

Commentary

Association Between Green Tea Consumption and Lung Cancer Risk

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Green tea is a popular beverage and its health benefits are well known. However, inconsistent results have been reported in observational studies concerning the association between green tea consumption and the lung cancer risk. In this commentary, several methodological issues underlying the measurement of tea exposure are highlighted. The recommendations should be useful for designing and planning prospective cohort studies to ascertain the protective effect of green tea against lung cancer.

Key words: Cohort study, Exposure, Green tea, Lung cancer, Prevention
J Prev Med Public Health 2010;43(4):366-367

Lung cancer is the most common cancer globally. Because of its high burden and societal cost, primary prevention through an appropriate diet becomes important, in addition to tobacco abstinence and early detection [1]. Green tea is a popular beverage in the Asia-Pacific region and its habitual consumption has long been associated with health benefits, including cardiovascular protection and chemoprevention of various cancers [2,3]. Numerous *in vitro* studies and animal experiments have suggested that green tea or its polyphenolic flavonoids, known as catechins, can reduce tumour formation, tumour size, and cellular proliferation [3]. However, results based on observational studies remain inconsistent. A large cohort study (the “Ohsaki study”) of 41 440 individuals conducted in Japan found no association between green tea consumption and the lung cancer risk. Indeed, slight increases in adjusted risk were observed for drinking one or more cups of green tea [4]. The findings appear to contradict a review of epidemiological evidence which concluded “a small beneficial association for green and black tea, particularly among never-smokers” [5]. Similarly, a recent meta-analysis of 22 epidemiological studies concluded an 18% reduction in lung cancer risk by consuming at least 2 cups of green tea per day [6].

The limitations of case-control studies are well known, especially with regard to the retrospective dietary recall to infer potential cause-effect relationships. However, there are several methodological issues concerning prospective cohort studies that should be considered. Firstly, a long follow-up period for lung cancer outcome

should be allowed. The total follow-up was only 7 years in the Ohsaki study. Because there is a much longer induction period and latency period for lung cancer [1], cases diagnosed during the follow-up should be considered as cancer carriers at baseline. Measurement of green tea consumption at the baseline survey was thus not related to the risk of being diagnosed as a cancer patient during the follow-up, but merely served as a proxy for habitual green tea intake [7]. Secondly, in the literature, most of the baseline dietary questionnaires (including the one used in the Ohsaki study) on green tea consumption were limited to only “cups per day” type categories. Detailed information on quantities of intake and cumulative exposure to green tea (years of drinking) was lacking. It has been suggested that habitual green tea consumption over an extended duration is essential to produce the desired protective effect [7]. Cumulative tea exposure may perhaps be measured in terms of (cups/day \times years of drinking), in the manner of pack-years for quantifying cigarette smoking exposure. The third problem concerns the reliance of baseline data in many studies. Rather, repeated measurements of tea consumption should be undertaken during the follow-up whereby changes in circumstances such as adverse health conditions might alter the tea drinking habit (e.g. reduced tea intake to avoid drug interaction). There is also the possibility of information bias over the follow up period. In our opinion, imprecise estimate of tea consumption level has probably led to potential misclassification and consequently the lack of association and even elevated risks as reported in the

Ohsaki study.

As pointed out by Arts [5], differences in cultivars and production methods and in brewing methods at home can influence the tea composition and internal exposure to bioactive ingredients. Accurate assessment of tea exposure is thus necessary in future epidemiological studies. It is advantageous to conduct such studies in Asian countries particularly China and Japan where the consumption of green tea is common. However, possible interaction and effect modification due to mixed tea drinking (barley, oolong and black teas) and residual confounding should not be ignored. The effects of green tea may also differ between lung cancer subtypes. Well-designed case-control studies, and prospective cohort studies with repeated measurements of tea intake, as well as comprehensive meta-analysis of published results on lung cancer subtypes, are recommended to further clarify the role of tea in lung cancer prevention. In the meantime it may be prudent to continue drinking tea instead of other alternatives [8].

CONFLICT OF INTEREST

The authors have no conflict of interest to declare on this study.

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