Tea impact on cardiovascular health

As is known, flavonoids are widely represented in fruits and vegetables. As a consequence, flavonoids can be found in a highly variable extent in a wide variety of plant foods, including some unexpected major dietary sources such as green and black tea. In various animal models of atherosclerosis dietary flavonoids slow down the development of vascular disease. In humans, an inverse relationship between flavonoid intake and cardiovascular disease has been described in different epidemiological surveys and retrospective analyses, while very few data deriving from case-control and follow-up studies are available. As far as tea consumption is concerned, a case-control study by Sesso et al examined the relationship between tea and coffee consumption and myocardial infarction. In a total population study of 338 subjects with myocardial infarction and 338 matched controls from the Boston Area Health Study observed that compared to non-drinkers (n=155) individuals who drank one cup of tea or more per day (n=192) had a 44% reduction in the risk for myocardial infarction. In keeping to this, Mukamal et al examined tea consumption in the Myocardial Infarction Onset Study, a prospective cohort study conducted in 1900 US patients who were admitted to community hospitals because of acute myocardial infarction. During a mean follow-up of 3.8 years, compared to non-drinkers (n=1019) moderate (<14 cups of tea per week, n=615) and heavy tea drinkers (≥14 cups of tea per week, n=266) had 31% and 39% risk factor adjusted reductions in mortality, respectively. Concordantly, in a meta-analysis by Peters et al incidence of myocardial infarction was estimated to decrease by 11% with an increase in tea consumption of 3 cups of tea per day. Although of great interest, the relevance of these studies is limited by several factors, including variation in the flavonoid content of different commercially available teas, the lack of information on adequate analytical techniques able to quantify total flavonoid content and, last but not least, of large scale, controlled, randomized intervention clinical trial similar to those conducted – often with conflicting outcomes – with various orally active antioxidant agents. In this regard, no human intervention studies on the effect of either green or black tea on cardiovascular events are available. However, a range of potential mechanisms through which flavonoids from tea might influence cardiovascular health has been explored in intervention trials. Expanding upon this field, the presence of endothelial dysfunction, i.e. decreased nitric oxide bioavailability with impaired vascular relaxation and increment of the endothelial adhesive-procoagulant properties, is known to represent an important step during human atherogenesis and accompanied by a greater incidence of cardiovascular disease. A consistent bulk of data indicate that flavonoids improve endothelial function. In vitro studies provided evidence for direct effects of flavonoids from tea on endothelium-, i.e. nitric oxide-, dependent vasorelaxation. Similarly, human intervention trials also showed that tea ingestion could reverse endothelial dysfunction, i.e. improve endothelium-dependent, nitric oxide-dependent vasorelaxation. In addition, previous results from our group and a recent study by Hodgson et al clearly indicated that black tea ingestion is able to reduce both systolic and diastolic blood pressure levels, starting from ingestion of one single cup of tea per day. Concordantly, in cross-sectional studies, inverse correlations between tea intake and either blood pressure levels or the prevalence of hypertension have been described. With particular regard to our study we have observed that systolic (-3.3 mmHg) and diastolic (-2.6 mmHg) blood pressure (BP) decreased after 1-week of tea consumption (p<0.0001 versus placebo). Flow mediated dilation (FMD) also improved after tea (p<0.0001 after placebo), while an additional cup of tea further increased FMD at 1, 2, 3 and 4 hours after consumption with maximal response 2 hours after intake (p<0.0001). Fat challenge significantly increased BP (p<0.0001) and decreased FMD (p<0.0001). This was counteracted by tea consumption. Tea also improved the reflection (small vessel tone; p<0.0001) and stiffness indexes (large arterial stiffness; p<0.0001), with additional effects after acute tea consumption, with and without fat loads. Thus, we demonstrated for the first time that moderate consumption of black tea protects against oral fat load-induced arterial dysfunctions in hypertensive but otherwise healthy subjects. The vascular benefits of tea are also reflected in BP lowering, and improved endothelial function as well as peripheral arterial hemodynamics under fasted and postprandial conditions. Our findings are of clinical relevance and expand upon the suggested protective effects of black tea on the lipid profile and systemic inflammation.

In conclusion, although some of the epidemiologic data are conflicting, findings from available studies support the recommendations of the American Heart Association and, consequently, the increase the daily consumption of fruits, vegetables, and other foods with high polyphenol contents. In this context, either green or black tea exerts significant cardiovascular protection and add no calories to the daily diet. Thus, tea should be always taken in consideration in cardiovascular prevention and studied in future ad hoc studies.