

Activity 1 – Maintaining Physiological Homeostasis

Introduction

Maintaining oxygen delivery to tissues is an important part of homeostasis. This is achieved by ensuring the circulatory system is functioning well. It is important that some parameters are maintained in order to ensure this:

- Heart rate
- Respiratory rate
- Blood pressure

Here we will discuss how these parameters change with exercise and injury and how the body ensures oxygen delivery despite these stressors.

Aim of activity

This activity will teach pupils how physiological parameters such as HR, BP, Temperature and RR change in stressful situations such as exercise and injury.

Materials

Each pupil will need:

- Copy of worksheet
- Stopwatch
- BP monitor
- Thermometer

For the demonstration:

- Red food colouring
- Water
- Closed circuit for fluid with a tap/valve

Instructions

1. Ask pupils, how the circulatory system works. Confirm their understanding of how blood moves around the body and the heart acts as a pump. Talk about oxygen delivery to tissues.
2. Hand out the worksheets, ask them to measure their own temperature, HR, RR, BP at rest and record them on the sheet.
3. Ask them what they think would cause their physiology to change. Discuss their “predictions” about what will happen. Ask them to write down their predictions in the worksheet.
4. Ask pupils to do star jumps for 1 minute. Then remeasure their parameters and put these into their worksheet.
5. Discuss the changes that have occurred. Ask the students why they think these changes have happened and how their body is trying to maintain physiology? E.g. HR increases to maintain O₂ delivery to tissues.

6. After the discussion ask them to measure parameters again. Discuss how these have returned to normal.
7. Now discuss haemorrhage as an injury pattern. Set up a closed system with red coloured fluid inside before the session. Ensure the system has a tap/valve. Discuss how the circulatory system is a closed system.
8. Open the tap/valve to allow some fluid to leak. Discuss what happens to the pressure, in the system – talk about how BP decreases in bleeding patients.
9. Ask the pupils how they think a bleeding patient's body tries to maintain oxygen delivery to tissues? i.e. resp rate decreases, heart rate increases.
10. Discuss with students the effect of blood loss on temperature.
11. Discuss how injury is a different injury is a more severe type of stressor which affects human physiology and may not revert to normal without interventions.

Extension Activities

- Ask the students how they think bleeding patients can be treated.
- Discuss how wounds are compressed using bandages and tourniquets.
- Discuss blood transfusions and the laws around transfusing blood in the UK, discussing when they will be able to donate blood.
- Discuss the advantages and disadvantages of donating blood.