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Publication date:
2019

Proceedings of the Nutrition Society (2019), **78 (OCE1)**, E27 doi:10.1017/S0029665119000314

Winter Meeting, 4–5 December 2018, Optimal diet and lifestyle strategies for the management of cardio-metabolic risk

Co-ingestion of antioxidant drinks with an unhealthy challenge meal fails to prevent post-prandial endothelial dysfunction: an open-label, crossover study in healthy older adults

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Endothelial function is impaired for several hours after an unhealthy challenge meal (e.g high calorie, high fat)[1]. This impairment has been shown to be abolished in the presence of antioxidants[2], suggesting that reactive oxygen species (ROS) may play an important role in the induced dysfunction. In this study, we assessed whether drinks with high-antioxidant capacity impacted endothelial dysfunction induced by an unhealthy challenge meal.

The study was an open-label randomised crossover design: 7 healthy older adults (1 male, 6 females; BMI 25-35; mean age 57 years) were recruited to the study and completed four experimental trials. Participants received either water, orange juice, green tea or red wine with a high calorie meal (>900 kcal; >50g fat) following an overnight fast. Endothelial function (primary measure) was assessed by flow-mediated dilatation (FMD) of the brachial artery immediately before (baseline) and two hours after the meal; blood samples were also taken at these time points for routine lipid and glucose analysis, as well as measurement of oxidised low density lipoprotein (ox-LDL) and oxygen radical antioxidant capacity (ORAC). Participants returned at weekly intervals to complete the remaining arms of the study. Data was analysed using a 2-factor repeated measures ANOVA.

The results demonstrate that two hours following an unhealthy meal challenge there was a substantial increase in circulating triglycerides (≥100 %, $P < 0.001$), but not total cholesterol or glucose (both $P > 0.05$). FMD was reduced by ~30 % at this timepoint, but the effect was not attenuated by co-ingestion of any of the antioxidant drinks (Fig. 1). In addition, there was no effect of the meal or condition on circulating levels of ox-LDL or ORAC ($P > 0.05$).

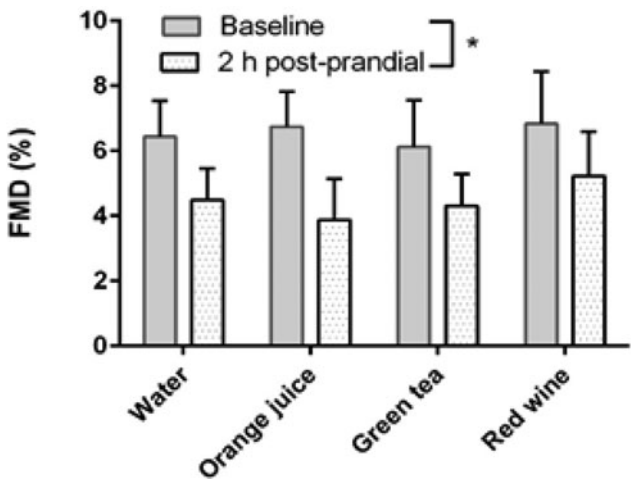

Fig. 1. Group mean + SEM FMD responses to an unhealthy challenge meal. FMD was significantly attenuated after the meal challenge ($P < 0.01$), but there was no significant difference between FMD in any of the study arms compared to the water (control) arm.

We conclude that co-ingestion of any of our test antioxidant drinks failed to protect against the substantial post-prandial endothelial dysfunction induced by an unhealthy meal challenge. That circulating ox-LDL was not influenced by the antioxidant drinks might point to either a lack of role for oxidative stress in the endothelial dysfunction experienced, or a need for complex and lengthy intracellular signalling to achieve antioxidant benefits.

This study was part funded by BBC studios. KG is funded by Highlands and Islands Enterprise; DM is supported by the European Union's INTERREG VA Programme, managed by the Special EU Programmes Body (SEUPB).

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