

Letter to the Editor

Glycaemic index of potatoes: myth and reality from a European perspective

Potatoes – an integral part of European meals

Traditionally, potatoes are a central component of warm meals in many European countries (Wandel *et al.* 2001; FAO, 2004). In an analysis from the EPIC study (*n* 13 031 men and 22 924 women) including data from ten European countries (Greece, Spain, Italy, France, Germany, The Netherlands, UK, Denmark, Sweden and Norway), potatoes contributed on average 7% to the total carbohydrates consumed, but these data (Wirfalt *et al.* 2002), as well as data from the FAO (2004) show a clear north–south divide in potato consumption. Over the past 40 years, changes in lifestyle and requirements for convenience, accompanied by an increased consumption of pasta and rice, have led to a considerable decrease in potato consumption in most Northern and Central European countries (decrease of 30–45% from 1961 to 2002; FAO, 2004). However, high annual intakes above 80 kg per capita are maintained even today in the Baltic countries, Poland, The Netherlands, Ireland and the UK (FAO, 2004).

With the rising reputation of the glycaemic index concept potatoes fell into disrepute

In recent years, potatoes have fallen into disrepute (Ludwig, 2000; Willett, 2001; Worm, 2003). One reason for this may be recent evidence of the health benefits of a diet with a low dietary glycaemic index (GI) or a low dietary glycaemic load (GL) (Ludwig, 2002). The GI reflects the quality of carbohydrates, and ranks carbohydrate sources according to the glycaemic responses produced when ingesting 50 g of available carbohydrate from food (Jenkins *et al.* 1981), whereas the GL – the product of the food's GI and the dietary carbohydrate content per serving (g) – accounts for the total glycaemic effect of the ingested carbohydrate-containing food (Salmeron *et al.* 1997*b*). To date, several epidemiological studies have described associations between the dietary GI or GL and risks of type 2 diabetes and CHD (Salmeron *et al.* 1997*a,b*; Liu *et al.* 2000; Hodge *et al.* 2004; Schulze *et al.* 2004). Furthermore, recent weight-loss intervention studies suggest that a diet with a low GI or GL may represent a promising alternative to a low-fat diet (Slabber *et al.* 1994; Spieth *et al.* 2000; Ebbeling *et al.* 2003).

Although these findings have not been confirmed by all studies (Meyer *et al.* 2000; van Dam *et al.* 2000; Stevens *et al.* 2002), particularly in the USA, new dietary concepts for food selection have been developed, promoting radical changes to current dietary recommendations, e.g. the 'Low glycaemic index pyramid' (Ludwig, 2000), the 'Healthy eating pyramid' (Willett, 2001) and 'Low-carbohydrate diets' (Worm, 2003). Common to these concepts is the ranking of potatoes among the foods to be eaten

sparingly, since a number of prominently cited studies have reported that potatoes are characterised by a high GI value (Soh & Brand-Miller, 1999; Foster-Powell *et al.* 2002).

All potatoes have a high glycaemic index – an unjustified generalisation

However, as with all GI data, the GI values of potatoes may depend on cooking method, processing, variety and the composition of the meal (Lunetta *et al.* 1995; Fernandes *et al.* 2005; Foster-Powell *et al.* 2002). This fact deserves attention since mashed potatoes, French fries, baked potatoes and potatoes cooked in a microwave are characterised by GI values mostly exceeding the upper limit for a high GI value of 70 (Fig. 1); whereas conventionally boiled potatoes appear to have a GI value on average below 70. The values of conventionally boiled potatoes do vary considerably though, so it may also be that some potato varieties have an inherently low GI whatever the cooking method (Najjar *et al.* 2004; Fernandes *et al.* 2005). In this context, it should be considered that most currently available GI values are based on mature potato varieties (Ontario, Prince Edward Island, Desiree, Pontiac, Sebago) (Hambloch, 2005). The starch of more mature potatoes is, however, easier to digest, presumably due to increased amylopectin branching and hence lower resistance to gelatinisation, which in turn results in a higher GI (Soh & Brand-Miller, 1999). Finally, recent studies have shown that potatoes consumed cold have a lower GI because the digestibility of starch decreases with cooling, thus cold potato preparations such as potato salad can be expected to have a low GI (Najjar *et al.* 2004; Fernandes *et al.* 2005).

European consumption habits favour potatoes with lower glycaemic index

Therefore, before extending recommendations for reduced potato consumption to European countries, US consumption patterns should be compared with those in European countries. Whereas in the USA potatoes are mostly consumed baked, fried, mashed or roasted (Pitierse, 2000), many Northern and Central Europeans prefer their potatoes boiled (Anonymous, 2000; Wandel *et al.* 2001). Although younger people tend to prefer French fries and pan-fried potatoes, boiling is still the principal mode of preparation among children and adolescents (Fischer, 1999; Wandel *et al.* 2001). We can also confirm this for participants of the Dortmund Nutritional and Anthropometrical Longitudinally Designed (DONALD) Study, where boiled potatoes contributed more than 50% to total carbohydrate intake from potatoes in children aged 7–8 years in 1990, 1996 and 2002 (54%, 52% and 62%,

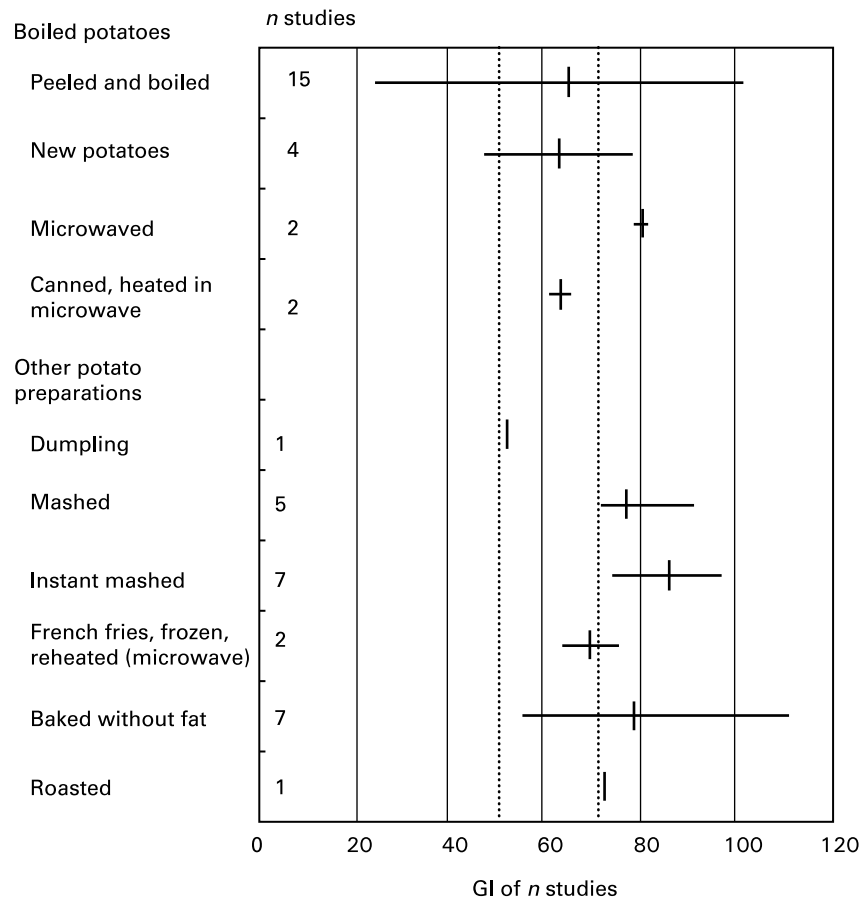


Fig. 1. Glycaemic index (GI) values (glucose reference) for potatoes by different cooking methods (Chantelau, 2000; Foster-Powell *et al.* 2002). Values are means with the range (minimum to maximum) depicted by horizontal bars. Dotted vertical lines represent the cut-off levels proposed for a low GI (≤ 55) and a high GI (≥ 70) of a food (Brand-Miller *et al.* 2003).

respectively), followed by pan- or French fried potatoes (28%, 31% and 24%) and mashed potatoes (15%, 12% and 11%). Despite the fact that this selected, non-representative study sample is characterised by a relatively high educational and socio-economic status (Kroke *et al.* 2004), their dietary habits are comparable to those described in the first nationwide German dietary survey from 1987–8 (Alexy *et al.* 2002).

Finally, while mature potato varieties prevail in the USA, Canada, Australia and the UK, varieties commonly consumed in Central European countries are characterised by a lower starch content (Hambloch, 2005), an indication of smaller, less mature potatoes with reduced amylopectin branching. This is also reflected in the lower GI values reported by three studies that have examined European potatoes (GI range: 41–56%; Chantelau, 2000; Foster-Powell *et al.* 2002).

Conclusions

In conclusion, many Europeans appear to prefer potato varieties characterised by a lower GI than that of varieties in the USA. The fact that fried, baked, mashed, roasted or microwaved potatoes are the potato preparations most frequently consumed in the USA has resulted in a general recommendation to eat less potatoes. This advice should not be thoughtlessly adopted in European countries where less mature boiled potatoes prevail. Instead,

conventionally boiled less mature potatoes should be encouraged rather than discouraged as part of low-GI diets. In addition, evaluation of boiled potatoes should also consider their additional benefits, i.e. their relatively low energy density, their high vitamin C, vitamin B₆, folic acid, magnesium, iron content and their alkalis-ing effect due to their high potassium content.

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