

Food, fuel and the human body



What are we going to learn?

Learning Objectives

1. Identify the seven nutrient groups and describe their primary biological functions.
2. Use data to calculate and evaluate whether a diet meets individual daily energy and nutrient requirements.
3. Use scientific evidence to assess common claims about plant-based nutrition.

Key words

Kilojoule - the unit used to measure the energy provided by food and drinks.

Respiration - the chemical reaction in living cells that provides energy from glucose (food) for all biological processes.

Absorption - the process of one substance completely taking in or soaking up another substance.

What does your gut tell you?

Write true, false or not sure for each statement with a sentence to explain your response

1. *"You can't get enough protein from plants"*
2. *"A plant-based diet can't give you enough energy to be active"*
3. *"Plant milk isn't as nutritious as cow's milk"*
4. *"A well-planned plant-based diet can meet all your nutritional needs at any age"*



What the body needs - essential nutrients



**Carbohydrates -
pasta, bread**



**Lipids - olive oil,
avocado**



**Proteins - tofu,
legumes**



**Vitamins - fruit,
vegetables**



**Minerals - fruit
vegetables**



**Dietary fibre - fruit,
vegetables**



Water

→ Now match the nutrient to its biological function

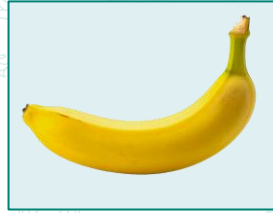
Stretch: Choose one nutrient group and write two sentences explaining what would happen to the human body if it received none of that nutrient over a long period of time.

Have you matched the nutrient to their biological function?

Carbohydrate	Primary energy source for cells - broken down to release energy for muscle contraction and brain function
Lipids	Energy store and structural component - forms cell membranes and enables absorption of fat-soluble vitamins
Proteins	Build and repair body tissues - chains of amino acids used for growth, maintenance and enzyme production
Vitamins	Regulate biological processes - include roles in immune function, bone development and nerve signalling
Minerals	Support specific body systems - iron for oxygen transport in red blood cells; calcium for bone and muscle function
Dietary fibre	Support digestive function - indigestible plant material that feeds beneficial gut bacteria
Water	Universal solvent - enables all biochemical reactions and transports nutrients around the body

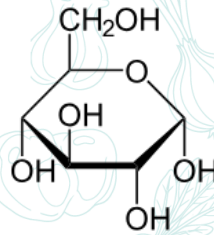
What is food energy?

Kilojoule

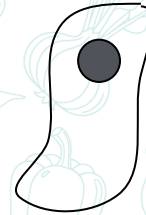


Approx 370-440 kJ

Respiration
(aerobic)



Glucose



Cell
respiration



**Energy
for life
processes**

Food energy investigation

Meal	Food	Energy (kJ)
Breakfast	Porridge oats with fortified oat milk and a banana	1,680
AM snack	Mixed nuts, peanut butter on wholemeal toast and an orange	1,470
Lunch	Lentil and vegetable soup with two slices of wholemeal bread	1,890
PM snack	Hummus with carrots and cucumber sticks	630
Dinner	Tofu stir fry with brown rice and mixed veg	2,100
Evening	Fortified oat milk with a small handful of sunflower seeds	630
TOTAL		

Food energy investigation - *example*

Daily meal plan	
TOTAL	8,400 kJ

	Description	Daily energy (kJ)
A	13 year old female	9,000

1. Calculate the percentage in which the meal plan provides for each individual's daily energy requirement.
2. State whether each individual is under, over or meets their requirement.
3. Add or remove meal items to reach as close to the daily requirement as possible.

$$8,400 \div 9,000 \times 100 = \mathbf{93.3\%}$$

93.3% is below 100% - the meal plan is **under** the daily recommendation

Individual A needs approximately 600 kJ more ($9,000 - 8,400 = 600$ kJ).

Let's look at the food menu...

Food energy investigation - *example*

3. Add or remove items to reach as close to the daily recommendation as possible.

Item	Energy (kJ)
Tablespoon of peanut butter	380
Avocado (half)	630
Banana	440
Small bowl of edamame beans	500
Extra portion of brown rice	590
Fortified oat milk and berry smoothie	840
Medium plum	130
Mixed nuts	500

*Individual A needs approximately 600 kJ more
(9,000 – 8,400 = 600 kJ).*

*From the food menu: **extra portion of brown rice (590 kJ) OR banana (440 kJ) and a medium plum (130 kJ) = 570 kJ***

Food energy investigation

Follow the tasks on your worksheet

Meal	Food	Energy (kJ)
Breakfast	Porridge oats with fortified oat milk and a banana	1,680
AM snack	Mixed nuts, peanut butter on wholemeal toast and an orange	1,470
Lunch	Lentil and vegetable soup with two slices of wholemeal bread	1,890
PM snack	Hummus with carrots and cucumber sticks	630
Dinner	Tofu stir fry with brown rice and mixed veg	2,100
Evening	Fortified oat milk with a small handful of sunflower seeds	630
TOTAL		8,400

Menu items	Energy (kJ)
Tablespoon of peanut butter	380
Avocado (half)	630
Banana	440
Small bowl of edamame beans	500
Extra portion of brown rice	590
Fortified oat milk and berry smoothie	840
Medium plum	130
Mixed nuts	500

Stretch - what is fortification and why is it an important part of UK diets?

The misconception clinic

You are a sports nutritionist responding to the claims from the starter. Use the terms below to fill in the gaps before moving on to respond to the fourth and final claim independently.

"You can't get enough protein from plants"

"A plant-based diet can't give you enough energy to be active"

"Plant milk isn't as nutritious as cow's milk"

Missing words:

Vitamin B12 - lipids - plant-based - fortified - carbohydrates - amino acids -
- energy requirements - respiration - protein - calcium - fortified

Stretch claim: *"You can't get enough energy or protein for sport on a plant-based diet"*
Respond to your patient using scientific evidence from this lesson.

The scientific verdict

"A well-planned plant-based diet can meet all your nutritional needs at any age."

Patient concern: *[write the claim]*

Scientific verdict: *[true/false/partially true because...]*

Evidence: (1-2 pieces of evidence from today's lesson)
[The scientific evidence shows that...]

Recommendation: *[it's important to know that...]*

Key terms to use:

nutrients

amino acids kilojoule

respiration fortification

plant-based diet

Plenary

**If this is the answer...
what's the question?**

