Dear Editor:

In a recent issue of *The Journal of Nutrition*, Pellegrini et al. (1) reported the development of a semiquantitative FFQ for assessing dietary total antioxidant capacity (TAC)\(^2\). The FFQ developed was validated using 3 different in vitro assays, Trolox equivalent antioxidant capacity (TEAC), total radical-trapping antioxidant parameter (TRTAP), and ferric reducing antioxidant power (FRAP), against a 3-d weighed food record in 283 individuals in Northern Italy. The 3-d weighed food record is indeed a more reliable method in measuring food intake than food daily or 24-h recall. However, the article also reports that the plasma TAC of the subjects, determined by TEAC and FRAP, was not associated with the dietary TAC. The latter finding raises doubt about the value of the FFQ developed for assessing dietary TAC.

Free radical-induced oxidative damage has been implicated in the etiology of many degenerative diseases. Oxidative damage is the consequence of excess oxidative stress, inadequate antioxidant potential, or the combination of the both (2). Oxidative stress is a balance between the factors that exert oxidative stress and those that possess antioxidant potential, and antioxidant potential is the sum of a large number of interrelated and interdependent antioxidant systems (2,3). As the levels and/or activities of the majority of antioxidant systems are closely related to the nutritional status of experimental subjects, the possible protection of dietary components against oxidative damage has received considerable attention recently. However, it is difficult to determine the contribution of an individual nutrient or dietary component toward the overall antioxidant potential in vivo. Therefore, a number of in vitro assays, such as TEAC, TRTAP, and FRAP, have been suggested to assay the total antioxidant potential or TAC in the diet.

Although in vitro assays for dietary TAC may be useful in estimating antioxidant intake, they are not reliable in predicting antioxidant capacity in vivo, or even ex vivo (4–6). Vitamins C and E, for example, may act as an antioxidant or prooxidant in vitro or ex vivo, depending upon assay conditions employed (6,7). In in vitro or ex vivo assays, the target compound is directly exposed to the testing compound at the concentration added to the assay medium. On the other hand, the testing compound ingested is first subjected to various metabolic processes. The testing compound (or its metabolites) that survived these processes is also subjected to membrane barrier and/or homeostatic regulation prior to reaching the target site. Therefore, it is not surprising that the dietary TAC of subjects was not found to associate with the plasma TAC in this study. As the authors are aware that available literatures do not show a link between dietary TAC and plasma TAC (p.97, column 1, lines 11–14), the statement that “This result was not completely unexpected because the role of antioxidant-rich diets on the modulation of antioxidant plasma status is not yet clear” (p. 97, column 1, paragraph 2, lines 6–9) is puzzling.

Measurement of plasma TAC is generally regarded as an in vitro assay for in vivo function and is a more meaningful indicator of total antioxidant potential than in vitro or ex vivo assays for dietary TAC. The lack of association between dietary TAC and plasma TAC observed suggests that in vitro assays for TAC may not predict how those dietary components would act in vivo. The findings that coffee and tea contributed 26.5–54.3% and alcoholic beverages 11.3–40.3% of TAC (p. 97, column 1, paragraph 1, lines 12–19) of the population studied support this view. Based on the information obtained from this study, the authors would seem more appropriate to conclude that the FFQ developed for assaying dietary TAC, while validated by in vitro TAC assays, does not necessarily reflect TAC in vivo.

A number of foods and beverages rich in phytochemicals have been associated with decreased risk of developing chronic diseases. However, whether the protective effect of these compounds is attributable to the antioxidant or other functions remains unclear. The available evidence of in vivo antioxidant functions of foods and beverages is largely inconsistent or confusing. Currently, many dietary supplements, functional foods, or nutraceuticals are being promoted as possessing high antioxidant potential and other functions based on in vitro assays. As in vitro or ex vivo TAC assay may not predict the antioxidant capacity of a food component or diet in vivo, interpretation and extrapolation of data obtained from in vitro or ex vivo assays of TAC needs to be cautious.

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**Literature Cited**


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