

# Why you should avoid chemical sunscreen filters

## Hormone Disruption

A hormone is a chemical substance produced in the body that controls and regulates the activity of certain cells or organs. Hormones are essential for every activity of life, including the processes of digestion, metabolism, growth, reproduction, and mood control. Many hormones, such as neurotransmitters, are active in more than one physical process (MedicineNet).

Most chemical sunscreen filters are made up of small particles that are absorbed into the skin. Examples include oxybenzone, octinoxate, 4-MBC, octocrylene and homosalate. Some of these particles have even been found in plasma and urine [1]. By contrast, physical sunscreen ingredients like zinc oxide and titanium dioxide contain large particles that safely remain within the stratum corneum (outer dead layer of skin).

Dozens of studies in the last decade have examined the potential health hazards of small molecule sunscreen chemicals, including skin irritation or allergy, hormone disruption and skin damage that occurs when sunlight interacts with sunscreen chemicals (EWG: Environmental Working Group, 2015). Many of these chemicals are known or suspected hormone disruptors, allergens and carcinogens.

## Oxybenzone

Oxybenzone is part of the benzophenone family and EWG gives it a high hazard rating of 8/10. It penetrates the skin and has been found in mother's milk. Oxybenzone has been associated with skin allergies and is known to be a hormone disruptor. A study by the National Institute of Health (NIH) and the New York State Department of Health's Wadsworth Centre found that men with high exposure to benzophenone UV filters had a 30% reduction in fertility [2].

The U.S. Centers for Disease Control (CDC) detected oxybenzone in more than 97% of Americans based on a sample of more than 2500 adults and children [3]. Even though oxybenzone has been linked to skin allergies, hormone disruption and cell damage, 80% of chemical sunscreens sold in the U.S. and Canada contain oxybenzone.

A study by researchers at UC Berkeley and Clinica de Salud del Valle Salinas has demonstrated how taking a 3 day break from various cosmetics can lead to a substantial drop in levels of hormone-disrupting chemicals in the body. Oxybenzone fell by 36% and methyl/propyl parabens dropped by 44-45% [4].

Oxybenzone is also an emerging marine contaminant that poses a hazard to coral reef conservation [5].

## Octinoxate

Octinoxate, also known as octyl methoxycinnamate (OMC), is another small molecule chemical UV filter. Octinoxate has been given a hazard score of 6 by the EWG due to high concerns of biochemical or cellular level changes and endocrine disruption (EWG).

Octinoxate can be absorbed quickly through the skin and has been detected in urine, blood and breast milk [6,7]. It is an endocrine disruptor that mimics oestrogen and can disrupt thyroid function.

Lifetime oestrogen exposure is a risk factor for developing certain types of cancers in women, including breast cancer. In an article

published in Environmental Health Perspectives, octinoxate was shown to increase cell proliferation in MCF-7 breast cancer cells [8]. Octinoxate may also have thyroid disrupting properties [9]. The thyroid gland is part of the body's metabolism system.

A reduction of sperm count has also been shown in offspring of those who were exposed to octinoxate [6]. In addition, results of the Danish study presented at the Endocrine Society's 98th annual meeting in Boston in 2016 showed that the following UV filters disrupt sperm cell function: avobenzone, homosalate, meradimate, octisalate, octinoxate, octocrylene, oxybenzone and padimate O. These chemicals are common ingredients in sunscreens.

## Photostability

Photostability is a term that describes how slowly (or quickly) the UV protection of a sunscreen filter or product will break down due to exposure to UV radiation. Sunscreen filters fall into two classes, physical and chemical.

Physical filters (zinc oxide and titanium dioxide) are the most stable and maintain their ability to filter UV rays even when they are exposed to these rays. Physical filters sit on top of the skin and reflect and scatter most UV radiation rather than absorbing it, thereby remaining intact.

Chemical filters (octinoxate, oxybenzone, avobenzone, homosalate, octocrylene, octisalate) penetrate into the skin and absorb most UV radiation, converting it to heat energy. Chemical filters are changed by UV radiation in this process. Not only does the UV protection they provide decrease but their chemical composition also changes releasing free radicals as a result. This is one of the reasons for the suggestion that some chemical sunscreens may cause cancer. Free radicals cause premature ageing. Therefore, it is possible that the free radicals released by the degradation of chemical filters could also contribute to the ageing process.

The data show that when octinoxate, oxybenzone and octocrylene penetrate into the nucleated layers of skin, the level of reactive oxygen species (ROS) increases above that produced naturally by epidermal chromophores under UV illumination [10].

Since chemical filters erode so quickly, the FDA (Food and Drug Administration) and AAD (American Academy of Dermatology) recommend that sunscreens be reapplied every 2 hours. However, physical filters might not erode at all in 2 hours, provide much longer-lasting protection and have to be reapplied less often.

Even though frequent reapplication is necessary for chemical filters, unfortunately, it will also lead to increased exposure to chemical filters, many of which are hormone disruptors. There will also be increased free radicals in the skin.

### AlumierMD's Choice in Sunscreen Filters

When choosing sunscreen filters, AlumierMD chooses zinc oxide and titanium dioxide because they are photostable, have no skin absorption and have an excellent safety record. Sunscreen filters with evidence of human toxicity or poor photostability are avoided.

References

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Summary Articles

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