

A Primer on Sunscreens.

What you should know...



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Choosing the best sunscreen in terms of protection from UV light is no longer a simple decision. Dermatologists now know that exposure to both UVA and UVB light is detrimental to your skin's health. UVB are shorter wavelengths (290-320 nm) of Ultraviolet radiation from the sun. They affect the outer layer of the skin and are responsible for sunburns. UVA rays are longer wavelengths (320-400 nm) of Ultraviolet radiation. They penetrate to the deeper layers of the skin causing long-term damage such as discoloration and loss of collagen, in other words photo aging of the skin. Both types of UV light contribute to the risk of skin cancer.

Unfortunately, current labeling requirements mandate that only the Sun Protection Factor (SPF) for UVB radiation be indicated. In other words, the SPF indicated on your sunscreen

bottle is not an adequate measurement of the sun protection you are receiving.

Both the US Food and Drug Administration (FDA) and Health Canada are working to implement a system where UVA protection is also measured and represented on sunscreen labels. Both will most likely use a star system for rating UVA protection with 4 stars being the highest designation. In the interim, consumers need to become 'label readers' and be able to decipher what active ingredients in concentration and combination provide the best broad spectrum protection. The following are a few 'code-breakers' designed to help you decipher label copies currently on the market.

Organic Active Ingredients

In terms of protection against UVB rays, the pharmaceutical industry has relied on several tried and tested ingredients and

very little in terms of technological advances has occurred with these mainstays. **Octocrylene** (in concentration of 8% or higher), **Octisalate** (in concentrations of 5% and higher), **Homosalate** (weak protection in all concentrations from 5% and up) and **Octinoxate** (in 7.5% and higher) are common UVB protectors and offer moderate protection alone and strong protection when combined.

Oxybenzone (in concentrations of 3% or higher) is another ubiquitous UVB protector but has become known as an irritant and photo-allergen among contact dermatologists. All of the above ingredients offer virtually none to very little UVA protection however.

The available UVA protectors in North America with respect to organic active ingredients are: **Avobenzonone (Parsol 1789)** and the L'Oreal patented ingredients of **Mexoryl SX** and **Mexorly XL** (not currently available in the US).

Due to patent restrictions, **Avobenzonone** is arguably more commonly found.

However, dermatologists are beginning to question its use as studies show that the UVA protection factor of **Avobenzonone** breaks down when exposed to sunlight, and even more so when **Avobenzonone** is used in combination with **Octinoxate**.

Different companies have claimed methods to stabilize **Avobenzonone**, including using **Octocrylene** and **Oxybenzone**. However, its photostability in specific formulations have not been confirmed in published peer reviewed journals¹. Furthermore, **Avobenzonone** if used with no other UVA protector needs to be used in concentrations of 10% and higher to offer strong protection but even then fails to completely span the UVA spectrum through to the longest wavelengths.

¹ Bissonnette, R. MD FRCPC. "Update on Sunscreens". Skin Therapy Letter, edited by Dr. Stuart Maddin. Volume 13, Number 6, July-August 2008. .

Mexoryl SX is now featured in many products within the L'Oreal and L'Oreal subsidiary brands. Some L'Oreal brands include Vichy, Lancome, Ombrelle and La Roche-Posay. However, when used alone rather than in combination with **Mexoryl XL**, **MEXORYL SX** offers moderate protection when used in a 4% concentration and relatively stronger protection when used in 10% concentration. However, very few formulations use a 10% concentration.

Mexoryl XL is now appearing in the Anthelios line of La Roche-Posay and Vichy's line of sunscreens and is marketed as having a synergistic effect with **Mexoryl SX**. According to La Roche-Posay, a 4% concentration of **Mexoryl XL** and a 4% concentration of **Mexoryl SX** give double the protection of an 8% concentration of **MEXORYL SX** alone. Both **MEXORYLS** however are still used in combination with other UVA protectors like **Avobenzone** and UVB

protectors like **Octocrylene**. Typically with a combination of five active ingredients, lines like the Anthelios XL in their formulas designated as SPF 60 offer strong protection up until the longest waves of UVA. Formulas with lower SPFs do not contain both both **Mexoryls** in 4% concentrations. However, even in the SPF 60 version protection against the longest waves of UVA still drops off

Inorganic Active Ingredients

The two active inorganic ingredients Titanium Dioxide and Zinc Oxide act as physical sun 'blockers'. In other words, they provide a physical shield from sunlight and sit on top of the epidermis rather than being absorbed like chemical organic ingredients. They undeniably provide the broadest, most complete form of sun protection from the spectrum of UVB light through to the longest wavelengths of UVA but only if used in their most effective concentration. In

fact, sunscreens with either inorganic ingredient provide up to 20% more protection from UVA than sunscreens without them.² Unfortunately, most formulators have resisted using both ingredients in their effective concentrations (roughly 10% and higher) due to cosmetic considerations: including the rate of absorption, the feel, and the transparency of the overall product. In the past, typically only skiers and snowboarders were willing to use the solid white or sometimes coloured paste of older formulations. Eventually, formulas began to use the process of micronization to reduce the size of the zinc particle and make the product less chalky looking upon application. However even many micronized versions do not feature either ingredient at their optimal level because of these same aesthetic reasons.

² Environmental Working Group. "Nanotechnology: Summary". http://www.cosmeticsdatabase.com/special/sunscreens2008/report_nanotechnology.php

Nanotechnology has in many ways provided the solution. **Nano Zinc** and **Nano Titanium Dioxide** are essentially particles the size of one billionth of a meter and have unique physical and chemical qualities, the most apparent of which is complete transparency after application. **Nano Titanium Dioxide** has been available in sunscreens 1990 and **Nano Zinc Oxide** since 1999. Some have raised concern about absorption rates through the skin but out of 16 peer reviewed studies, virtually no incidences of absorption were found for either nano-scaled particle when applied to healthy skin. The Environmental Working Group, a non-profit research organization, who advocate precautionary approaches to personal care products reversed their position on nano-scale particles and stated, "EWG researchers found that zinc and titanium-based formulations are among the safest, most effective sunscreens on the market based

on available evidence. The easy way out of the nano debate would be to steer people clear of zinc and titanium sunscreens with a call for more data. In the process such a position would implicitly recommend sunscreen ingredients that don't work, that break down soon after they are applied, that offer only marginal UVA protection, or that have fewer studies demonstrating lack of skin penetration.”³

Conclusions

At the present moment, consumers need to be extremely proactive and self-motivated to ensure they are using an effective and safe sunscreen. This means decoding long and complicated chemical names of active ingredients, knowing effective concentrations for these ingredients, and remembering which

combinations of actives to avoid. This is a monumental task.

Clearly, both Health Canada and the FDA in the US have a responsibility to make the process of understanding sunscreen protection much simpler for consumers. However, they have not set a deadline for coming out with the UVA star system or establishing more restrictive labeling requirements. Without some public agitation, the delays in rewriting the monographs for sunscreens may continue.

In the meantime, consumers are encouraged to visit the website of the non-profit advocacy group the Environmental Working Group at www.cosmeticsdatabase.com. The site allows consumers to search for their sunscreen or for an active ingredient by name and will show them the actual level of protection their brand is affording them.

In short, turn over your sunscreen bottle and start investigating!

³ Environmental Working Group. “Nanotechnology: Summary”. http://www.cosmeticsdatabase.com/special/sunscreen2008/report_nanotechnology.php