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Invited Commentary

Invited Commentary: A Sunbed Epidemic?

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The Icelandic study of melanoma trends by Héry et al. in this issue of the *Journal* (*Am J Epidemiol.* 2010;172(7):762–767) is a fascinating analysis of an ecologic association. The authors noted a sharp increase in melanoma incidence that appeared to lag a few years behind the increased prevalence of sunbeds in Iceland. Caution, however, must be exercised in interpreting the data because of the lack of understanding of emissions of ultraviolet radiation from sunbeds and the ecologic nature of the data.

Iceland; melanoma; ultraviolet rays

Abbreviations: CI, confidence interval; UV, ultraviolet; UV-A, ultraviolet A; UV-B, ultraviolet B; UV-C, ultraviolet C.

The Icelandic study of melanoma trends in this issue (1) is a fascinating analysis of an ecologic association. In this study, the authors note a sharp increase in melanoma incidence among young women that began after 1990, reaching what appears to be a peak in 2000. At the same time, information is available on the prevalence of sunbeds in Iceland, rapidly increasing from 3 salons in 1979 in Reykjavik to 207 salons in 1988. There was a decline in melanoma rates among women after 2001, following a reduction in prevalence of sunbeds. This ecologic study is consistent with biologic evidence and case-control and cohort analyses of sunbed use associated with melanoma.

BIOLOGIC EVIDENCE—ULTRAVIOLET WAVELENGTHS AND MELANOMA ETIOLOGY

Ultraviolet (UV) radiation consists of ultraviolet C (UV-C) wavelengths (100–280 nm), ultraviolet B (UV-B) wavelengths (>280–320 nm), and ultraviolet A (UV-A) wavelengths (>320–400 nm). The role of UV-A in the etiology of melanoma has been controversial. Until the 1993 publication by Setlow et al. (2) suggesting that 90%–95% of melanoma induction might be attributed to UV wavelengths greater than 320 nm—the UV-A, it had been assumed that the relevant UV wavelength for the development of melanoma was UV-B. Therefore, it had been concluded that tanning salons were safe in relation to skin cancer development, as they were advertised as emitting 99% UV-A, which is approximately 10 times weaker than UV-B (3). With additional studies supporting a role for UV-A in the etiology of melanoma (4), there has been a shift to including both UV-A and UV-B as important, although this shift is γ contentious (5). However, the epidemiologic data from case-control and cohort studies support a role for sunbeds in the etiology of melanoma.

EPIDEMIOLOGIC DATA

The risk for melanoma from sunbed use has been summarized by the International Agency for Research on Cancer (IARC) (6). A meta-analysis of 19 studies has evaluated the association between sunbed exposure and melanoma and other skin cancers, and results show that exposure at a young age is the most damaging, with a significant summary relative risk for ''first exposure under the age of 35'' of 1.75 (95% confidence interval (CI): 1.35, 2.26), a relative risk for ''ever use'' of sunbeds of 1.15 (95% CI: 1.00, 1.31), and a relative risk for ''exposure distant in time'' of 1.49 (95% CI: 0.93, 2.38); for ''recent exposure,'' a relative risk of 1.10 (95% CI: 0.76, 1.60) was found. All of the relative risks are raised, and the most persuasive study published to date,

a prospective cohort study of 106,379 women in Sweden and Norway (7), found a similar level of risk with the increased risk due to more recent types of sunbeds used after 1983 when commercial tanning salons that emitted more UV-A became more popular. Until then, sunlamps were often arc mercury lamps, more often used in home settings. These emitted primarily UV-B (about 40%) and some UV-C (about 20%) (8). Since the 1980s, commercial tanning has become popular in all industrialized countries; however, the spectral output is difficult to standardize and is often far higher than approved (9).

Pigmentary characteristics

UV radiation affects those with light pigmentary characteristics more than the darker phenotype. Those with light hair, light eyes, and skin that burns easily are at most risk for developing melanoma from UV exposure whether it is from the sun or from artificial tanning devices. Although, in the ecologic study that is the subject of this invited commentary, the authors were unable to measure any of these host characteristics, this phenotype characterizes the Icelandic population.

Gender and age

This study has reported that young females had the largest increase in risk for melanoma over the time period. Females, particularly young women, tend to use sunbeds more than males do. Recent data from the US National Cancer Institute show that the incidence of melanoma in the United States is growing among young females (10). In addition, sunbed usage in the United States is most prevalent among young women (11). In fact, the evaluation of use of sunbeds by Veierød et al. (7) found that those who used sunbeds at ages 20–29 years once or more per month had a significant relative risk of 2.58 of developing melanoma (95% CI:1.48, 4.50), the highest risk noted to date.

ISSUES

A recent International Agency for Research on Cancer Working Group (12) concluded that tanning beds are not safer than sun exposure, and this study from Iceland is thus noteworthy.

Although most studies have shown an increased risk for melanoma associated with sunbed use that is not always statistically significant, there are multiple qualifications that need to be taken into account when evaluating the association. 1) It is difficult to disentangle the use of artificial UV radiation from natural UV exposure. Some authors, for example, Wester et al. (13), have found that frequent tanning in sunlight correlates with sunbed use. The authors of this study (1), however, assessed increased sunbathing by evaluating travel to southern latitudes. They found data to show that older Icelanders had much higher rates of travel abroad than did the younger population who experienced the increased rate of melanoma. 2) To date, there have been relatively small numbers of subjects exposed to sunbeds, as it is only more recently that they have become popular. 3) Although there is good agreement for individual recall of sunbed usage (14), it is likely that the timing of use and the UV dose experienced are not the same for all individuals, and this makes causal associations more tenuous. 4) An assessment of spectral output of individual sunbeds is not currently possible, as regulations in the United States and many other countries do not require inspection, and so the irradiance of tanning devices varies widely (9, 15), further complicating the ability to draw conclusions as to the dose and type of UV that may be associated with melanoma etiology. 5) Most studies have taken place in higher latitudes in North America and Europe where the background ambient UV radiation is low; it would be useful to have more data from lower latitudes with higher levels of ambient UV, such as Australia and the southern United States, in order to further understand the complicated relation of melanoma with UV exposure. 6) Ecologic studies are inconsistent—even at similar latitudes with very good data. In Denmark, Faurschou and Wulf (16) concluded that sunbed risk is important for basal cell carcinoma but not cutaneous melanoma.

CONCLUSIONS

These data appear to demonstrate a relation between sunbed use and the development of melanoma; however, as they are ecologic, the results are not based on individual measures and are only weakly supportive of this relation. With the caveats just mentioned, this study adds to the evidence that sunbeds are health hazards and that UV-A has a biologically plausible role in the development of melanoma.

Note added in proof: *Since the submission of this invited commentary, Lazovich et al. published a paper showing a strong association between sunbed use and the development of melanoma: "Melanoma risk was pronounced among users of UVB-enhanced (adjusted OR, 2.86; 95% CI, 2.03–4.03) and primarily UVA-emitting devices (adjusted OR, 4.44; 95% CI, 2.45–8.02)" (17, p. 1557). (OR, odds ratio; UVA, UV-A; UVB, UV-B).*

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