Chapter 8

Sunscreens: can they prevent skin cancer?

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INTRODUCTION

Skin cancer is the most common malignancy in humans [1]. Furthermore, Armstrong and Kricker [2] have calculated that in white populations over 90% of cutaneous malignant melanomas are caused by sun exposure. Similar proportions of both basal cell carcinoma and squamous cell carcinoma of the skin are likely attributable to sunlight exposure [3]. Because of the high proportion of skin cancer caused by sunlight, prevention programs have become increasingly common not only in high incidence areas such as Australia [4,5], but also in lower incidence countries such as Canada [6], the US [7,8] and the UK [9].

Most of these programs have focused on decreasing solar exposure either by sun avoidance, by time-shifting activities to avoid periods of high insolation, or by increasing the use of protective clothing in the sun. Sunscreens have also been employed in many of these prevention initiatives; but only as a “last resort” where shade or protective clothing is not an...
alternative [10]. The reason for this is that although they have been demonstrated to be effective at preventing sunburn, little high quality human evidence has been available until recently that sunscreens may prevent skin cancer. This chapter will review the available evidence for the three major types of skin cancer; cutaneous malignant melanoma (CMM), squamous cell carcinoma (SCC) and basal cell carcinoma (BCC). The recent information about behavioral aspects of sunscreen use which suggests that use of these agents has encouraged rather than attenuated the rising incidence of cutaneous melanoma will also be discussed.

1. DEVELOPMENT OF SUNSCREENS

Use of sunscreens to prevent sunburn was first reported in 1928 [11]. During World War II, the need to maintain Allied troops’ health in high sunlight areas such as the South Pacific led to the use of red petrolatum to prevent severe sunburn which would otherwise have adversely affected light-skinned soldiers. During the 1960’s para amino benzoic acid (PABA) became a very popular sunscreen, and during the late 1960s and the 1970s achieved widespread use in North America, and to a lesser extent in Europe. However reports of contact sensitization [12] led to concerns about its long-term use. Furthermore this compound is water-soluble and its ability to provide adequate sun protection quickly declined with heavy sweating or bathing. Most of the sunscreens developed during the period up to the 1980’s were designed to prevent sunburn and thus primarily filtered UVB (280-315 nm). Concerns about the erosion of the earth’s stratospheric ozone layer, which surfaced in the 1980s, however, sensitized the public to the carcinogenic potential of solar radiation, and led to demands for both a higher UVB sun protection factor (SPF) and UVA protection. More recently, experiments with the Xiphophorus fish model have led to the hypothesis that longer wavelength UVA radiation might be involved in the genesis of melanoma [13]. This in turn has resulted in sunscreen manufacturers providing formulations which attenuate a much broader band of UV wavelengths than previously. Current broad-spectrum sunscreen formulations contain a number of active agents, each of which attenuates different parts of the UV spectrum affording good filtering of both short wavelength UVB (280-315 nm), and longer UVA (315-400 nm) wavelengths.