POTATOES AND GLYCEMIC INDEX

Pinhero RG, Waduge RN, Liu Q, Sullivan JA, Tsao R, Bizimungu B, Yada RY. **Evaluation of nutritional profiles of starch and dry matter from early potato varieties and its estimated glycemic impact.** *Food Chem.* **2016 Jul 15;203:356-66.**

To identify healthier potatoes with respect to starch profiles, fourteen early varieties were evaluated for their dietary fiber, total starch, rapidly digestible (RDS), slowly digestible (SDS), and resistant (RS) starch for nutrition and with regard to estimated glycemic index (eGI) and glycemic load (eGL). While all these profiles were highly dependent on the potato variety, eleven out of fourteen varieties were classified as low GL foods ($p<0.05$). A strong positive correlation was observed with eGI and RDS ($r=0.975-1.00$, 0.96-1.00 and 0.962-0.997 for uncooked, cooked and retrograded varieties, respectively), whereas a strong negative correlation was observed between eGI and RS ($r=-0.985$ to -0.998, -0.96 to -1.00 and -0.983 to -0.999 for uncooked, cooked and retrograded varieties respectively, $p<0.05$). For the cultivars examined, the present study identified RDS and RS as major starch factors contributing to eGI. Link: https://www.ncbi.nlm.nih.gov/pubmed/26948625.

Hätönen KA, Virtamo J, Eriksson JG, Sinkko HK, Sundvall JE, Valsta LM. **Protein and fat modify the glycaemic and insulinaemic responses to a mashed potato-based meal.** *Br J Nutr.* **2011 Jul;106(2):248-53.**

Potatoes, especially mashed potatoes, are known to result in high glycaemic and insulinaemic responses. However, in most meals, potatoes are accompanied by other foods. The objective of the present study was to investigate how glycaemic and insulinaemic responses to a mashed potato meal changed when a high-fat food (rapeseed oil), a high-protein food (chicken breast) and/or salad were added to the meal. Healthy subjects (n 11) ingested the test meals once and the reference food (glucose solution) twice in a random order at 1-week intervals. Capillary blood samples were then drawn for 2 h, and glucose and insulin were analysed. The 2 h glycaemic responses to six mashed potato-containing meals varied more than twofold. The glycaemic index (GI) of pure mashed potato was 108, whereas combined with chicken breast, rapeseed oil and salad, it was only 54. The latter GI also differed considerably from its predicted value of 103, which was based on the individual GI of the components of the meal. The insulinaemic indices of the mashed potato-based meals varied between 94 and 148. Chicken breast in the meal increased the insulinaemic response, and rapeseed oil diminished it. However, the insulinaemic response to mashed potato with chicken breast and rapeseed oil was lower than that to mashed potato alone. In conclusion, the protein, fat and salad contents of a meal exert considerable influence on the glycaemic and insulinaemic responses to mashed potatoes. Furthermore, the estimation of the GI of a mixed meal by calculation is imprecise. Link: https://www.ncbi.nlm.nih.gov/pubmed/21338539.

Ramdath DD, Padhi E, Hawke A, Sivaramalingam T, Tsao R. **The glycemic index of pigmented potatoes is related to their polyphenol content.** *Food Funct.* **2014 May;5(5):909-15.**

Polyphenol extracts from colored fruits and vegetables inhibit α-glucosidase in vitro, however it is not known whether this translates into an attenuation of blood glucose response in vivo. We examined this relationship in a GI study by feeding colored potatoes to 9 healthy volunteers. We also examined the in vitro inhibitory activity of potato anthocyanin extracts on rat intestinal α-glucosidase. Potatoes (Purple Majesty; Red-Y38; Yukon Gold and Snowden) were fed with skin after cooking in a convection oven, using a random block design and 50 g available carbohydrate. Glucose was used as the standard and venous blood collected at 0, 15, 30, 45, 60, 90, 120 min. Areas under the curve (AUC) for glucose and insulin were calculated, and GI and Insulin Index derived. Neither AUC for blood glucose response nor insulin was significantly different among the various potatoes studied. Although the mean GI (±SE) values for the potato types varied (purple = 77.0 ± 9.0; red = 78.0 ± 14.0; yellow = 81.0 ± 16.0; and white = 93.0 ± 17.0), these differences were not significantly different. The mean (±SE) polyphenol content (mg GAE/100 g DW) was 234 ± 28; 190 ± 15; 108 ± 39; 82 ± 1 for purple, red, yellow and white potatoes, respectively. There was a significant inverse correlation between polyphenol content and GI of the potatoes ($r = -0.825$; $p < 0.05$; $n = 4$). In vitro, polyphenol extracts of red and purple potatoes inhibited α-glucosidase by 37.4 ± 2.2% and 28.7 ± 3.2%, respectively. The GI of colored potatoes is significantly related to their polyphenol content, possibly mediated through an inhibitory effect of anthocyanins on intestinal α-glucosidase. Link: http://www.ncbi.nlm.nih.gov/pubmed/24577454.

Anderson GH, Soeandy CD, Smith CE**.White vegetables: glycemia and satiety.** *Adv Nutr.* **2013 May 1;4(3):356S-67S.**

The objective of this review is to discuss the effect of white vegetable consumption on glycemia, satiety, and food intake. White vegetables is a term used to refer to vegetables that are white or near white in color and include potatoes, cauliflowers, turnips, onions, parsnips, white corn, kohlrabi, and mushrooms (technically fungi but generally considered a vegetable). They vary greatly in their contribution to the energy and nutrient content of the diet and glycemia and satiety. As with other foods, the glycemic effect of many white vegetables has been measured. The results illustrate that interpretation of the semi-quantitative comparative ratings of white vegetables as derived by the glycemic index must be context dependent. As illustrated by using the potato as an example, the glycemic index of white vegetables can be misleading if not interpreted in the context of the overall contribution that the white vegetable makes to the carbohydrate and nutrient composition of the diet and their functionality in satiety and metabolic control within usual meals. It is concluded that application of the glycemic index in isolation to judge the role of white vegetables in the diet and, specifically in the case of potato as consumed in ad libitum meals, has led to premature and possibly counterproductive dietary guidance. Link: http://www.ncbi.nlm.nih.gov/pubmed/23674805.

Williams SM[1], Venn BJ, Perry T, Brown R, Wallace A, Mann JI, Green TJ**. Another approach to estimating the reliability of glycaemic index.** *Br J Nutr.* **2008 Aug;100(2):364-72.**

The usefulness of the glycaemic index (GI) of a food for practical advice for individuals with diabetes or the general population depends on its reliability, as estimated by intra-class coefficient (ICC), a measure having values between 0 and 1, with values closer to 1 indicating better reliability. We aimed to estimate the ICC of the postprandial blood glucose response to glucose and white bread, instant mashed potato and chickpeas using the incremental area under the curve (iAUC) and the GI of these foods. The iAUC values were determined in twenty healthy individuals on three and four occasions for white bread and glucose, respectively, and for potato and chickpeas on a single occasion. The ICC of the iAUC for white bread and glucose were 0.50 (95 % CI 0.27, 0.73) and 0.49 (95 % CI 0.22, 0.75), respectively. The mean GI of white bread was 81 (95 % CI 74, 90) with a reliability of 0.27 indicating substantial within-person variability. The GI of mashed potato and chickpeas were 87 (95 % CI 76, 101) and 28 (95 % CI 22, 37) respectively with ICC of 0.02 and 0.40.The ICC of the iAUC were moderate and those of the GI fair or poor, indicating the heterogeneous nature of individuals' responses. The unpredictability of individual responses even if they are the result of day-to-day variation places limitations on the clinical usefulness of GI. If the very different GI of potato and chickpeas are estimates of an individual's every-day response to different foods, then the GI of foods may provide an indication of the GI of a long-term diet. Link: https://www.ncbi.nlm.nih.gov/pubmed/18186950.

Fernandes G[1], Velangi A, Wolever TM. Glycemic Index of Potatoes Commonly Consumed in North America *J Am Diet Assoc.* **2005 Apr;105(4):557-62**.

The purpose of this study was to determine the effect of variety and cooking method on glycemic response and glycemic index of common North American potatoes. Two studies were conducted. In study one 10 subjects (four men and two women) consumed 200 g Russet or white potatoes that were either (a) precooked, refrigerated, and reheated (precooked) or (b) cooked and consumed immediately (day-cooked). Incremental area under the curve was determined. In study two 12 subjects (11 men and one woman) consumed 50 g carbohydrate portions of white bread or potatoes (six different varieties and two different cooking methods). Glycemic index values were calculated. In both studies meals were consumed after a 10- to 12-hour overnight fast and finger-prick capillary-blood glucose was measured before and at intervals for 2 hours after consumption. Repeated measures analysis of variance with Newman-Kuels to protect for multiple comparisons were used (criterion of significance two-tailed P <.05). In study one the results indicated that Precooked Russet potatoes elicited lower area under the curve than day-cooked (P <.05), while precooking had no effect on boiled white potatoes. In study two he glycemic index values of potatoes varied significantly, depending on the variety and cooking method used (P =.003) ranging from intermediate (boiled red potatoes consumed cold: 56) to moderately high (roasted California white potatoes: 72; baked US Russet potatoes: 77) to high (instant mashed potatoes: 88; boiled red potatoes: 89). It is concluded that the glycemic index of potatoes is influenced by variety and method of cooking and US Russet potatoes have only a moderately high glycemic index. Individuals who wish to minimize dietary glycemic index can be advised to precook potatoes and consume themcold or reheated. Link: **http://www.ncbi.nlm.nih.gov/pubmed/15800557**.

Henry CJ, Lightowler HJ, Strik CM, Storey M. **Glycaemic index values for commercially available potatoes in Great Britain.** *Br J Nutr.* **2005 Dec;94(6):917-21.**

The glycemic response to eight potato varieties commercially available in Great Britain was compared against a glucose standard in a non-blinded, randomized, repeated measure, crossover design trial. Seventeen healthy subjects (three males, fourteen females), mean age 32 (sd 13) years and mean BMI 22.3 (sd 3.6) kg/m2, were recruited to the study. Subjects were served portions of eight potato varieties and a standard food (glucose), on separate occasions, each containing 50 g of carbohydrate. Capillary blood glucose was measured from finger-prick samples in fasted subjects (0 min) and at 15, 30, 45, 60, 90 and 120 min after the consumption of each test food. For each potato variety, the glycemic index (GI) value was calculated geometrically by expressing the incremental area under the blood glucose curve (IAUC) as a percentage of each subject's average IAUC for the standard food. The eight potato varieties exhibited a wide range in GI values from 56 to 94. A trend was seen whereby potatoes with waxy textures produced medium GI values, whilst floury potatoes had high GI values. Considering the widespread consumption of potatoes in Great Britain (933-1086 g per person per week), this information could be used to help lower the overall GI and glycemic load of the diets of the British population. Link: http://www.ncbi.nlm.nih.gov/pubmed/16351768