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Glycaemic suppression by fruit residues

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۲ The glycaemic response to ingested carbohydrate foods is governed partly by gut-level processes of digestion that may L be affected by digestion-resistant food remnants. Such processes include gastric emptying, luminal mixing, diffusion, and enzymic depolarisation. Freed from the constraint of fruit structure, after in vitro digestion of kiwi fruit flesh the settled volume of dispersed kiwifruit debris was four times the flesh volume before digesting, and enough to occupy a large proportion of the free space within the foregut. The impact of kiwifruit remnants on gut processes involved in the glycaemic response to co-ingested carbohydrate foods was tested in vitro by measuring glucose diffusion, mixing, and pancreatic digestion of carbohydrate staples within the settled dispersion of kiwifruit remnants. The additional effect of introduced hydrocolloid on mixing in the presence of kiwi fruit remnants was also measured. Within the settled dispersion of kiwifruit debris glucose diffusion was reduced by about 40%, simulated intraluminal mixing was reduced by about 50%, and digestion was retarded. Hydrocolloid substantially accentuated the retardation of mixing by kiwifruit remnants. In a subsequent clinical trial meals were formulated to be equal in carbohydrate content and type, but contain cereal plus kiwifruit, or cereal plus kiwifruit sugars, so any differences in meal effects could be attributed to non-available carbohydrate components of the kiwifruit. The meals containing kiwifruit suppressed the glycaemic response to co-ingested wheaten cereal, averted hyperglycaemia, and maintained satiety. The results suggest that dietary fibre from kiwifruit may significantly suppress the glycaemic response to co-ingested carbohydrate through its effects on physical processes in the gut that are part of digestion, and indicate a need for further research to clarify its role.

Recent Publications

- 1. Ballance, S; Knutsen, SH; Fosvold, OW; Wickham, M; Trenado, CDT; Monro, J (2018). Glyceamic and insulinaemic response to mashed potato alone, or with broccoli, broccoli fibre or cellulose in healthy adults. European Journal of Nutrition, 57, 199-207, DOI: 10.1007/s00394-016-1309-7
- 2. Mishra, S; Edwards, H; Hedderley, D; Podd, J; Monro J (2017). Kiwifruit non-sugar components reduce glycaemic response to co-ingested cereal in humans. Nutrients, 9, 1-13, DOI: 10.3390/nu9111195
- 3. Mishra, S; Willis, J; Ansell, J; Monro, JA (2016). Equicarbohydrate partial exchange of kiwifruit for wheaten cereal reduces postprandial glycaemia without decreasing satiety. Journal of Nutritional Science, 5, 1-9. DOI: 10.1017/jns.2016.30
- 4. Hardacre, AK; Lentle, RG; Yap, SY; Monro, JA (2016). Does viscosity or structure govern the rate at which starch granules are digested? Carbohydrate Polymers, 136, 667-675. DOI:10.1016/j.carbpol.2015.08.060.

Biography

John A Monro is a Principal Scientist at the New Zealand Institute for Plant & amp; Food Research Limited, and a Principal Investigator at the Riddet Institute, Palmerston North, New Zealand. His original research was on the structure and function of plant cell walls, but soon progressed to the role of cell walls, as dietary fibre, in gut function and health. He has researched dietary fibre in the fore and hind gut, how to measure it in a physiologically valid way, and how to communicate its effects to consumers so as to provide an accurate guide to food choices for health. More recently his research has focused on digestible carbohydrates in foods, on valid determination of carbohydrate availability by *in vitro* digestive analysis, and on food structural factors determining the glycaemic response to foods. He has also been concerned with the problem of communicating the relative glycaemic potency of foods to consumers and developed the concept of glycaemic glucose equivalents as a functional food value, to enable food composition databases to say not only what a food is, but also, what it does. At present he is conducting both postprandial and long term clinical trials on the benefits of fruit consumption in diets for glucose-intolerant consumers.

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