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Department of Health

# Bridge

This Newsletter aims to promote communication between students and the Student Health Service of the Department of Health

March 2018 Issue No.75

Published by the Student Health Service, Department of Health

## Editor's Note

When we mention about the effects of ultraviolet radiation (UV light) on our health, the first thing which comes into mind is to protect our skin. However, we should not disregard the effects of UV light on the eyes. In this issue, we have invited our optometrist to tell us about the harmful effects of UV light on the eyes and share with us some useful tips for eye protection. Protect your eyes and be prepared for the coming summer.

# Protect your eyes from sunlight

**This publication is produced by Student Health Service of the Department of Health.**
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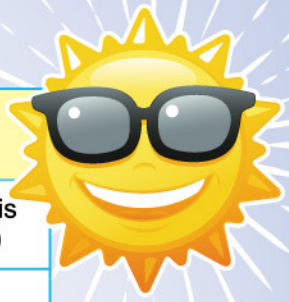
If you have any comments, you may email to our Edition Board at shsbridge@dh.gov.hk

## 1 Introduction

Although our eyes can adapt to various light intensities, strong sunlight will cause eye tiredness and harmful UV light (ultraviolet radiation) will cause damage to our eyes. We should also know that even on a cloudy day, exposure to UV radiation can still be high. So, no matter under strong sunlight or not, we need a pair of suitable and well fitted sunglasses to protect our eyes during outdoor activities.

## 2 Harmful effect of UV radiation on the eyes



| UV index / Exposure time | High (6-10) | Extreme ( ≥11) |
|---|---|---|
| Short period | photokeratitis (inflammation of cornea) and photoconjunctivits (inflammation of conjunctiva) etc. | acute photokeratitis (snow blindness) |
| Long period | pterygium, cataract and cancer of the eyelid, prolonged exposure can cause blindness | |

In general, the higher the UV index, the more likely the damage caused to eyes, and the less time for the harmful effects to occur.

## 3 What is UV radiation?

UV radiation is a part of sunlight which we cannot see with our eyes. It is subdivided into UVA (wavelength 315-400nm), UVB (wavelength 280-315nm), and UVC (wavelength 100-280nm).

**UV A**
(wavelength 315-400 nm)
98 % reaches the earth's surface

- Absorbed by the lens
- Adverse effect on the eye: Cataract

**UV B**
(wavelength 280-315 nm)
Mostly absorbed by the ozone layer with < 2% reaching the earth's surface

- Absorbed by the cornea
- Adverse effect on the eye:
  Acute - Keratitis, conjunctivitis, eye pain, photophobia, eye redness, etc.
  Chronic - pterygium, cancer of eyelid, etc.

**UV C**
(wavelength 100-280 nm)
Only very little amount reaches the earth's surface

- Absorbed by ozone layer
- Does not present any threat

- < 1% UV radiation reaches the retina
- Acute adverse effect: snow blindness reduced visual acuity and scotoma)
- Chronic adverse effect: age-related macular degeneration

## 4 How to choose sunglasses

### 1) Effectively block strong sunlight
### In general, sunglasses can block about 70-90 % of visible light.

| Light transmission rate (ISO 12312-1:2013) | Ability to block sunlight | Purpose | Limitation |
|---|---|---|---|
| >80% | -- | Decoration, indoor activities , overcast day | -- |
| 43% to ≤80% | Adequate | | Not suitable for driving at night |
| 18 to≤43% | Good | Suitable for most outdoor sports and day time activities | |
| 8 to ≤18% | Very good | | Not suitable for driving |
| 3 to ≤8% | Excellent | Skiing, sunbathing on beach, mountain climbing (high altitude) and sports done under strong sunlight (eg. desert car racing, beach volleyball) | |

For outdoor flying activities, sunglasses with lenses that can block 70-85% of visible light and without color distortion should be worn. Polarized lenses are not recommended.

## 2 Effectively block UV radiation

Refer to label information to ensure the sunglasses can block ≥ 99% of UV radiation.

## 3 Lens color guide

Most sunglasses lens are mono-coloured (same degree of light transmission for the whole lens)

| | Grey | Greenish grey | Amber | Yellow |
|---|---|---|---|---|
| Suitable Weather | | | | |
| Suitable time | | | Early Morning, Late afternoon | Daytime, Late afternoon |
| Suitable activities | All outdoor activities and daytime driving | Most outdoor activities and daytime driving | Good for outdoor activities and driving | Indoor sports and dusk/evening driving |

a) Grey lens: provides true color perception, which can protect the eyes on a sunny day without impairing vision. Ideal for any outdoor activity and daytime driving.

b) Greenish grey lens: suitable for rainy or sunny days and ideal for clear bright days. Good for daytime driving and most outdoor activities.

c) Amber lens: suitable for early morning, late afternoon, cloudy or foggy days. Also suitable for days ranging from cloudy to sunny. Suitable for outdoor activities and daytime driving.

d) Yellow lens (lighter than amber): suitable for daytime activities, as well as dusk /evening driving and indoor sports.

## 4 Other features

**Left:** Effect of polarized lens

**Right:** Normal lens

### (a) Polarized lens

- Polarized lenses can reduce the glare and the reflected sunlight from surface of the road, water, ice or sand.
- Suitable for driving, cycling, running, fishing, boating, hiking, and water sports.

### (b) Double colored lens

- Dark on the top, lighter on the bottom (suitable for driving)
- Dark on top and bottom and lighter in the middle (suitable for sailing or skiing)

### (c) Metallic mirror coating lens

- A thin layer of silver metallic film is added to enhance the effect of sunlight reflection.

### (d) Wrapped around type (sunglass frame)

- Wraparounds reduce sunlight entering from the sides.

### (e) Photochromic lenses

- Photochromic lenses darken in bright sunlight (after absorbing UV radiation ) and become lighter in weak sunlight.
- Suitable for people who are short-sighted, long-sighted or people who have astigmatism.

**Smart tips**

Sunglasses with dark coloured lenses does not guarantee effective UV radiation blockage. Conversely, dark coloured lenses without UV radiation blocking function will cause dilation of the pupils of the eyes, which allows more light (including UV radiation) to enter the eyes and cause harmful effects.

When purchasing sunglasses, pay attention to those which can block UV radiation (label should read “UV 400”), as opposed to those which can only be used as decoration or regarded as toys.

**Concluding remarks**

A pair of good sunglasses helps reduce strong sunlight, glare (light reflected from surface of the road, water or sand) and UV radiation. Sunglasses should be worn during outdoor activities when the UV index is 3 or higher. Appropriate sunglasses should also be chosen to suit different outdoor activities. Please note even when sunglasses are worn, in order to protect the eyes, do not look directly at the sun or other strong light.

**Sources of information**


1) The known health effects of UV
http://www.who.int/uv/faq/uvhealtfac/en/index3.html
2) 紫外線知識你要知
http://www.weather.gov.hk/education/edu06nature/06nature_ultraviolet/ele_ultraviolet_c.htm
3) ISO 12312-1:2013 (Eye and face protection-Sunglasses and related eyewear)
Table 1: Transmittance for sunglass filters for general use.