

CYCLING AND THE SUN

The hazards of outdoor life with a hole in the ozone layer

BY ALAN A PARKER

THE ANTI CANCER COUNCIL may be right in saying that people should stay out of the midday sun but it is not a realistic proposition for touring cyclists with long distances to cover. This article looks at the long term skin and eye damage from cumulative doses of ultraviolet radiation and the means for enjoying the open air without taking unnecessary health risks. The problem is to enjoy the benefits of cycling and the sun without adverse long term effects especially as the thinning of the ozone layer will lead to more biologically active ultraviolet (UV-B) radiation reaching the ground.

The invisible component of sunlight that causes most of the skin cancer and cataracts in the lens of the eye is the UV-B. At present only a fraction of the UV-B gets to ground level, but more will be let in if the ozone layer is thinned. UV-A is relatively harmless and ozone does not filter that out anyway. Very little more UV-A will reach ground level.

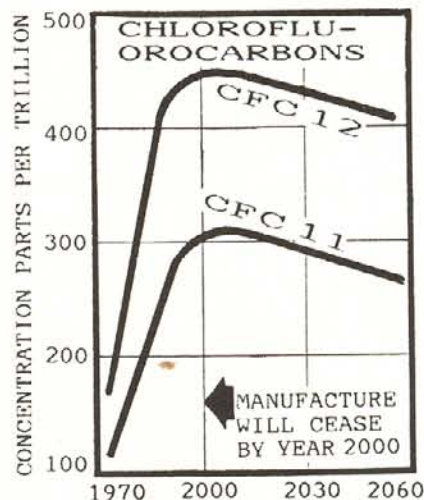
Manufactured gases called chlorofluorocarbons (CFC's), used in aerosol cans and refrigerators, are continuing to accumulate in the stratosphere and will do until at least the year 2010. CFC's will progressively thin out this protective ozone shield that absorbs active ultraviolet radiation before it reaches the Earth's surface.

Because of this the annual dose of UV-B reaching ground level will increase for many years and will not get back to 1970 levels for over 100 years. CFC gases stay in the atmosphere for a long time with an average life of 110 years. In addition to the overall increase in UV-B, holes in the ozone layer will drift over Australia for a few days every summer exposing us to extra radiation.

Next December the break up of the hole in the ozone layer over Antarctica could result in an ozone hole over the southern part of Australia for several days as happened in 1987.

Cyclists pride themselves on keeping fit. It would be a pity if cyclists so damaged their skin that would have skin cancer in old age. Or worse still if their eyes deteriorated from the excessive UV-B.

Some days the increase in UV-B could be up to 50%. The sun won't seem any hotter but those invisible burning rays will be there. Unfortunately there is no national warning system planned to tell people of the presence of this menace, but the UV-B doses shown in the diagram will give some idea of the increasing level of risk.



UV-B is not a problem for cyclists who regularly protect their skin and eyes and it should not be a problem to those decide to play it safe in the future. The tools for protection are all available today so it is not a problem for those who are careful.

Protection from UV-B is provided by skin creams, eye shades, spectacles with plastic lenses, glass lenses with protective UV coatings, wide brimmed hats, peaked caps, clothing and gloves, and

avoiding what mad dogs and Englishmen do which is going out in the midday sun in the summer.

The health benefits of sunlight

A recent book entitled *The Sun and Your Skin* by Robert Marks, a Professor of Dermatology, describes the risks and benefits of sunbathing. The main benefit is the production of vitamin D by the action of UV-B on a biochemical in the skin. UV-B has anti-microbial properties and reduces the likelihood of certain skin infections. Sunlight is useful in treating several rare diseases and some common ones like acne and psoriasis.

Very depressed people or the aged can be helped and stimulated by getting out into the sun because several biochemicals are activated throughout the body by the action of UV-B.

Professor Marks also says that the non fatal skin cancers which can be surgically removed are commonest in Australia. The often fatal form of skin cancer melanoma is the fifth most common cancer and the tenth most common as a cause of death.

As leisure opportunities increase the incidence of non fatal cancer is going up at around 5% annually in all white populations due to recreational exposure to UV-B.

Damien Browning in his book *Daylight Robbery* makes more claims for the benefits of sunlight and he says it can prevent non skin cancers, osteoporosis, and tooth decay. It can stimulate the immune system, improve cardio-vascular fitness, increase the oxygen carrying capacity of the blood, reduce blood pressure and stimulate sexuality.

However not enough research has been done on the benefits of sunlight to fully substantiate Downing's claims. To verify all the biochemical consequences of UV radiation on the human body is not difficult, but assessing the effects on health is both difficult and time consuming. There is a lot more to learn about the health benefits of sunlight. But risks have to be considered now in relation to the known benefits.

It may seem unfair to sun worshippers that we are not born equal. Some people have skins better suited to the sun and they can get more benefit from sunlight than others. Some people react so badly to the sun it is doubtful whether they benefit at all.

The starting point is to assess your own skin for its resistance to ultraviolet light, particularly the biologically active parts of the ultraviolet spectrum known as UV-B which has the maximum burning/tanning effect. No measure devices are needed; just use common sense. You know how your skin reacts to sun so you will be one of the following types. ▸

- Burn and never tan.
- Burn and then tan.
- Sometimes burn and then tan.
- Just tan and never burn.

Sunburn has always been a problem for fair skinned cyclists who burn and never tan but for those of us with darker skins who rarely if ever burn it was never a problem. Between these two skin types lie the majority who tan but will burn if they don't take precautions.

For cyclists who want the benefits of exercise over the whole day and could not care less about getting a tan but don't want to burn, the following technical data on UV-B today and in the future could be helpful in deciding when and where to go on a cycling holiday.

Past health risks of sunlight

According to the Anti Cancer Council those who burn and never tan have three times the skin cancer rate as those who tan and never burn. It seems obvious that those who burn and never tan will have to be very careful in the way they protect themselves from sunlight and the invisible UV radiation that comes with it. Australians have one of

the highest skin cancer rates in the world. The reason for this is probably due to British migrants, especially the Celts who are not genetically equipped for the climate like the Aborigines, Asians, and the darker skinned southern Europeans.

The map of Australia showing the UV-B doses and skin cancer rates by latitude clearly shows the general connection between the UV-B dose and the incidence of skin cancer. The UV-B doses shown are annual figures and do not show how the dose varies from winter to summer.

For those who burn and then tan or sometimes burn and tan, the objective should be to avoid burning by taking exposure to the sun slowly and getting started early in the spring when the sun has a lower level of UV-B.

There is roughly one tenth of UV-B at sea level in Perth, Sydney, Hobart, Adelaide, Canberra and Melbourne in June and July than in December and January. On cloudy and clear days and during the four hours around noon the ten to one ratio also applies for UV-B dosages. During the four hours in the middle of the day when there are clear skies in January in Melbourne there is more UV-B than on a clear day in Cairns for a whole day in July. This shows that if you have a sensitive skin it makes good

sense to cycle in northern Australia during the winter.

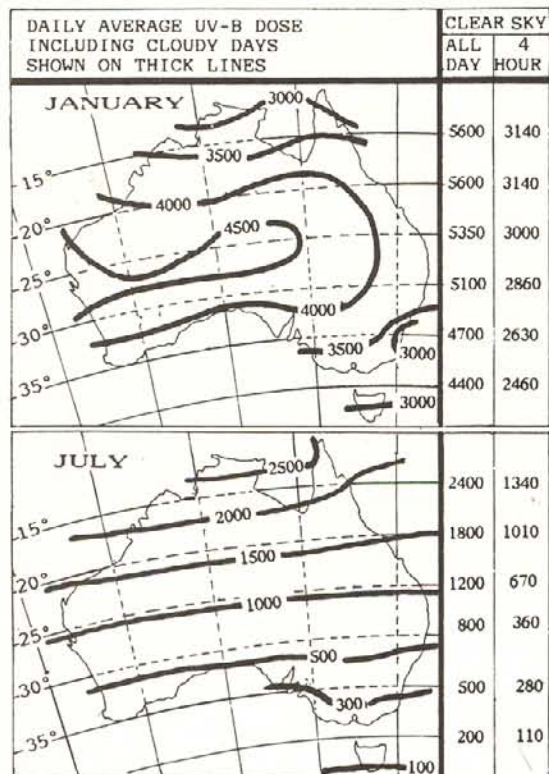
For those who work indoors and play outdoors the risk is not that high, and to put the risk of recreational exposure to UV-B in perspective it should be noted that the people most at risk of skin cancer are those who work outdoors for most of the day, for most of their working life, in the sunny north of Australia. This is why 62% of Australian skin cancers are on the face and neck which are the most exposed parts when working, with the highest rate in Queensland.

The reason that more indoor workers are getting skin cancer is that they do two things. They spend more of their leisure time outdoors, expose their whole body to the sun and over the years they damage their skin by getting burnt and peeling instead of slowly getting a tan. With the UV-B filtering skin creams available today this should not happen.

Outdoor workers are on average ten times more exposed to UV-B than indoor workers but they only get three times as much skin cancer and eye cataracts which shows that it is possible to cope with more UV-B and manage the potentially damaging effects.

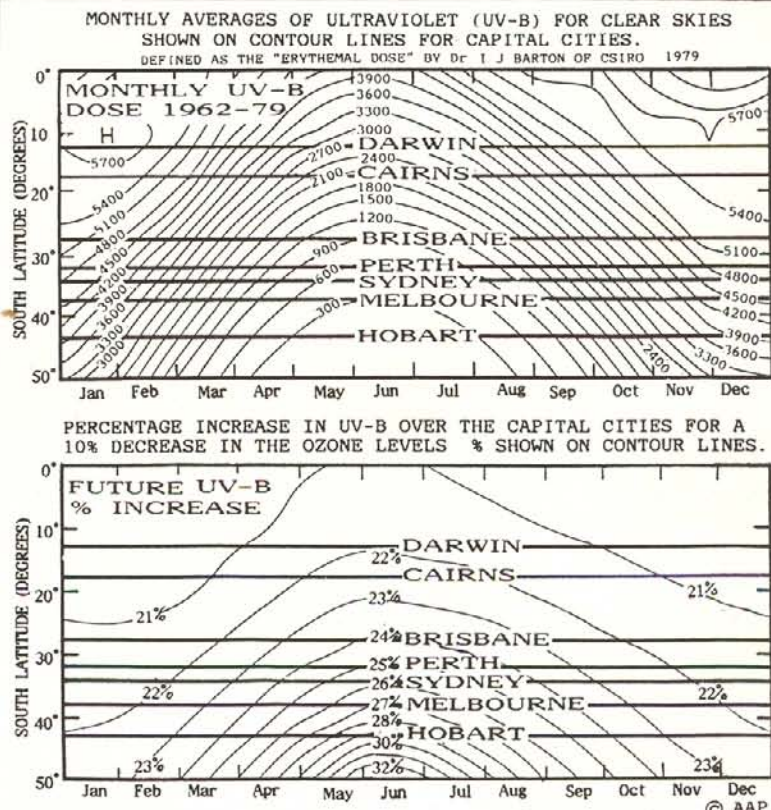
Studies of watermen who work on Chesapeake Bay (USA) which is the same latitude as Port Phillip Bay showed that those who worked outside the most and did not wear spectacles or wear a

DISTRIBUTION OF ULTRAVIOLET (UV-B) OVER AUSTRALIA ON CLOUDY AND CLEAR DAYS AND OVER 4 HOURS MID DAY (CLEAR)



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PAST AND FUTURE ULTRAVIOLET (UV-B) RADIATION LEVELS IN SELECTED AUSTRALIAN CITIES



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hat had three times the incidence of cataracts in the lens of the eye.

There are two things cyclists can learn from studies of skin cancer and eye cataracts in outdoor workers. The first lesson is that the outdoor workers skin slowly thickens and mostly tans during the spring when the sun is less intense and this toughens up the skin's resistance. The second is that the traditional wide brimmed bush hat used by a lot of workers protects the neck and the face.

Avoiding future health risks.

According to the American Environment Protection Agency (EPA) the increase in skin cancer can be estimated for any decrease in the ozone levels. Measurements show that a 1% decrease in ozone will produce a 2% increase in UV-B, and a 4.8 to 7.5 increase in skin cancers is expected as a result.

To be more specific, the dose of UV-B that reaches the ground varies with latitude. Dr I J Barton of CSIRO's division of atmospheric physics has calculated the amount for all latitudes and all months as shown on the contour lines on the upper chart. The figures shown apply to 1979 and there has been a 4% decline in global ozone levels since then. By the year 2030 it is probable that there will be another 15% decline in ozone levels making a possible 20% reduction in ozone levels.

Dr Barton has also calculated the percentage increase of UV-B at different latitudes for a 10% decrease in Ozone and the % increase in UV-B dosage is shown on the lower chart. It can be seen from the UV-B contour lines that a 10% decrease in ozone will produce an increase of 29% UV-B in Hobart during June and a 22% increase in January and in Darwin there will be a 22% increase in June and a 20% increase in January. These increases are compatible with the US EPA data and should produce be-

tween 48% and 75% increase in skin cancer. This would probably produce a similar increase for cataracts.

Taking into account the recent 4% decrease in ozone since 1979 it will be about ten years before there is a 10% reduction in ozone worldwide. In Australia there will probably be a few days each year when the ozone depletion is far lower than this due to the unique atmospheric conditions over Antarctica. A hole in the ozone will form over Antarctica every year. In November this hole will break up, sometimes drifting over Australia in early December. On these days the ozone layer could be reduced by as much as 60% letting in 120% more UV-B. That will produce burnt skin on those who now never burn and always tan, and inflammation of the eyes similar to snow blindness will occur.

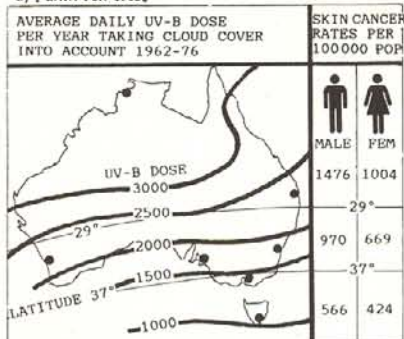
This has happened once before for three days when an ozone hole floated over Australia in December 1987. Due to heavy cloud which filtered out the higher than normal levels of UV-B coming through the stratosphere there were no health problems. If there were clear skies this December more UV-B radiation would be present at ground level and could produce very bad sunburning even for those who normally do not burn. There is a chance that it could happen next December, right in the middle of a long distance bike ride and during the school holidays.

Hopefully the Government will have a UV-B early warning system in place before this happens, although governments usually act after an event and a public outcry.

The Town and Country Planning Association of Victoria has written to the Victorian Minister for Planning and the Environment saying that an early warning system is desirable and should be in place before December 1989. ○

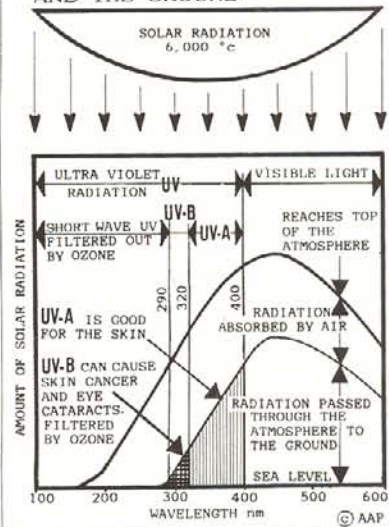
DISTRIBUTION OF ULTRAVIOLET (UV-B) RADIATION AT GROUND LEVEL AND THE INCIDENCE OF SKIN CANCER BY LATITUDE.

UV-B IS THE ERYTHEMAL DOSE AND THE SKIN CANCER IS NON-MELANOCYTIC, AND STRATIFIED BY LATITUDES AS GREATER THAN 29°, BETWEEN 29° AND 37° AND LESS THAN 37°. DATA FOR 1985.



DATA SOURCE :
 'Incidence of non-melanoma skin cancer treated in Australia', G Giles, R Marks, P Foley. British Medical Journal Vol 296, 2-1-88.
 'The Australian climatology of biologically effective ultraviolet radiation', I J Barton and G W Paltridge. The Australian Journal of Dermatology Aug 79 Vol 20 no 2 © AAP

THE AMOUNT OF SOLAR RADIATION REACHING THE TOP OF THE ATMOSPHERE AND THE GROUND



Avoiding excessive UV-B

UV-B is not and will not be a problem for the wary. While increasing levels of UV-B may reduce some crop yields and damage the eyes of wildlife so as to reduce their survival rate it should not damage humans, as there are lots of affordable ways of reducing the dose of UV-B. We can also control when and where we go out in the sun.

For example for over a hundred years mountain cattlemen have been living with higher levels of UV-B on the high plains. They experienced burnt skin and sore eyes so they wore wide brimmed hats which cut down the UV-B reaching the face neck and eyes by 50%. The mountain cattlemen had the good sense to cover up and I doubt if they wandered around half naked like many outdoor workers do today and finish up with skin cancer years later.

For cyclists who are going to spend long hours everyday in the saddle in summer I would recommend the following:

1. Get acclimatised in the spring.
2. Put a peak on your helmet or wear a peaked hat or cap if you don't use a helmet.
3. Attach a piece of cloth to hang down and protect the back of your neck like they did in the French Foreign Legion.
4. If you have spectacles with glass lens the optician will put a special UV protection coating on them for about \$20.
5. If you have plastic lenses they filter out 60% of the UV-B and that is sufficient if you also use peak on your helmet or hat.
6. If you don't wear spectacles you should use sun glasses bearing the SAA or ANSI mark because some of the sunglasses sold look dark but do not effectively filter out UV-B.
7. If you like cycling with your shirt off try and avoid doing it 2 hours either side of noon in the summer. During the early morning and late afternoon when the sun is lower in the sky most of the UV-B will be absorbed by the atmosphere because it has to travel so much further at an angle to reach you. You can get a nice tan this way it just takes a little bit longer and burning can be avoided.
8. Those with sensitive skins should always use a sunscreen cream.
9. Avoid burning and peeling and always apply a sunscreen cream to any part of your skin that has peeled. Liver marks and other skin blemishes usually appear first on those places that have been burnt the most.

If you are the worrying type don't be frightened off from enjoying the sun in moderation. The risk of skin cancer is very small and 19 out of 20 skin cancers don't do any damage or can be easily removed. Doctors freeze the cancers with drops of liquid nitrogen and they just drop off.

The risk of a fatal melanoma or cataracts is very small and will not be greatly increased if you take care. The benefits of sunlight and the fresh air and exercise that goes with it are free. Just take care. ●