UV Eye Protection

Approved by: Board
Approval date: 4 July 2013

Next review: 4 July 2016
1. Purpose and scope

This position statement was developed by Cancer Council Australia's National Skin Cancer Committee and endorsed by 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 on the eyes and what constitutes adequate eye protection.

2. Health effects of UV radiation on the eyes

Repeated 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].

Exposure to UV radiation over long periods can result in more serious damage to the eyes including squamous cell cancers on the surface of the eye [2] [3] [4] and skin cancer around the eyes [5]. The link between UV and some types of eye cancer is clear, however the evidence that UV radiation is a risk factor for ocular melanoma is weaker [6] [7]. While one Australian study suggested that cumulative UV radiation is not associated with ocular melanoma and sunglass wearing does not protect against it [8], another study found a strong link between artificial UV radiation exposure (from solariums and welding) and some ocular melanomas [9]. 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].

Other long-term eye problems associated with UV radiation include:

- cataracts – cloudiness of the lens [1];
- macular degeneration – damage to the retina [1] [12];
- pterygium – an overgrowth of the conjunctiva on to the cornea [13]; and
- climatic droplet keratopathy – cloudiness of the cornea [14].

It has been estimated that 20% of cataracts are potentially due to UV radiation exposure to the eye [15]. In 2004, the direct cost of cataract in Australia was estimated at $326.6 million. In 2000 and 2001 it was estimated that almost half of the 8600 cases of pterygium treated annually in Australia are caused by sun exposure [16] [17]. The cost of pterygium in Australia was estimated at $8.3 million in 2001 [17].

3. Exposure of the eyes to UV radiation

UV radiation exposure to the eyes is dependent on a number of factors and can differ dramatically from the pattern of ambient UV radiation. 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]. Exposure also depends on facial geometry, with the brows and nose blocking some UV radiation at certain times of day.

Ambient UV levels, the UV index and time of day do not correlate well with the risk of ocular UV damage, due mainly to the geometry of the eye. UV index is not deemed an appropriate indicator of whether eye protection is required [18].

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

Alternatively, a broad-brimmed hat can reduce UV radiation to the eyes by 50% [23].

4. Australian Standards

2.1. Sunglasses

The Australian/New Zealand Standard AS/NZS 1067:2003 Sunglasses and Fashion Spectacles regulates all sunglasses and fashion spectacles available in Australia, and their classification and labelling [24]. The Standard defines five categories of lenses, according to the amount of UV radiation that is able to pass through the lens (see Table 1). The Standard also specifies lens dimensions (width and height) and safety requirements.

Table 1. Classifications of sunglasses and fashion spectacles according to the Australian/New Zealand Standard AS/NZS 1067:2003

<table>
<thead>
<tr>
<th>Lens category</th>
<th>Description</th>
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<tbody>
<tr>
<td>Lens category 0:</td>
<td>These are not sunglasses, as they have a very low ability to reduce sun glare; they provide limited UV protection</td>
</tr>
<tr>
<td>Fashion spectacles</td>
<td></td>
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<tr>
<td>Lens category 1:</td>
<td>These are not sunglasses, however, they do provide limited sun glare reduction and UV protection; they are not suitable for driving at night</td>
</tr>
<tr>
<td>Fashion spectacles</td>
<td></td>
</tr>
<tr>
<td>Lens category 2:</td>
<td>These sunglasses provide a medium level of sun glare reduction and good UV protection</td>
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<tr>
<td>Sunglasses</td>
<td></td>
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<tr>
<td>Lens category 3:</td>
<td>These sunglasses provide a good level of UV protection and a high level of sun glare reduction</td>
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<tr>
<td>Sunglasses</td>
<td></td>
</tr>
<tr>
<td>Lens category 4:</td>
<td>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</td>
</tr>
<tr>
<td>Sunglasses</td>
<td></td>
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</tbody>
</table>

Sunglasses and fashion spectacles meeting the Australian/New Zealand Standard must be labelled to specify that they comply with AS/NZS 1067:2003, 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].

The Australian Radiation Protection and Nuclear Safety Authority developed an eye protection factor (EPF) rating system for glasses complying with the Standard. The EPF rating ranges from 1 to 10, with EPF values of 9 and 10 transmitting almost no UV radiation. Some sunglasses may be labelled with an EPF value.

Sunglasses may also be labelled UV 400 (blocking 100% of UV), or state the amount of UV radiation blocked as a percentage.

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).

2.2. 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 infants (0–12 months), see the Cancer Council Australia position statement.

2.3. Eye protection at work

The Australian/New Zealand Standard AS/NZS 1338.1:1992 Filters for eye protectors - Filters for protection against radiation generated in welding and allied operations regulates eye protection in the workplace for occupations both indoors and outdoors where UV radiation may reach potentially hazardous levels [26].
Tinted eye protectors that comply with Australian Standard AS/NZS 1338:1992 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 sufficient UV protection for outdoor use [26].

2.4. 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. Lenses can also be coated with a UV protective layer. Lenses that darken when exposed to sunlight provide additional comfort by reducing glare, but do not necessarily filter out more 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.

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 and is not closely correlated to ambient UV levels and the UV index. RANZCO and Cancer Council Australia recommend protecting the eyes from UV at all times when outdoors during daylight hours.

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 by Cancer Council Australia's National Skin Cancer Committee and reviewed by RANZCO. It was endorsed by Cancer Council Australia's principal Public Health Committee and published in July 2013.
7. References


8. Record of Amendments

<table>
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<th>Details of amendment</th>
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