Sunscreens prevent sunburn. They have also been proven to be somewhat effective in preventing squamous cell carcinoma (1). However, both the most numerous (basal cell carcinoma) and the most deadly (melanoma) skin cancers have little evidence for efficacy of sunscreens. Therefore, using sunscreens as an approach to skin cancer prevention for basal cell carcinoma or cutaneous malignant melanoma (CMM) at this point in time is unsupported. The epidemiologic evidence for the utility of sunscreens in preventing basal cell carcinoma or CMM is flawed by poor reliability, potential negative confounding, inadequate latency between sunscreen use and development of basal cell carcinoma or CMM, and inaccurate measurement of sunscreen application.

Suggestions have been made that sunscreens actually increase risk for skin cancer (2), although the most likely way that this association might occur is when individuals use sunscreens to prolong their stay in the sun (3-7), and so it is possible that the use of sunscreens for intentional sun exposure may actually increase risk.

Evaluation of sunscreen use is closely linked to reported sunburn history. Measurement error is a more serious problem in evaluating sunburn history than other sun-associated variables (8-10). Test-retest reliability studies have shown that sunburn history is poorly recalled with only a little over half the subjects giving the same answer at two points in time to the question: “Have you ever been sunburned severely enough to cause pain or blisters for two days or more?” Other sun-associated variables, such as time spent outdoors during recreation, for example, seem to be more reliably remembered (9).

The relationship between sun exposure, sunscreen use, and the development of skin cancer is often negatively confounded. Subjects who are extremely sun sensitive often engage in fewer activities in the bright sun and wear sunscreen when they do. As these subjects are susceptible to the development of skin cancer, they may develop skin cancer regardless of the amount of sunlight exposure or the sun protection factor of the sunscreen.

Latency between initiation and the development of melanoma is generally thought to be >10 years and likely to be as long as 40 years. All the studies reported to date have examined subjects diagnosed between 1979 and 1998 (11), none of whom would have rigorously used sunscreens 20 years before diagnosis as they were not marketed widely.

If sunscreens were to be a safe and reliable method to prevent all skin cancers, then one might expect to find a stronger relationship between sun exposure and the development of melanoma than is currently seen. Analytic epidemiologic studies have shown only modest risks for the role of sun exposure in the development of melanoma incidence; three meta-analyses show almost the same estimates of effect for the role of intermittent sun exposure, an odds ratio of 1.6 (14-16). Importantly, chronic sun exposure, as in those occupationally exposed to sunlight, does not seem to increase risk for the development of melanoma and is sometimes associated with a protective effect, with an odds ratio of 0.70, equivocal for the development of basal cell carcinoma, and a clear risk factor for squamous cell carcinoma (12). Public health campaigns that advise those with outdoor occupations to use sunscreen on a regular basis to prevent skin cancer are undoubtedly misguided, as these individuals do not seem to be at increased risk for melanoma.

Sunscreen use has not thus far been clearly associated with CMM, either positively or negatively. Eighteen published studies were pooled using standard meta-analytic techniques to examine the relationship between sunscreen use and melanoma (13). No association was seen between melanoma and sunscreen use, in either direction. These studies suffer from several limitations, the most serious of which are noted above (reliability of measure, potential uncontrollable negative confounding, latency period for the development of melanoma, and inaccurate measurement of sunscreen application).

Nevi, multiple and/or atypical, have been considered a surrogate marker for the development of melanoma. Randomized trials of sunscreen application or other sun protection have had inconsistent results about the role of sunscreen in preventing nevus formation. A small study of 309 children by Gallagher et al. (17) in Western Canada found a very small preventive effect for sunscreen; children in the sunscreen group developed fewer nevi than children in the control group, 24 versus 28. In a further analysis of these data, Lee et al. (18) reported that this effect was found mainly on the trunk, three versus five nevi, respectively. Another larger randomized trial of 970 children in Western Australia (19) found that sunscreen was not associated with the number of nevi on children’s backs but that wearing clothing was protective. Several other cross-sectional studies have shown
protective effects of clothing (e.g., refs. 20, 21) and a few have shown protective effects of sunscreen (e.g., ref. 22). These conflicting and sometimes null results are consistent with the idea that sunburn, which sunscreen prevents, is only a marker of the interaction between exposure and susceptibility and that elimination of sunburn will have little effect on the development of CMM. Furthermore, it is consistent with an alternative mechanism for the development of CMM. Recent efforts to evaluate the pathways to the development of melanoma include targeting the melanocortin 1 receptor and stimulating DNA repair capacity (23). It is important to realize that the field of skin cancer prevention is still in its infancy and that it is highly complex (24). Until the mechanisms for initiation and promotion for skin cancer are clearly elucidated, it would be well to take great care in the claims for either prevention of all skin cancer by sunscreens or promotion of any skin cancer by sunscreens. Blanket advice to the public to wear sunscreens at any time outdoors is not at this time warranted. Instead, advice should focus on individual risk characteristics that are unequivocal, such as pigmentedary phenotype, family history, and nevus type and number, and recommend avoidance of sun exposure by those who are clearly at high risk and reasonable enjoyment of outdoor activities with less anxiety by those who are clearly at reduced risk.

References
Counterpoint: Sunscreen Use Is a Safe and Effective Approach to Skin Cancer Prevention

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