The eye is a filter that improves with age

The front part of the eye, comprising the cornea and the crystalline lens, acts as a natural filter in adults (Fig. 1) which absorbs UV rays (ultraviolet) and protects the retina. This filter works perfectly (100%) in filtering UVB rays (wavelength of between 280 to 315 nanometres) and almost completely (98%) for UVA rays (wavelength between 315 and 380 nanometres). In older adults, the replacement of the crystalline lens by intra-ocular implants (cataract operation) has shown that the crystalline lens has often “tanned” and has to be replaced by a highly protective “yellowed” implant (to cut out UV rays + blue light).
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UV filtration: the primary protection

200 to 280 nm : UVC  Almost totally blocked by ozone layer
280 to 315 nm : UVB  "Burning rays"
315 to 380 nm : UVA  "Ageing rays"

Fig. 1

A child's eye is much more vulnerable than an adult's eye in terms of the sun's rays. It is in fact an "incomplete" filter, which allows UV rays and blue light through (Fig. 2). Some of the UVA rays and all blue light (380 to 500 nanometres) cross through the more transparent crystalline lens and reach the retina.

Babies and very young children, in particular, therefore need extra protection against UV rays, cutting out at 400 nanometres and allowing only a maximum of 8% to pass through, i.e. Category 4 filtration, particularly since they are more exposed to reverberations, because they are closer to the ground with reduced or even nonexistent mobility.

**UV, blue light: a cumulative phenomenon?**

Whereas the harmful effects of UV rays have been demonstrated, the harm caused by blue light is more difficult to show, particularly since heredity, alcohol, tobacco and diet also play a role. Can the hypothesis of a cumulative phenomenon be ignored, however, that is to say the retinal capital attacked continually, resulting in permanent damage?

**Total absence of any kind of standard**

In order to choose adequate sunglasses, the reflex is to refer to current standards. However there are no standards for children's sunglasses. The only element taken into consideration is that sunglasses for children are smaller than adult sunglasses.

The solution: wrap-round sunglasses (Fig. 3)

Sunglasses offer protection only if the light is obliged to pass through them! If the sunglasses do not wrap round the child's eyes completely, the light gets into the eyes from the sides, or from above or below the sunglasses, and the filter, however efficient it is, is absolutely useless. Wrap-round frames should therefore be chosen for children with a curved base (base 8 or more), a style that has been made popular by sportsmen.

For skiing, for example, children and parents wear a mask with an elastic round the head, instead of glasses. The ski mask is highly efficient from the point of view of sun protection because no rays pass through the sides. A mask also guarantees permanent wear by the child. An anti-mist mask should be chosen, with good lenses.

Wrap-round glasses, yes, but they must be fitted with efficient filters!

Polycarbonate, Transitions®

To protect children's eyes efficiently, choose lenses with at least a 100% UV filter.

The filtering quality of a lens depends mainly on the material from which it is made. Polycarbonate lenses should therefore be recommended for children's glasses. Polycarbonate sun lenses offer many technical advantages which makes their usage particularly suitable for children. Extremely efficient, they filter out all UV and offer total security in case of a fall or projection thanks to their high resistance to impact.

Photochromic lenses are also recommended such as, for example, Transitions® lenses, which block up to 400 nm and are easy to wear due to the fact that they react to UV intensity, darkening outdoors and lightening indoors.

CR39® lenses with UV absorber could also be advised.

Choose your colour: brown lenses

At equal transmission levels (the most common transmission is 15%, which means that 15% of visible
light crosses the filter, 85% being filtered out), a brown lens is more efficient than a grey lens. Brown lenses are also good blue light filters (as are yellow and red lenses, which are more difficult to wear!).

**Awareness and education**

Not everyone is aware of the need to protect eyes from the sun.

Over 90% of adults are aware of the fact that UV rays attack the skin, but less than 10% know about their effects on the eyes! It is therefore essential to make people aware of the danger of the sun's rays for the eyes and the need to protect themselves.

In terms of prevention education, the Australians are exemplary.

Australia is a particularly sunny country where a great deal of emphasis is placed upon outdoor life and sport (most of the population live near a beach); it is also a forerunner in terms of education regarding sun protection for the skin (380 000 cases of skin cancer every year), head and eyes:

SLIP on a long-sleeved shirt
SLAP on the sunscreen
SLOP on a hat
SEEK out shade
SLIDE on the sunnies (*Fig. 4*).

*Sunglasses or sunnies are now obligatory for schoolchildren and are part of the school uniform!*

Youth prejudices and trends

Prejudices and group influence (friends) are an overriding factor in the wearing of sunglasses. Luckily the trend is going in the right direction and sunglasses are extremely fashionable. Many manufacturers have launched very attractive collections, with an extensive choice of designs and brands. The use of sunglasses has also extended to the world of sportsmen and athletes. Finally, technical progress (thin lenses, anti-reflection, polarizing, photochromic...) and developments in frames have greatly improved the social acceptability of spectacles. Children with ametropia, who have to wear spectacles continuously or for extensive periods of time, no longer see this as a handicap but almost an advantage! And teenagers, in general, wear their sunglasses to look “cool”.

Conclusion

To make the right choice of sunglasses for their children parents can rely on a two-fold guarantee: the Brand, and Advice from their opticians or sun protection specialist.

Main epidemiological studies of the effects of rays on tissues

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