Concurrent Session 17: Dietary Antioxidants and Health

Challenges of measuring health properties of antioxidants in food
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Background – Phytochemicals are abundant micronutrients in fruit and vegetables. There is an emerging body of evidence regarding their health benefits, some of which may be due to their antioxidant properties.

Objective – To compare chemical antioxidant assays with more biologically relevant cell-based assay systems for measuring antioxidant activities of food polyphenols.

Design – The free radical scavenging activities of three flavonoids: quercetin, rutin and catechin, commonly found in apple, onion and tea respectively, were measured. The three flavonoids were evaluated using both oxygen radical absorbance capacity (ORAC) and lipid peroxidation inhibition capacity (LIPC) assays. Cytoprotective effects were measured by the degree of protection against H2O2-induced damage of human Jurkat cells.

Outcomes – As expected all compounds exhibited activity in these assays. Quercetin offered the strongest protection against H2O2-induced cell death. A comparison of the results of the assays showed that the ability to inhibit peroxidation of lipids in a liposomal system (LIPC) correlated well with the cytoprotective activities (expressed as EC50), but not with the ability to protect an aqueous fluorescent substrate in the ORAC assay.

Conclusions – In vitro assays can only rank antioxidant activity for their particular reaction system and their relevance to in vivo health-protective activities is uncertain. Therefore, it is prudent to use more than one type of antioxidant assay to measure antioxidant activities, and to include at least one assay that has biological relevance.

Antioxidant restriction affects inflammatory response in short-duration exhaustive exercise
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Background – Exercise is known to increase the production of reactive oxygen species (ROS)[1]. Dietary carotenoids have antioxidant properties and may possess anti-inflammatory effects [2].

Objective – The objective of the study was to determine the effect of dietary antioxidant restriction on short-duration maximal exhaustive exercise induced markers of inflammation, carotenoids and fatty acids in healthy male endurance athletes.

Design – Seventeen endurance-trained athletes performed two separate exercise tests. Participants followed their habitual (high) antioxidant diet (HA) and performed an overnight fasting treadmill exercise test. Participants then followed a reduced antioxidant diet (RA) for 2 weeks and then performed the same overnight fasting treadmill exercise test. Blood was collected at rest and post-exercise for the analysis of inflammatory markers, fatty acids and carotenoids in plasma.

Outcomes – The RA diet induced a significant increase (P<0.01) in baseline plasma TNF-alpha concentration (612.86 ± 325.23 ng/ml) compared to the HA diet (28.30 ± 39.07 ng/ml). Baseline plasma beta-carotene concentration significantly decreased (P<0.05) in the RA diet (122.61 ± 54.49 ng/ml) compared to the HA diet (194.96 ± 92.07 ng/ml). Exercise decreased plasma carotenoid concentrations in both diets. Exercise significantly decreased (P<0.01) plasma n-6 fatty acid concentration in the RA diet (186.38 ± 94.54, 96.16 ± 48.76 µg/ml) and increased (P<0.05) plasma n-3 fatty acid concentration in the HA diet (14.27 ± 5.04, 18.63 ± 4.94 µg/ml).

Conclusion – Healthy endurance-trained adults performing short-duration exhaustive exercise may require higher intakes of carotenoids to combat oxidative stress and inflammation generated through exercise, which can be achieved via a diet containing high-carotenoid foods.

References