

Activity 4 – Clots and Blood transfusions

Introduction

Bleeding after trauma is a major cause of death and forms the basis for much scientific enquiry carried out by the Centre for Trauma Sciences. The process of clotting is an important part of the body's response to bleeding. Blood transfusion can help to treat patients who have lost a lot of blood.

This activity will allow pupils to see how clots are formed and what types of blood transfusions are available.

Aim of activity

This activity aims to highlight the importance of clotting as a safety mechanism after injury. It also aims to introduce students to the concept of blood transfusion through discussion of antigens and antibodies and blood group compatibility.

Materials

Each student will need:

- Worksheet

For demonstration purposes

- Kerplunk game or homemade version using a cardboard tube and some straws.
- Cut out platelets
- Red jelly beans or equivalent

Instructions

1. Begin the lesson by discussing with students what happens when they get a cut or injury to the skin. How do they think it stops bleeding?
2. Discuss that the cut is a site for pathogens to enter the body, so infections may occur so stopping the bleeding and closing the entry point is important for homeostasis.
3. Discuss that the injured blood vessel will also constrict to try and reduce the blood flow to the site of injury.
4. Follow the student's discussions about scabs and talk about how a scab is a clot and then discuss how clots form. Ask the students what they think are the most important characteristics of a clot. i.e. Strong, waterproof etc
5. Use a Kerplunk game or your own recreation to demonstrate this.
6. Use that analogy that the holes in the cylinder are the site of damage to the blood vessel.
7. Show pupils that fibrin, a long fibrous protein (the sticks provide with the game), form a net. Begin threading these into the cylinder.
8. Test the ability of the fibrin alone to stop the bleeding
9. Illustrate that some red jelly beans continue to fall through

10. Introduce the fact that fibrin does not work alone. Use the platelet cut outs to fill in the holes in the fibrin net and then show that the jelly beans do not fall through.
11. Go back to discussing that proteins (fibrin) and platelets are important in clot formation and answer any questions the students may have.
12. Discuss whether the clot should stay forever, how it may be broken down (enzymes), which bit of the clot this may work on (fibrin), when clotting is good (bleeding), when clotting is bad (stroke and heart attacks)

After the game has finished move on, to discussing how bleeding patients are treated.

1. Ask students of ways that they know to stop bleeding.
 - a. Discuss a nose bleed – add pressure
 - b. Discuss blast injuries at war – use of tourniquet for pressure
 - c. Discuss lifting the affected limb
2. Ask them what they know about blood transfusions? Do any of them know anybody who has had a transfusion or donated blood? Discuss what kinds of patients may need a blood transfusion.
3. Ask the students what blood is made up of?
 - a. Identify red blood cells, white blood cells, platelets, plasma
4. Discuss that different blood products can be transfused and discuss:
 - a. Whole Blood
 - b. Packed Red Blood Cells
 - c. Plasma
 - d. Platelets
 - e. Cryoprecipitate (clotting factors)
5. Ask the students which blood products would help a bleeding patient?
6. Discuss that people have different blood groups and you cannot give all blood to everybody. The groups must be compatible.
7. Explain to students that every blood cell has antigens on it, if the body receives blood cells whose antigens it does not recognise, the immune system will attack these blood cells causing a person to feel very unwell.
8. Tell the students that there are 4 blood groups, A, B, AB and O. Give them the worksheet and ask them to choose which transfusions each person can have.

Extension Activities

- Introduce the concept of Rh negative / Rh positive blood groups to the blood transfusion activity
- Ask the students to think about diseases where clotting is affected such as Haemophilia