SOLAR ECLIPSE EYE DAMAGE

On 3rd Nov 2013 the world is going to witness one of the rare eclipses - the Solar Eclipse. Uganda is one of the privileged countries that will witness the total and partial eclipse. As we warm up to enjoy this spectacular moment, we need to take note of the few likely hazards that come along with such viewing.

When a person looks repeatedly or for a long time at the Sun without proper protection for the eyes, there occurs some photochemical changes on the retina that may be accompanied by a thermal injury - the high level of visible and near-infrared radiation causes heating that literally cooks the exposed tissue. This thermal injury or photocoagulation destroys the rods and cones, creating a small blind area. The danger to vision is significant because photic retinal injuries occur without any feeling of pain (there are no pain receptors in the retina), and the visual effects do not occur for at least several hours after the damage is done.

WHO IS AT RISK?

- Susceptible individuals include children and teenagers, because the lens of the eye filters little short wavelength light before the age of 20 years; people with ocular conditions such as retinal dystrophies or albinism or who have undergone certain forms of cataract surgery; those taking photosensitising medication; and those using alcohol or recreational drugs (which cause pupil dilatation).
- During a solar eclipse more people are at risk. With the sun partially covered, it's comfortable to stare, and protective reflexes like blinking and pupil contraction are a lot less likely to be in use than on a normal day.
- Scientists have not been spared either - Isaac Newton suffered a small blind spot by looking at the Sun’s reflection in a mirror when it was high in the sky.
- Fishermen at sea or the lake have suffered sun burns for viewing the water.

WHEN IS VIEWING THE ECLIPSE SAFE?

The only time that the Sun can be viewed safely with the naked eye is during a total eclipse, when the Moon completely covers the disk of the Sun during the short two minute period of total eclipse, and one should look away the moment the first rays of the sun appear at the edge of the moon.

It is never safe to look at a partial or annular eclipse, or the partial phases of a total solar eclipse, without the proper equipment and techniques.

WHAT EQUIPMENT CAN FILTER THESE SUN RAYS?

The following commonly used filters DO NOT OFFER adequate protection because most of these transmit high levels of invisible infrared radiation which can cause a thermal retinal burn.

- color film,
- black-and-white film that contains no silver,
- photographic negatives with images on them (x-rays and snapshots),
- smoked glass,
- sunglasses (single or multiple pairs),
- photographic neutral density filters
- polarizing filters.

Viewing the sun through binoculars or telescopes produces the 10-25° temperature rise in the retina required for a thermal burn. By contrast, looking at the sun with the naked eye...
induces photochemical injury to retinal receptor cells and pigment epithelium, associated with only a 4° rise in retinal temperature.

Welders’ glasses and pin-hole cameras are relatively safer though not perfect.

- **The safest devices** are solar viewers with aluminized polyester. Most such filters have a thin layer of chromium alloy or aluminum deposited on their surfaces that attenuates both visible and near-infrared radiation.

Other suggested locally available filters include:

- negatives without images (x-rays or black and white films) used as double layers
- pin holes (made by passing a pin through a hard paper or cardboard)
- black kaveera (polythene bag)
- compact discs
- floppy discs

These may not be entirely safe but are a lot safer than nothing at all.

**SIGNS AND SYMPTOMS**

- Because the retina does not have pain receptors there is no pain felt during the burn.
- Visual loss tends to appear hours after the injury.

These should not cause a false impression that no eye damage has occurred because a blind spot in the affected eye may follow much later.

**TREATMENT, IN CASE OF A RETINAL BURN?**

No treatment has been shown to be effective in solar injuries to the retina.

The emphasis is therefore on prevention:

- **Children must be closely supervised.**
- It is unsafe to look at the sun during the partial phases of a total eclipse, or during a partial eclipse.
- Failure to use proper observing methods may result in permanent eye damage or severe visual loss. This can have important adverse effects on career choices and earning potential, since it has been shown that most individuals who sustain eclipse-related eye injuries are children and young adults.
- Binoculars and telescopes should not be used.
- **Do not view** through a mirror or through water in a basin because the sun rays will be directly reflected straight into the eye with the same intensity.

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