

# Liposhield™ HEV

## Blue light / High Energy Visible (HEV) Light protection



### Liposhield™ HEV

INCI : Water (and) Melanin  
CAS #: 7732-18-5, 8049-97-6  
EC #: 231-791-2, 232-473-6

**Protects skin from harmful effects of HEV light**

**Prevents oxidative stress**

**Prevents the generation of an impaired barrier**

**Prevents skin aging related to accelerated cell senescence**

Naturally-derived, fractionated melanin, tailored to absorb in the violet/blue range of 400-500 nm with minimal absorption in the beneficial red range.

Recent scientific evidence suggests that High Energy Visible (HEV) light, at the wavelengths that the eye perceives as blue to violet, is harmful to skin. HEV light has been shown to generate the same amount of reactive oxygen species (ROS) in the skin as those produced by UVA and UVB combined. The exact impact of this ROS burst to normal biochemical cycles that maintain healthy skin is not fully understood.

Vantage™ has conducted a study analyzing the changes in skin's gene expression when exposed to HEV light. This study's results indicate that HEV light may significantly affect the skin's inflammatory cascade and its progression to healing, its barrier recovery, cell cycles and melanogenesis. Our results may explain the variety of previously described effects of HEV light on skin and shed new light on the understanding of what is believed to be the harmful impact that leads to accelerated skin aging.

Our conclusion, based on this study and other research group's studies, is that in order to maintain skin's health; the skin must be shielded from these wavelengths. As a result, we have developed a novel compound that acts as an "umbrella" to shield the skin from HEV light, Liposhield™ HEV.

### Recommended applications



Skin Care



Sun Care



Color Cosmetics



 Vantage

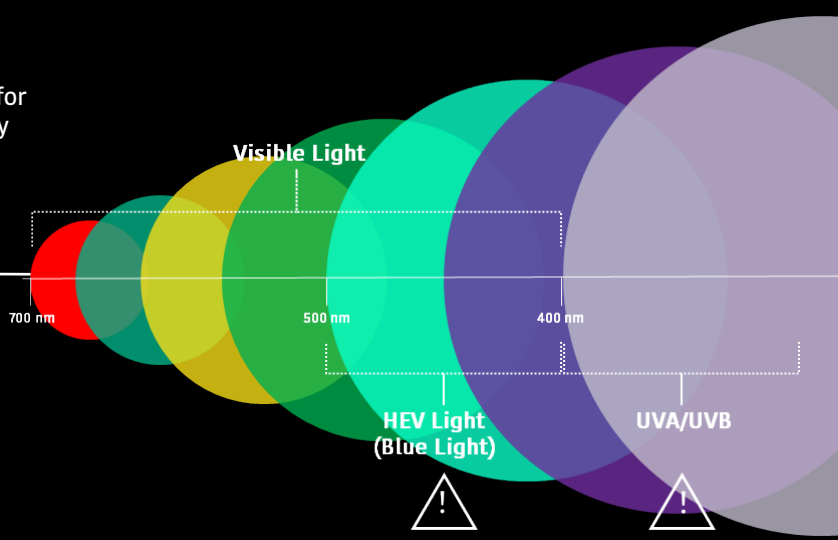
# What is High Energy Visible light?

Photo aging mechanisms are now well established and advances in this field have led to increased awareness of sun damage. Consumers are looking for solutions to mitigate sun and light damage at every level:

- UV Protection
- High Energy Visible light (Blue Light) protection

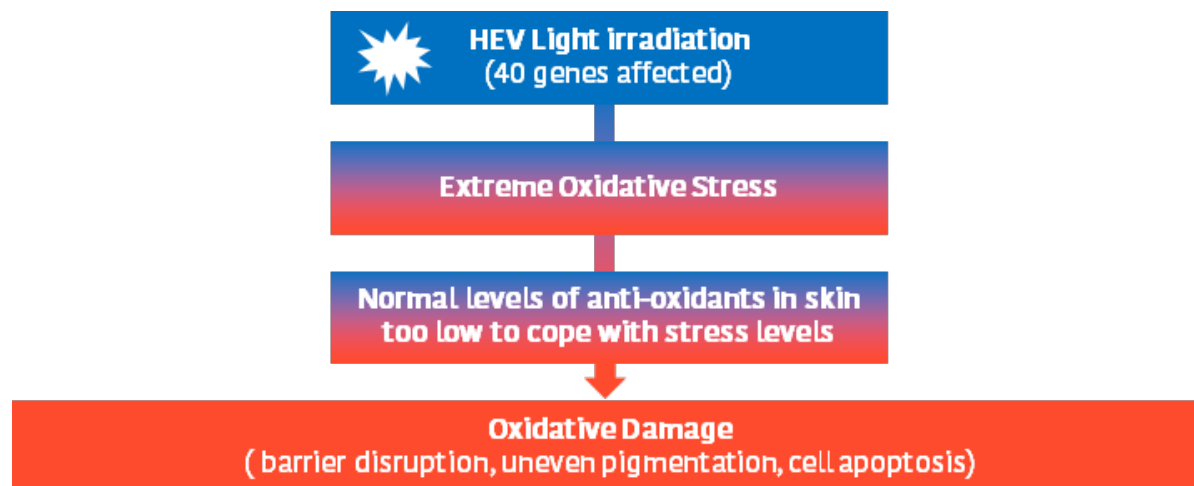
**High Energy Visible light (HEV) is the high-frequency light emitted between 400 and 500 nm** that is part of the visible spectrum.

This light is emitted outside by the sun, but also indoor, by many LED lights, screens and monitors.



## Damage caused from HEV light

- Conventional sunscreens only absorb UVB-UVA, 290-400nm while HEV or Blue light absorbs 400-500nm
- Penetrate deeper than UVA and UVB, reaching beyond the dermis
- Responsible for the generation of 50% of the Reactive Oxygen Species (ROS) generated in the skin as a result of sun exposure
- $O_2^-$  (superoxide radical) and HO (hydroxy radical) are among the radicals generated
- UVA-like: promotes indirect DNA damage that is mediated by ROS
- Activates matrix metalloproteinases (MMP's) that lead to wrinkle formation and premature aging



High Energy visible light modulates the expression of 40 skin related genes.

# Gene expression study

## Liposhield™ HEV shields skin cells from blue light impact at gene expression level

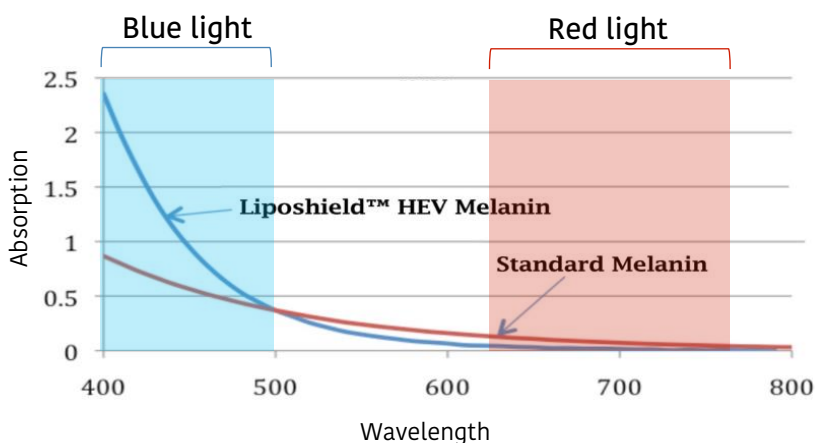
To test the shielding effect of Liposhield™ HEV in absorbing HEV light and protecting skin cells, a test was developed that compared the effect of blue light on an unprotected cell culture and on a cell culture protected by a thin film containing Liposhield™ HEV. Following irradiation, RNA was isolated and samples were prepared for gene expression analysis

On the Liposhield™ HEV protected sample, one gene coding for heat shock protein was different from non-irradiated control. Further analysis reveals that Liposhield™ HEV shielded the following effects:

- Barrier disruption
- Aging at the cellular level affecting normal cell cycle and death patterns
- Melanogenesis leading to uneven pigmentation

# Fractionated melanin vs Standard melanin

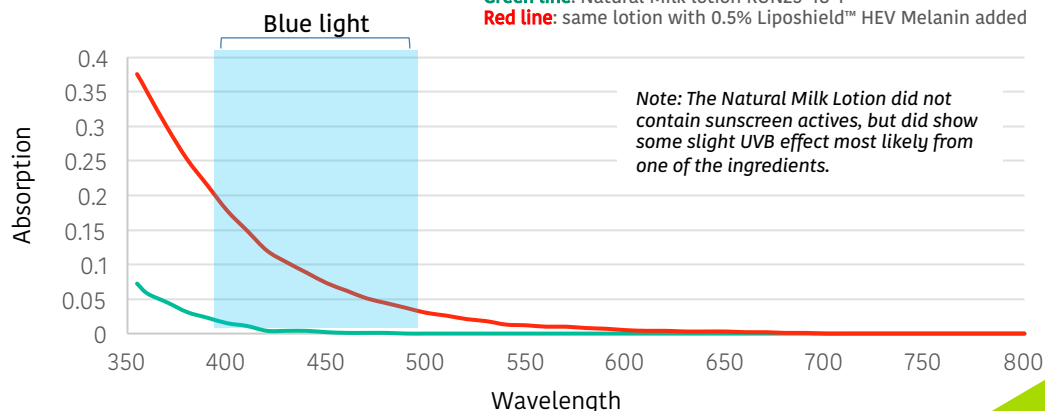
## Liposhield™ HEV exhibits higher absorbance than traditional melanin in blue light range.



- Optical Absorption of standard melanin (full size) and Liposhield™ at the different wavelengths of the visible spectrum normalized at 500 nm
- Between 600-750 nm (red spectrum) both melanin's have relatively low absorption
- Between 400-500 nm (blue light spectrum), Liposhield™ HEV absorbs significantly more when compared to standard melanin.
- Minimally absorb the red wavelengths (~600-750 nm). Liposhield™ HEV allows passage of these therapeutic wavelengths.

## Blue light absorption in O/W emulsion

Green line: Natural Milk lotion RON23-48-1  
Red line: same lotion with 0.5% Liposhield™ HEV Melanin added



Note: The Natural Milk Lotion did not contain sunscreen actives, but did show some slight UVB effect most likely from one of the ingredients.

The addition of 0.5% Liposhield™ HEV Melanin led to outstanding HEV absorbance performance out to 500nm range.

# Liposhield™ HEV

## Blue Light / High Energy Visible (HEV) Light protection

Appearance @25°C	Dark brown liquid
Odor	Characteristic
Solid Content	9-12%
Recommended Use Level	0.2-0.5%
Solubility	Soluble in water

Preservative System: Pentylene Glycol and Ethylhexylglycerin

## Formulation guidelines

### Solubility and pH:

- Liposhield™ HEV is a 9-12% aqueous solution
- The pH should be adjusted to and held between 6.1 - 6.9
- At higher pH levels the formulation might darken

### Incorporation:

- Add after emulsification at 45°C or below
- Use medium propeller mixing
- Will impart a yellowing effect to o/w emulsions,
- Color can be mitigated with the addition of dyes, resulting in pale pastel formulations,
- water-in-oil (w/o) or water-in-silicone (w/Si) emulsions may partially mask the yellowing effect
- should not affect the foundation color

### 0.5% Liposhield™ HEV Melanin Cream at 6 Months



### Addition of dye will mitigate the color



O/W Emulsion with 0.5% Liposhield™ HEV Melanin and Red 40 (C11603S)

O/W Emulsion with 0.5% Liposhield™ HEV Melanin

O/W Emulsion with 0.5% Liposhield™ HEV Melanin and Blue 1 (C142090)

## Color mitigation

The color of Liposhield™ HEV can be mitigated somewhat by formulating into W/O emulsions and W/Si makeups, or by the addition of titanium dioxide or pigments.

