

Energy, nutrients and digestion



- Food and drinks provide energy and nutrients in different amounts, they have important functions in the body and people require different amounts during their life.
- Digestion involves different parts of the body, each having an important role.

Energy

Energy is essential for life, and is required to fuel many different body processes, growth and activities. These include:

- keeping the heart beating;
- keeping the organs functioning;
- maintenance of body temperature;
- muscle contraction.

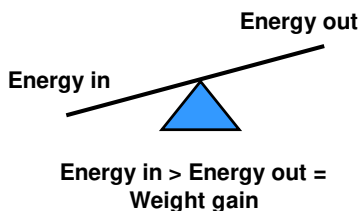
Different people need different amounts of dietary energy depending on their:

- age;
- gender;
- body size;
- level of activity;
- genes.



Energy balance

To maintain body weight it is necessary to balance energy intake (from food and drink) with energy expenditure (from activity).



Tasks

1. Create an infographic on either macronutrients or micronutrients. Focus on the definition of each nutrient, recommendations and sources.
2. Draw the digestive system and label each of the body parts and the stages of digestion that occur at each part.
3. Calculate the energy and nutrients provided by a food diary for one or two days using <http://explorefood.foodafactoflife.org.uk> - reflect on the results.

Energy from food

- Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with the term calories (kcal).
- Different macronutrients provide different amounts of energy.

	Energy per 100g
Carbohydrate	16kJ (3.75 kcals)
Protein	17kJ (4 kcals)

Energy requirements vary from person to person, depending on the Basal Metabolic Rate (BMR) and Physical Activity Level (PAL).

Total energy expenditure = BMR x PAL

Body Mass Index (BMI) can be used to identify if an adult is a correct weight for height.

BMI = $\frac{\text{weight (kg)}}{(\text{height in m})^2}$

Recommended BMI range (adults)

Less than 18.5	Underweight
18.5 to 25	Desirable
25-30	Overweight
30-35	Obese (Class I)
35-40	Obese (Class II)
Over 40	Morbidly obese

Nutrients

There are two different types of nutrients:

- macronutrients;
- micronutrients.

There are three macronutrients that are essential for health:

- carbohydrate;
- protein;
- fat.

There are two types of micronutrients:

- vitamins;
- minerals.

Carbohydrate

Free sugars include all sugars added to foods, plus sugars naturally present in honey, syrups and unsweetened fruit juice.

Fibre is a term used for plant-based carbohydrates that are not digested in the small intestine.

Sugars include a variety of different sugar molecules such as sucrose

Starchy foods are the main source of carbohydrate for most people and are an important source of energy. We should be choosing wholegrain versions of starchy foods where possible.

Protein

Protein is made up of building blocks called amino acids. There are 20 amino acids found in protein. For adults, eight of these have to be provided by the diet (this is higher in children). These are called essential amino acids, which cannot be made by the human body.

Fat

Sources of fat include:

- saturated fat;
- monounsaturated fat;
- polyunsaturated fat.

A high saturated fat intake is linked with high blood cholesterol levels.

Micronutrients

Vitamins

There are two groups of vitamins:

- fat-soluble vitamins, e.g. vitamins A and D.
- water-soluble vitamins, e.g. B vitamins (thiamin, riboflavin, niacin, folate, vitamin B12) and vitamin C.

Minerals

Minerals are inorganic substances required by the body in small amounts for a variety of different functions. Examples include: calcium, sodium and iron. Most micronutrients are mostly provided by the diet. An exception is vitamin D which can be synthesised by the action of sunlight on the skin.

Calcium is essential for a number of important functions such as the maintenance of bones and teeth, blood clotting and normal muscle function.

Sodium is needed for regulating the amount of water and other substances in the body.

Iron is essential for the formation of haemoglobin in red blood cells. Red blood cells carry oxygen and transport it around the body. Iron is also required for normal metabolism and removing waste substances from the body.

Stages of digestion

Ingestion - the intake of food into the gastrointestinal (GI) tract.

Digestion - a series of physical and chemical processes which begin in the mouth, but take place mainly in the stomach and small intestine.

Absorption - the passage of digested food substances across the gastrointestinal lining into the bloodstream and lymphatic system.

Elimination - the excretion of undigested food substances (such as cellulose) or waste in faeces.

Key terms

Energy: The power the body requires to stay alive and function.

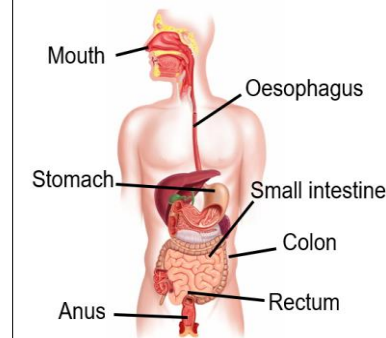
Digestion: The process by which food is broken down in the digestive tract to release nutrients for absorption.

Macronutrients: Nutrients needed to provide energy and as the building blocks for growth and maintenance of the body.

Micronutrients: Nutrients which are needed in the diet in very small amounts.

Digestion

The body requires energy from food and drink. Our bodies release the energy and nutrients from food. The food passes down the Gastrointestinal tract (GI) tract as shown below.



To find out more, go to: <https://bit.ly/31CBjke>

Food hygiene

- Good food safety and hygiene practices are essential to reduce the risk of food poisoning.

Food poisoning

Food poisoning can be caused by:

- bacteria, e.g. through cross-contamination from pests, unclean hands and dirty equipment, or bacteria already present in the food, such as salmonella;
- physical contaminants, e.g. hair, plasters, egg shells, packaging;
- chemicals, e.g. cleaning chemicals.

Bacterial contamination is the most common cause.

Micro-organisms occur naturally in the environment, on cereals, vegetables, fruit, animals, people, water, soil and in the air. Most bacteria are harmless but a small number can cause illness.

Harmful bacteria are called pathogenic bacteria.

The process of food becoming unfit to eat through oxidation, contamination or growth of micro-organisms is known as food spoilage.

Bacterial growth and multiplication

All bacteria, including those that are harmful, have four requirements to survive and grow:

- food;
- moisture;
- warmth;
- time.



High risk food

Bacteria easily multiply on foods known as 'high-risk food'. These are often high in protein or fat, such as cooked meat and fish, dairy foods and eggs. Cooked pasta and rice are also regarded as high risk foods if they are not cooled quickly after cooking and stored below 5°C.

Moisture

Bacteria need moisture to survive. Dried foods, such as powdered milk, cereals or dried egg do not support bacterial growth, if properly stored. However, if moisture is added, any bacteria still alive can quickly begin to multiply.

Symptoms of food poisoning

The symptoms of food poisoning include:

- nausea;
- vomiting;
- stomach pains;
- diarrhoea.

People at risk

Elderly people, babies and anyone who is ill or pregnant needs to be extra careful about the food they eat.

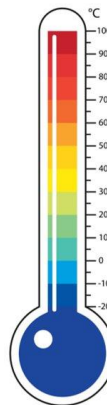
Why clean?

To remove grease, dirt and grime, and prevent food poisoning and pests.

Temperatures to remember

To reduce the risk of food poisoning, good temperature control is vital:

- 5-63°C – the danger zone where bacteria grow most readily.
- 37°C – body temperature, optimum temperature for bacterial growth.
- 8°C – maximum legal temperature for cold food, i.e. your fridge.
- 5°C (or below) – the ideal temperature your fridge should be. 1°C to 4°C
- 75°C – if cooking food, the core temperature, middle or thickest part should reach at least this temperature.
- 75°C – if reheating food, it should reach at least this temperature. In Scotland food should reach at least 82°C.



Allergen and food intolerance awareness

There are 14 ingredients (allergens) that are the main reason for adverse reactions to food. Cross-contamination of food containing these allergens must be prevented to reduce the risk of harm. They must also be labelled on pre-packaged food and menus so that consumers can make safe choices. The 14 allergens are:

Celery (and celeriac)	Milk
Cereals containing gluten	Molluscs
Crustaceans	Mustard
Eggs	Nuts
Fish	Peanuts
Lupin	Sesame
	Soybeans
	Sulphur dioxide

Where should food be stored in the fridge?

Cheese, dairy and egg-based products

The temperature is usually coolest and most constant at the top of the fridge, allowing these foods to keep best here.

Cooked meats

Cooked meats should always be stored above raw meats to prevent contamination from raw meat.

Raw meats and fish

Raw meats and fish should be below cooked meats and sealed in containers to prevent contamination of salad and vegetables.

Salad and vegetables

These should be stored in the drawer(s) at the bottom of the fridge. The lidded drawers hold more moisture, preventing the leaves from drying out.

Getting ready to cook

- Remove blazers/jumpers and roll up long sleeves.
- Tie up long hair and tuck in ties or head coverings.
- Thoroughly wash and dry hands.
- Put on a clean apron.

Time

When bacteria spend enough time on the right types of food, at warm temperatures, they can multiply to levels that cause illness.

Reheat food only once and eat leftovers within 48 hours.

Best before date

You can eat food past this date but it might not be at its best quality.

Use by date

You've got until the end of this date to use or freeze the food before it comes too risky to eat.

USE BY:

25/08/20

KEEP REFRIGERATED

BEST BEFORE:

25/08/21

STORE IN A COOL DRY PLACE

Key terms

Allergens: Substances that can cause an adverse reaction to food. Cross-contamination must be prevented to reduce the risk of harm.

Bacteria: Small living organisms that can reproduce to form colonies. Some bacteria can be harmful (pathogenic) and others are necessary for food production, e.g. to make cheese and yogurt.

Cross-contamination: The transfer of bacteria from one source to another. Usually raw food to ready to eat food but can also be the transfer of bacteria from unclean hands, equipment, cloths or pests. Can also relate to allergens.

Food poisoning: Illness resulting from eating food which contains food poisoning micro-organisms or toxins produced by micro-organisms.

High risk ingredients: Food which is ready to eat, e.g. cooked meat and fish, cooked eggs, dairy products, sandwiches and ready meals.

Task

Create a poster highlighting the top tips for ensuring food is safe to eat. Include personal hygiene, safe storage, preparation and cooking of food.

To find out more, go to:
<https://bit.ly/2Z97B5f>