Berry polyphenols and digestive enzymes: Possible health benefits.

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Abstract

Berries are rich dietary sources of polyphenols, easily providing 100 mg/100g, and these components have been implicated in a wide range of potential health benefits. In this talk, I will highlight SCRI research on the potential health benefits of berry polyphenols with respect to cardiovascular health, neurodegenerative diseases and cancer.
However, it has become apparent that a large portion of dietary polyphenols survives gastric conditions and is available in the small intestine. We are particularly interested in the possible beneficial effects of this high polyphenol dose in the gut, especially as many berry polyphenols have low serum bioavailability and may influence their ability to influence systemic effects.

Certain polyphenols can inhibit digestive enzymes *in vitro* at levels easily achieved in the gut. A range of berry extracts rich in polyphenols inhibited the crucial starch digestion enzymes, α-amylase and α-glucosidase, *in vitro* (1) which could benefit people with poor control of blood glucose levels such as in type 2 diabetes. However, different berry extracts were more effective against the different enzymes suggesting specific enzyme-inhibitor interactions. By comparing the polyphenol composition of effective and less effective extracts, we identified candidate inhibitory components and suggested potential mechanisms for amylase and glucosidase inhibition. The candidate components were partially purified and retested to confirm inhibition. We also carried out human studies that suggest that berry extracts can modulate acute glycaemic responses after ingestion of starch-rich foods, perhaps through inhibition of these enzymes *in situ*.
Berry polyphenols also showed potential for the inhibition of pancreatic lipase activity, which is a proven therapeutic target for the control of obesity and hyperlipidemia through reduced fat digestion (2). We present evidence for the identification of key components.
Taking into account the potential synergies for inhibition of starch and lipid digestion by the diversity of polyphenol components present within berry species, the inhibition of digestive enzymes may be another important mechanism for the health benefits attributed to a diet rich in fruit and vegetables.

1. McDougall et al. (2005) Journal of Agricultural and Food Chemistry 53, 2760
2. McDougall et al. (2009) Food Chemistry 115, 193