

Public Health Nutrition ADVICE

Inside

▶ NZ Food NZ Children

▶ Weekend eating

▶ Quiz

Auckland District Health Board

Nutrition newsletter

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Glycaemic Index and Weight Loss

What is glycaemic index?

The Glycaemic Index (GI) is a ranking of carbohydrate containing foods (50g carbohydrate portions) based on their immediate effect on blood glucose levels compared with a reference food that is glucose or white bread. The foods are tested after an overnight fast and there can be considerable inter and intra individual variability in response.

A key issue with the GI, is the wide range of weights of food that provide 50 grams carbohydrate portions, for example 50 grams for sucrose and 800 grams for carrots (carrots are only 5% carbohydrate). Thus to take account of both the GI and the amount of carbohydrate present in a serving of food the glycaemic load (GL) has been developed. Glycaemic load is defined as the amount of carbohydrate in a portion of food multiplied by the GI value for the food, divided by 100. So carrots have a high GI but a low GL, in contrast potatoes have both a high GI and GL.

The GI is a tool that has been used in the management of people with diabetes. However, more recently GI has been promoted as a mechanism for prevention and treatment of obesity. The public is increasingly being warned of the negative effects of high GI foods such as potatoes, white bread and white rice. So what is the evidence and will promotion of a low GI diet help in controlling the obesity epidemic?

The theory

Satiety appears to be the mechanism underlying the promotion of low GI diets for weight loss.

The theory is that high GI foods are rapidly absorbed, causing a large increase in postprandial blood glucose and insulin levels. This induces glucose storage and inhibits lipolysis (fat breakdown). The high insulin levels persist and blood glucose concentration falls rapidly, often in to the hypoglycaemic range (reactive hypoglycaemia). It is theorised that this metabolic state could be seen as a fasting state, which would trigger the release of glucagon (a hormone that causes glucose to move from the liver into the blood) and stimulate hunger signals.

In contrast, low GI foods could enhance weight control because they minimise postprandial insulin secretion thereby avoiding the hypoglycaemic state, promote satiety and increase fat oxidation.

The counter arguments

The premise that high GI foods promote high levels of glucose, which in turn provokes the release of high levels of insulin, falls short when it is shown that insulin response is not necessarily predicted by glycaemic response. For example lentils (low on the index) provoke higher insulin levels than potatoes (high on the index).

Also, it is stated that the focus on insulin as a cause of obesity

has obscured its important effects in the central nervous system, where it acts to prevent weight gain. Insulin stimulates leptin production, which acts centrally to reduce energy intake and increase energy expenditure (metabolic rate). Thus increased insulin secretion has been suggested to protect against weight gain.

Finally, many of the low GI foods are also high in fibre. Therefore, it is proposed that it is the fibre content and not the lower glucose response that is responsible for the satiety value of these low GI foods.

The evidence

There are no long-term clinical trials examining the effects of glycaemic index on body weight regulation. Animal studies and short term or small scale studies in humans have addressed the issue thus far.

In a recent systematic review¹ 31 studies were found that measured appetite sensations following low GI versus high GI meals. Low GI meals produced greater satiety and reduced hunger in 15 studies, no difference was found in 14 studies, and in two studies the high GI meals produced greater satiety. In 20 longer term studies (< 6 months), weight loss on a low GI diet was seen in four studies and on a high GI diet in two studies, with no difference recorded in 14 studies. The average weight loss was 1.5 kg on a low GI diet and 1.6 kg on a high GI diet.

Overall, at present no clear pattern has been observed between studies of low versus high GI diets. Further research is also needed to rule out any possible confounding factors and to better understand potential mechanisms for action.

The public health perspective

The issue now is whether there is sufficient evidence to advise the public to replace high GI foods with low GI foods? It has been stated that if future randomised, long term trials show no difference in weight loss between high versus low GI diets it could be damaging to the credibility of the scientific community. It is also quite possible that the classification of foods into high and low GI could later be found to be too simplistic with respect to appetite and energy balance control, and that some low GI foods could be discovered to be less satiating than high GI foods².

Lists of the GI and GL values of a wide range of foods are available in books and other publications. However, these lists only rate carbohydrate containing foods for their impact on blood glucose levels. No account is taken of energy density or nutritional value of the foods. Hence, provision of such lists offers little towards the practical implications of a healthful dietary pattern or management of energy balance to achieve weight loss.

At the same time, many messages that are the cornerstone

of nutrition promotion will in fact impact on the GI/GL of the diet. For example, the population is being encouraged to eat more vegetables, fruit and wholegrain foods. Legumes (beans, lentils and peas) are also promoted as foods to eat regularly due to their many desirable nutritional properties. These foods all contain a wide array of health protecting compounds and with few exceptions have a low GI/GL. From a public health stance, with the evidence available, this appears to be an appropriate approach to take rather than focusing on the actual GI/GL values of specific foods.

1. Raben A. Should obese patients be counselled to follow a low-glycaemic index diet? No. *Obesity Reviews* 2002;3:245-256.
2. Astrup A. The role of the glycaemic index of foods in body weight regulation and obesity. Is more evidence needed? *Obesity Reviews* 2002;3:233.

Conclusion

- ▶ Glycaemic index was initially proposed to help control blood glucose levels, not as a weight loss method.
- ▶ The bottom line for weight loss remains as always, less energy (calories) in than out.
- ▶ Wholegrain foods, vegetables, fruit and legumes have many desirable nutrition attributes including low GI/GL values. These foods provide the foundation for healthy eating.

NZ Food NZ Children

Results from the National Children's Nutrition Survey³ were released last month. These results provide important information for nutrition promotion. So how can we apply the results and what are some messages we can promote based on the findings?

The largest contributor to saturated fat was milk.

- ▶ This finding shows that children continue to use homogenised (dark blue top) and full fat (silver top) milks.
- ▶ One cup of full fat milk contains 2 teaspoons of butter!
- ▶ The standard choice for all children over two years should be lite (light blue top) or trim (green top milk) or calcium enriched (yellow top milk). Not only are these milks lower in fat but they are also much higher in calcium.



The single greatest contributor to total fat intake in the diet was "potatoes, kumara and taro". This group of foods included potato chips and crisps.

- ▶ An important strategy appears to be restriction of the sale of chips/crisps in school canteens, this should reduce consumption of what appears to be a key contributor of fat and calories in children's diets.
- ▶ Other snacks can be promoted, for example popcorn, fruit, yoghurt and fruit bread.



Over one quarter of sugar intake came from sugary drinks.

- ▶ A diet soft drink (no sugar) is a far preferable choice to standard soft drink. (Note the September 2003 issue of Nutrition Advice provided information on aspartame, the artificial sweetener used in diet soft drinks.)
- ▶ 1 can of standard soft drink contains 10 teaspoons of sugar. However with the expanding portion size, most vending machines are now stocking 600ml bottles of soft drink, which contain 18 teaspoons of sugar!
- ▶ The best choices of drinks are water and reduced fat milks.



The iodine status of children was deemed to be low and indicative of mild iodine deficiency.

- ▶ If salt is being used it should be iodised salt.
- ▶ Popular rock salts do not contain added iodine.
- ▶ Other food sources of iodine are fish, seafood, eggs, dairy products and seaweed products such as sushi.



Older children were at greater risk of having inadequate selenium intakes than younger children.



- ▶ A primary food source of selenium is fish and seafood.
- ▶ To ensure a good intake of both selenium and iodine including at least one fish or seafood meal a week is worthwhile.

The most commonly eaten convenience snack was instant noodles.

- ▶ Instant noodles are low in vitamins, minerals, fibre and other health protecting compounds.
- ▶ They are a source of fat (3 teaspoons of fat per noodle cake) and are very high in salt. Like most manufactured foods the salt contained in noodles is not iodised.
- ▶ To increase the nutritional value of noodles add some colourful frozen vegetables e.g. corn, peas etc when cooking the noodles.



Over half the children ate less than two servings of fruit each day and one third ate less than three servings of vegetables.



- ▶ Promote convenient forms of vegetables and fruit - fresh, frozen and canned are all good choices.
- ▶ Go for colour, at least three colours each day. A greater range of colours will help ensure an intake of a wide spectrum of vitamins and antioxidants. This is particularly important for Pacific Island children who had lower levels of vitamin A. The body can convert beta-carotene found in orange, red and dark green vegetables and fruit into vitamin A.

Three quarters of children ate white bread

- ▶ Encourage children to eat wholemeal or wholegrain varieties of bread, which are higher in fibre, vitamin and minerals than white bread.
- ▶ School canteens can make up sandwiches and filled rolls using a range of different wholemeal/wholegrain breads.
- ▶ Exposure to such foods will help children develop a liking for them.



3. Ministry of Health. NZ Food NZ Children: Key results of the 2002 National Children's Nutrition Survey. Wellington: Ministry of Health; 2003.

Watch out for weekend eating!

Does your food intake change when it comes to the weekend?

A recent US study⁴ explored this issue by looking at the diets of 28000 people representative of the US population. The findings showed that adults consumed 115 calories (483 kJ) more per day on each weekend day (Friday to Sunday) than on weekdays.

This result is significant because 10 calories (42 kJ) of positive energy imbalance per day increases a person's weight by half a kilo per year. Thus the behaviour described in this

study would total 17,940 additional calories (75,348 kJ), that is a weight gain 2.5 kilograms per year.

This study highlights the importance, of distinguishing between weekday and weekend days when conducting diet histories and providing advice and support to patients/clients.

4. Haines P, Hama M, Guilkey D et al. Weekend eating in the United States is linked with greater energy, fat, and alcohol intake. *Obesity Research* 2003;11:945-949.

Quiz

- 1 Most manufactured/processed foods contain iodised salt.
True False
- 2 Trim (green) and Lite (light blue) milks are lower in calcium than homogenised (dark blue) milk.
True False
- 3 A bag of chips (160g) contains 11 teaspoons of fat.
True False
- 4 One large cookie has the same energy (kilojoule) value as nine chocolate chip biscuits.
True False
- 5 One glass (200 mls) of made up powdered fruit drink contains 5 teaspoons of sugar.
True False

Answers

1. **False**
Most manufactured foods contain plain salt not iodised salt.
2. **False**
1 cup trim milk = 375 mg
1 cup homogenised milk = 288mg
3. **True**
4. **True**
5. **True**

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