Adult Guidance

The Circulatory System: Functions

Terminology

Oxygenated blood: Blood that contains oxygen.

Deoxygenated blood: Blood that has had oxygen removed from it.

Unoxygenated blood: Blood that has never had oxygen to begin with.

Sometimes deoxygenated blood is referred to as unoxygenated blood but this is incorrect as there is no point at which blood in our bodies has been without oxygen, since even a blastocyst foetus is being supplied with oxygenated blood from the mother.

The human circulatory system is referred to as a double circulatory system. All mammals have a double circulatory system as there are two loops. One loop sends blood from the heart to the lungs and the other loop is from the heart to the rest of the body.

The Heart

The heart is able to circulate blood throughout the body as a result of the cardiac muscle. The cardiac muscle is part of the wall of the heart. The coordinated contractions of the cardiac muscle cells propel blood through the atria and ventricles. The differences between the cardiac muscle and skeletal muscles include:

- Cardiac cells are branch-like in structure rather than a linear structure.
- T-tubules are larger than in skeletal muscles – this is vital in the excitation-contraction coupling which is a physical process whereby electrical stimulus turns into a mechanical response.
- The cardiac muscle requires extracellular calcium ions to contract.

Until recently, it was believed that cardiac muscle cells could not be regenerated, however the most recent research shows that all heart muscle cells do regenerate and that about 45% of the heart muscle cells of a 50 year old would have been generated after birth.

The Lungs

While we tend to explain respiration quite simply to children, it is important that they start to understand that humans don't just inhale oxygen and exhale carbon dioxide.

The air we inhale contains 78.04% nitrogen, 21% oxygen and 0.96% argon. The air goes through the trachea, bronchi and bronchioles to the air sacs (alveoli). It is in the alveoli that oxygen alone is exchanged into the blood stream. However we only use around 5 % of the oxygen we breathe in.

The gases we exhale include 78.04% nitrogen, 13.6% – 16% oxygen, 4% – 5.3% carbon dioxide and 1 % argon and other gases.

(Two examples that might help illustrate this to the children are:

1. Mouth to mouth resuscitation would not be helpful if we breathed out only carbon dioxide! It is because we breathe out oxygen that we can perform this procedure.
2. If we only inhaled oxygen from the air then the quality of the air in general would not matter. It is the fact that the air has to travel to the alveoli before oxygen is extracted which makes poor air quality affect our lungs and health as everything in the air will enter the lungs.)