How the Glycaemic Index of the Foods we Eat affects our Energy Levels, Mood swings and Weight control

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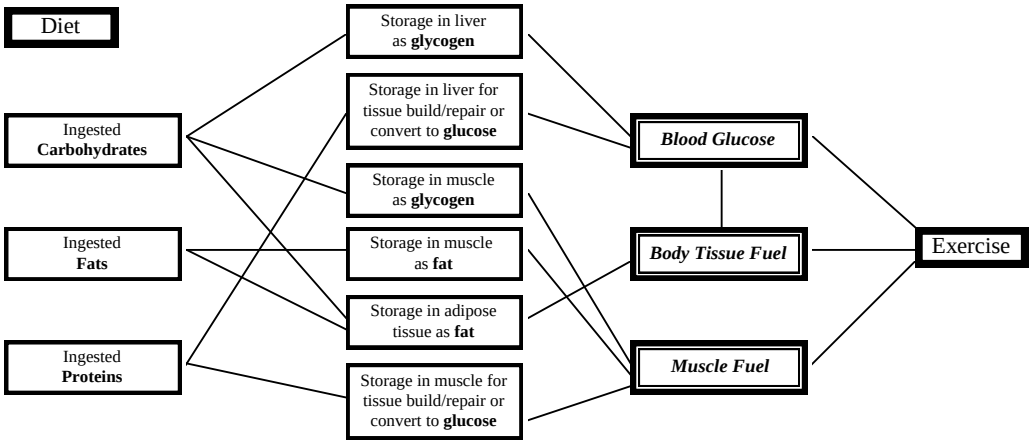
Did you realise that the simple act of choosing what to eat can make or break your day, your relationships, your work performance. You can have energy to spare to enjoy life. You can enhance your concentration, your thinking power, abolish mood swings and feel calmer. Weight loss with energy for exercise can be a reality. This is simply by being aware of the glycaemic index of the foods you are eating. To understand how, read on.

The food we eat is made up of a combination of protein, fat and carbohydrate. Some foods contain predominantly one of these nutrients. Most foods are a mixture of these nutrients.

How Food is Converted to Energy



Fat and carbohydrate are our main sources of energy, although they also provide essential vitamins and fatty acids for body processes. Protein is primarily used for tissue growth and repair. It can be converted into glucose for fuel in times of starvation.

The body's preferred fuel is a sugar called **glucose** that comes from carbohydrate. When we eat carbohydrate rich foods these are broken down in the stomach into different sugars. All of these are eventually converted to glucose in the liver. One of the major roles of the liver and the pancreas is to control the level of glucose in the blood. Once glucose enters the blood stream it is taken up by the different cells in the body, depending on their needs at that particular time. Much of this glucose will be used by the brain and the other tissues to maintain our body functions. As we walk and run some of it will be burned immediately for fuel by our muscles. Some will be stored in the muscle as glycogen or in the adipose tissue as body fat for later use.

Dietary fat takes a lot longer to digest and its absorption is more complex. Most the fat we eat goes into the body's fat stores to be used by the muscles and organs when the blood glucose levels begin

to drop between meals or in exercise. Unfortunately we can't just use up these fat stores when we run out of glucose as fat needs glucose present to be burned as a fuel. The brain can only use glucose and cannot use fat as a source of energy. So it is vital that we have adequate glucose available at all times or our mood, concentration and energy levels are affected adversely.
What is equally important to us is not just having glucose available but **how quickly a food is converted to glucose.** This is the key to regulating how much energy we have at any given time. It determines whether we experience energy highs and lows, sugar cravings and weight gain. To understand why read on.

Problem with Processed Food

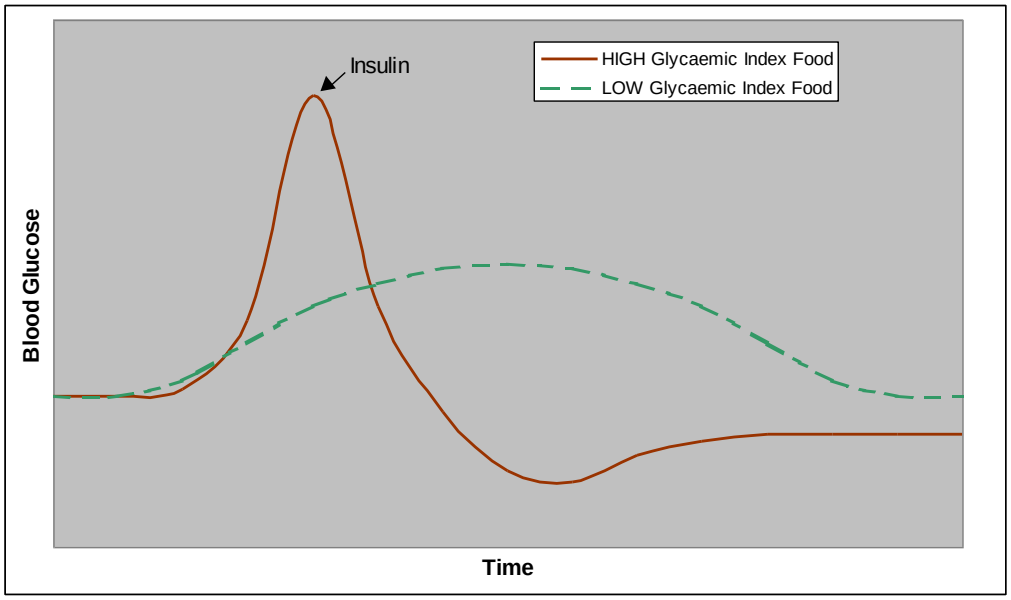
Today a lot more food is highly processed and we are eating more convenience foods. Grains are processed or refined by removing the outer husk, bran and germ layers to produce white flour. Our grain consumption has increased 30% in the last 30 years and most of this is processed/refined. Our taste preferences have changed, we eat a lot of refined carbohydrates such as breads, pastas, rice, biscuits, muffins and cereals. The more a food is processed beyond its natural state the less processing our body has to do to digest and absorb it. The quicker we digest food the more quickly we feel hungry again and the sooner we need to eat again. Ideally we want foods that give a slow steady release of energy and also keep us feeling full for longer.

Glycaemic Index Defined

The **glycaemic index** of a food is a measure of how quickly the carbohydrate is converted to glucose and released into the bloodstream. This depends on many factors as we will discuss, but a food with a high glycaemic index is converted rapidly to glucose, while a food with a low glycaemic index is converted more slowly to glucose.

Role of Insulin

When glucose is released into the bloodstream by the liver, a hormone, insulin is released by the pancreas. Insulin is needed for glucose to be taken up into the body cells and used for energy. If the glucose is released slowly there is no problem, moderate levels of insulin are released and the glucose enters the body cells to be used as a fuel or is stored in the fat cells for later use. See graph below.



However if high levels of glucose are released into the bloodstream the body overcompensates. High blood glucose levels are potentially dangerous so the body must react quickly to lower these by releasing high levels of insulin. This quickly transfers some of the glucose into the body cells for immediate use but most of it goes into the body fat cells for storage.

When we eat a high glycaemic index food its rapid digestion causes a peak in blood glucose levels that we experience as a sugar high, but then a short time later we experience an energy low as the glucose has been removed from our blood by insulin. This is the rapid drop in blood glucose levels you see on the graph above. This has a profound effect on our mood sending us up with the sugar high and often causing irritability and hunger with the low. We find ourselves looking for something sweet again as our blood glucose levels drop again. As glucose is the primary fuel for the brain, it is most affected by these swings in blood glucose levels. We experience mood swings, lack of concentration, and sugar cravings. We gain more body fat because the high levels of insulin encourage fat cells to take up the excess glucose and convert it to body fat, yet we feel low on energy. High insulin levels reduce our body's use of body fat as a fuel.

If we choose instead to eat a low glycaemic index carbohydrate when we are hungry we will experience a gentle rise in our blood glucose without the high levels of insulin. Our cells will take up the energy they need and any that is over will be stored as body fat. We will have a constant energy supply without the ups and downs of sugar highs and lows, our mood and concentration will be steady and we will not be hungry so soon after eating.

Diabetes

Weight gain isn't the only consequence of regularly eating high glycaemic index foods. If insulin levels are raised too often the cells that respond to insulin become resistant to its signals. This happens in adult onset diabetes. Less glucose is taken up by the body cells and the glucose remains in the blood stream where it causes cell damage and can contribute to the plague build up in the arteries associated with heart disease. As the body cells are not receiving enough glucose they are fatigued and the body triggers the release of more insulin to try and boost energy levels. After many years this can lead to type 2 diabetes. The good news is that people who already have diabetes who eat a low glycaemic index diet give their body cells a rest from large doses of insulin. In time these cells can re-sensitise to insulin, enabling a return to normal glucose metabolism or at least better management of energy levels. Exercise is very important as it helps this re-sensitisation process.

By choosing foods that have a low glycaemic index you can prevent the onset of diabetes.
Note: Recent research in the Netherlands has suggested that caffeine (in tea, coffee and cola drinks) which we often have with our high glycaemic index snack, increases the chances of cells becoming insulin resistant. Remember many diet drinks may not contain sugar but they do contain caffeine.



Energy Slumps, Sugar Cravings and Weight Gain

Ask yourself do you eat your lunch and feel a surge of energy immediately afterwards only to feel a rapid energy drain in the next hour or so leaving you feeling sleepy, sluggish and hungry. By mid afternoon your concentration level and energy level is at an all time low and you look for a quick sugar fix or snack to boost your energy levels. You reach for your mid afternoon high glycaemic index snack and a quick cup of caffeine causing another rush of glucose and the cycle continues.
You gain weight because more of your food is being stored in your fat cells and because you are eating more often. Yet your brain organs and muscles are not receiving all the fuel they desperately need.

The second reason you gain weight is because insulin inhibits the conversion of body fat back into glucose for the body to burn. This is an adaptation for survival to enable the body to store energy as fat when food is plentiful so that we had something to survive on in times of famine.

Insulin also increases appetite.

So keeping our body insulin levels low by eating low glycaemic index foods helps to avoid storing body fat. It also enables you to convert fat stores back into glucose for energy and keeps your appetite under control. Add some exercise and you have the keys to weight loss and maintenance.

Premenstrual Syndrome/Menopause

Many studies into the symptoms of Premenstrual syndrome have found that the hormonal changes just prior to menstruation or during menopause exaggerate these glucose highs and lows. Many women have found relief from the symptoms of pms by managing their blood glucose levels through diet and exercise. Eating low glycaemic index carbohydrate rich foods every few hours in the week before menstruation has been found to profoundly reduce the mood swings and sugar cravings of pmt.

What affects the Glycaemic index of a Food

A few years ago we thought if a carbohydrate was complex (starchy foods like bread, pasta and rice) it had a low glycaemic index. If it was simple or sugary it had a high glycaemic index. However now we know it is not so simple.

- Pure protein foods (meat, fish, poultry and eggs) and pure fats (oils, butter, margarine) do not contain carbohydrate and so have a low glycaemic index. A food containing these will slow the digestion of the carbohydrate in that food or other foods eaten with it.
- When high carbohydrate foods are raw the starch is harder to break down compared to food that has been milled or cooked so they take longer to digest and have a lower glycaemic index.
- Foods higher in fibre take longer to digest. For example legumes (beans and pulses like lentils) are high in protein and fibre and so have a low glycaemic index.
- Foods containing pure glucose like sports drinks, some fizzy drinks and cordials have a high glycaemic index and raise blood glucose levels quickly. Foods containing fructose (fruit sugar) and foods containing lactose (milk sugar) are digested more slowly and have a lower glycaemic index.
- Acidic foods slow digestion and lower glycaemic index, eg citrus fruits, vinegars, lactic acid in milk products.

Health Benefits of Eating Low Glycaemic Index Foods

Weight loss/maintenance

Fill up factor of higher fibre and protein, you stay full for longer
Appetite increasing effect of insulin is reduced
Cravings disappear
Increased intake of nutrients that aid fat burning enzymes i.e zinc, iron, calcium and vitamin c

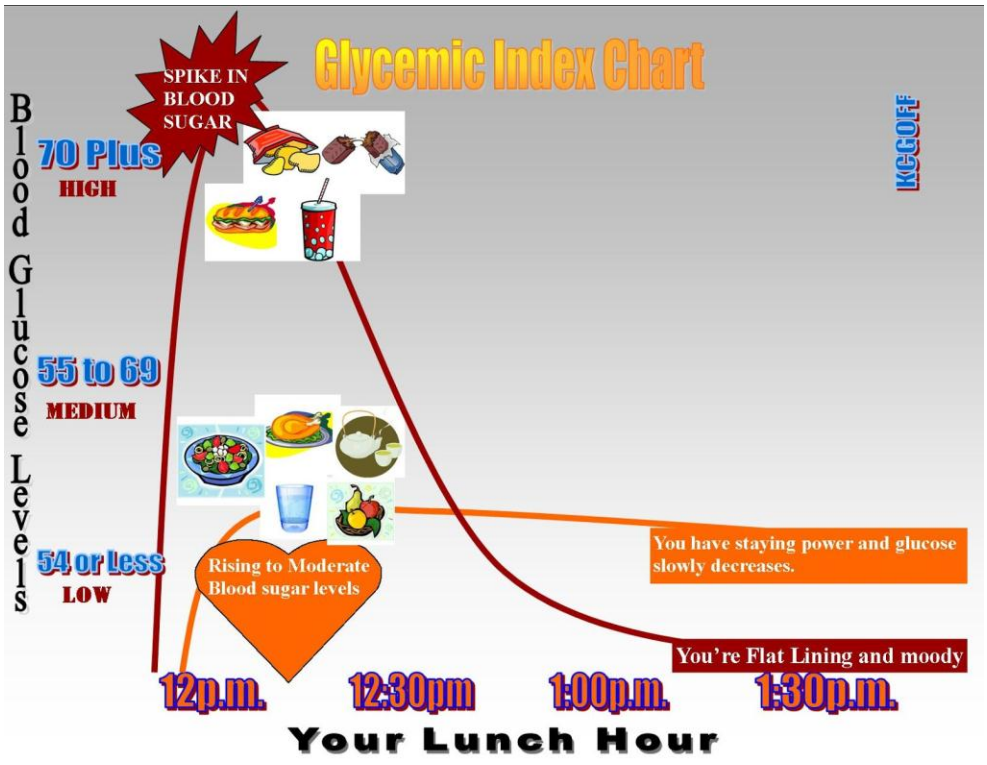
Anti-ageing

Research has found that excess sugar in the blood increases cross linking, where particles in the blood stick to the sugar. Collagen is particularly susceptible to cross linking, leading to increased wrinkles and slackness of the skin, loss of movement in joints and increased stiffness of blood vessels which can affect blood pressure.

Sugary foods increase free radicals in the body which cause cell damage that has been linked to increased risk of developing heart disease and cancer. Sugar leaches magnesium and other nutrients from cells and depresses the immune system.

Energy

Increased energy levels because more glucose is available to the body and less has been converted to body fat.
Carbohydrates contain substances that the body converts to serotonin. Serotonin helps to calm the body and creates a sense of well being. If large doses of serotonin are produced by eating a lot of high glycaemic index carbohydrates we begin to feel very sleepy due to too much serotonin. This often happens post lunch.



Practical Advice to Improve Your Diet

- Eat more food in its natural state, more fruit and vegetables and vegetarian beans and pulses. Minimise your intake of refined flour and convenience foods.

- Although adding fat to foods can lower glycaemic index we should still reduce our intake of saturated fats (from animal products and palm/coconut oil) and eat more unsaturated fats (from vegetable oils, oily fish, nuts and seeds) instead. This is important for health, heart disease and cancer prevention. Take care to avoid hydrogenated vegetable fats as found in many processed baked goods as these form trans fatty acids in the body that contribute to heart disease, stroke and cancer. Also check for the presence of palm or coconut oil which are saturated. Read the label.

- If eating a high glycaemic index food you can:
  1. Have a small portion size to minimise insulin release
  2. Combine it with two lower glycaemic index foods
  3. Add a small amount of protein or fat (unsaturated) to lower the glycaemic index

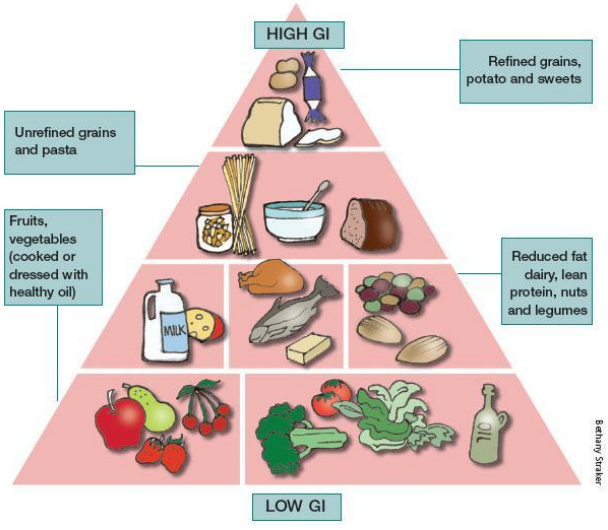
- Try to eat only one high glycaemic index food or two medium glycaemic index foods per day.

- Add something acidic to your meal to lower the glycaemic index, for example fruit or apple juice, salad dressing containing vinegar, or dairy products containing lactic acid.

- Always start the day with a low glycaemic index breakfast. Researchers in Tufts University who fed volunteers a high glycaemic index breakfast ate twice the snack calories later in the day compared to those who had a low glycaemic index breakfast.

- Eat every two - three hours to maintain blood glucose levels, ideal snacks include pasta, low glycaemic index breads, nuts, seeds, fruit, yoghurt, and some plain chocolate in moderation.

- Cut down your caffeine intake and try decaffeinated or herbal teas/water instead. If you are going to enjoy a cup of coffee don't combine it with a high glycaemic index snack as it exaggerates the negative blood glucose effects.



Glycaemic Index of Carbohydrate Rich Foods

High Glycaemic Index Foods

Bagels, baguettes, gluten free bread, white bread and buns, pannini, ciabatta, french bread
Flaked cereals (corn, wheat, or bran), honey or sugar coated cereals, puffed cereals, instant oatmeal, millet
Gluten free pasta, rice noodles
Baked potatoes, french fries, mashed potato real or instant
Rice that takes less than 10mins to cook, jasmine rice or sticky rice
Hard sweets, doughnuts, jelly beans, chewy fruit sweets, waffles
Popcorn, pretzels, rice cakes
Watermelon and dates
Parsnips and pumpkin
Condensed milk
Lemonade, orangeade, cola drinks, high energy sports drinks, beer

Medium Glycaemic Index Foods

Barley, rye or pumperknickel bread (no grains), brown bread, fruit bread, pitta bread, sourdough bread, white tortilla wraps, white or brown bread with added fibre, stone ground bread
Bran cereal with fruit, muesli (low sugar and regular), wheat cereal
Couscous, all types of pasta, soba noodles, udon noodles
Potato chips, sweet potatoes
Basmati, brown, risotto, white or wild rice
Cookies, chocolate bars containing nougat or caramel, ice cream
Potato crisps, corn chips
Apricots and peaches (canned in syrup), bananas, cantaloupe melon, figs (fresh and dried), red grapes, mango, papaya, pears (canned in syrup), raisins
Beets, corn on cob, sweetcorn kernels
Orange, cranberry juice
Red and white wine

Low Glycaemic Index Foods

Granary bread and buns, barley breads, rye or pumperknickel bread with grains, soy bread, wheat tortilla wraps.
Cereals with bran strands, oatmeal or porridge
Barley, Bulghur wheat, Buckwheat or quinoa
Egg noodles or glass (cellophane or bean thread) noodles
New potatoes, yams,
Chocolate, yoghurt or low fat ice creams
Nuts and seeds
Apples, dried apricots, avocado, blackberries, blueberries, cherries, grapefruit, white grapes, kiwi fruit, citrus fruits, peaches and pears (fresh and canned in fruit juice), plums, prunes, raspberries, strawberries, tomatoes
All vegetables not in other lists
Baked beans, black beans, lima beans, chickpeas, kidney beans, lentils, soybeans, split peas.
All dairy products
All meat, poultry, pork, fish
Water, tea, herbal tea, juices including tomato, apple, carrot, pineapple and grapefruit

Changes I Could Make to My Diet

Breakfast

Mid Morning

Lunch

Mid Afternoon

Dinner

Snacks

Weekend

Drinks