J R Coll Physicians Edinb 2005; 35:33–34

Sunlight, sunscreens, health and melanoma

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KEYWORDS melanoma, skin cancer, sunlight, sunscreen

LIST OF ABBREVIATIONS squamous-cell cancers (SCC), sun protection factor (SPF), ultraviolet A (UVA), ultraviolet B (UVB), ultraviolet radiation (UVR)

DECLARATION OF INTERESTS No conflict of interests declared.

Published online ***November 2004***

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Cutaneous melanoma remains one of the most fascinating and challenging conditions to treat. Worldwide incidence rates have risen more rapidly than that of any other malignancy in Caucasian populations over the past three decades.

The relationship between the sun and melanoma has long been recognised. Sunny countries, most notably Australia and New Zealand, have the highest age-adjusted incidence rates (55 and 56/100,000 respectively) in the world.[1] The lifetime risk of developing melanoma in Australia is 1 in 25 for men and 1 in 34 for women. Throughout Australia there is a clear inverse relationship between incidence and latitude. Unlike other forms of skin cancer, the relation with sun exposure is not a clear-cut one. In non-melanoma skin cancer (basal-cell and squamous-cell cancers), the risk is, generally, greatest in those with highest cumulative sun exposure over a lifetime and most frequent on exposed sites, e.g. the head and neck. With melanoma, it seems that intermittent sun exposure, particularly that received in childhood and adolescence, is most relevant. Melanoma occurs more frequently in individuals with poor sun tolerance, i.e. those who freckle and burn as opposed to tan, and this is often associated with lighter eye colours. This Celtic skin type is frequently encountered in Scotland, where melanoma has an incidence of 13/100,000 for women and 10·6/100,000 for men.

The Scottish Melanoma Group has clinical, pathological and follow-up data on all cutaneous melanomas diagnosed since 1979 and remains an active multi-disciplinary group involved in audit and research. This data forms one of a very small number of population-based melanoma databases in the world. Much of the work on melanoma in Scotland has been modelled on the Australian experience and this holds true particularly for preventative and educational ventures.[2] The Queensland Melanoma Project has been running since the early 1970s and has involved both public and professional education on early recognition and prevention of melanoma. The key message as regards sun behaviour is encapsulated in their slogan – **Slip** (into the shade), **Slap** (on a hat), **Slop** (on sunscreen). The importance of this venture is recognised such that there is now legislation in place to ensure central registration of all melanomas and provision of adequate shade in schools and work places in Australia.

Clearly the situation in Scotland is different in some ways to that in Australia. The number of melanoma patients is not as great and the climate is radically different. However, the message of sensible sun exposure has been widely agreed by health professionals and educationalists. As is often the case with health messages, there has been diversity of opinion, particularly with regard to sunscreen use. Sunscreens, in the form of creams and lotions, have been available for over 40 years. The range available has dramatically increased in the past ten years with improved recognition of different types of UVR and their role in skin cancer development.

In animals, sunscreen use can reduce formation of SCCs of the skin and in humans, development of actinic keratoses, which are a recognised precursor of SCC. There is no evidence as yet that sunscreen use prevents melanoma or basal-cell cancer in humans.

Ultraviolet radiation has two components of major skin cancer relevance; these are UVB (290–320 nm) and UVA (320–400 nm). UVA penetrates more deeply into the skin and is of more constant intensity throughout the year and at different times of day. It is recognised to cause many of the features of chronic sun damage including skin ageing. UVB is often recognised as the main cause of sunburn (erythema), and is at its peak around noon and in summer months. Originally, sunscreens were directed at reducing UVB penetration into the skin. Traditional sunscreens carry a SPF grade, which largely describes UVB protection by

reducing/preventing erythema. The often-advised SPF 15 will filter out 93·3% of UVB. This is based on a testing situation where sunscreen is applied 2 mg/cm^2 to all skin. In reality, most real people apply 0·5–1 mg/cm^2. Thus most actual use equates to a lower SPF. In addition, high SPF sunscreen-use confers an ability to spend longer in the sun without burning than if the same skin were unprotected. Concern was raised that this might encourage sun-sensitive individuals to spend more time in the sun, and thus risk greater exposure to UVA and to UVB-related damage other than erythema. More recently, sunscreens are being developed to reflect/absorb both UVB and UVA. At present it is the minority of sunscreens which quote protection factors for both types of UVR.

Another concern raised around Australian-style modification of sun behaviour was the loss of other health benefits of sun exposure. One of these benefits is the manufacture of vitamin D in the skin. It has been estimated that between 9% and 40% of Americans are deficient in vitamin D. This varies with age, gender and ethnicity. It is also recognised that the average American diet contains minimal vitamin D and thus most people require to manufacture vitamin D in the skin to prevent osteomalacia, or rickets. It has been argued that sunscreen application virtually abolishes vitamin D manufacture and thus sunscreen users, along with sunlight-deprived individuals, should double their dietary vitamin D intake. This assumes that sunscreen is used all the time and applied at a thickness to give full activity. Generally, as mentioned above, this is not the case, thus, most people will have enough inadvertent sun exposure to manufacture some vitamin D and those at greater risk can be advised on dietary supplement.

In addition, there have been a number of publications suggesting that sunscreen use may increase risk of melanoma. These have been, in the main, retrospective questionnaires of use of sun protection in melanoma patients compared to controls. A few studies reported increased numbers of melanomas among sunscreen users, which was an obvious cause for concern. Other similar studies reported either a protective benefit of sunscreen or no difference between the two groups. One obvious problem has been that several of the studies failed to control for skin type. Thus, sun-sensitive individuals tend to use sunscreens and are also at increased risk of melanoma. The problem now seems to have been solved in that two recent meta-analyses[3, 4] have found no association between melanoma and sunscreen use. This should reassure patients, especially those with increased risk of melanoma, of the wisdom of continuing to protect their skin adequately from the sun.

In the future it is likely that a greater understanding of the role of UVR in melanoma will emerge and this may allow development of more specificly protective, acceptable sunscreens for all. Meantime, while melanoma and other skin cancers continue to increase and while our understanding of its aetiology remains unclear, it seems wise to continue to advise the continued use of the sensible sun protection measures advised by our Queensland colleagues.

KEYPOINTS

- Melanoma has been the most rapidly increasing caucasion malignancy over the last 30 years, the highest incidences are in Australia and New Zealand.
- The relation between sun exposure and melenoma is well-known but not clean-cut. Sun exposure in childhood and adolescence may be particularly important.
- Individuals who freckle and sunburn easily, and who have light eye-colous are at higher risk.
- UVR is of two types. UVA is more constant throughout the day and year than UVB, penetrates skin deeply and contributes to skin aging. UVB is most intense in summer and noon-time sun and causes sunburn.
- Sunscreens quote SPF which mainly apply to UVB. Recently, SPF for UVA and UVB are being quoted.
- Sunscreens prevent squamous skin cancer but not melanomas. There is no evidence to support the suggestion that sunscreen use increases melanoma risk.

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