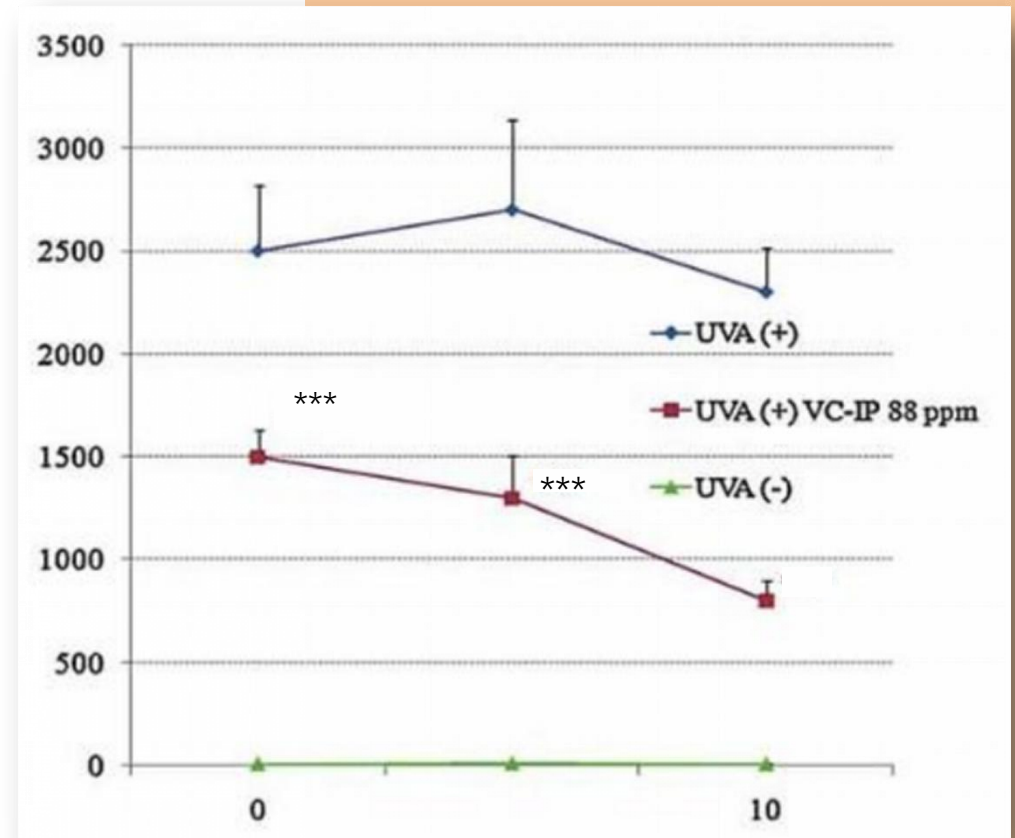


Conclusion:

- After irradiation with UVA (100 J/cm²), a significant accumulation of intracellular ROS was observed in untreated cells (corresponding to the blue fold);
- In cells pretreated with VC-IP at different time points, ROS levels were significantly reduced by 88%, 60%, and 48%, respectively (corresponding to the rosy red fold line).

Vertical coordinate: fluorescence intensity

The greater the fluorescence intensity, the greater the ROS level within the cell.



Anti-oxidation

ROS generation induced by UVA



Experimental protocol:

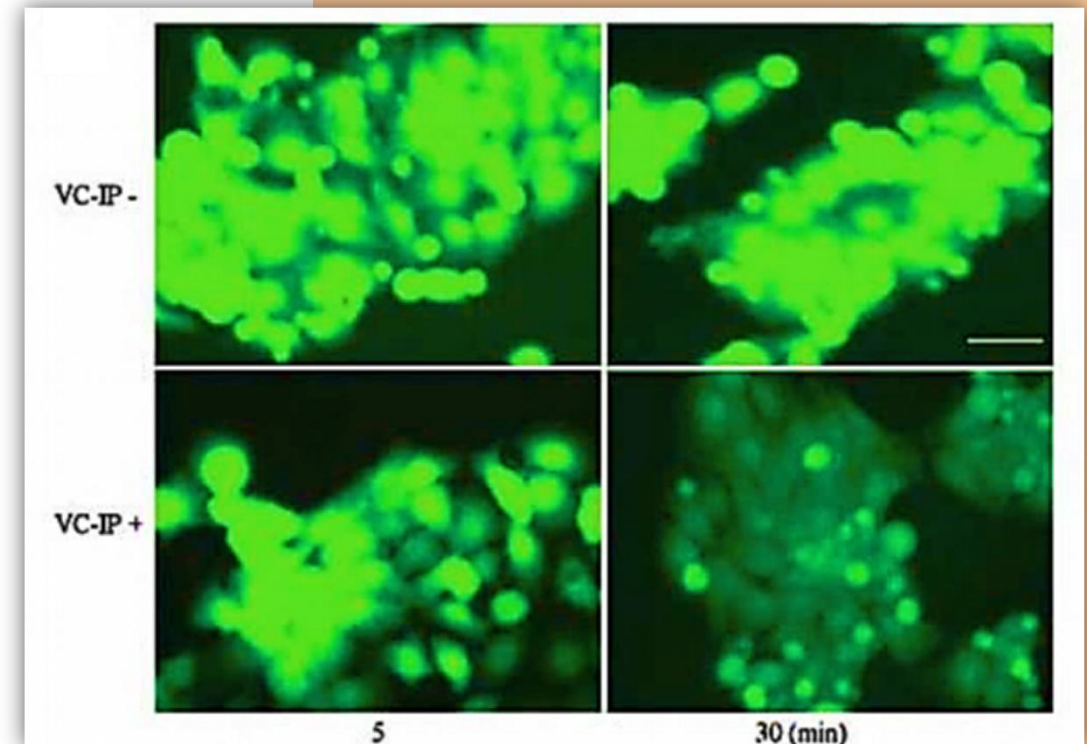
The cells were pretreated with 88 ppm VC-IP for 3h and then irradiated with UVA (100 J/cm²). Intracellular ROS levels were quantified using the CDCFH method at 5, 10, and 30min after UVA irradiation.



Conclusion:

- High fluorescence intensity was observed in unpretreated HaCaT cells after 5 and 30min of UVA irradiation, whereas VC-IP pretreated (3h) cells showed much lower fluorescence intensity;
- Intracellular ROS induced by UVA was blocked by the addition of 30 ppm VC-IP.

*green fluorescence: intracellular ROS



Anti-wrinkle

Collagen synthesis inhibited by UVA



Mechanism:

Loss of collagen is considered a characteristic histological finding of aging skin.



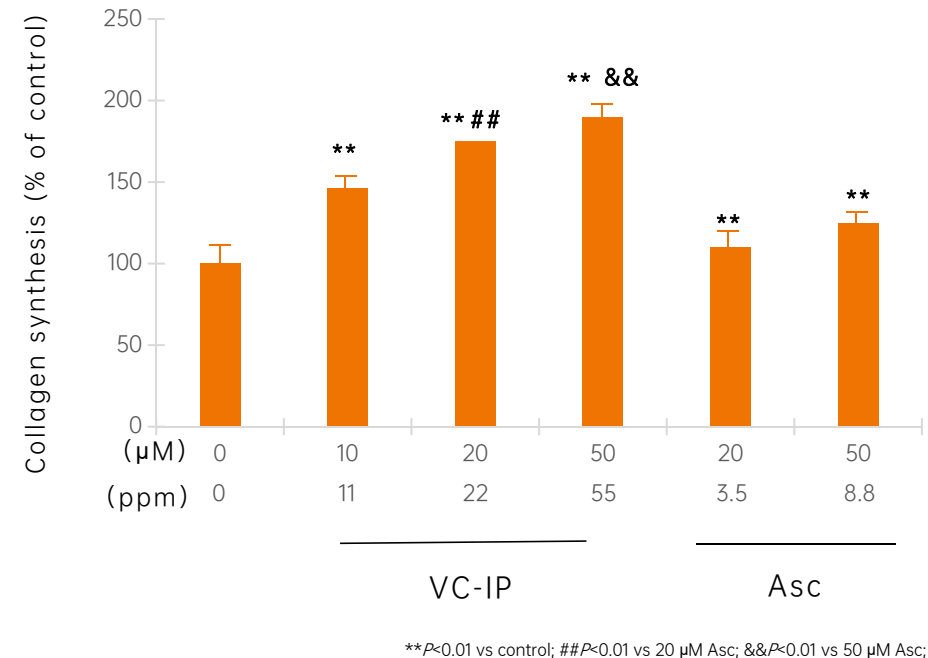
Experimental protocol:

Detection of type IV collagen synthesis levels in NHDF (human fibroblasts) after the addition of VC-IP or Asc (ascorbic acid)



Conclusion:

- VC-IP promotes collagen IV synthesis in fibroblasts in a concentration-dependent manner;
- VC-IP showed more effective collagen-increasing activity than Asc at the same concentration.



Anti-wrinkle

The release of MMPs promoted by UVA



Mechanism:

Expression of MMP-2 and MMP-9 specifically drives type IV collagen degradation.



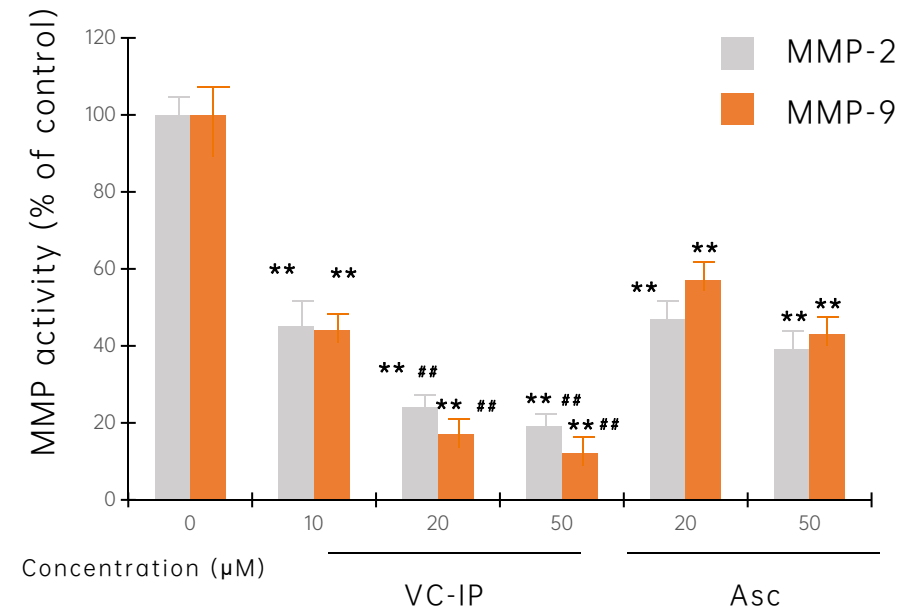
Experimental protocol:

Detection of MMP-2 and MMP-9 expression in NHDF (human fibroblasts) after incubation with VC-IP or Asc (ascorbic acid).



Conclusion:

- The activities of MMP-2 and MMP-9 could be inhibited significantly by VC-IP and Asc.
- At the same concentration, both MMP-2 and MMP-9 levels were significantly lower in VC-IP treatment compared to Asc.
- VC-IP serves a dual purpose of stimulating the production of collagen and inhibiting its breakdown.



** $P < 0.01$ vs control; ## $P < 0.01$ vs 20 μM Asc

Brightening

Melanocyte activity in vitro



Experimental protocol:

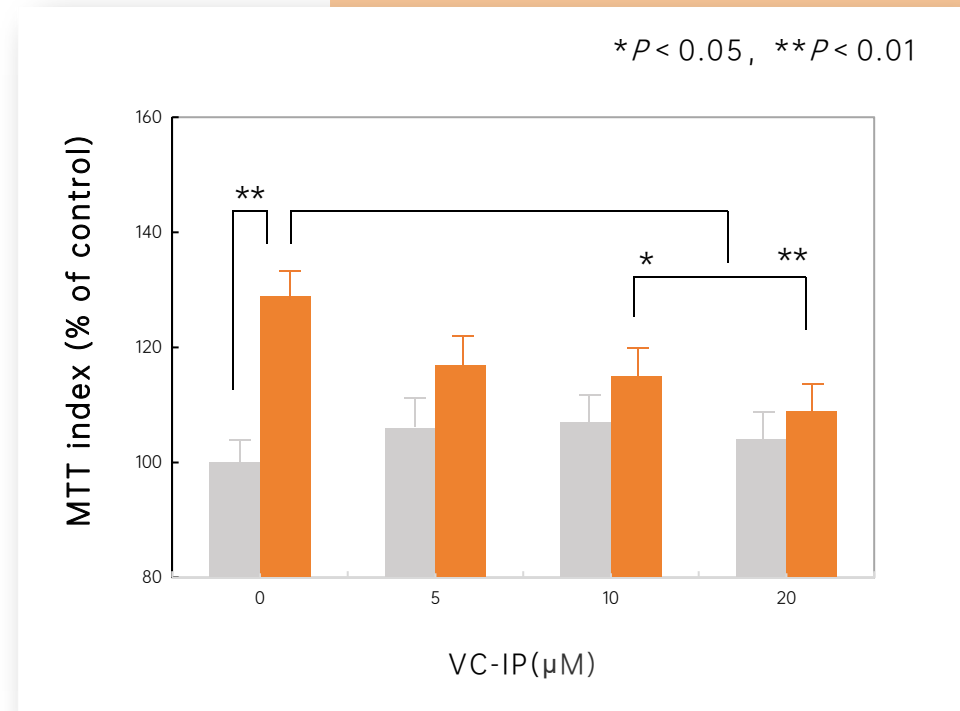
Effect of UVB induction on melanocyte proliferation through the MTT method.



Conclusion:

- Melanocyte proliferative capacity was significantly upregulated after UVB induction compared to the group without VC-IP (+130%);
- In the UVB-induced group, VC-IP could dose-dependently inhibit melanocyte proliferation.

Non-UVB treatment UVB treatment



Brightening

keratinocyte activity in vitro



Experimental protocol:

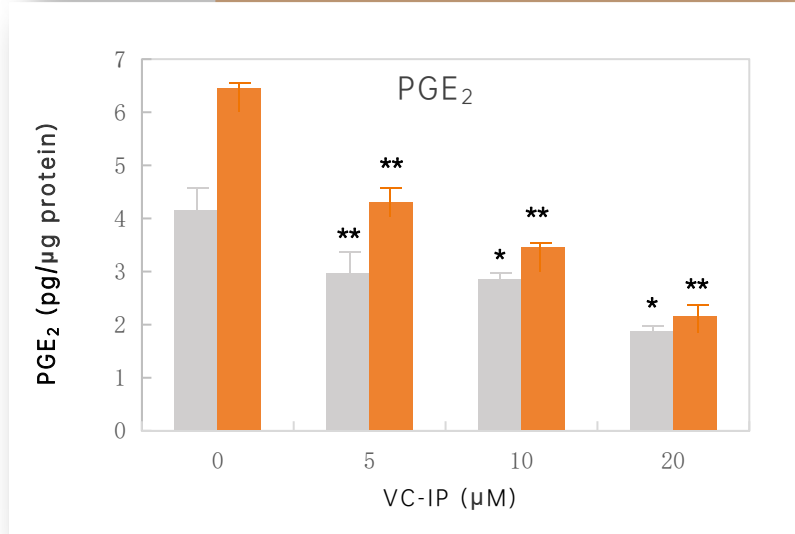
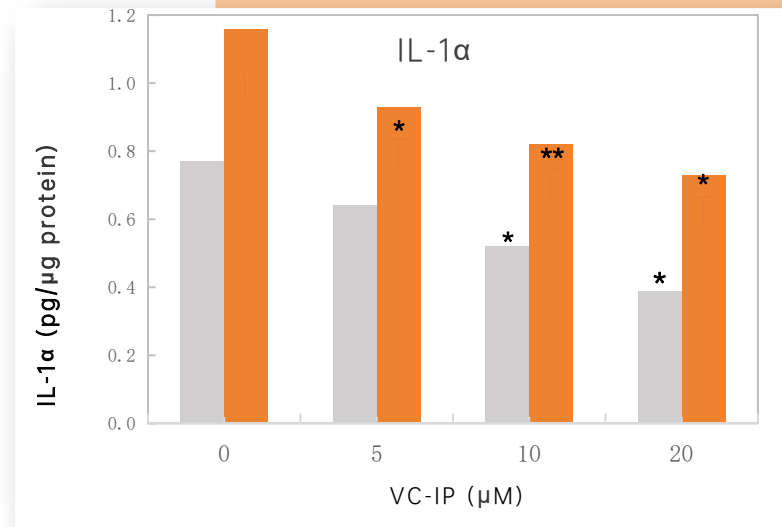
Release of IL-1 α and PGE₂ of keratinocytes induced by UVB through ELISA.



Conclusion:

- In the UVB-induced group, VC-IP could dose-dependently inhibit the release of IL-1 α and PGE₂ ;
- VC-IP could also reduce cellular IL-1 α and PGE₂ release in the non-UVB-induced state.

Non-UVB treatment UVB treatment



* $P < 0.05$, ** $P < 0.01$

Brightening

Clinical Test



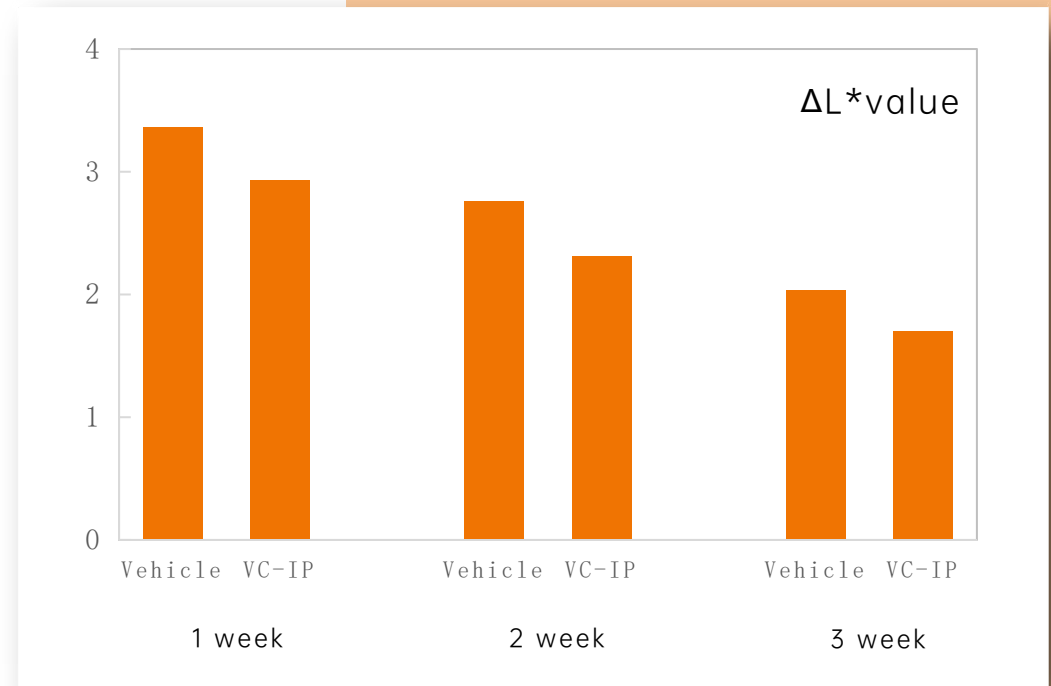
Experimental protocol:

- 22 Japanese males and females, aged 20-40 years, with skin type II or III, had the inner upper arm as the test site.
- Subjects were exposed to 1.5 MED of simulated light from the sun using specific instruments; immediately after exposure, a topical application of a cream (O/W) type containing 3% VC-IP or carrier only was applied to the UV-exposed area;
- Pigmentation intensity was assessed by L* value measurements and scored visually after 1, 2, and 3 weeks.



Conclusion:

After 1 week of UVB irradiation, there was a statistically significant difference between the scores of the Vehicle group (control) and the VC-IP group by visual scoring, and the VC-IP was effective in inhibiting UV-induced skin pigmentation.



▲ ΔL* values were significantly lower in the VC-IP group than in the Vehicle (control) group at 1 and 2 weeks after UVB irradiation. ($p < 0.05$)

UV protecion

8-OHdG induced by UVA



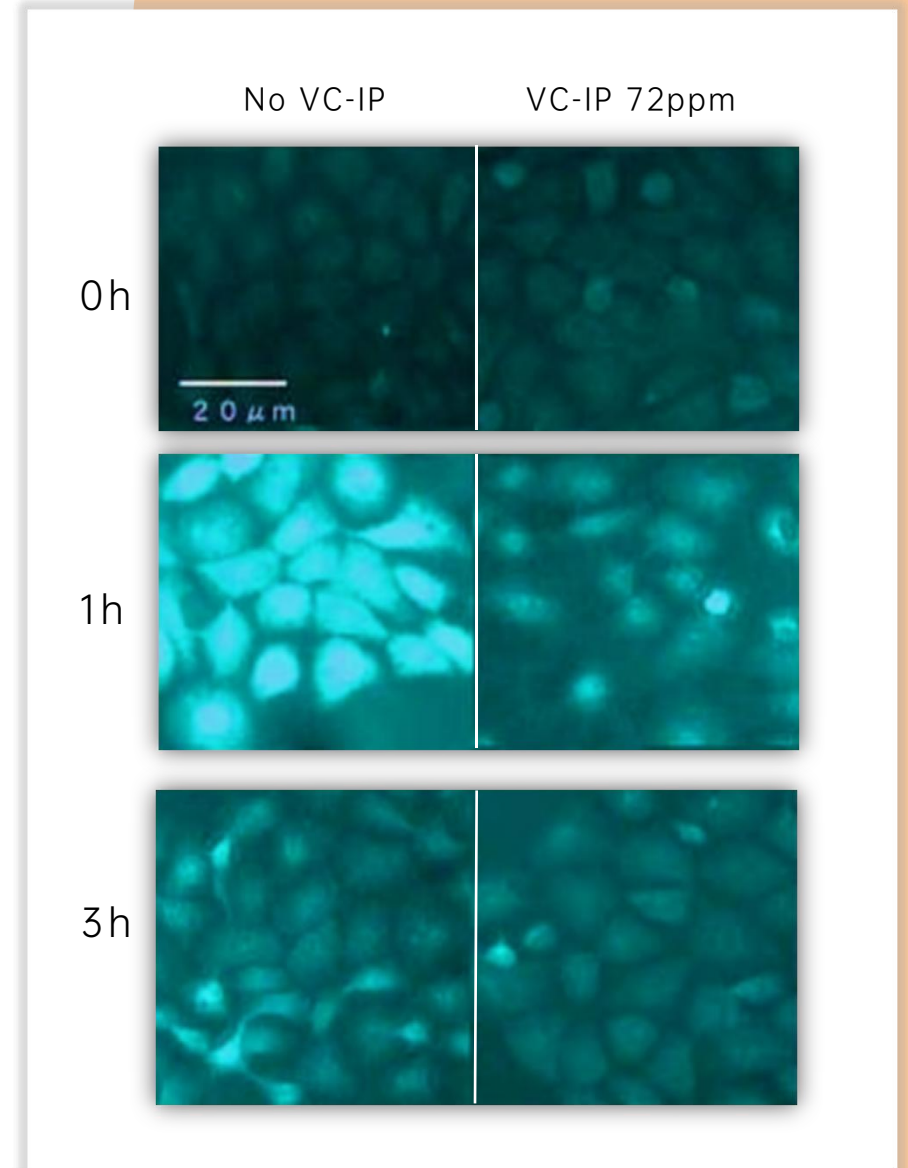
Experimental protocol:

The formation of 8-OHdG is the oxidative modification of DNA and is thought to be a worsening consequence of oxidative stress.



Conclusion:

- Formation of 8-OHdG was significantly reduced when VC-IP was administered at 72 ppm to HaCaT cells 24h before UVA (100 J/cm²) irradiation;
- VC-IP could protect keratinocytes from UVA-induced oxidative DNA damage.



UV proteccion

p53 induced by UVA



Experimental protocol:

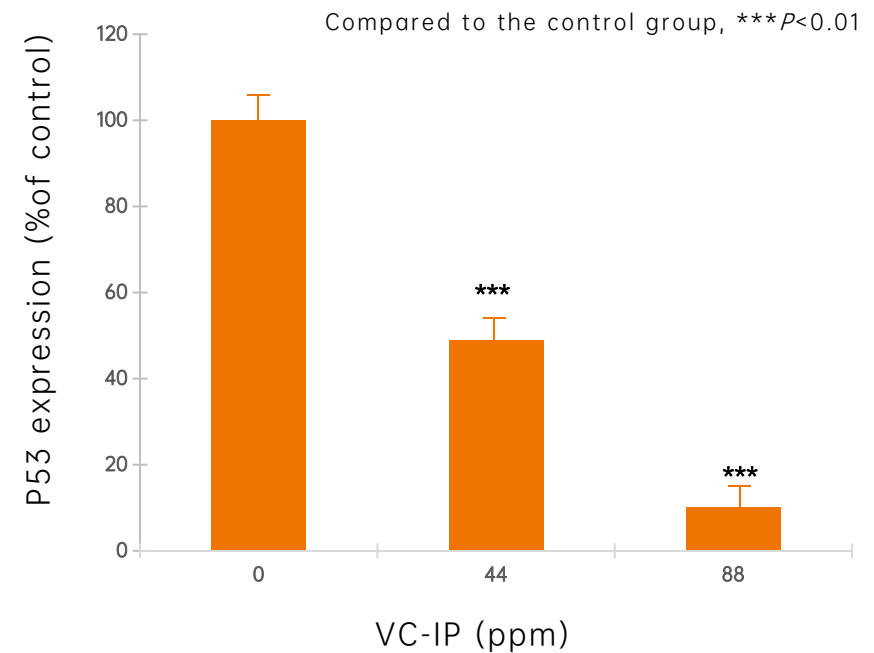
The wild-type p53 protein acts as a molecular policeman of the genome by halting the cell cycle to repair damage; if repair is not possible, it promotes cell death by initiating apoptosis; DNA-damaging agents such as UV light and ionizing radiation induce high levels of p53 expression.



Conclusion:

VC-IP could stabilize UVA-activated p53 protein expression to prevent apoptosis.

HaCaT cells were pretreated with VC-IP for 24h, and after irradiation with UVA at 100 J/cm² for 3h, p53 was detected.



UV protecion

Apoptosis induced by UVA

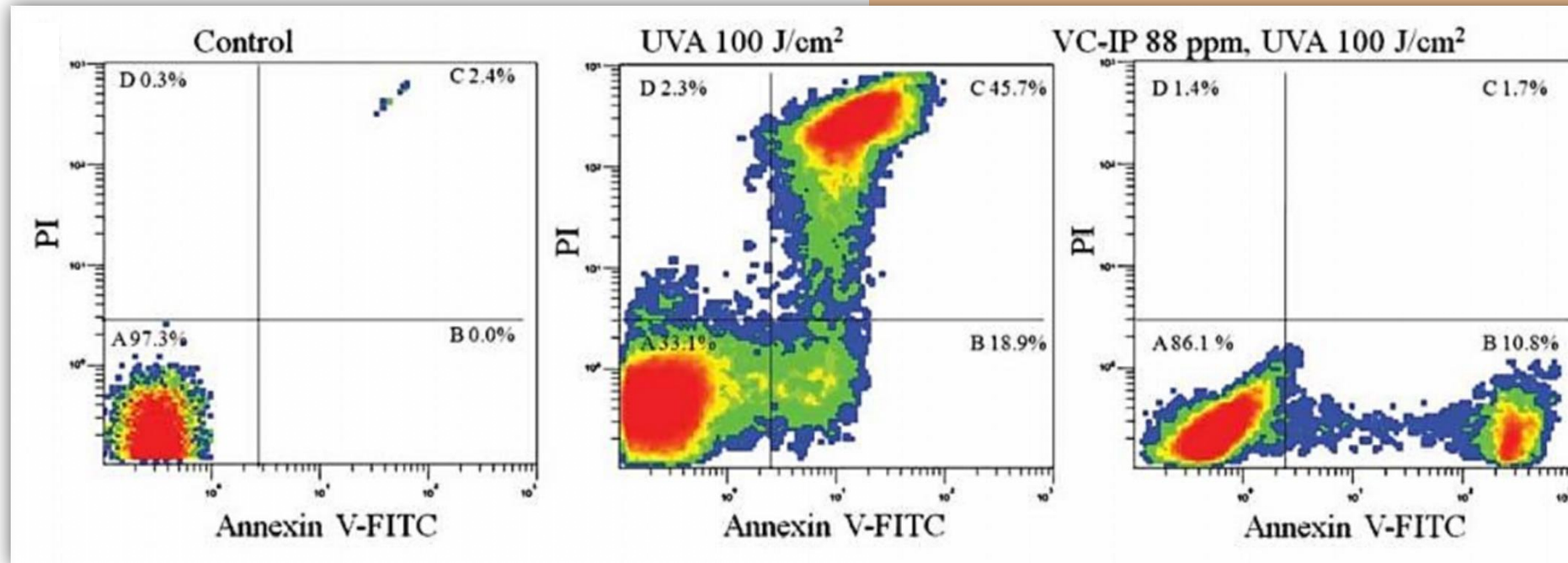
Detection of early versus late apoptotic cells in populations by flow cytometry analysis of outward translocation within phosphatidylserine and membrane permeability of cell populations;

- A: normal cells;
- B: apoptotic cells (early)
- C: apoptotic cells (terminal) and necrotic cells

Control
A- 97.3%, C- 2.4%

UVA group
A- 33.1%, B- 18.9%, C- 45.7%

UVA+VC-IP group
A- 86.1%, B- 10.8%, C- 1.7%



Conclusion: VC-IP can largely reduce UVA-induced keratinocyte apoptosis and necrotic cell death.

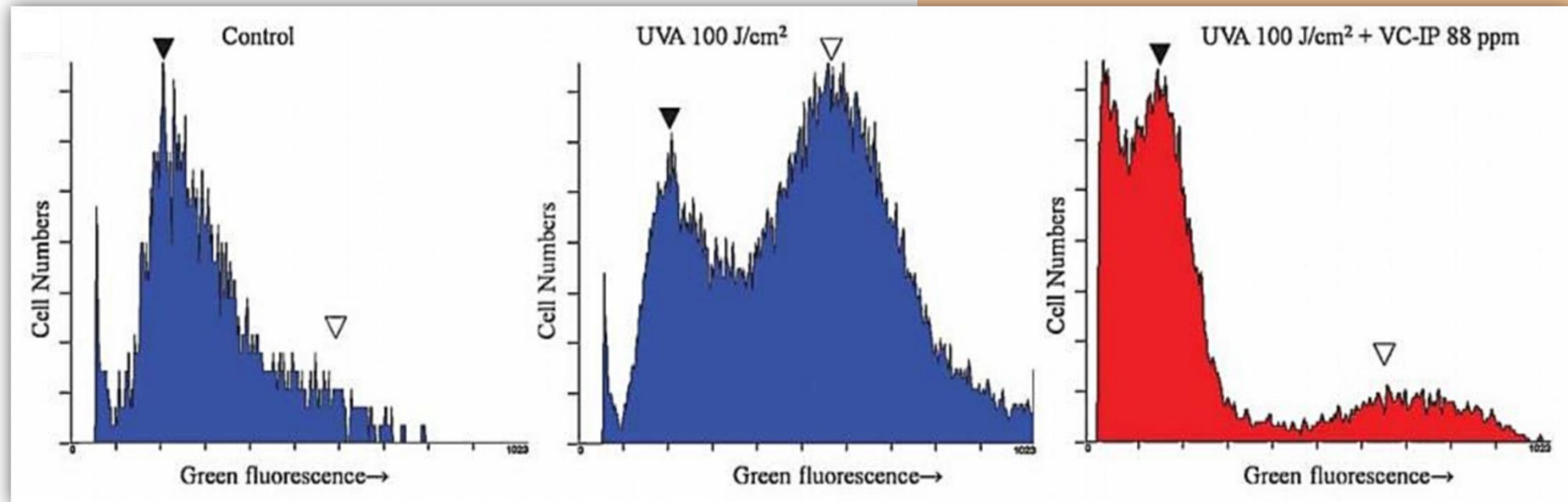
UV protection

Mitochondria activity variations induced by UVA

After UVA irradiation, cells were stained with the fluorescent dye MitoCapture, and mitochondrial membrane potential was analyzed by flow cytometry.

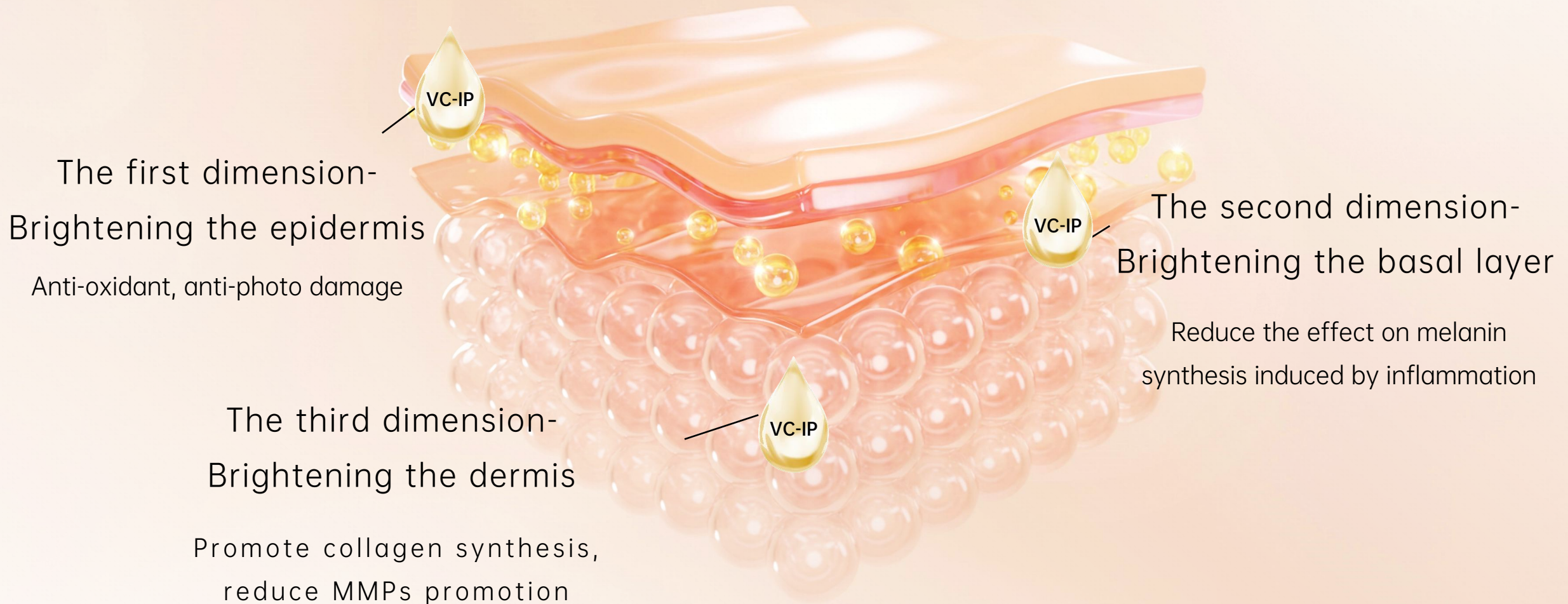
▼ Normal cells

▽ Apoptotic cells



Conclusion: VC-IP could stabilize mitochondrial function and thus protect cells from apoptosis induced by UVA damage.

"Skin-friendly VC", three-dimensional brightening



03

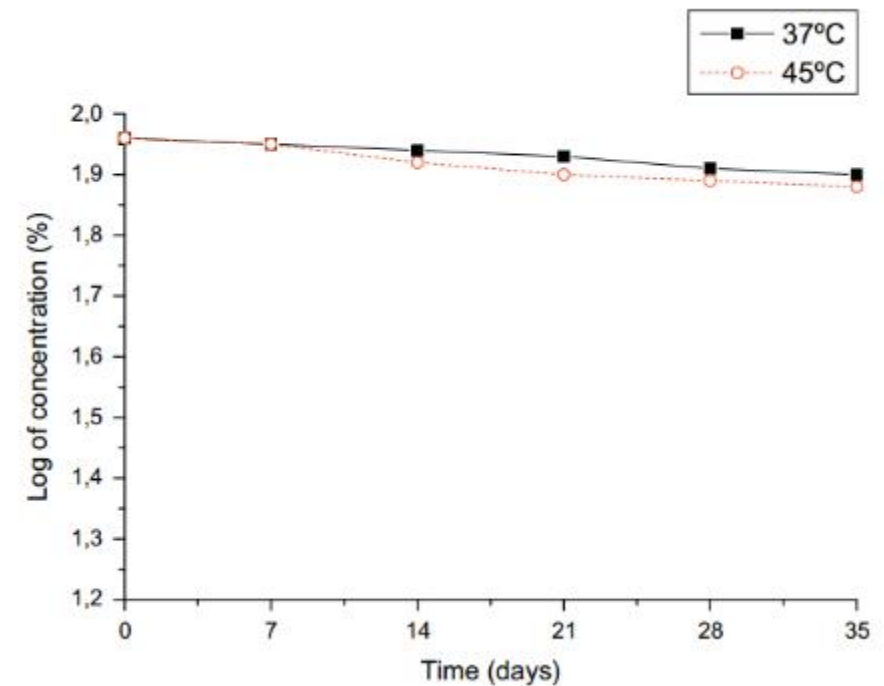
Formula Applications

- ▶ Content stability
- ▶ Raw Material Compatibility
- ▶ Formula stability

Stability of VC-IP

Experimental protocol:

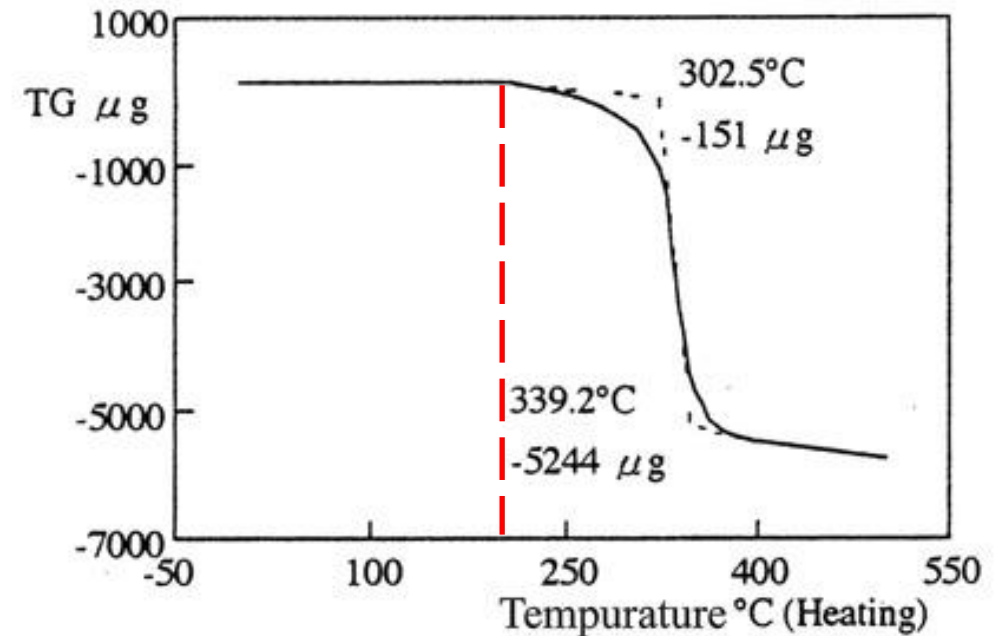
- Formulated samples are stored at room temperature or in a thermostatic incubator at 37 °C or 45 °C with humidity and photoperiod control;
- Changes in VC-IP concentration were analyzed using HPLC at 7-day intervals over a 35-day period.
- **Conclusion:**
 - ✓ The loss of VC-IP would be less than 15% when the formulation was stored at 37 °C for 3 months.



The logarithm of residual VC-IP concentration in formulations stored at 37 °C/45 °C for 0-35 days.

Content Stability of VC-IP

- VC-IP is kept in a thermostat at 40 °C or 60 °C for 1 month and it remains unchanged in appearance and color;
- The weight remains at the same value when the VC-IP is exposed to 200 °C; (this value is measured by the TG thermogravimetric analyzer at 5 °C/min increments);
- **Conclusion: VC-IP has excellent thermal stability.**



Stability of VC-IP/liquid VC-IP heated in the range of 30 ~ 500 °C
Heating up rate of 5 °C /min

Raw Material Compatibility

The solubility is shown in the table on the right:

Solubility of VC-IP (5%, 10%, and 50%) in a variety of raw materials is shown at temperatures of 25 °C, 50 °C, and 70 °C, where "S" stands for soluble and "I" for insoluble.

TABLE I. Solubility of VC-IP

	Concentration (wt.%)								
	5			10			50		
	25	50	70	25	50	70	25	50	70
Water		I	I	I	I	I	I		
Glycerol		I	I	I	I	I	I		
Propylene glycol	I	I	I	I	I	I			
1,3-Butylene glycol	I	I	I	I	I	I			
Ethanol	S	S	S	S	S	S	I	S	S
Propylene glycol monocaprylate	S	S	S	S	S	S	S	S	S
Caster oil	S	S	S	S	S	S	S	S	S
Oleic acid	S	S	S	S	S	S	S	S	S
Glycery tri-2-ethylhexanoate	S	S	S	S	S	S	S	S	S
Glycery tri-decanoate	S	S	S	S	S	S	S	S	S
Oleyl alcohol	S	S	S	S	S	S	S	S	S
Decaglyceryl decaoleate	S	S	S	S	S	S	S	S	S
Isopropyl myristate	S	S	S	S	S	S	S	S	S
Com salada oil	S	S	S	S	S	S	S	S	S
Olive oil	S	S	S	S	S	S	S	S	S
Cetyl isooctanoate	S	S	S	S	S	S	S	S	S
Isocetyl myristate	S	S	S	S	S	S	S	S	S
Jojoba oil	S	S	S	S	S	S	S	S	S
Mineral oil (#70)	S	S	S	S	S	S	S	S	S
Squalane	S	S	S	S	S	S	S	S	S

S, soluble; I, insoluble.

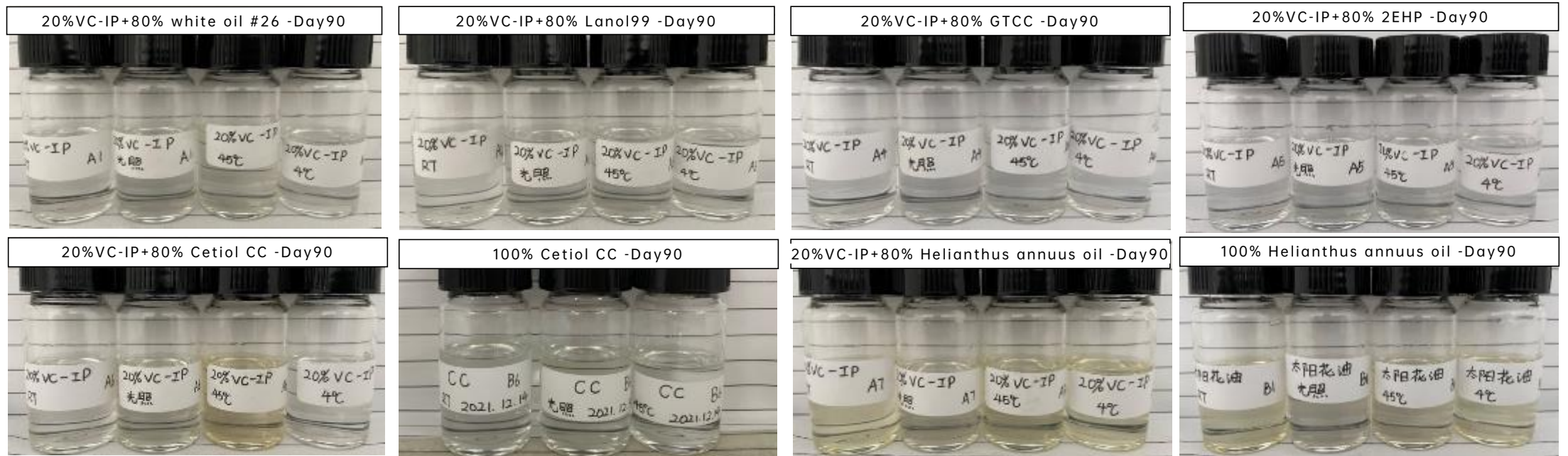
Values 25, 50, and 70 are represent temperature (°C).

Raw Material Compatibility

Conclusion:

- (1) VC-IP is highly compatible with many common fats and oils and has excellent stability;
- (2) VC-IP is incompatible with silicone-based ingredients and can cause delamination;
- (3) Try to avoid compounding VC-IP with Cetiol CC.

VC-IP was mixed with 7 kinds of oils and fats: white oil #26, Lanol99, GTCC, 2EHP, Cetiol CC, Helianthus annuus oil, dimethicone-100CST-not shown in the picture, in a ratio of 2:8 to observe the compatibility, and was observed continuously whether there is any change in the color and whether there will be any incompatibility phenomenon in different conditions (ambient temperature and light, ambient light, 45°C, 4°C).



Formula Stability

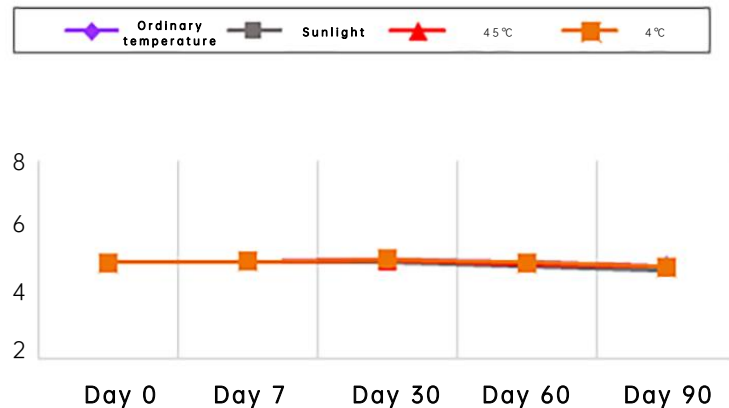
VC-IP focuses on pH control only in aqueous formulations.

Conclusion:

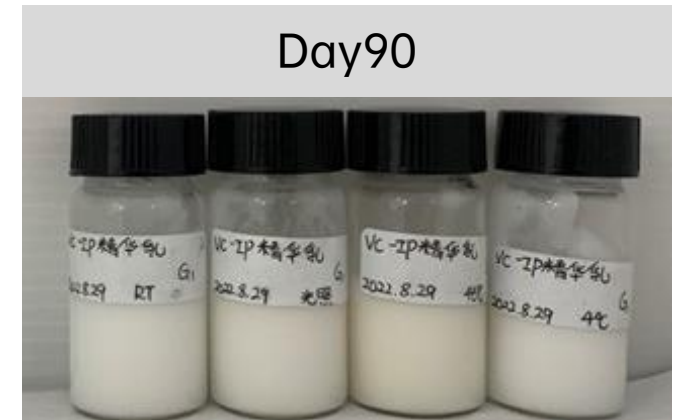
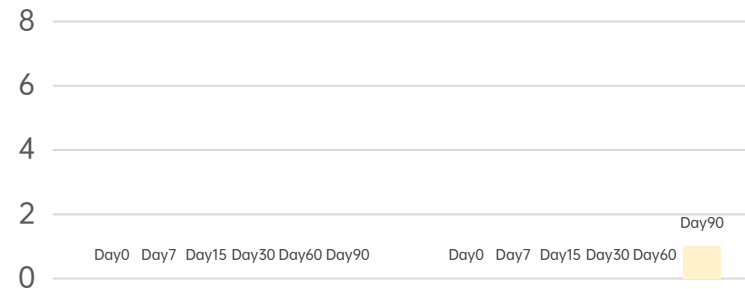
- (1) pH stabilization: The formulation showed almost no fluctuations in pH under 4 conditions in 90 days;
- (2) Slight yellowing of the color at high temperatures: 90 days, formulation slightly yellowed at 45°;
- (3) Formulation Suggestion: When adding VC-IP, keep the pH of the formula around 4.5-5, which can effectively alleviate the discoloration and pH fluctuation of the formula.

Configure 15% VC-IP whitening essence milk, add citric acid buffer pair to protect the formulation, test the final formulation pH=4.91, and continuously observe the change of color and pH of the formulation under different conditions (ambient light avoidance, ambient light, 45°C, 4°C). (Comparison of 2 groups of formulations - pH=5.75, pH=6.60 - during the same period, the color and pH changes in descending order were: pH=6.60 group, pH=5.75 group, pH=4.91)

pH variation



Color variation



04

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Marketing Claims



EXPLORING SECRET OF BRIGHTENING

ANTI-OXIDATION COMBATING DULLNESS

-DELICATE SKIN OIL-



Delicate Skin Oil

✓ *Fearless of Dullness*

- 20%VC-IP, stay away from dull, dry, sensitive skin

✓ *Holistic Skincare*

-1 bottle for anti-aging, anti-wrinkle, whitening, and repair.

✓ *Nourishing Skin with Oil*

-Natural plant oils and fats for skin-friendliness

Instructions:

After cleansing your face and applying toner, make sure your hands and face are dry, apply one to two drops to your face, and massage all over your face until complete absorption.

Delicate Skin Oil

NO. EOW20230906

Synthetic Oil

Lanol99 is a solvent with a unique branched chain structure that leaves the skin feeling fresh and non-greasy.

Plant Oil

3 kinds of natural plant oils are compounded, replenished, and locked synchronously, more skin-friendly.

Active Ingredient

VC-IP can effectively prevent melanin synthesis and improve dullness; promote collagen synthesis and give skin elasticity; effectively remove free radicals in the skin and resist multiple cell damage caused by UV.

Phase	Trade Name	INCI Name	% W/W	Supplier
	Lanol99	Isononyl Isononanoate	To 100.00	SEPPIC
	Squalane	Squalane	10.00	EPF
	JD JOJOBA GOLDEN OIL	<i>Simmondsia chinensis</i> (Jojoba) Seed Oil	10.00	JD
A	MEADOWFOAM SEED OIL	<i>Limnanthes alba</i> (Meadowfoam) Seed Oil	10.00	Sethic
	dl- α -Tocopheryl Acetate	Tocopheryl Acetate	0.50	DSM
	Gwhite VC-IP	Ascorbyl Tetraisopalmitate	20.00	JAKA

JAKA®

VCE+VC-IP

BRIGHTENING AND ANTI-OXIDATION

DUAL C LUXURY SERUM



Instructions:

After cleansing your face and applying toner, make sure your hands and face are dry, apply one pump of the lotion to your face, and massage all over your face until complete absorption.

Dual C Luxury Serum

✓ *Refreshing with two VC derivatives*

- 5% VCE+ 5% VC-IP, Dual VC Advanced Skin Refreshing

✓ *Enjoying VC Skincare in the Morning*

- Daytime brightening without the fear of aging

✓ *Yogurt Texture*

- Light and soft, for all kinds of skin

Dual C Luxury Serum

No. LO20230906

Emulsifier

Olivem 1000 is a natural O/W emulsifier that creates a stable, skin-friendly liquid crystal emulsion system, giving the formula a fresh, soft feel.

Thickener

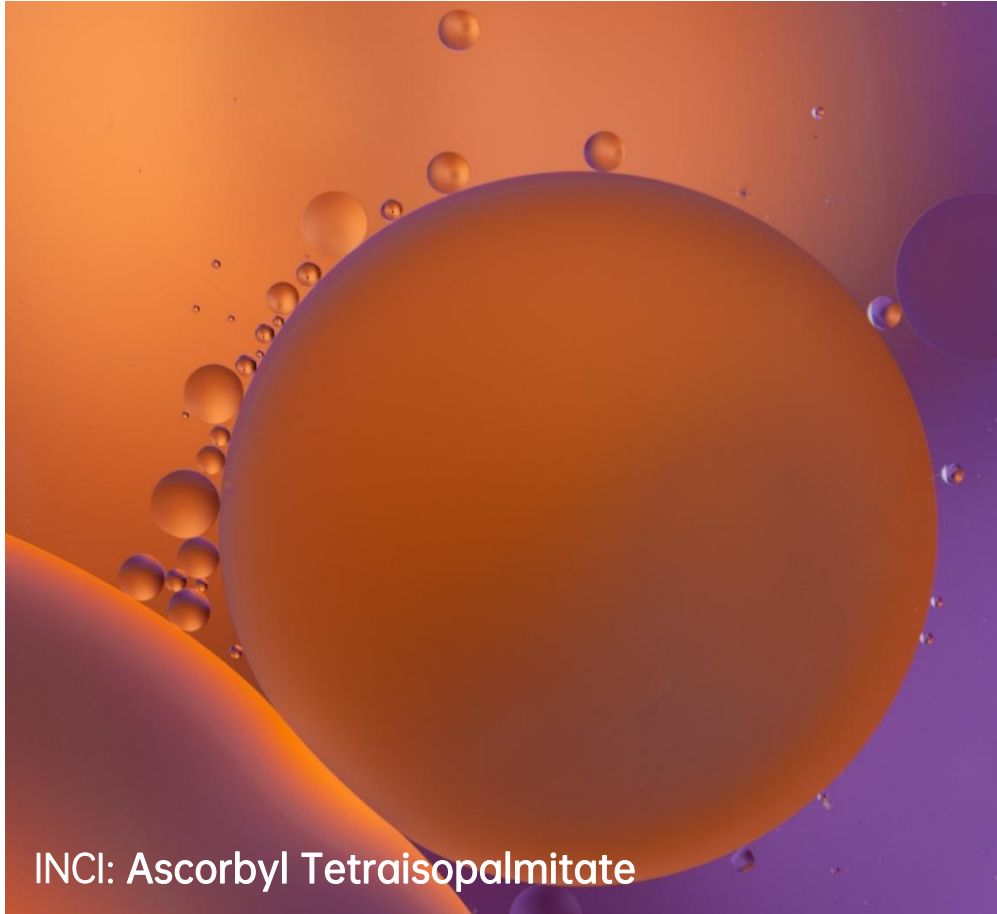
Xanthan Gum and Polyacrylate Crosspolymer-6 Complex. The texture is enhanced while still retaining a sense of hydration and freshness.

Active Ingredients

5% VC-IP + 5% VCE complex, double C efficient whitening, advanced anti-oxidation, brightening skin.

Phase	Trade Name	INCI Name	% W/W	Supplier
A	Olivem 1000	Cetearyl Oliviate, Sorbitan Oliviate	2.00	Hallstar
	Lanette O	Cetearyl Alcohol	1.20	BASF
	Squalane	Squalane	2.00	EPF
	Lanol99	Isononyl Isononanoate	2.00	SEPPIC
	Cegesoft C 24	Ethylhexyl Isopalmitate	2.00	BASF
	DC200(350CST)	Dimethicone	2.00	DOW CORNING
B	Water	Water	To 100.00	-
	Glycerin	Glycerin	3.00	P&G
	Butylene Glycol	Butylene Glycol	3.00	DAICEL
	LIPONIC EG-1	Glycereth-26	2.00	VANTAGE
	Disodium EDTA	Disodium EDTA	0.02	Adamas
	Keltrol CG-T	Xanthan Gum	0.05	CP KELCO
	SEPIMAX ZEN	Polyacrylate Crosspolymer-6	0.20	SEPPIC
C	SymSave H	Hydroxyacetophenone	0.40	Symrise
	Eumulgin SG	Sodium Stearoyl Glutamate	0.20	BASF
	Gwhite VC-IP	Ascorbyl Tetraisopalmitate	5.00	JAKA
D	Citric Acid	Citric Acid	0.18	SINOPHARM
	Sodium Citrate	Sodium Citrate	0.40	Ourchem
	Gwhite VCE	3-o-Ethyl Ascorbic Acid	5.00	JAKA
	Water	Water	5.00	-
E	LKDiol 6P	1,2-Hexanediol	0.40	LK
	FRAG 30237295 BREEZY ISLAND	Fragrance	0.10	Givandan

Marketing claims



Gwhite VC-IP

Skin-friendly, Refreshing Skin

Skin-friendly VC 84% high conversion

- Fat-soluble VC is more skin-friendly and converts VC very efficiently

Comprehensive efficacy

- Anti-oxidant, anti-wrinkle, brightening, UV protection

Excellent formula applicability

- Stable at high temperature, good compatibility with conventional oils and fats

No worries about registration

- Raw Material Information+ Raw Material Safety Report+ General Information

Documents for Gwhite VC-IP

Category	No.	Name of Document	Content
Profile	1	PPT	Detailed Profile
Technical Documents	2	FCRM	Full Composition of Raw Material
	3	MFC	Manufacturing Flowchart
	4	MOA	Method of Analysis (Company Standard)
	5	MSDS	Material Safety Data Sheet
	6	SP	Specification
Raw Material Information	7	RMI	<ol style="list-style-type: none"> 1) Basic information (Raw material submission code, recommended level, efficacy category, manufacturer information, etc.) 2) Composition and process (Natural index/natural origin index, impurities and other residues, etc.) 3) Storage and transportation (Storage conditions, corrosion challenge test, labeling regulatory statements in compliance with GHS/CLP, etc.) 4) Regulatory Information (Whether in compliance with national cosmetic regulations, a listing of chemical substances by countries, CITES Convention, Nagoya Protocol, HALAL, KOSHER, COSMOS, RSPO standard, PCPC registration, etc. or not.) 5) Safety and efficacy information (Safety assessment report, safety test data, ecotoxicological data, etc.)
Usage Guidance	8	PUG (Product Usage Guidance)	Compatibility and Stability Tests

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