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Stability of the total antioxidant capacity of fresh fruit juices subjected to an *in vitro* digestion procedure

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Free radicals have been implicated in the initiation and progression of a number of diseases including various cancers, CVD and diabetes. Antioxidants are known to protect tissues against the damaging effects of oxygen-free radicals. Therefore, it has been hypothesised that a diet rich in antioxidants may infer protection against certain diseases. Fruits and vegetables are a major source of antioxidants among other bioactive compounds essential for optimal health. Current government recommendations promote the consumption of any five portions of fruit or vegetables per day in order to facilitate good health. However, though lacking in the fibre content of whole fruits, fruit juices are an excellent source of antioxidants. The objective of the present study was to analyse the total antioxidant capacity of a variety of fruit juices and to determine the stability of the antioxidant capacity after an *in vitro* digestion procedure.

Ten commercially available fresh fruit juices (both Tesco own brand and premium brand varieties) were selected. Samples of each juice were subjected to an *in vitro* digestion procedure⁽¹⁾ designed to simulate *in vivo* digestion. The total antioxidant capacity of the samples was analysed prior to digestion via FRAP⁽²⁾ and the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay⁽³⁾. Following digestion samples were analysed via FRAP only.

Juice	FRAP ($\mu\text{mol/l}$)	SE	DPPH (% inhibition)	SE	FRAP ($\mu\text{mol/l}$)	SE
Tesco OJ	5821	181	49.9	4.6	5343	413
Innocent OJ	5122	195	46.0	4.4	5645	315
Tropicana smooth OJ	5828	158	51.6	4.5	6086	417
Tesco grapefruit	7668	260	71.2	0.8	6208*	60
Tropicana grapefruit	7268	102	65.4	1.8	5424*	258
Tesco pineapple	5689	199	63.8	1.0	4915	205
Tropicana pineapple	8576	87	68.0	0.9	6374*	240
Ocean spray cranberry	6733	125	84.1	0.4	8570*	225
Tropicana red grape	5653	159	80.3	0.9	8122*	120
Pomegreat pomegranate	8557	110	80.6	1.0	20063*	291

n 3 independent experiments; * $P < 0.05$ = significantly different to FRAP values prior to digestion.

All of the juices analysed were a significant source of antioxidants; however, there was wide variation between the different types of juice. Pomegranate juice had the highest antioxidant capacity compared to the other types of juice analysed. For many of the juices, the total antioxidant capacity was significantly ($P < 0.05$) enhanced after an *in vitro* digestion. In general, there was little difference in antioxidant capacity between supermarket own brand and premium brand varieties of fruit juice.

1. Ryan L, O'Connell O, O'Sullivan L *et al.* (2008). Micellarisation of carotenoids from raw and cooked vegetables. *Plant Foods Hum Nutr* **63**, 127–133.
2. Benzie IFF & Strain JJ (1996) The ferric reducing ability of plasma (FRAP) as a measure of "antioxidant power": the FRAP Assay. *Anal Biochem* **239**, 70–76.
3. Brand-Williams W, Cuvelier ME & Berset C (1995) Kinetics and mechanisms of antioxidant activity using the DPPH-free radical method. *Lebensm-Wiss u-Technol* **30**, 609–615.