Reviewer’s report

Title: Cumulative solar ultraviolet radiation exposure and basal cell carcinoma in a nationwide US cohort using satellite and ground-based measures

Version: 0 Date: 20 Aug 2019

Reviewer: Myles Cockburn

Reviewer's report:

This well written manuscript addresses the issue of dose-response of solar UV exposure in skin cancer risk. While it is well established that sun exposure causes skin cancer, we don't have good data on "how much?", which is actually a critical piece of missing information in developing effective interventions. (In contrast to cancer risk factors like obesity and physical activity, where we have data on dose-response).

This analysis goes some way to addressing that question, although still only provides a relative answer, concluding that the highest levels of ambient UV exposure are the ones most consistently linked to skin cancer risk.

Another important contribution of this paper is that we don't have data on non-melanoma skin cancer in our population-based cancer registries (skin cancer not reportable), so large cohorts are the only place we can obtain this kind of information.

While self report of NMSC doesn't sound like it would be particularly accurate, anecdotally it's likely that most people know when they've been diagnosed with NMSC - if the outcome is misclassified, it's likely to over-represent severe disease, and this limitation should be noted. (However, that's unlikely to affect the dose-response strongly, especially because the exposure metric is not self-reported, it's based on residential history, which is in this case relatively objective).

One limitation not discussed is the representativeness of this population - there should be some discussion of how representative radiation technologists are of the general population (important because the aim is to provide population-based estimates of relative risk). Three main concerns would be (1) their socioeconomic status - strong SES gradients in skin cancer, so if rad techs are relatively well off, they might be at the low end of actual sun exposure and high end of knowledge about avoiding the sun; (2) you'd think that rad techs would be aware of radiation risks, including sun exposure, so are likely to have a different risk of exposure reflected by their residential levels (ie the "ecological" misclassification is likely to be higher in rad techs); (3) access to care likely to be better, and therefore likelihood of being diagnosed with NMSC....
The discussion about the two different methods of UV exposure is a bit overdone, especially when they show essentially the same thing - some of that might be replaced with discussion of generalizability (above) and/or the likelihood that residential exposure misclassification will bias results towards the null.

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