The Royal Australian and New Zealand College of Ophthalmologists

RANZCO Position Statement: UV Eye Protection

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The Royal Australian and New Zealand College of Ophthalmologists ACN 000 644 404
94 - 98 Chalmers Street, Surry Hills NSW 2010 Australia **Mail to:** PO Box 92 Strawberry Hills NSW 2012
T 61 2 9690 1001 **F** 61 2 9690 1321 **E** ranzco@ranzco.edu **www.ranzco.edu**

We acknowledge the Aboriginal and Torres Strait Islander Peoples, the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and community. We pay our respects to them and their cultures; and to their Elders past, present and emerging.
In recognition that we are a bi-national College, we also acknowledge the Rangatiratanga of Māori as Tangata Whenua and Treaty of Waitangi partners in Aotearoa New Zealand.

1. Purpose and scope

This position statement was developed through a collaboration between Cancer Council Australia's National Skin Cancer Committee and The Royal Australian and New Zealand College of Ophthalmologists (RANZCO). The purpose of the statement is to improve public awareness about the impact of UV from the sun on the eyes and what constitutes adequate eye protection.

2. Health effects of UV radiation on the eyes

Exposure of the eyes to UV radiation causes both short-term eye complaints and permanent eye damage.

The most common short-term impact of UV exposure to the eye is acute photo keratopathy, akin to sunburn of the cornea, which can cause inflammation [1].

Long term exposure to UV radiation can result in more serious damage to the eyes including on the eyelid skin, the ocular surface and in the anterior segment of the eye.

There is a strong evidence that UV exposure is associated with basal cell carcinoma and squamous cell carcinoma of the eyelid [2] [3] [4] [5]. Although UV radiation is strongly associated with skin cancer, including on the eyelids [2] [10], UV does not appear to be a risk factor for sebaceous carcinoma of the eyelid [11] and the evidence of the association between UV exposure and ocular melanoma is limited [8] [9].

On the ocular surface, UV exposure is associated with photokeratitis, climatic droplet keratopathy, and pterygium. Within the anterior part of the eye, it is associated with cortical cataract [6]. There is insufficient evidence to determine whether there is a clear causal link between UV exposure and age-related macular degeneration (AMD) [6] but there does appear to be evidence showing greater sun-light exposure could increase risk. Theoretically this may be more due to effects of visible blue light rather than UV [28] [29].

3. Exposure of the eyes to UV radiation

The World Health Organization's UVI Guide measures UV levels on a scale from 0 (Low) to 11+ (Extreme). The UV level is affected by a number of factors including the time of day, time of year, cloud cover, altitude, how close you are to the equator, scattering and reflection.

The level of UV exposure to the eyes is highly dependent on the angle of sunlight reaching the eyes, which is influenced by time of day and time of year. The eye receives direct UV radiation when facing the sun with the sun low in the sky, however reflected and scattered light also have a strong impact in contributing to the total UV exposure to the eyes [18]. RANZCO and Cancer Council Australia recommend protecting the eyes at all times when UV level is 3 or above. During summer in Australia, all parts of the country experience long periods during the day when the UV level is 3 or above. It is recommended that outdoor workers protect their eyes from UV all year round as cumulative exposure at lower UV levels can also result in eye damage.

Protecting eyes from UV at all times is also recommended for certain activities such as skiing, boating and going to the beach, as snow and water are highly reflective surfaces and because UV levels are higher at higher altitudes.

Protective measures include the use of a hat, sunglasses and UV blocking contact lenses. A broad-brimmed hat can reduce UV radiation to the eyes by 50% [23]. Scheduling the time spent outdoors in peak UV period e.g. management of work rosters to avoid peak UV periods can also be an effective method to help to reduce exposure to UV.

Wraparound, close fitting, sunglasses with maximum coverage provide the best protection through reducing direct and reflected UV radiation and glare reaching the eyes [20] [21] [22]. Non-wraparound sunglasses are not effective in blocking peripheral UV [19]. UV-blocking contact lenses effectively reduce UV exposure to the eyes, blocking around 90% of UVA transmittance [19].

4. Australian Standards

4.1. Sunglasses

The Australian/New Zealand Standard AS/NZS 1067 Sunglasses and Fashion Spectacles applies to all sunglasses and fashion spectacles available (including products given away) in Australia [24]. The standard is adopted into legislation [30] with all sunglasses required to meet the legislation with regular audits and significant penalties and fines for suppliers not complying. The Standard defines five categories of lenses, according to the amount of UV radiation and visible light that is able to pass through the lens (see Table 1). The Standard specifies lens dimensions (width and height), transmittance (visible light), detection of signals, optical quality, coverage (Category 4 only) and safety requirements.

Table 1. Classifications of sunglasses and fashion spectacles according to the Australian/New Zealand Standard AS/NZS 1067

Lens category	Description
Lens category 0: Fashion spectacles	These are not sunglasses, as they have a very low ability to reduce sun glare; they provide limited UV protection
Lens category 1: Fashion spectacles	These are not sunglasses, however, they do provide limited sun glare reduction and UV protection; they are not suitable for driving at night
Lens category 2: Sunglasses	These sunglasses provide a medium level of sun glare reduction and good UV protection
Lens category 3: Sunglasses	These sunglasses provide a good level of UV protection and a high level of sun glare reduction
Lens category 4: Sunglasses	These are special purpose sunglasses that provide a very high level of sun glare reduction and good UV protection, they must not be used when driving

Source: Australian/New Zealand Standard AS/NZS 1067 [24]

Sunglasses and fashion spectacles meeting the Australian/New Zealand Standard must be labelled to specify that they comply with AS/NZS 1067, and which lens category they comply with. Fashion spectacles (lens categories 0 and 1) are not sunglasses and do not provide adequate protection against UV radiation [24].

Sunglasses may also be labelled UV 400 (blocking 100% of UV), or state the amount of UV radiation blocked as a percentage. The standard requires that sunglasses claiming a level of UV protection must meet this claim.

It is important that the price of sunglasses not be used to gauge the quality of protection from UV radiation. Sunglasses providing excellent protection need not be expensive. Darker-tinted or polarised lenses may be required to reduce glare, however the darkness or colour of the lens does not indicate the level of UV protection.

Check the label to determine the level of UV protection provided. RANZCO and Cancer Council Australia recommend wearing close-fitting, wraparound style sunglasses that meet the Australian/New Zealand Standard for sunglasses (categories 2, 3 and 4).

4.2. Sunglasses and Children

Children are particularly sensitive to UV radiation skin and eye damage [25]. As such it is important to protect children's eyes.

Exposure of very young children to UV radiation should be limited. It is important that children wear a sun protective hat to provide some protection to the eyes.

Once children are old enough to manage wearing sunglasses, they should be encouraged to do so when exposed to UV radiation. These glasses should meet the Australian/New Zealand Standard for sunglasses (not fashion spectacles) [24]. Sunglasses labelled as toys are not covered by the Standard and therefore should not be used to provide sun protection.

For more information on sun protection for babies (0–12 months), see the Cancer Council Australia position statement.

4.3. Eye protection at work

The Australian/New Zealand Standard AS/NZS 1337 relates to requirements for eye protection for occupations both indoors and outdoors [26]. Tinted eye protectors that comply with Australian Standard AS/NZS 1337.1 are recommended as these provide at least the same amount of protection against UV radiation as sunglasses, as well as impact protection. Untinted eye protectors marked 'O' (for outdoor) also have UV protection and are suitable for outdoor use [26]. Prescription safety spectacles must comply with 1337.6 which includes the same impact requirements as AS/NZS 1337.

Workers exposed to sources of radiation other than the sun e.g. welding, UV lamps, lasers, refer to AS/ NZS 1336 for guidance on the appropriate filters to protect against these hazards.

4.4. Prescription glasses

The Australian/New Zealand Standard for sunglasses and fashion spectacles does not cover either tinted or clear prescription glasses. However, some tinted or clear prescription lenses may provide protection from UV radiation. Certain lens materials and coatings provide UV protection. Lenses that darken when exposed to sunlight provide additional comfort by reducing glare, but may or may not filter out UV radiation. Prescription glasses used for sun protection should be close-fitting and wraparound to provide maximum protection.

If you wear prescription glasses, ask your optometrist about the level of UV protection they provide.

4.5. Filters for direct observation of the sun during eclipses

The sun can pose a significant hazard from prolonged staring, as occurs during a partial eclipse with retinal burning and eclipse blindness resulting from lack of adequate protection. Only filters specially designed for viewing the sun and complying with ISO 12312-2 should be used when viewing an eclipse. These protectors should provide adequate coverage to ensure that no direct radiation from the sun can reach around the frame to their eye other than through the appropriate filter. During an eclipse of the sun, eye protectors must be worn whenever a part of the sun is not covered by the moon. It is only safe to view the sun with the naked eye when the moon completely covers the disk of the sun during a total eclipse.

5. Recommendations

As part of a comprehensive SunSmart lifestyle, RANZCO and Cancer Council Australia recommend wearing close-fitting wraparound sunglasses and a broad-brimmed hat to protect the eyes from UV radiation.

UV radiation exposure to the eyes is dependent on a number of factors. RANZCO and Cancer Council Australia recommend protecting the eyes during sun protection times (when UV level is 3 or above)

RANZCO and Cancer Council Australia recommend:

- reducing exposure of the eye to UV radiation as much as possible;
- wearing close-fitting, wraparound style sunglasses that meet the Australian/New Zealand Standard for sunglasses (categories 2, 3 and 4) or the Australian/New Zealand Standard for eye protectors for industrial applications as appropriate; and
- further protection of the eyes by wearing a broad-brimmed, bucket or legionnaire style hat.

6. Position statement details

This position statement was developed through a collaboration between Cancer Council Australia's National Skin Cancer Committee and The Royal Australian and New Zealand College of Ophthalmologists (RANZCO).

7. References

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8. Record of Amendments

Page	Details of amendment	Date approved
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