



Solar UV radiation and the UV Index

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Introduction

Australia has the highest rate of skin cancer - over 200,000 new cases of skin cancer are reported each year and over 6000 of these are potentially fatal melanomas. This can be explained by the predominantly fair skinned population, the outdoors Australian lifestyle, the often cloud-free climate and exposure to the resulting high levels of solar ultraviolet (UV) radiation. Anti-cancer authorities have undertaken extensive public education campaigns in an effort to reduce the incidence of this avoidable disease. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has measured the daily solar UV radiation levels in large population centres around Australia for many years. As part of ARPANSA's commitment to the public education campaign, the daily solar UV radiation levels are available from the ARPANSA website.

ARPANSA has produced a free educational poster that can be downloaded from ARPANSA's website '*UVR Health and Safety*' or provided on request. Requests can be emailed to info@arpansa.gov.au.

In 1995 the joint recommendation of the World Health Organization (WHO), the World Meteorological Organization, the United Nations Environment Programme, and the



International Commission on Non-Ionizing Radiation Protection was to standardise the reporting of UV radiation levels to the public. From this meeting they developed the UV Index, which is a number relating to how much solar UV radiation reaches the ground, based on the potential for skin injury. The reported value is calculated from the daily maximum UV radiation

averaged over 30 minutes. One UV Index unit represents 25 mWm⁻² of UV radiation. On a clear sky day, the maximum UV radiation level occurs at solar noon. If there is substantial cloud cover during this time, the maximum may occur at another time when UV radiation levels are higher. In 2002 the UV Index categories were revised to improve its use as an educational tool to promote sun protection. The '*Global Solar UV Index - A Practical Guide*' can be found at WHO's Intersun web site <http://www.who.int>. UV Index values are related to the UV radiation exposure categories as follows:

Relationship between UV Index and UV Exposure Category	
UV Index	Exposure Category
2 or less	Low
3 to 5	Moderate
6 to 7	High
8 to 10	Very High
11+	Extreme

The exposure categories are based on the response of fair-skinned people to UV radiation.

The UV Index may be either a prediction or a measurement. ARPANSA obtains the measured UV Index from a detector that responds to UV radiation in much the same way as human skin does. The measurements take into account cloud cover and other environmental factors that computations can only approximate. Measured UV Index levels are useful for educating the public on how solar UV radiation varies with cloud cover, season and latitude.

The Bureau of Meteorology (BOM) began forecasting UV radiation levels for public use in September 1996. They calculate the predicted value from a radiative transfer model using parameters of date, time, latitude, temperature and ozone concentration. The skin's response to UV radiation is required for calculating the predicted solar UV Index. The BOM provides the average of UV index predictions: one for the expected clear sky UV index for solar noon and the other with varying cloud cover. The estimated uncertainty in the predicted values is one unit of UV Index.

Media reports of UV radiation levels raise public awareness about the harmful effects of excessive exposure to solar UV radiation. As the numbers are internationally standardised, a UV Index of 8 in Australia is equivalent, for example, to a UV Index of 8 in India or Japan. On a cloud-free day, UV radiation levels change with solar elevation, and the daily maximum is taken as the UV Index. The reason for the thrust of the education policies of the various cancer councils is to try to

get people to reduce their UV radiation exposure from the sun when outdoors. This is important during summer and particularly so during the three hours either side of solar noon (around 1pm daylight savings time) when the UV radiation levels can be the highest.

In order to maximise the usefulness of the UV Index, the qualifying words in the above table should also be included. Nowadays most of the media reports show the UV Index with its corresponding exposure category and information can be obtained from the The Cancer Council on how people can reduce their solar UV exposure. Sun protection information is important as most skin cancers are due to cumulative sun exposure.

It will take time for people to become familiar with the appropriate sun protection behaviour to adopt for a particular UV Index. For example, people know what clothes to wear to suit the weather. This is easy since our bodies respond to variations in temperature. Difficulties arise with UV radiation exposure because our bodies cannot "feel" UV radiation. We only know we have received too much solar UV radiation when our skin begins to redden 8 to 24 hours later. **The best advice is to always wear suitable clothing, hat, sunglasses and apply sunscreen to exposed skin when outdoors especially during summer. Also look for or provide some form of shade as it is an effective form of sun protection.**