

Science lesson – bone marrow

(Approximately one hour)



Learning outcomes

- **All students will:** know that new blood cells come from stem cells, which can be found in bone marrow, circulating blood or cord blood; learn that for some people the only cure for some illnesses is a bone marrow transplant; understand that people are dying because a suitable bone marrow match cannot always be found.
- **Most students will:** understand the basic function of stem cells and be able to name illnesses that are treated by a bone marrow transplant. They will understand the need for a close tissue match when seeking a bone marrow donor for a patient.
- **Some students will:** understand the reasons for the real difficulty in finding suitable tissue matches for patients due to the current shortages of donors from a variety of ethnic communities.

Starter activity (10 Min)

- Ask the questions: How old is your blood? Is it older, the same age or younger than you are?
- Possible prompt: Think about when you fall over, or cut yourself and lose some blood. Do you live with less blood in your body for the rest of your life? Ask the class to discuss their answers with the person sitting next to them.
- Have a class discussion which reaches the conclusion that we make new blood and get rid of old blood.

Group/individual activity (40 Min)



- Cue up the bone marrow PowerPoint presentation, which explains what bone marrow is and how it can be donated and used.
- Explain that we produce new blood cells from stem cells. What are stem cells and where can they be found (*see slides 1–2*)? Explain that a ‘bone marrow’ donation is actually a donation of stem cells.
- Introduce Leukaemia (a cancer that forms in the bone marrow, causing abnormal white blood cell development) – a bone marrow transplant can be a life-saver (*see slide 3*).
- At this point it could be useful to play the filmed Real story about Sally Brewis, who is alive today thanks to a bone marrow donation. Alternatively, read the Student card about Olivia.



Answers (Activity sheet 3):

1. Those that could be treated by bone marrow donation: A, D, E, H, I.
2. They all relate to blood cell production.
3. Other diseases: B – Measles; C – Bronchitis; F – Influenza; G – Diabetes; J – Heart disease.

**Group/individual activity** (continued)

- What other disorders can be treated by bone marrow transplants (see slide 4)? Give out copies of **Activity sheet 3** (page 21). Now move on to discuss how bone marrow is donated (see slide 5). Introduce the three methods of collecting stem cells:
 - From bone marrow
 - From circulating blood
 - From cord blood.
- Discuss the advantages and disadvantages of the three different types of bone marrow donations for patients (see slide 6).
- Hamzah Khalid is a donor from an ethnic community who is featured on a **Student card**. Explain that the best donor is someone whose tissue type is close to the recipient's tissue type (see slide 7).
- Ask students to make a list of a few people they think would be their best bone marrow match. Discuss students' lists as a class, introducing matches from identical twins, family members, and those of similar race/ethnicity. Highlight that only 30% of bone marrow donors are found in the patient's immediate family.
- Emphasise that people in the UK are dying because a suitable bone marrow match cannot always be found. You could mention Jeanette Crizzle, to whom this pack is dedicated www.jeanettecrizzletrust.org. Discuss how more people might be persuaded to become donors.
- Introduce how you can become a bone marrow donor at age 18 – by joining the British Bone Marrow Registry (if you are already a blood donor) or joining The Anthony Nolan Trust Registry (by giving a blood sample). There is more information on the website.

Plenary (10 Min)

- Use the **bone marrow true and false quiz** to review and consolidate what students have learnt about bone marrow and bone marrow donation. Students answer True or False to ten statements.

Extension/homework activities

You can use these extension activities as the basis for a follow up lesson, or as a homework task to consolidate learning.

- Write a flyer about bone marrow donation for people turning 18. Include information about saving lives and what is involved in being a donor. Discuss the issue with your family to get more ideas. Ask some sixth formers to critique your leaflet for you and amend accordingly.
- Ask students to research what they think are the advantages and disadvantages of the different types of bone marrow donation (bone marrow, circulating blood and cord blood) for donors.

For more able students:

- Find out about embryonic stem cell research. What new treatments could it lead to? Why is it the subject of such passionate debate? What do you think?

