# Defeating diabetes through diet

## As diabetes continues to spread worldwide, current medication and advice do not treat the disease adequately

## What is diabetes?

Diabetes (*diabetes mellitus*) is characterised by high levels of glucose (sugar) in the blood. It is caused either by the pancreas not producing the hormone insulin (type 1 diabetes), not producing enough of it or by the body's cells inability to react to insulin (type 2 diabetes).

Symptoms of diabetes include tiredness, irritability, nausea, hunger, thirst, weight loss, blurred vision, tingling sensations in the hands and feet and dry, itchy skin.

Glucose is the body's main energy source for cells and it is insulin, produced by the pancreas, which allows it into the cells.

Glucose comes from carbohydrates found in healthy whole foods but it is also in not-so-healthy foods such as white bread, cakes, sweets and other sugary foods.

## Numbers skyrocketing

In 1985, about 30 million people worldwide had diabetes; a decade later it was 135 million; by 2000 about 171 million; and by 2030 it is predicted to be 366 million (WHO, 2005). Population growth, ageing, unhealthy eating and lack of exercise all play a part.

In the UK, 2.8 million people have been diagnosed with diabetes (Diabetes UK, 2010a), while half a million more are thought to have it undiagnosed (Diabetes UK, 2010b).

In 2008 alone, 145,000 people were diagnosed in the UK and by 2025 it is expected to be over four million. Most of these will be type 2 diabetes (Diabetes UK, 2010b). Currently, 85 per cent of adult diabetics have type 2 and 15 per cent type 1 (Diabetes UK, 2010b).

## Type 1 diabetes

Type 1 diabetes tends to develops early in life when the immune system attacks insulin-producing cells in the pancreas by mistake, effectively destroying them. Subsequently, the body can't produce insulin and is therefore unable to use glucose, which builds up in the blood.

Type 1 diabetes affects 10 per cent of all diabetics (Diabetes UK, 2010b) and is increasing in all age groups, but particularly children under five (NHS, 2008).

## Type 2 diabetes

In type 2 diabetes, the body makes some insulin but not enough or it doesn't react to insulin properly (insulin resistance) so glucose builds up in the blood. This affects 90 per cent of all people with diabetes (Diabetes UK, 2010b).

Type 2 diabetes usually develops in people over the age of 40 but in South Asian and African-Caribbean people it is often around the age of 25 (Diabetes UK, 2010b). It is also becoming more common in children and young people of all ethnicities (NHS, 2008).

### Heredity and its links with diabetes

(Diabetes UK, 2010b)

| Relative(s) with particular types of diabetes | Risk of type 1 diabetes | Risk of type 2 diabetes |
|---|---|---|
| Mother | 2% | 15% |
| Father | 8% | 15% |
| Both parents | Up to 30% | 75% |
| Brother or sister | 10% | 10% |
| Non-identical twin | 15% | 10% |
| Identical twin | 40% | 90% |

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## Gestational diabetes

This usually appears after the first trimester of pregnancy because the body can't produce enough insulin for both mother and baby. If it occurs during the first trimester, it is likely to have existed before pregnancy.

Gestational diabetes affects about five per cent of all pregnancies (*Lancet*, 2008). Whilst it is likely to disappear after the baby is born, it increases the risk of developing type 2 diabetes later in life by 30 per cent (Girling and Dornhorst, 2004).

## Metabolic syndrome

Known also as syndrome X, it is characterised by:

- 'central' obesity (weight around the waist)
- raised blood pressure
- raised triglycerides (fats in the blood)
- low HDL ('good' cholesterol)
- impaired glucose metabolism (the body not using glucose properly so that levels rise but are not yet diabetic)

These symptoms significantly increase the risk of diabetes but also cardiovascular (heart) disease.

## Pre-diabetes

People whose glucose levels are elevated are diagnosed with pre-diabetes, which almost invariably leads to full-blown type 2 diabetes. Most people are unaware they have pre-diabetes.

## Health complications

There is usually a time lapse after the onset of diabetes before it is diagnosed and in that interim, health complications can develop. Even those who are aware and make the usual lifestyle changes are still at considerable risk of heart disease, stroke, eye problems, kidney disease, nerve damage and amputations.

## All in the genes?

Genetic make-up plays an important role and can make people more or less susceptible to developing diabetes. However, there is nothing inevitable about it.

Several gene types contribute to type 1 diabetes but only a small proportion of people with those genes develop the disease – less than 10 per cent (Knip *et al*., 2005). It follows that environmental factors must play a part.

## Lifestyle and environmental factors Type 1 diabetes

In 1990's, cow's milk was suggested as a possible trigger (Karjalainen *et al*., 1992; Gerstein, 1994; Åkerblom and Knip, 1998) and this has become increasingly accepted. The theory is as follows (Campbell and Campbell, 2004; Knip *et al*., 2005).

A genetically susceptible baby is exposed to cow's milk too early in life through infant formula. When milk proteins reach the small intestine, they are not fully digested and fragments are absorbed into the blood. The immune system recognises these fragments as foreign intruders and attacks them.

Coincidentally, some fragments are identical in structure to the surface of the insulin-producing cells (ß-cells) in the pancreas (Karjalainen *et al*., 1992; Martin *et al*., 1991) and the body cannot distinguish between the two. Both pancreas cells and invaders are destroyed by the immune system and diabetes results. Type 1 diabetes is irreversible.

The process can be fast and aggressive or take up to 10 years (Knip *et al*., 2005). Fast progression is, however, rare (Knip, 2002).

## Milk proteins responsible

1 **Bovine serum albumin (BSA).** When diabetic and healthy children were tested for BSA antibodies in their blood, all diabetics had levels as much as seven times higher than the healthy children. (Karjalainen *et al*., 1992). Following studies have confirmed this (Hammond-McKibben and Dosch, 1997).
2 **ß-casein.** About 30 per cent of human ß-casein is different from cow's milk ß-casein and it is thought to be the reason why the immune system reacts to it and destroys its fragments (Cavallo *et al*., 1996; Becker *et al*., 1995).
3 **Cow's insulin.** This is present in formula milk (Vaarala *et al*., 1999). The immune system of genetically susceptible babies given cow's milk formula reacts strongly to it by forming anti-insulin antibodies (Paronen *et al*., 2000).

Genetically susceptible children weaned too early and given cow's milk formula had a 13.1 times greater risk of type 1 diabetes than non-susceptible children breast-fed for at least three months (Perez-Bravo *et al*., 1996). A study in 40 different countries confirmed this and found that the more meat and milk in the diet, the higher the risk of diabetes - the more plant-based food in the diet, the lower the risk (Muntoni *et al*., 2000).

## Type 2 diabetes

Obesity is the main risk for developing diabetes and with rising numbers of overweight people, the incidence is ever-increasing.

As carbohydrate intake goes down and fat intake goes up, the number of diabetics increases (Campbell and Campbell, 2004; Barnard, 2007). The difference is not entirely due to genes as when people move from low risk countries and adopt the diet of high-risk countries, their risk increases (Tsunehara *et al*., 1990).

Studies have shown a 45 per cent reduced risk for non-meat eaters (Snowdon and Phillips, 1985); and that just one serving of meat per week can increase risk by 74 per cent (Vang *et al*., 2008).

Why? The main enemy is fat! Microscopic drops of fat (intramyocellular lipids) can accumulate inside muscle cells and interfere with their ability to react to insulin. The process begins many years before diabetes manifests itself (Phillips *et al*., 1996; Krssak *et al*., 1999; Delarue and Magnan, 2007; Morino *et al*., 2006).

When young healthy men were put on a 50 per cent fat diet (common in Western countries), it was found that fatty foods turned off the genes that help mitochondria in their cells burn fat (Sparks *et al*., 2005). As a result, people with type 2 diabetes appear to have fewer mitochondria to metabolise the fat supplied (Barnard, 2007).

A recent study looked at the cell metabolism and insulin resistance more closely (Hoeks *et al*., 2010) and the conclusions were that elevated levels of fats in blood and/or muscles caused a reduction in mitochondrial function.

## Ancient and modern approaches

The classical approach is based on diet adjustments, carbohydrate counting and medication. This approach focuses on glucose management and weight-loss but doesn't meaningfully change metabolism.

The recommendations in this fact sheet change cell metabolism by changing your approach to diet. You'll think about food in a new way but it requires no calorie counting and no combining foods from exchange lists. Most importantly, it is based on the knowledge that diabetes can be defeated.

# The D-Diet: eat your diabetes away!

A healthy diet to reverse or improve diabetes should be based on the following food groups:

| No. of Servings | Foods | Healthy Portion Size | To Provide |
|---|---|---|---|
| At least 5 | Fruits and Vegetables. Eaten preferably whole or in smoothies (juices have higher GI because they don't contain fibre) | | Folate (folic acid), Calcium, Vitamin A, Vitamin C, Fibre, Iron, Antioxidants |
| | Fresh fruit: | 1 medium piece | |
| | Dried fruit: | 1½ tbsp | |
| | Green or root vegetables: | 3 tbsp | |
| | Salad vegetables: | 1 cereal bowl | |
| 3 or 4 | Whole grains<br>Wholegrain pasta, brown rice, oats, rye bread, grains such as wheat, spelt, barley, millet, quinoa, etc. | | Energy, Fibre, B Vitamins, Calcium, Iron, Protein |
| | Cooked brown rice: | 3 heaped tbsp | |
| | Breakfast cereal: | 25g or 1 regular sized cereal bowl | |
| | Cooked wholemeal pasta: | 1 cup as side dish or 2 cups as main dish | |
| | Wholemeal or rye bread: | 2 slices | |
| 2 or 3 | Pulses<br>Beans, lentils, soya, peas, chickpeas, tofu and low-fat soya and bean products (burgers, sausages, mock meat, yoghurts, etc.) | ½ cup (cooked) | Protein, Energy, Fibre, Iron, Calcium, Other Minerals |
| 1 | Nuts or seeds | 1 tbsp | Protein, Energy, Fibre, Calcium, Other Minerals, Vitamin E |
| Small amounts | Margarine and vegetable oils. Flaxseed, hemp seed or rapeseed oil, used cold; olive oil or rapeseed oil for cooking | 1 tsp per portion | Energy, Vitamins E (oils), A & D (fortified margarine), Omega-3 and Omega-6 Fats (flaxseed, soya, walnut, hemp) |
| At least 1 | B12 supplement or fortified foods such as:<br>fortified soya milk, fortified breakfast cereal, yeast extract (eg Marmite) | | Vitamin B12 |
| 1-2 litre of water per day (eight glasses) should also be consumed as part of a healthy, balanced diet. Tea, especially herbal teas, count as water. | | | |
| If you are on medication, consult your doctor on how grapefruit might affect you. | | | |

## Reversing diabetes

Those with either type of diabetes will benefit from our D-Diet approach. Although type 1 is life long and sufferers will always need insulin, it will enable them to keep doses to a minimum and reduce the risk of complications. As for type 2 diabetes, research has shown that this approach can reverse the condition.

In one of the first studies on a group of 40 diabetic patients, 36 were able to discontinue all medication after only 26 days (Barnard *et al*., 1982). The same research group later demonstrated that the benefits last for years if the diet is adhered to (Barnard *et al*., 1983).

In a further groundbreaking study combining diet and exercise (Barnard *et al*., 1994), 197 men with type 2 diabetes found that after just three weeks, 140 of them were able to discontinue their medication.

A 2006 study of type 2 diabetics compared a diet based on American Diabetes Association (ADA) guidelines to a low-fat vegan diet, emphasising foods with a low glycemic index where vegetables, grains, fruits, and pulses were unlimited (Barnard *et al*., 2006). Over the 22-week study, 43 per cent of the vegan group and 26 per cent of the ADA group reduced their diabetes medications. Furthermore, the vegan group lost an average of almost a stone (13 pounds), compared with just over half a stone (9 pounds) in the ADA group.

Following these successes, diet effects were further studied (Barnard *et al*., 2009a) with type 2 diabetics on either a low-fat vegan diet or an ADA diet. Glycemic control improved more than threefold in the vegan compared to the ADA group. The reduction in triglycerides (fats in blood) in the vegan group was remarkable and cholesterol levels dropped by astonishing 20.4mg/dl in contrast to just 6.8mg/dl in the conventional group.

Another research group working with 2,875 volunteers found that a diet based mainly on plant foods protects against insulin resistance whilst refined grains, fatty foods, sweet baked foods, candy and sugary soft drinks promote insulin resistance (Liu *et al*., 2009).

Vegan diets were eventually endorsed by the ADA when in 2010, their *Clinical Practice Guidelines* stated that plant-based diets have been shown to improve metabolic control in people with diabetes (American Diabetes Association, 2010).

## Basic principles of the D-Diet

Before switching to this new diet, diabetics should inform their doctor because glucose control and insulin sensitivity can improve relatively quickly and there might be a need for medication adjustment.

## 1st principle – no to all animal products

By avoiding all meat, fish, dairy and eggs you'll avoid substantial amounts of fat and your cholesterol intake will be zero. Even white meat and fish contain surprising amounts of fat – around 40 per cent of calories (Food Standards Agency, 2002).

All fish also come with a sizeable portion of cholesterol and saturated fat (Barnard, 2007). Even low-fat dairy products contain fat, mostly saturated.

Animal protein puts an additional strain on the kidneys and can harm them (Knight *et al*., 2003; Barclay *et al*., 2010). Plant proteins do not appear to cause this problem.

Unrefined plant foods are naturally high in fibre and complex (starchy) carbohydrates, and low in fat - with the exception of oils, nuts and seeds. Animal products provide no fibre or healthy carbohydrates.

Avoiding certain foods is ultimately easier than attempting to reduce their intake (Trapp *et al*., 2010).

## 2nd principle – lower the fat

Even though vegetable oils contain essential fatty acids, less saturated fat and no cholesterol, they should still be kept to a minimum to reduce the amount of intracellular fats (Barnard, 2007).

Researchers compared the effects of a low-fat vegan diet with a conventional low-fat diet on type 2 diabetics (Nicholson *et al*., 1999). The vegan group had a 28 per cent reduction in glucose levels whilst in the conventional group it was 12 per cent. Average weight loss was 7.2 kg (1.1 stone) in the vegan group compared to 3.8 kg (0.6 stone) in the conventional group. Medication was reduced for all vegans but none in the conventional group.

## 3rd principle – keep a low GI

Carbohydrates that are digested quickly have a high GI; carbohydrates that break down more slowly, releasing glucose gradually into the bloodstream, have a low GI – and this is what you should be aiming for. (See the GI database at www.glycemicindex.com.)

The D-Diet contains only foods from plant sources, a minimum of oils and is rich in food with a low glycemic index. The D-Diet is based on these food groups: whole grains, pulses, vegetables, fruit, and nuts and seeds.

## Why and how it works

The D-Diet works on many levels:

1 It eliminates fats from your cells, improving cell metabolism. (A review of studies on bariatric (gastric band) surgery (Andreelli *et al*., 2009) showed that type 2 diabetes can be reversed within days of surgery by decreasing the availability of triglycerides, free fatty acids and fats – thus illustrating that reducing fat works.)
2 Reducing refined carbohydrates and fats and eliminating animal products reduces the risk of heart and circulation problems.
3 It helps kidneys as they can cope better with plant protein than animal protein.
4 It reduces the likely damage to blood vessels by poor blood sugar control (low GI foods prevent blood sugar from getting too low or too high) and raised cholesterol levels.
5 The D-Diet produces weight-loss without portion restriction and without leaving you hungry.

## Vitamin B12

There is a need for vitamin B12 supplementation either in the form of food supplements or enriched foods such as soya milk or margarines – as there is for anyone over the age of 50. B12 requirements may be higher in diabetics because the commonly taken drug, Metformin, can reduce its absorption (Diabetes UK, 2008).

## Don't worry, be healthy

The benefits of a well-planned vegetarian diet have been confirmed time and again. One of the latest reviews (Craig, 2010) confirms its suitability for everyone. Another recent review (Anderson *et al*., 2004) confirmed that nutritional therapy is essential for the successful treatment of diabetes.

## Summary

- Around 400 UK citizens are diagnosed with diabetes every day.
- Diabetes puts people at a considerable risk of heart disease, stroke, eye problems, kidney disease, nerve damage and amputations.
- Lifestyle plays an enormous role in increasing or decreasing the risk of diabetes.
- Cow's milk might be the main trigger in the development of type 1 diabetes.
- Obesity is the main risk factor for type 2 diabetes.
- Fat accumulation in body cells increases the risk of diabetes.
- The vegan D-Diet is effective for both the treatment and prevention of diabetes and protects against degenerative diseases.

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