

## Glycaemic index of food and the rate of fat deposition in rats

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The glycaemic index (GI) relates the effects of carbohydrate-rich foods on postprandial blood glucose and insulin. High GI meals induce higher glucose and insulin response than low GI meals. Long term consumption of high GI diet has been shown to contribute to the development of insulin resistance in animals (1). Moreover, the epididymal fat pad weight, adipocyte size and number were reported to be greater in rats fed a high compared with a low GI diet (2). The present study was designed to determine if the diets differing in the GI alone can lead to differences in rate of fat deposition in rats.

Sixteen male Wistar rats aged 6 weeks and weighing  $200 \pm 4$  g were randomly allocated to consume either a low glycaemic index diet (high in amylose) or a high glycaemic index diet (high in glucose). Carbohydrate (65%), protein (22%), fat (11%) and energy (18.8 kJ/g) content were identical in both diets. Rats were fed 375 kJ per day delivered as two separate meals. After 10 and 16 weeks of feeding, the body fat content was determined by dual energy X-ray absorptiometry (DEXA).

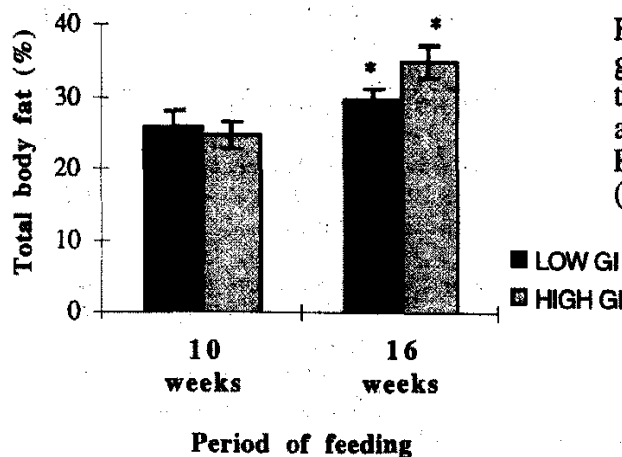


Figure. Total body fat (%) of low glycaemic index diet fed rats was lower than that of high glycaemic index fed rats after 16 weeks of feeding (\* $P < 0.05$ ). Results are expressed as mean  $\pm$  SEM (n=8)

After 10 weeks of feeding weight gained by high GI fed rats ( $360 \pm 9$  g) was greater than that of low GI fed rats ( $303 \pm 9$  g), ( $P < 0.001$ ). There was, however, no significant difference in total body fat accretion after 10 weeks of feeding. High GI fed rats continued to gain more weight than low GI diet fed rats and after 16 weeks on the diets weighed  $442 \pm 12$  g and  $368 \pm 15$  g respectively, ( $P < 0.001$ ). After 16 weeks on the diet, total body fat deposited by low GI fed rats was 12% lower ( $P < 0.05$ ) than that of high GI fed rats.

Our findings show that the diet high in high GI carbohydrate leads to increased weight gain and higher body fat deposition in rats, even when food energy intake is identical. The time needed for the diet to take its first effect is long and represents around 6% of the total life span of the rat.

- Higgins AJ, Brand Miller JC and Denyer, GS. Development of insulin resistance in the rat is dependant on the rate of glucose absorption from the diet. *J Nutr* 1996;126:596-602.
- Lerer-Metzger M, Rizkalla SW, Luo J, Champ M, Kabir M, Bruzzo F, Bornet F and Slama G. *British Journal of Nutrition* 1996;75:723-32.