

Name:

## Carbohydrates



The natural sugars in whole fruits are much better for our teeth than the free sugars found in fruit juices.

Read the information on the back.

Now answer the questions.

1. 50% of our total energy intake should come from which Macronutrient: protein, fat or carbohydrate?
2. Sugars and starches are both types of \_\_\_\_\_
3. Dietary Fibre is a type of carbohydrate, but it cannot be digested in the human digestive system.
4. What is the name of the process by which plants make carbohydrates?  
Ph \_\_\_\_\_
5. Carbohydrates can be classified into 3 groups, depending on their structure. What are they? Make a sketch to show the basic structure.



6. Give an example of a monosaccharide and where it is found.
7. Give an example of a disaccharide. How do we use this in cooking?
8. What is meant by natural sugars and free sugars and where are they found?
9. Dextrin, cellulose, dietary fibre and pectin are all examples of what?
10. What is the scientific, full correct name for Dietary Fibre?

11. How many grams of NSP per day should an adult have?

12. A deficiency of NSP / Dietary Fibre can lead to what?

13. What are the issues and problems related to eating an excess of carbohydrate?

### Stretch & Challenge:

Most people in the UK do not eat enough NSP. Suggest a healthy way to increase NSP in the diet of adults and some simple food swaps that could be made.



## Carbohydrates are Needed for Energy

Carbohydrates can be split into two main types: **sugar** and **starch**:

- **Sugar**, e.g. **glucose** and **fructose**, can be found in food **naturally** (e.g. sugars in **fruits** and **vegetables**), or can be **added** to food during the **manufacturing process** (e.g. sugars in **cakes**, **sweets** and **fizzy pop**).
- Added sugars are often referred to as **'empty calories'** because they have **no nutritional benefit** other than energy.



- Starch can be found in foods such as **potatoes**, **bread**, **pasta**, **rice** and **cereals**, as well as **vegetables** and **fruit** (in smaller amounts).
- **Starchy foods** contain lots of **nutrients** including **B vitamins**, **iron** and **calcium**.
- **Wholegrain** starch foods also have really **high fibre content** (see p.64).

When we eat carbohydrate-based foods, our body **breaks down** the **sugar** and **starch** into **glucose**, which is absorbed into our blood and used by our body for **energy**.

## Simple Carbohydrates are Digested Quickly...

Simple carbohydrates such as **sugar** can be divided into **monosaccharides** and **disaccharides**:

**Monosaccharides** are the most basic sugar molecules, e.g. **glucose** and **fructose**.



**Disaccharides** are made up of **two monosaccharides**, e.g. **sucrose** is made up of glucose and fructose.



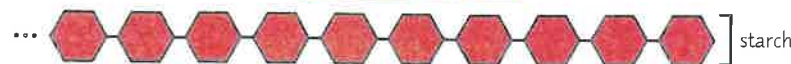
'Sugary' foods like cakes, jams and sweets are mainly made up of simple carbohydrates.

The body **rapidly digests** simple carbohydrates, making **blood sugar** levels **rise quickly** and providing a **short burst of energy**.

## ...While Complex Ones Take Longer to Digest

Complex carbohydrates such as **starch** are **polysaccharides**:

**Polysaccharides** are made up of **lots of monosaccharides** joined together, e.g. starches are made up of lots of **glucose molecules**.



Complex carbohydrates take a lot **longer to digest** than simple ones, so they **gradually increase blood sugar levels** and provide a **slow, steady** release of **energy**.

Monosaccharides	Disaccharides	Polysaccharides
Monosaccharides are the simplest form of carbohydrate structure. They include: <ul style="list-style-type: none"> <li>- Glucose – all other carbohydrate is converted into this in the body.</li> <li>- Galactose – found in the milk of mammals.</li> <li>- Fructose – found in fruit.</li> </ul>	Disaccharides are more complex sugars that are formed when two monosaccharides join together. They include: <ul style="list-style-type: none"> <li>- Sucrose – 1 unit of glucose + 1 unit of fructose.</li> <li>- Maltose – 2 units of glucose linked.</li> <li>- Lactose – 1 unit of glucose + 1 unit of galactose.</li> </ul>	Polysaccharides are made up of many monosaccharides units joined together. They include: <ul style="list-style-type: none"> <li>- Starch – many glucose units formed together.</li> <li>- Glycogen – formed after digestion.</li> <li>- Dietary fibre.</li> <li>- Dextrin – toasted crust on bread; sugars caramelise on the surface.</li> <li>- Cellulose – formed by plants from glucose.</li> <li>- Pectin – found in fruit, forms a gel on cooking.</li> </ul>

## Fibre Isn't Digested by the Body

- 1) **Fibre**, sometimes called **NSP** (non-starch polysaccharide) or **'roughage'**, is a type of **carbohydrate** that helps to keep your digestive system **working properly** and keeps food **moving** through it. Fibre is found in things like:

- **Vegetables** — e.g. peas, beans, broccoli, carrots and potatoes (especially the skin).
- **Fruit and fruit juice** — raspberries, prunes, bananas, apples.
- **Brown bread** and **wholemeal** or **whole grain** foods — e.g. wholemeal bread/rice/pasta/flour.
- **Lentils**, **beans**, **seeds** and **nuts**.



Fibre also makes us feel fuller for longer.

- 2) You need to eat lots of fibre to stay **healthy**. If you don't, it can lead to **health problems** such as: **constipation**, **bowel and colon cancer**, **heart disease**, **high blood pressure**.
- 3) The NHS states that the average adult should take in **30 g** of fibre every day. **Young children** need **less fibre** because the 'fullness' fibre gives people can stop them from eating foods that contain other important nutrients.

Most people in the UK don't eat enough fibre — some of the health problems mentioned are very common in people over 40.

## 50% of Our Energy Should Come from Carbs

According to government guidelines, **carbohydrates** should make up approximately **half** of our **food energy** per day (see p.16).

- Ideally, **most of this energy** should come from **starchy foods** and **natural sugars** such as those found in bread, pasta, fruit and veg.
- **Free sugars**, such as those added to food and drinks during manufacturing and those found in sweet foods like syrups and fruit juice, should take up **no more than 5%**.

On average, people in the UK consume **too much sugar**. To help with this, food labelling not only has a section for **total carbohydrates**, but it also has an extra section called **'of which sugars'** — this helps people separate their sugar intake from their total carb intake

## Eating Too Many or Too Few Carbohydrates Is Unhealthy

Like with fat and protein, **too much** (excess) or **too little** (deficiency) carbohydrate in our diet is **unhealthy** and can have **serious effects** on how our body functions:

### Excess

- If we take in more energy from carbohydrates than our body uses, the extra **carbohydrate** is **converted** into **fat**. Too much fat causes **obesity** and other diet-related health issues (see p.14-15).
- **Sugars** are the worst for this because they're digested quickly, meaning the **energy** they provide is ready to use **almost immediately** — if it's not used quickly, we store it as **fat**.
- Eating **too many sugary foods** can lead to **tooth decay**, sometimes called **dental caries** (see p.15). **Free sugars** are the worst type of sugar for tooth decay — e.g. mango juice is more likely to cause tooth decay than if you ate chunks of mango because the sugars are already released and ready to attack your teeth.
- Because **simple carbohydrates** (e.g. sugar) are **quickly digested**, they cause **rapid surges in blood sugar levels** (see previous page). If our blood sugar levels **fluctuate** (move up and down) too **wildly** it can lead to the development of **type 2 diabetes** (see p.15).