Reviewer’s report

Title: Concurrent validity of skin carotenoid status as a concentration biomarker of vegetable and fruit intake compared to multiple 24-hour recalls and plasma carotenoid concentrations across one year: a cohort study

Version: 0 Date: 27 Sep 2019

Reviewer: Nicole Kellow

Reviewer's report:

Thank you for your well-written submission, which aims to assess the utility and validity of spectroscopy-based quantification of skin carotenoid levels compared to plasma carotenoid concentrations and self-reported dietary carotenoid intake. Multiple measurements were taken over one year to attempt to consider seasonal changes.

A few comments:

1) The introduction reads very well, but the reader requires some additional explanation about the relationship between carotenoid intake and skin carotenoid deposition - I assume that circulating carotenoid levels reflect very recent V&amp;F intake, but what is SCS is measuring? As a reader who is not a carotenoid expert, I assume skin deposition of carotenoids might not reflect short-term V&amp;F intake, and might instead reflect habitual, longer-term carotenoid intake, with additional influence by exposure to free radicals generated during cigarette smoking, illness and UV radiation etc. How long can carotenoids remain in the skin, and are they longer-lived in the skin compared to in the bloodstream? I realise this is what you are trying to determine with this research, but the reader requires more of an explanation about the physiological relationship between dietary carotenoid intake, plasma carotenoid levels and skin carotenoids concentrations, and the potential limitations of these optical methods.

2) Methods: The research is methodologically sound. I would recommend you include the percentage of women participating in the study who were smokers (even if reported elsewhere, it needs to be mentioned in this article).

3) Methods: What is the intra-individual percentage error for these SCS techniques? This is especially important for the prototype RS instrument used.

4) Please report the percentage of 24-hr recalls that were not completed during the study. Over time, participants may have been less compliant with the completion of these recalls (a potential limitation?)

5) The discussion is well-written as it clearly describes the strengths and limitations of the study, does not oversell the findings and to a large extent addresses my first comment at 1).
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