

CACHE Level 2

Certificate in Understanding the Care and Management of Diabetes

SIGNS AND SYMPTOMS

BALANCED DIET

PREVENTION

GLYCAEMIA

BLOOD GLUCOSE

TYPE 2

RISK FACTORS

Workbook 1

Section 1: Understand diabetes

This section will help you to understand the function of glucose and insulin in the body. You will also explore how different types of diabetes occur and the risk factors associated with Type 2 diabetes.

What is blood glucose?

Please read the following as it will help you to answer question 1.

Diabetes is a condition that affects the body's ability to use glucose. Glucose is one of the body's main fuels. It is an energy rich sugar that is broken down in the cells to power the millions of biochemical reactions that constantly take place in the body. Put very simply, glucose provides energy to all of the cells in the body. The cells take in glucose from the blood and break it down for energy. Some cells, like brain cells and red blood cells, rely solely on glucose for fuel.

Did you know?

Every three minutes, a person in the UK finds out that they have diabetes.



We obtain glucose from the food that we eat. It comes mainly from starch-rich foods such as potatoes, rice, bread and pasta.

In the small intestine, glucose is absorbed into the blood and the blood travels to the liver through the hepatic portal vein. Cells in the liver absorb most of the glucose and convert it into glycogen. This is stored in the liver and can be re-converted into glucose when blood glucose levels fall.

The body tries to keep a constant supply of glucose for the cells by maintaining a constant glucose concentration in the blood stream; otherwise, the cells would have more than enough glucose right after a meal but not enough in-between meals and overnight. When we have too much glucose, the body stores the excess in the liver and muscles by making glycogen – glycogens are long chains of glucose. When glucose is in short supply, the body uses the glucose from stored glycogen and/or stimulates us to eat food. The overall aim is to maintain a constant blood glucose level.

Blood glucose is therefore a type of sugar produced by the body when it digests food. It is the major 'fuel' used by our bodies to give us energy for daily life. The main function of blood glucose is to supply the body's cells with energy.

The level of blood glucose refers to the concentration of glucose in the blood. The figure given in a reading is expressed in millimoles per litre (mmol/L). People without diabetes may have a level between 4–7mmol/L. Blood glucose levels are usually at their lowest early in the morning and peak after eating.

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Carbohydrates

Please read the following as it will help you to answer question 2.

The food we eat is made up of fat, protein and carbohydrate. Protein and fat don't actually have a direct effect on blood glucose levels but they do need to be considered as part of an overall healthy diet. It is carbohydrate that provides our main energy supply for the body, to keep it functioning. Carbohydrates in the form of starches and fibre are important to:

- help regulate blood sugar levels
- prevent the body from using protein for energy (it is required for other vital functions)
- give a feeling of fullness (assisting weight control)
- protect against heart disease and cancer and help prevent constipation

Carbohydrates therefore provide the body with the fuel it needs for physical activity and for healthy organ function. Carbohydrates are also an important part of a healthy diet. They are an ideal source of energy for the body and this is because they can be converted more readily into glucose (the form of sugar that is transported and used by the body) than proteins or fats can be. Carbohydrate can be found in many foods and in two main forms. These are:

- simple carbohydrates
- complex carbohydrates

Both types of carbohydrate are made up from units of sugar. What makes one carbohydrate different from another is the number of individual sugar units it contains and how the units are linked together.

Simple carbohydrates

Simple carbohydrates are simple sugars with a chemical structure that is made up of one or two sugars. They are refined sugars that have very little nutritional value. Simple carbohydrates are digested by the body quickly, because they have a very simple chemical structure. Food sources for simple carbohydrates include sugar, honey and syrup and many fruits. There are two types of simple carbohydrates:

- **Monosaccharides** – consist of only one sugar, and examples include fructose, galactose and glucose.
- **Disaccharides** – consist of two chemically-linked monosaccharides, and they come in the form of lactose, maltose and sucrose.

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Knowledge Activity 1: List five foods that contain simple carbohydrates.



- 1.
- 2.
- 3.
- 4.
- 5.

Complex carbohydrates

Complex carbohydrates consist of a chemical structure that is made up of three or more sugars which are usually linked together to form a chain. These sugars are mostly rich in fibre, vitamins and minerals. Due to their complexity, they take a little longer to digest, and they don't raise the sugar levels in the blood as quickly as simple carbohydrates do. Food sources of complex carbohydrates include many fruits and vegetables as well as whole grains. Complex carbohydrates act as the body's fuel, and they contribute significantly to the production of energy.

Complex carbohydrates have a higher nutritional value than simple carbohydrates and come in the form of starches and fibre.

- **Starches** – also known as polysaccharides, they have more than two units of sugar linked together.
- **Fibre** – found in plant cell walls and also known as non-starch polysaccharides (NSP). We cannot digest NSPs but they are a major component of dietary fibre.

Knowledge Activity 2: List five foods that contain complex carbohydrates.



- 1.
- 2.
- 3.
- 4.
- 5.

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Not eating enough carbohydrate may lead to low blood sugar levels – this is also known as ‘hypoglycaemia’. Hypoglycaemia makes an individual feel shaky, weak and light-headed. It can also affect concentration as the brain needs a good supply of fuel to think and learn. Hypoglycaemia is a particular risk for people with diabetes and also for very active sports people.

Some examples of simple and complex carbohydrates:

| Examples of foods which contain simple carbohydrates | Examples of foods which contain complex carbohydrates | |
|--|---|------------------|
| Sugar | Spinach | Yams |
| Golden syrup | Whole barley | Celery |
| Fruit juice | Buckwheat | Multigrain bread |
| Cake | Lettuce | Carrots |
| Bread made with white flour | Prunes | Cucumbers |
| Pasta made with white flour | Water cress | Potatoes |
| Fizzy, sugary drinks | Dried apricots | Low-fat yoghurt |
| Sweets | Courgettes | Soybeans |
| All baked goods made with white flour | Oatmeal | Radishes |
| Most packaged cereals | Pears | Skimmed milk |
| Honey | Asparagus | Lentils |
| Milk | Oat bran | Broccoli |
| Yoghurt | Plums | Brussels sprouts |
| Jam | Artichokes | Cauliflower |
| Chocolate | Muesli | Kidney beans |
| Biscuits | Okra | Soya milk |
| Fruit | Wild rice | Lentils |
| | Cabbage | Onions |
| | Brown rice | Wholemeal bread |



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Some common terms you might come across

Please read the following as it will help you to answer question 3.

- **Glycaemia** – is the presence of glucose in the blood.
- **Hypoglycaemia** – is the medical term for low glucose levels in the blood. This is generally a blood glucose level of below 4mmol/L.
- **Hyperglycaemia** – is the medical term for high glucose levels in the blood. This is generally a blood glucose level above 10mmol/L.

Pre-diabetic states

Please read the following as it will help you to answer question 4.

Pre-diabetes occurs when glucose levels are higher than normal but not high enough for diabetes to be diagnosed. People with pre-diabetes have an increased risk of going on to develop Type 2 diabetes. Having pre-diabetes has also been shown to put an individual at risk of having heart disease or stroke. Many people with pre-diabetes go on to develop Type 2 diabetes within ten years (we will look at the different types of diabetes later in the workbook).

Pre-diabetes is present when:

- fasting blood glucose is 6.1mmol/L (impaired fasting glycaemia – this is a measurement taken when the person has not eaten for eight hours), or
- the two hour blood glucose level during a glucose tolerance test (GTT) is between 7.8 and 11.1mmol/L (impaired glucose tolerance – measures how the body reacts to glucose), or
- the average glucose reading (called HbA1c and measured in millimoles per mole -mmol/mol) is between 42–48mmol/L

Pre-diabetes may also be known as impaired glucose tolerance and impaired fasting glycaemia. These are both known as pre-diabetic states.

Impaired fasting glucose – is indicated when the individual's blood glucose levels are raised beyond the normal range, but not to the diagnostic level of diabetes. The Royal College of Nursing (RCN) indicates that between 25% and 75% of people with impaired fasting glucose will develop Type 2 diabetes within ten years.

Impaired glucose tolerance – is indicated when an individual's fasting glucose level is consistently elevated above what is considered to be normal, but not enough to be diagnosed with diabetes. It can progress to Type 2 diabetes if lifestyle changes are not addressed.

TYPE 1

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