

Carotolino – Blue Light Protection and a
Vivid Look



AT A GLANCE

Carotolino- Blue Light Protection and a Vivid Look

- › Blue light damages skin. Nature's answer to blue light protection are carotenoids.
- › Besides blue light protection, topically applied carotenoids can improve skin color.
- › Carotolino is an active ingredient that contains perfectly stabilized carotenoids, which
 - › shield blue light
 - › neutralize blue light-induced ROS
 - › support a healthy and vivid skin color



PCHi 2020 Fountain Award

Carotolino synergistically targets skin protection and liveliness.

BLUE LIGHT PROTECTION

Two Sources of Blue Light Necessitate Novel Skin Care

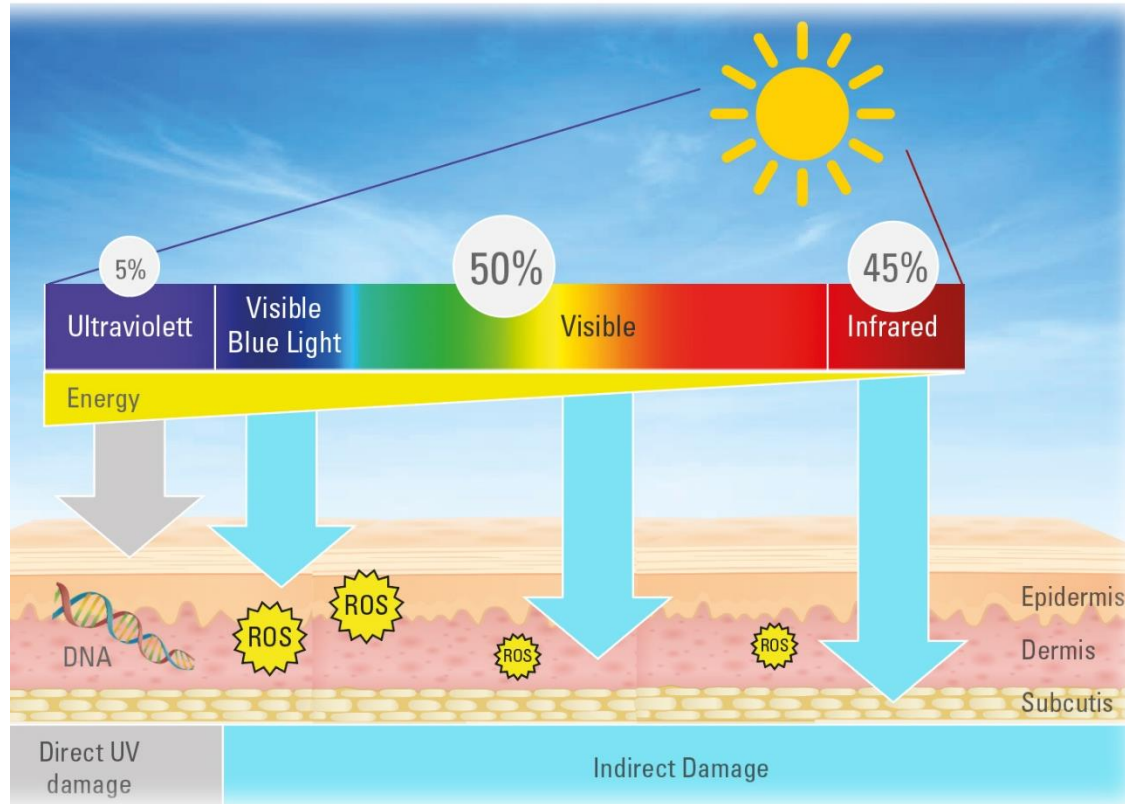
- › Blue light, as part of the natural sunlight, penetrates deep into the skin and triggers premature skin aging.
- › Today, much of the blue light we are exposed to comes from electronic devices.



Digital dependence necessitates modern skin care to protect against natural and artificial blue light.

BLUE LIGHT PROTECTION

Blue Light-Induced Skin Damage

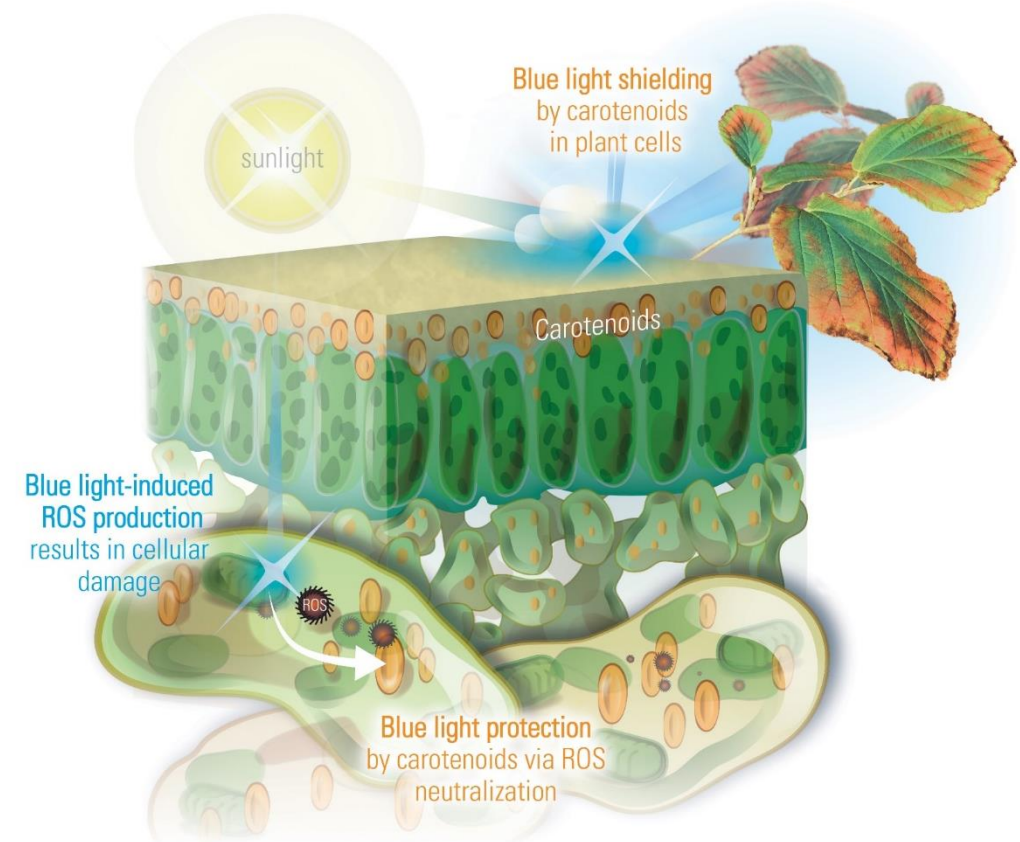


- › Visible light contains three ranges, of which blue light (High Energy Visible Blue Light = HEV) carries most energy.
- › 50% of sun-induced reactive oxygen species (ROS) originate from infrared and visible light, especially blue light.
- › ROS leads to indirect damage and premature skin aging.

CAROTENOIDS

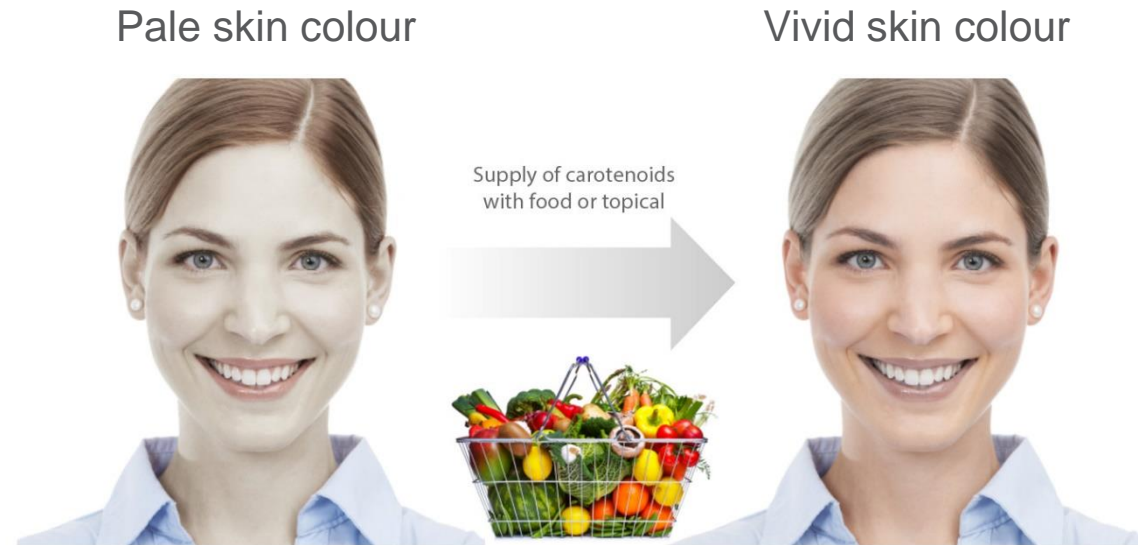
(1) Blue Light Protection Invented by Nature

- › There is no green plant without carotenoids.
- › Carotenoids protect the plant by
 - › absorbing blue light,
 - › neutralizing blue light-induced ROS.
- › This natural protection mechanism can be transferred to humans, as carotenoids can integrate into skin.



CAROTENOIDS

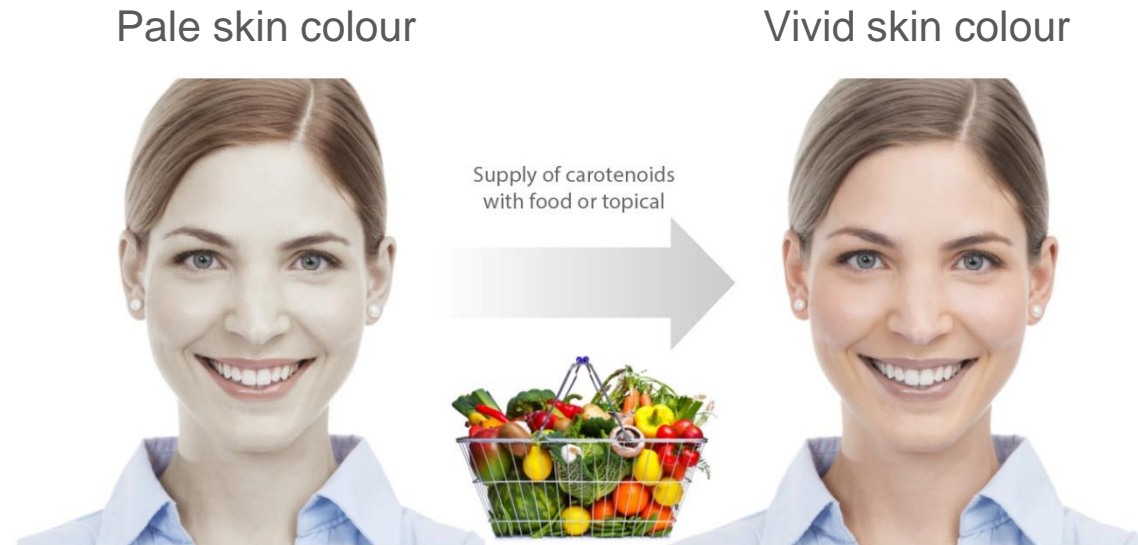
(2) Natural Skin Color Enhancer



- › Human skin color is composed of three pigments: haemoglobin, melanin and carotenoids.
- › People who eat more fruits and vegetables have more healthy skin tones, as attractive skin needs an adequate level of carotenoids.

CAROTENOIDS

(2) Natural Skin Color Enhancer



- › We embrace the beauty of all skin colors. Interestingly, for all skin colors there is a common understanding that adding carotenoid-based coloration (yellow/orange) contributes beneficially to the appearance of skin healthiness.*

* Whitehead, et al. You Are What You Eat: Within-Subject Increases in Fruit and Vegetable Consumption Confer Beneficial Skin-Color. PLoS One 7(3): e32988. 2012

THE CAROTOLINO APP – OPTIMIZE YOUR SKIN COLOR



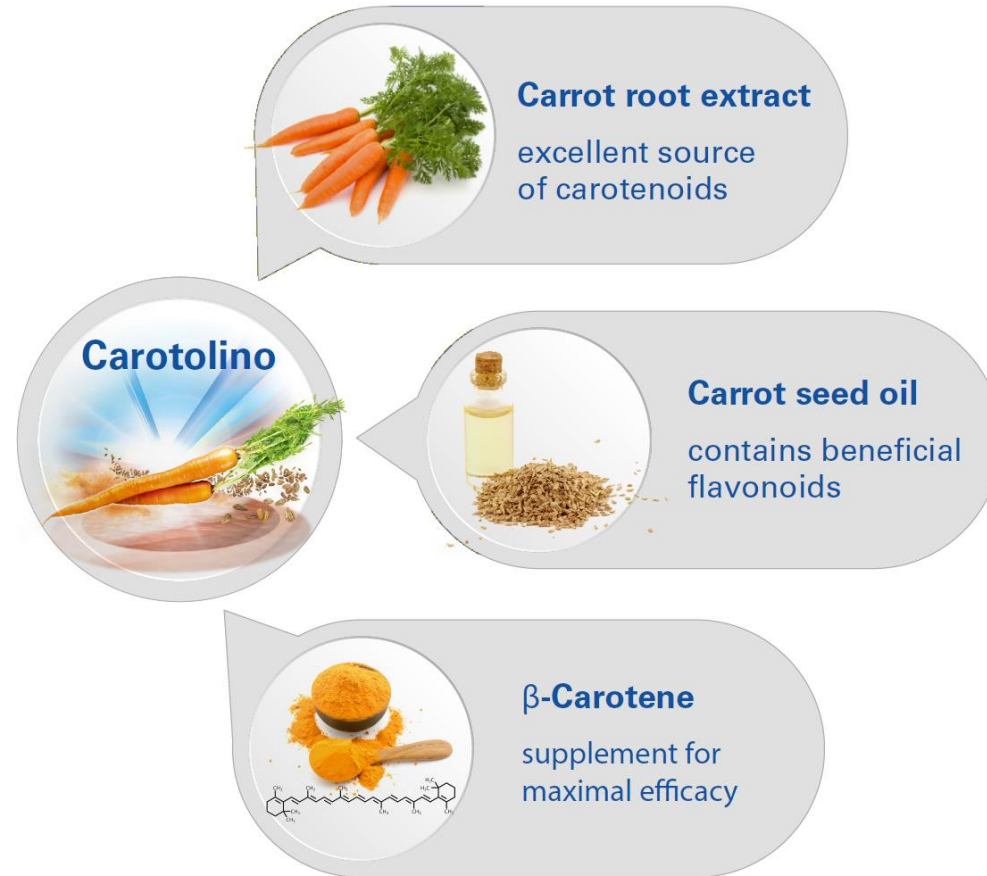
Carotolino



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COMPOSITION

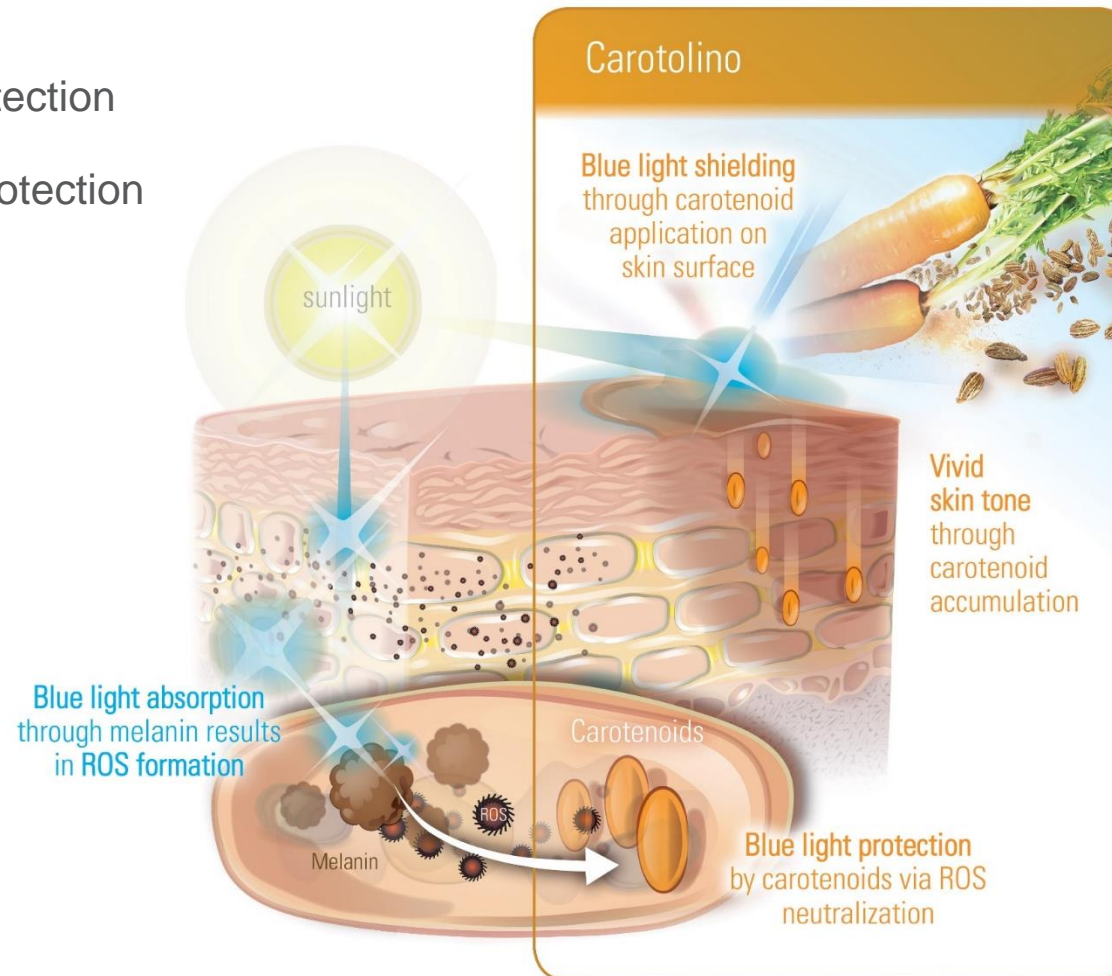
Carotolino – the Best of Carrots (*Daucus carota*)



MODE OF ACTION

Carotolino synergistically targets skin protection and liveliness.

- › (1) Direct blue light protection
- › (2) Indirect blue light protection
- › (3) Improved skin color



Carotolino Provides Perfectly Stabilized Carotenoids

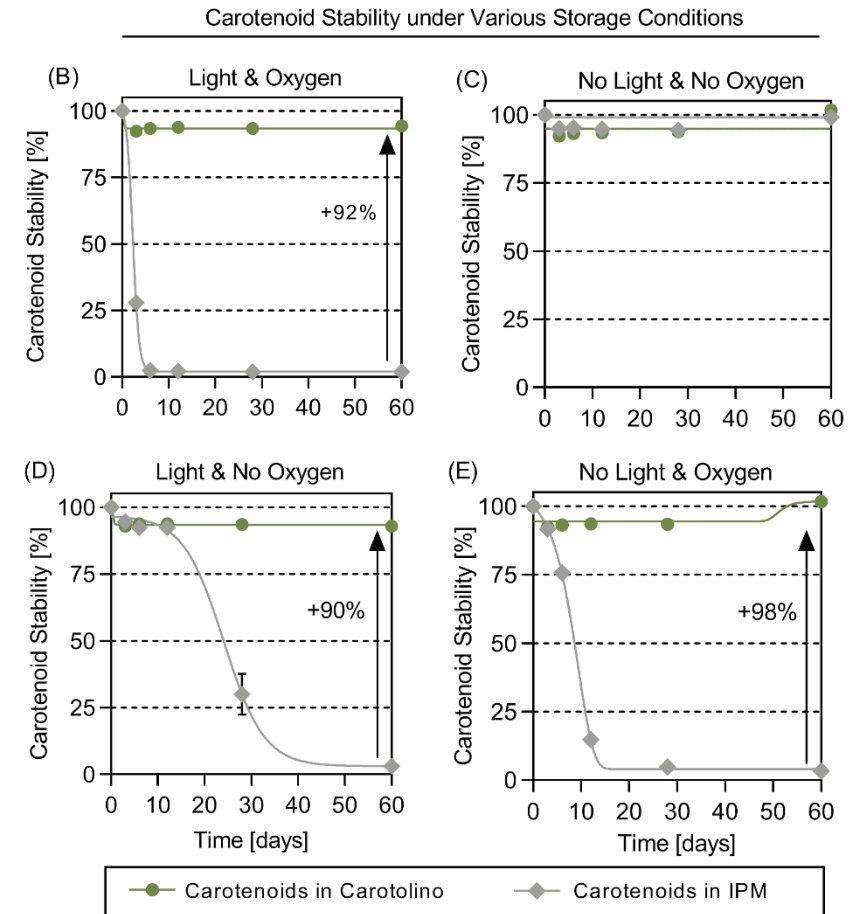
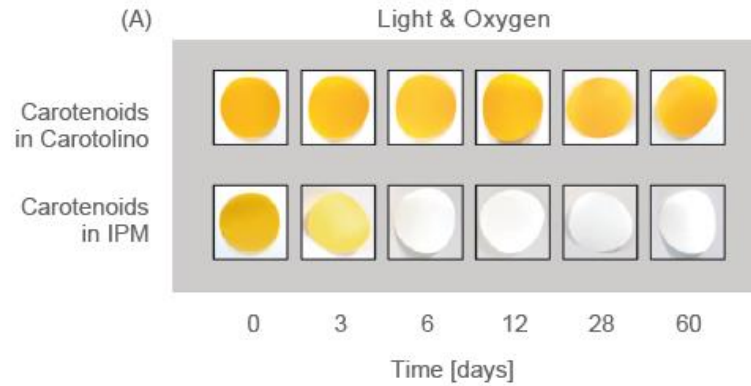
Objective:

- › Evaluate the stability of Carotolino compared to another cosmetic carotenoid preparation under different storage conditions.

Design	Carotenoid degradation assays
Test Substances	<ul style="list-style-type: none">• Carotolino• β-carotene in IPM (isopropyl myrisate)
Test Conditions	<ol style="list-style-type: none">1. Light and oxygen stability for 60 d<ul style="list-style-type: none">• Exposure to both, oxygen and light• Exposure to neither, oxygen nor light• Exposure to either, oxygen or light2. Heat stability: emulsion with 2 % Carotolino was heated to 80°C for 4 h
Endpoint	Coloration (ITA-value) as an indirect marker for β -carotene content with colorimeter

STABILITY ANALYSIS

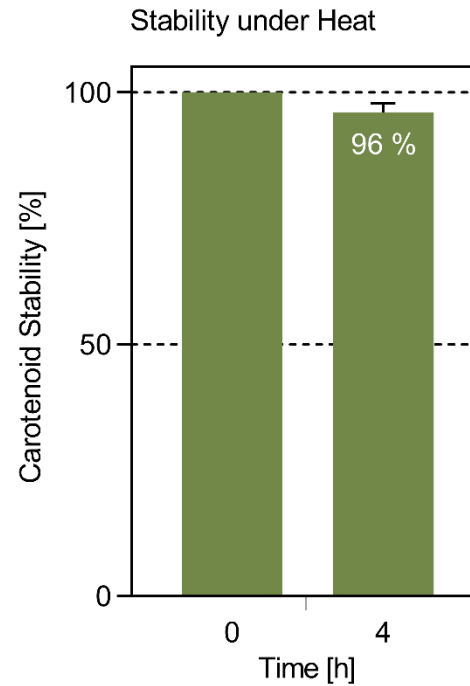
Carotolino Provides Perfectly Stabilized Carotenoids



Carotolino has excellent stability superior to carotenoids in IPM.

STABILITY ANALYSIS

Carotolino Provides Perfectly Stabilized Carotenoids



Carotolino provides carotenoids stable to elevated temperatures.

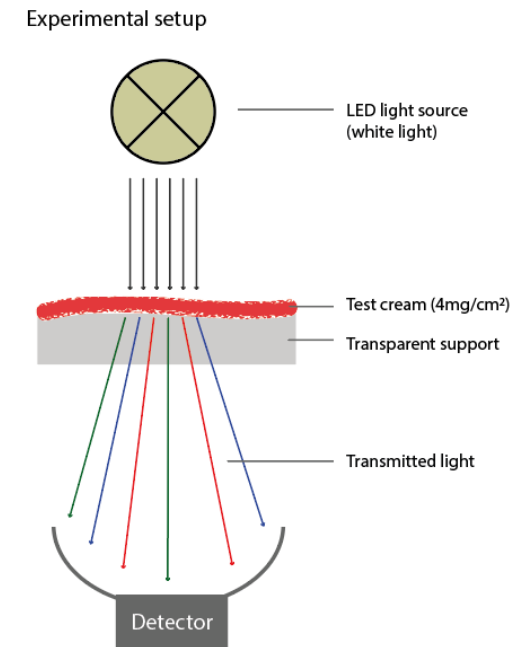
Carotolino ensures long-term blue light protection and a lasting skin coloration effect.

Carotolino Shields Blue Light Efficiently

Objective:

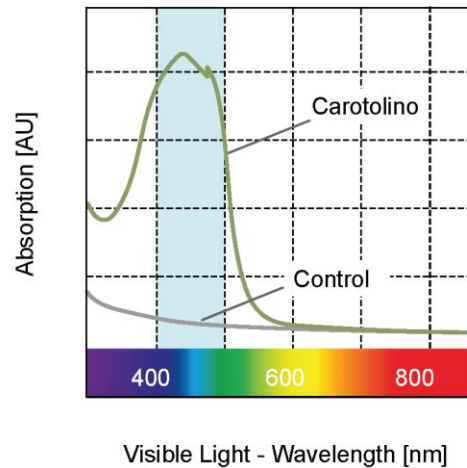
- › Show that Carotolino selectively absorbs blue light and protects from blue light in a cosmetic formulation.

Design	<i>In vitro</i> blue light protection assay
Test Substances	o/w emulsion containing 0 % (control), 0.25 %, 0.5 %, 1 % or 2 % Carotolino
Application Frequency	Application of emulsion to a transparent slide: 4 mg/cm ²
Endpoint	Blue light protection calculated as reduction of blue light intensity in visible light

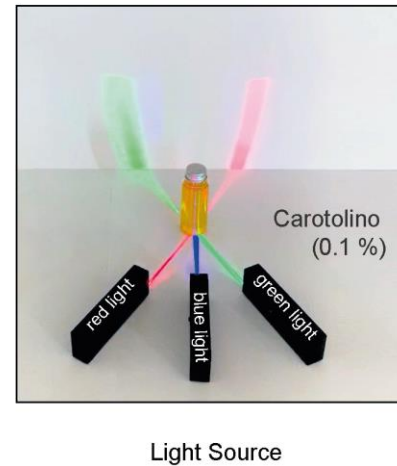


Carotolino Shields Blue Light Efficiently

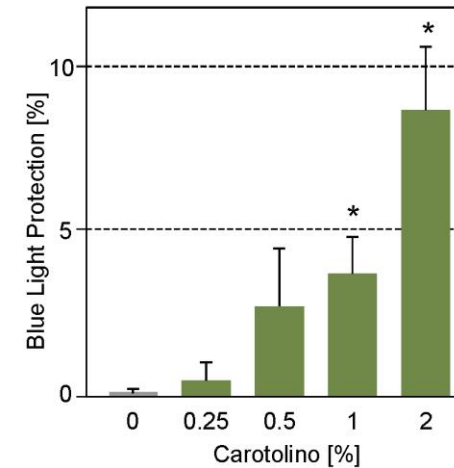
(A) Maximal Absorption in Blue Light Range



(B) Selective Absorption of Colored Light



(C) Blue Light Protection in a Cosmetic Formulation

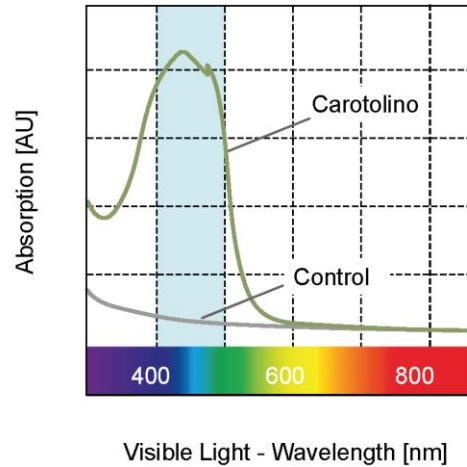


Results:

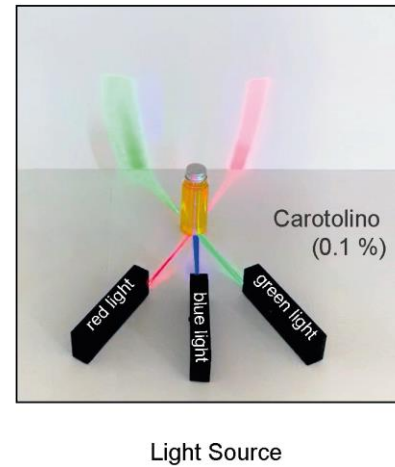
- › Carotolino, as a raw material, effectively absorbed blue light between 400-500 nm (A).
- › Carotolino, diluted in solution, selectively filtered blue light (B).
- › Carotolino, in cosmetic formulations, significantly shielded blue light (C).

Carotolino Shields Blue Light Efficiently

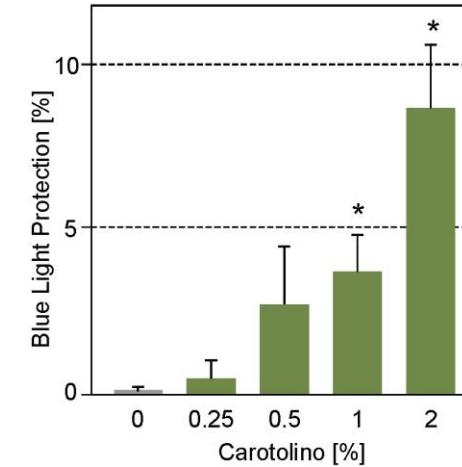
(A) Maximal Absorption in Blue Light Range



(B) Selective Absorption of Colored Light



(C) Blue Light Protection in a Cosmetic Formulation



Cosmetic formulations with Carotolino protect skin by directly shielding blue light.



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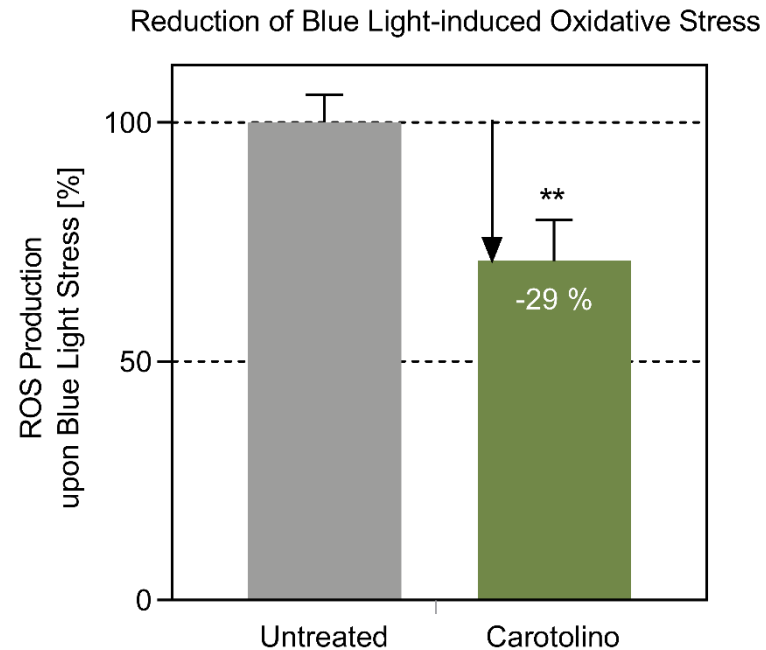
Carotolino Reduces Oxidative Stress Induced by Blue Light

Objective:

- › Show that the topical application of Carotolino reduces blue light-induced oxidative stress

Design	<i>In vitro</i> ROS fluometric quantification assay
Test Panel	3 D tissue model
Test Substances	<ul style="list-style-type: none">• Carotolino• Untreated control
Application Frequency	Single application prior to blue light exposure
Endpoint	Reduction of oxidative stress generated by blue light

Carotolino Reduces Oxidative Stress Induced by Blue Light



Carotolino reduced blue-light-induced ROS production by approx. 30 %.

Topical application of Carotolino protects the skin from indirect blue light damage through oxidative stress.

Carotolino Makes Skin Vivid and Lively

Objective:

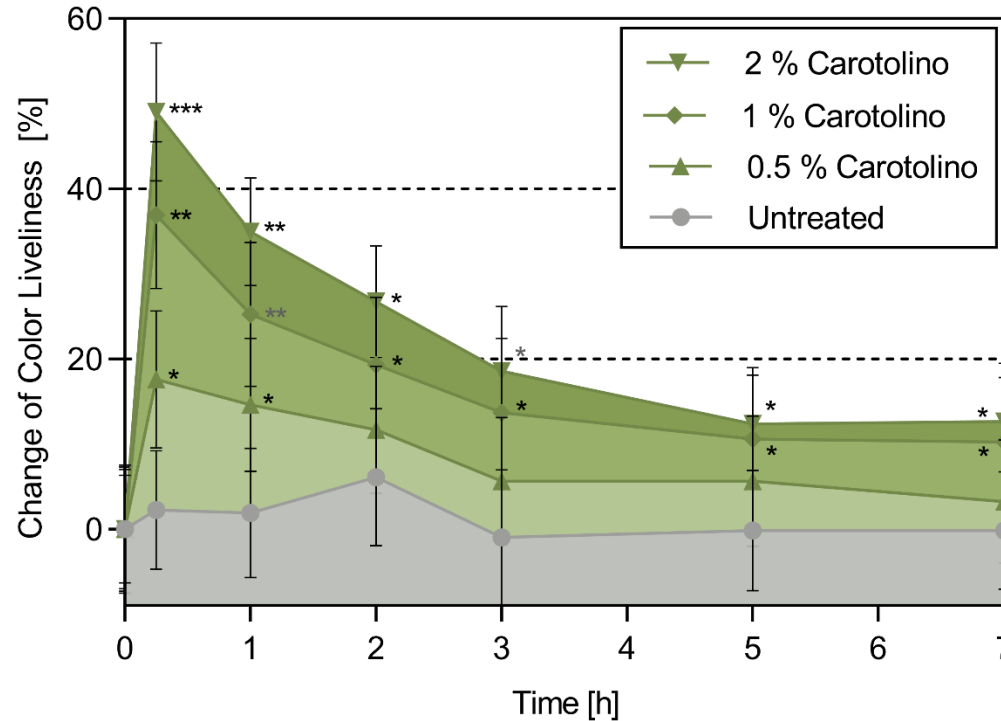
- › Show that the topical application of Carotolino creates a subtle color optimization.

Design	<i>In vivo</i> study
Test Panel	9 volunteers
Test Substances	Emulsions with 0 % (untreated control), 0.5 %, 1 % and 2 % Carotolino
Application Frequency	Single application
Endpoint	Liveliness of skin color, colorimeter b*value (blue-yellow axis) of the CIE Lab system

Carotolino Makes Skin Vivid and Lively



Improvement of Skin Tone upon Carotolino Application



0.5 - 1 % Carotolino shifted pale skin tones to a more lively appearance.

Topical application of Carotolino provides immediate and long-lasting improvement to the skin color.

CONSUMER SELF-ASSESSMENT TEST

Carotolino Enriches Cosmetic Formulations

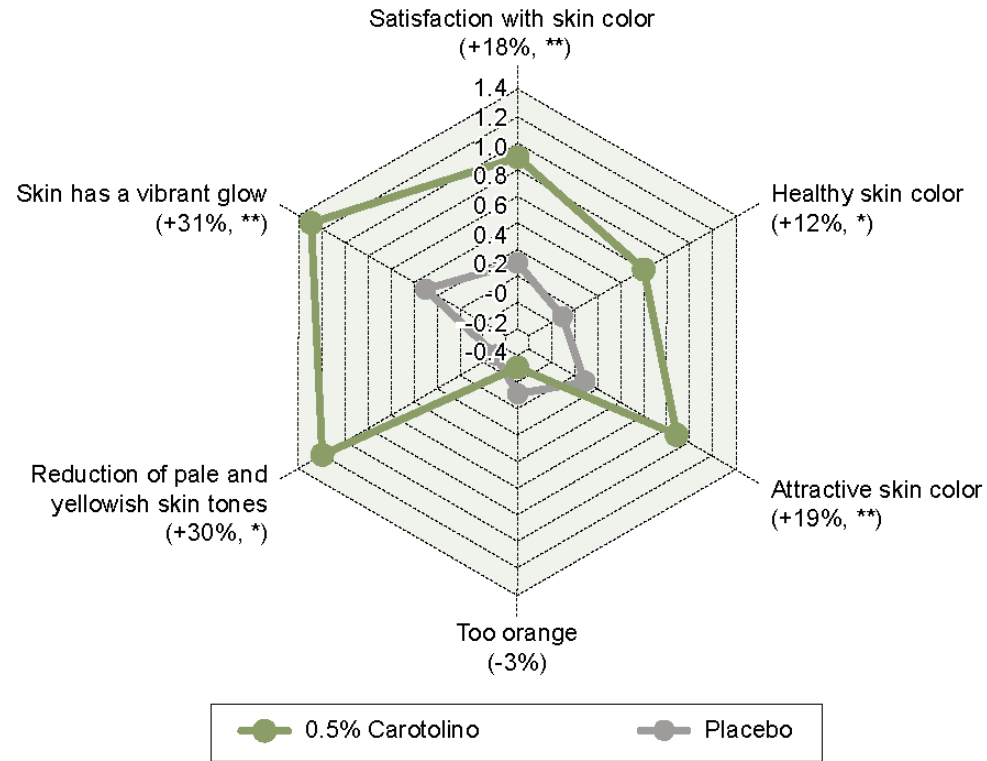
Objective:

- › Show that 0.5 % Carotolino in a test cream:
 - › perceptively changes **skin color** by adding liveliness to skin,
 - › improves **general skin appearance**, including healthiness and attractiveness,
 - › convinces consumers to **recommend** the product and **adds value** to a formulation.

Design	Placebo-controlled consumer test
Test Panel	2 groups of 20 volunteers each, Caucasian skin type, female, age 25-50, skin phototype (Fitzpatrick): I, III and IV
Test Substances	<ul style="list-style-type: none">• A test cream containing 0.5 % Carotolino• A test cream containing 0 % Carotolino (placebo)
Application Frequency	For 10 days, twice a day (morning and evening)
Endpoint	Self-evaluation questionnaire: rating parameters related to changes in skin color, general skin appearance, product recommendation and product value

CONSUMER SELF-ASSESSMENT TEST

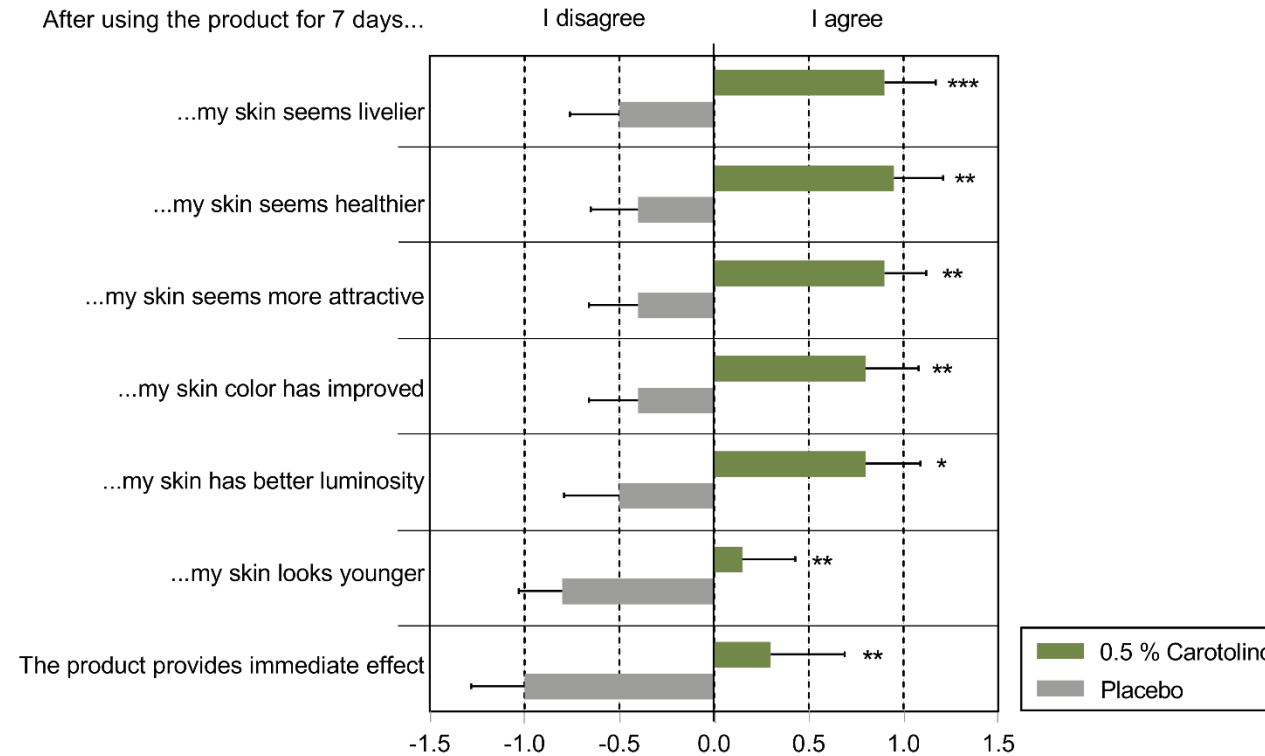
Carotolino Enriches Cosmetic Formulations



Consumers were more satisfied with their skin colour and perceived it as healthier and more attractive with Carotolino. The colour changes were never perceived as too orange.

CONSUMER SELF-ASSESSMENT TEST

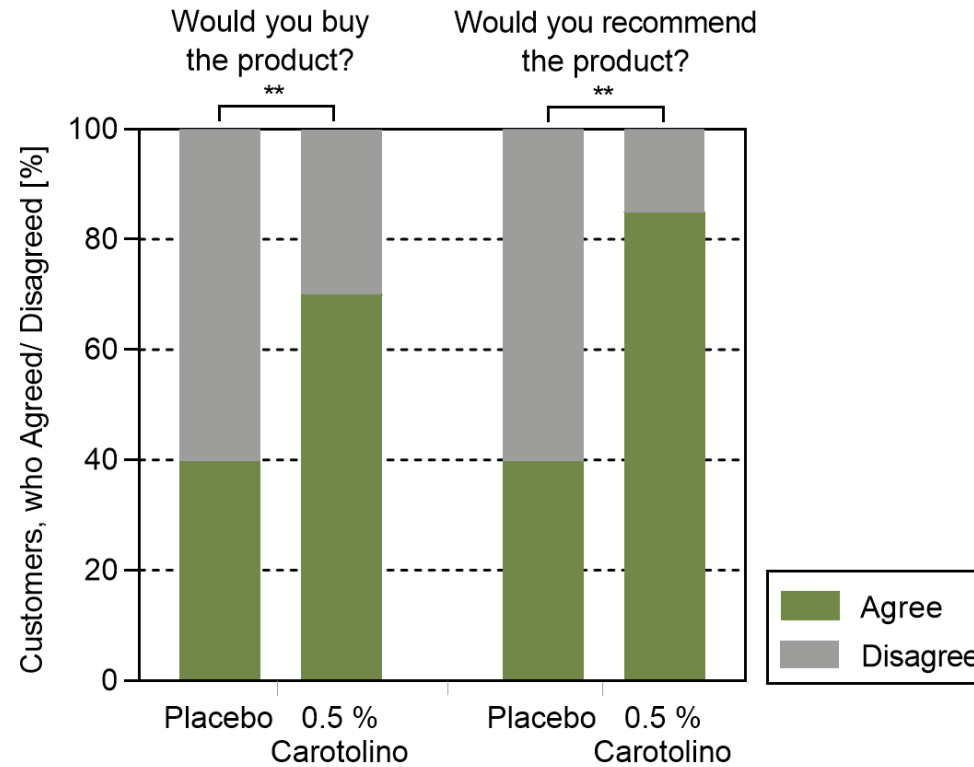
Carotolino Enriches Cosmetic Formulations



Improved general skin appearance: consumers judged their skin as livelier, healthier, younger and more attractive after using Carotolino.

CONSUMER SELF-ASSESSMENT TEST

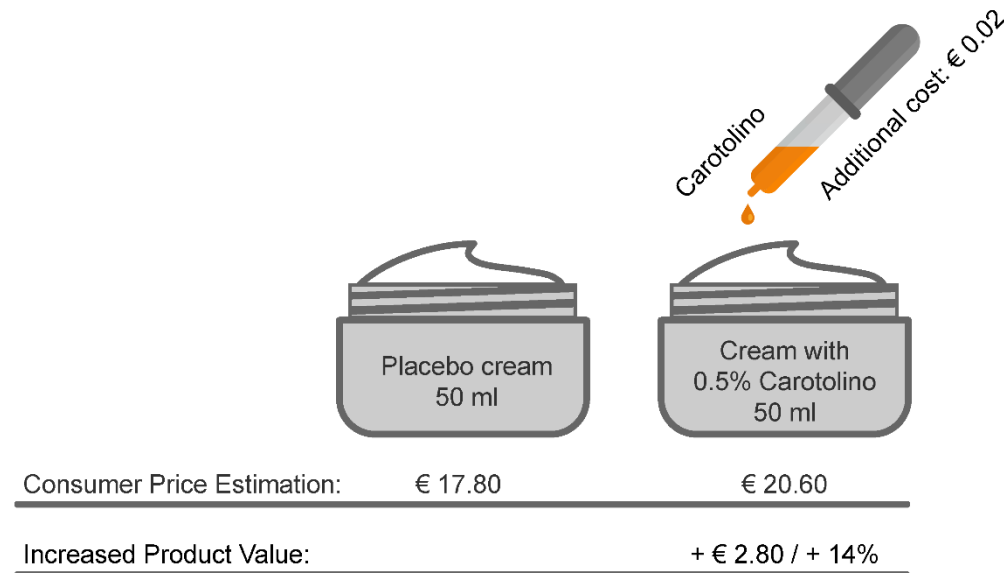
Carotolino Enriches Cosmetic Formulations



Increased product conviction and recommendation: consumers were more inclined to buy product (+ 30 %) and more confident to recommend the product (+ 45 %) when Carotolino was added.

CONSUMER SELF-ASSESSMENT TEST

Carotolino Enriches Cosmetic Formulations

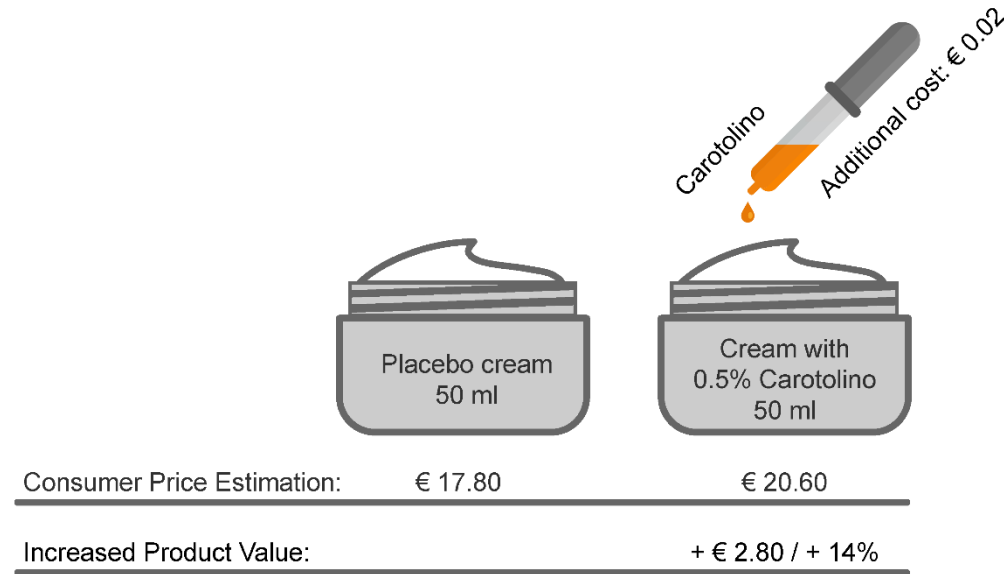


Results:

- › Increased product value: estimated product prices increased by 14 % (2.80 €) when Carotolino was added (additional production cost only 0.02 €).

CONSUMER SELF-ASSESSMENT TEST

Carotolino Enriches Cosmetic Formulations



Carotolino adds value to a formulation and produces tangible skin color improvement; improvement that is felt and enjoyed by consumers.

SUMMARY

Carotolino- Blue Light Protection and a Vivid Look

ACTIVE INGREDIENTS

- Carrot root extract (excellent source of carotenoids)
- Carrot seed oil (e.g. isoflavonoids)
- β -carotene (supplement for maximal efficacy)

PROVEN EFFICACY

in vitro

- Shielding of blue light
- Neutralization of blue light-induced radicals

in vivo

- Immediate & long-term improvement of skin liveliness

USER BENEFITS

- Direct & indirect blue light protection
- Support of a healthy & vivid skin color
- Most stable form of carotenoids



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Carotolino synergistically targets skin protection and liveliness.

Carotolino

Recommended Applications

- › Daily defense cream
- › Anti-aging applications
- › Protecting face and body care
- › After-sun care
- › Pleasant night creams
- › Treatment of dark eye circles
- › Lip balm (color and blue light protection)
- › Color protecting hair care

Characteristics

- › Stabilized composition of carrot root extract, carrot seed oil and β -carotene
- › Reddish-orange, oily viscous liquid
- › Preservative-free/ self-preserving



INCI

- › Canola Oil, Daucus Carota Sativa (Carrot) Seed Oil, Daucus Carota Sativa (Carrot) Root Extract, Helianthus Annuus (Sunflower) Seed Oil, Tocopheryl Acetate, Beta-Carotene

Recommended Use Level

- › 0.1 – 1 % for emulsions and up to 3 % for oils

«Lively Face Oil» with Carotolino and Vitamin F oilsoluble N

Lively Face Oil

with Carotolino and Vitamin F oilsoluble N



Phase	Ingredient	INCI	Function	Supplier	% w/w
A	Lipex PreAct™	Canola Oil	Emollient	AAK SWEDEN	26.00
	Carotolino	Daucus Carota Sativa (Carrot) Root Extract, Canola Oil, Daucus Carota Sativa (Carrot) Seed Oil, Helianthus Annuus (Sunflower) Seed Oil, Tocopheryl Acetate, Beta-Carotene	Active ingredient	Lipoid Kosmetik	3.00
	Vitamin F oilsoluble N	Linolenic Acid, Oleic Acid, Linoleic Acid, Palmitic Acid, Stearic Acid, Helianthus Annuus (Sunflower) Seed Oil, Tocopherol	Functional ingredient	Lipoid Kosmetik	0.50
B	dermofeel® sensolv	Isoamyl Laurate	Emollient	Evonik Nutrition & Care	25.00
	Olive oil, refined	Olea Europaea (Olive) Fruit Oil	Emollient		15.00
	Almond oil, refined	Prunus Amygdalus Dulcis (Sweet Almond) Oil	Emollient		15.00
	Cetiol® V	Decyl Oleate	Emollient	BASF	5.00
	Isopropyl myristate	Isopropyl Myristate	Emollient		2.00
	Avocado oil, refined	Persea Gratissima (Avocado) Oil	Emollient		5.00
	Argan oil, pressed	Argania Spinosa Kernel Oil	Emollient		2.00
	Soybean oil, refined, GMO-free	Glycine Soja (Soybean) Oil	Emollient		1.00
C	Vitamin Cocktail 1765-0	Parfum (Fragrance), Citral, Geraniol, Limonene, Linalool	Fragrance	Essencia	0.50

Formulation Insights

Appearance/ Aim

Oily liquid with a bright orange color. The formulation uses Carotolino at its very upper limit (3%) illustrating that the intense color of Carotolino is no hindrance – quite the contrary. Additionally, it works as a ‘booster’ for day creams or other bases of the daily routine, when a healthy and vibrant look is desired.

Ingredients

- **Carotolino** provides blue light protection and acts as a natural skin color enhancer. At a concentration of 3% it gives the formulation a colorful orange hue without overtly coloring the skin.
- **Vitamin F oilsoluble N** is an oil-soluble cocktail of polyunsaturated essential fatty acids, formerly known as ‘Vitamin F’. Vitamin F is well established in cosmetics for making the skin more supple and elastic. Conceptually, Vitamin F nicely fits to the provitamin A carotenoids that represent the key element of Carotolino.

Characteristics

- Without: synthetic polymers, PEGs and silicones. Self-preserving/ preservative-free.

Benefits

- Blue light protection for dull and rough skin.
- Skin color improvement: adds liveliness, compensates pale skin tones, is not perceived as too orange.
- Carotolino adds value to the formulation and increases buying intention (please request our product flyer).
- Natural caring oils for a nourished skin feel.

«Blue Light Blocking Cream» with Carotolino and Mexican Arnica Pro

Blue Light Blocking Cream with Carotolino and Mexican Arnica Pro



Phase	Ingredient	INCI	Function	Supplier	% w/w
A	Deionized Water	Aqua (Water)			Ad 100
	Glycerin 99.5 %	Glycerin	Humectant		2.50
	KELTROL® CG-SFT	Xanthan Gum	Thickener	CP Kelco	0.20
B	Phytocream® 2000	Cetearyl Alcohol, Glyceryl Stearate, Potassium Palmitoyl Hydrolyzed Wheat Protein	Emulsifier	Sinerga	3.00
	TEGO® Care 450	Polyglyceryl-3 Methylglucose Distearate	Emulsifier	Evonik Nutrition & Care	2.00
	Myrtil® 318	Caprylic/ Capric Triglyceride	Emollient	BASF	6.00
	dermofeel® sensolv	Isoamyl Laurate	Emollient	Evonik Nutrition & Care	4.00
	Coconut oil native, organic	Cocos Nucifera (Coconut) Oil	Emollient	All Organic Treasures	3.00
	Shea butter organic	Butyrospermum Parkii (Shea) Butter	Emollient	Emile Noel	3.00
	Beeswax pesticide removed	Beeswax	Consistency enhancer	Hammonia Oleochemicals	0.80
	Lanette® O	Cetearyl Alcohol	Consistency enhancer	BASF	1.20
C	Carotolino	Canola Oil, Daucus Carota Sativa (Carrot) Seed Oil, Helianthus Annuus (Sunflower) Seed Oil, Tocopheryl Acetate, Beta-Carotene, Daucus Carota Sativa (Carrot) Root Extract, Citric Acid, Tocopherol	Active ingredient	Lipoid Kosmetik	0.50
	Mexican Arnica Pro	Aqua (Water), Glycerin, Heterotheca Inuloides Flower Extract, Sodium Benzoate, Citric Acid, Potassium Sorbate	Substantiated extract	Lipoid Kosmetik	0.50
D	E-Leen® Green C	Pentylene Glycol, Glyceryl Caprylate/ Caprate	Preservative	MinaSolve	4.00
E	NaOH	Sodium Hydroxide	Neutralizing agent		q.s.
	Vitamin Cocktail 1765-0	Parfum (Fragrance), Citral, Geraniol, Limonene, Linalool	Fragrance	Essencia	0.50

Formulation Insights

Appearance/ Aim

An o/ w emulsion with a rich texture and wonderful yellow-orange, glossy color

Ingredients

- **Carotolino** provides blue light protection and acts as a natural skin color enhancer. At a concentration of 0.5% it gives the formulation a pleasant yolk-like hue. Lightproof packaging is recommended as the color tends to fade when exposed to light.
- **Mexican arnica**, with its brilliant yellow flowers, nicely fits to the orange nature of the formulation. The activity proven Herbasol® Pro extract provides anti-inflammatory activity and a natural touch (please ask for our 'Anti-Inflammation' flyer).

Characteristics

- Without: synthetic polymers, PEGs and silicones
- Formulation preserved with non-listed preservatives.

Benefits

- Blue light protection for sensitive and irritated skin.
- Skin color improvement adds liveliness, compensates pale skin tones, is not perceived as too orange.
- Carotolino adds value to the formulation and increases buying intention (please request our product flyer).

REFERENCES

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- [4] Stahl W and Sies H. β -Carotene and other carotenoids in protection from sunlight. Am J Clin Nutr, vol. 96, no. 5, pp. 1179S-84S, 2012.
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