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The study of dietary patterns and phytochemical intake has developed dramatically in the last few decades with the ambitious aim to provide ‘natural’ tools for protecting from a number of chronic diseases.^{1,2} Several tea-derived bioactive compounds (e.g. flavanols, flavandiol, flavonoids, and phenolic acids) are claimed to exert beneficial effects for human health.^{3,4} In particular, experimental studies and small interventional studies ascribe to the major flavonoids of tea (i.e. catechins) a wide range of health-promoting effects, including the following: attenuation of oxidative stress and inflammation, enhancement of endothelial cell and cardiomyocyte function, reduction of systemic blood pressure, improvement of lipid and glucose metabolism, inhibition of platelet activation and thrombus formation, immunomodulation, as well as protection against cancer.^{3,4} Hence, the interest of the scientific community has been oriented towards understanding the epidemiological relationship between tea consumption and human diseases, with a special focus on cardiovascular disease (CVD). Observational studies exploring this issue across different ethnic groups have shown conflicting results.⁵ In addition, based on observational studies and meta-analyses of observational studies, an indisputable conclusion on the association between tea consumption and either CVD or all-cause mortality cannot be drawn.^{5–7} Indeed, regular tea drinking has been inversely associated with the risk of CVD and all-cause mortality in a number of prospective studies conducted in Asian populations.^{6,7} However, the same association has not been consistently observed in studies conducted in western countries and multi-ethnic populations.^{8–11} In light of such a controversial scenario, it remains uncertain as to whether regular tea consumption may be considered a cardioprotective and health-promoting lifestyle habit. The lack of randomized clinical trials exploring the effect of tea drinking on hard clinical endpoints makes health claims on tea consumption questionable.

In this issue of the *European Journal of Preventive Cardiology*, Wang and colleagues¹² aimed to better

elucidate the prospective association between two different patterns of tea consumption (i.e. habitual (\geq three times/week) and a combined pattern including non-habitual (<3 times/week) and never tea drinking) and CVD incidence, CVD mortality and all-cause mortality in a large Chinese cohort of 100,902 individuals during a median 7.3-year follow-up.

The authors observed that habitual tea consumption had a significant inverse association with CVD incidence and mortality as well as with all-cause mortality, as compared with non-habitual or non-consumption of tea.¹² They also found that all these inverse associations were strengthened among habitual tea drinkers who maintained the same tea consumption pattern over time, whereas they were not significant among those who began or stopped drinking tea during the follow-up.¹² These results have important interpretative repercussions. The first and even more obvious interpretation is that tea consumption may provide overall health benefits and cardiovascular protection. The second interpretation is that an exposure-response relationship between tea consumption and health outcomes exists, in which both the amount of tea consumed, and the duration of tea drinking modulate this prospective association. From a preventive medicine perspective, this latter consideration implies that long-term adherence to a habitual pattern of tea consumption (at least three times/week) is necessary in order to produce a significant health benefit. Whether a non-habitual pattern of tea consumption may have a long-term prognostic effect as compared with non-consumption of tea cannot be inferred from the study by Wang and

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colleagues.¹² In addition, it remains to be clarified what amount of tea and tea-derived phytochemicals are sufficient to exert a beneficial effect on CVD incidence and both CVD and all-cause mortality. Finally, the possible existence of a threshold value, above which health benefits of tea consumption may be lessened or even lost, needs to be elucidated.

The study by Wang and colleagues¹² showed a significantly reduced risk of stroke mortality but not of coronary heart disease (CHD) mortality among habitual tea drinkers. In line with this result, in one previous study conducted in a Japanese population the frequency of tea drinking was more strongly associated with stroke mortality than with CHD mortality.¹³ As correctly stated by the authors,¹² the beneficial effect of tea consumption on stroke mortality was likely to be driven mostly by its blood pressure-lowering activity.¹⁴ Of note, hypertension is recognized to predict stroke mortality better than CHD mortality in Asian populations.¹⁵ In addition, consistent with previous observations,¹⁶ the incidence and mortality rates of stroke were higher than those of CHD in this cohort.¹² Thus, the authors¹² hypothesized that this may have contributed, at least in part, to strengthen the observed inverse association between tea consumption and stroke-related outcomes at the expense of that with CHD mortality. Despite being plausible, this latter interpretation should be considered with caution since the study by Wang and colleagues¹² had adequate statistical power to detect a significant effect of tea consumption on both CHD and stroke mortality. Hence, a preferential protection of habitual tea consumption against stroke mortality can be inferred from this study.¹² However, this finding should be interpreted in light of the results of a large multi-ethnic meta-analysis of 22 prospective studies, in which the association between tea consumption and stroke mortality was not significant.⁵

In a subgroup analysis of the study by Wang and colleagues¹² a negative association between habitual tea consumption and both CVD risk and all-cause mortality was found for green tea but not for black tea. This finding is in line with a large body of literature suggesting that the effect of green tea consumption on health outcomes is stronger than that of black tea.⁵ A plausible biological explanation of such a difference between green and black tea might be the higher content in bioactive compounds in green tea preparation. In fact, while the black tea processing method is based on fermentation, which leads to the loss of a large amount of catechins, the green tea processing is fermentation-free and preserves a greater amount of the starting catechin content.¹⁷ However, randomized clinical trials are needed to provide a definitive confirmation on the differential effect of various types of tea on health-related outcomes.

Taken together, the results of the study by Wang and colleagues¹² suggest that habitual tea consumption may be considered as an overall health-promoting lifestyle behaviour. In fact, if we consider that tea is the second most consumed beverage worldwide, even mild tea-mediated health benefits at the individual level might translate into significant effects at the population level. Acquisition of confirmatory information by clinical trials on the effect of tea on hard health-related endpoints is crucial before releasing consistent and unquestionable recommendations on the type and amount of tea to be consumed, and the pattern of tea drinking behaviour to be encouraged.

Author contribution

VB contributed to the conception and design of the paper. VB, MRM and MP contributed to the acquisition, analysis, and interpretation of data for the paper. VB, MRM and MP drafted the manuscript. VB, MRM and MP critically revised the manuscript. All gave final approval and agree to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of conflicting interests

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