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## The effect of Sea Buckthorn, a polyphenol and antioxidant vitamin-rich fruit on cognitive function

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Many aspects of cognitive performance and memory decline throughout adulthood. Working memory describes a system that temporarily stores and processes information to support reasoning, learning and comprehension. It is a useful tool to describe and study cognitive function<sup>(1)</sup>.

Polyphenols are thought to modulate the activity of a large number of enzymes and cell receptors, giving them a role in the prevention of diseases associated with oxidative stress, such as CVD<sup>(2)</sup>. Animal studies have shown improvement in cognitive function<sup>(3)</sup>. Little is known about their bioavailability.

Sea Buckthorn (SB) a deciduous shrub is native over much of the world including Great Britain. Its berries are among the most enriched plant sources of vitamin C with an average 695 mg/100 g and they are high in total phenolics, varying from 144 to 244 mg/100 g (depending on subspecies and cultivation methods)<sup>(4)</sup>. To date, there have been relatively few comprehensive studies on the effects of SB polyphenols, and there is no published literature on their impact on cognitive function.

Two pilot studies were undertaken to determine if the short-term consumption of SB juice affected working memory. The first, a placebo-controlled study ( $n$  12) assessed the effect of supplementary polyphenols in 150 ml fruit juice (40% SB) over a 7-d period. The intake of vitamins A, C and E and  $\beta$ -carotene were determined by a food frequency questionnaire. The second, a participant-blind placebo-controlled crossover study ( $n$  10) assessed the bioavailability of polyphenols in juice (20% SB) and its effects on working memory in individuals on a polyphenol-restricted diet over a 12-d period. Cognitive function was evaluated in both studies by Corsi block Word span and Digit span tests<sup>(5)</sup>.

The mean total urinary phenolics (mg/l gallic acid equivalent) were 208.9, 213.5 and 300.3 for baseline, control and SB treatment, respectively ( $P$  for trend = 0.004). There was also an increase in urinary antioxidant capacity, which, although non-significant, correlated strongly ( $r = 0.721$ ) with urinary total phenolics. Routine consumption of foods rich in vitamins C and E was positively correlated to cognitive function with a strong positive relationship observed for Digit span test score and vitamins C ( $r = 0.828$ ), E ( $r = 0.684$ ) and  $\beta$ -carotene ( $r = 0.565$ ).

The polyphenols in Sea Buckthorn juice are bioavailable (as determined by urinary phenolic output). In these studies, ingestion of SB either as a supplement or as a dedicated source of polyphenols, in the doses studied, did not confer significant effects on cognitive function. However, its effect on ameliorating the impact of oxidative stress in health and disease remains to be elucidated.

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