

Anatomy and Physiology – Year 9 OT

Musculoskeletal system

Humerus – The top of the arm Radius– Lower arm Ulna- Lower arm

- Tendons attach muscles to bones.
- Ligaments attach bone to bone.

Antagonistic muscle pairs

FLEXION (bent) – Bicep contracts, tricep relaxes.

EXTENSION (straight) – Tricep contracts, bicep relaxes.

When a muscle contracts it pulls on a tendon which pulls on a bone causing it to move.



Cardiovascular system

Heart

Blood vessels

- Arteries – Carry **OXYGENATED** blood **away** from the heart
- Veins – Carry **DEOXYGENATED** blood **in** to the heart

Cardiac Output = Stroke volume x Heart rate

Cardiac Output- The volume of blood pumped out of the heart in 1 minute

Stroke Volume – The volume of blood pumped out of the heart **per beat**

Heart Rate – How many times the heart **beats per minute**.

When you play Netball your **cardiac output increases** due to the **increased demand for oxygen** by your working muscles.

Respiratory system

Gaseous exchange

- Oxygen is **breathed in** through the mouth.
- It then enters the lungs and the **chest cavity becomes larger**.
- **Oxygen is then diffused into the blood** and transported to working muscles that need it during a game of Netball such as the biceps and triceps.
- **Carbon dioxide** is created by the working muscles and is a waste product.
- Carbon dioxide is **transported by the blood back to the lungs** and is breathed out.

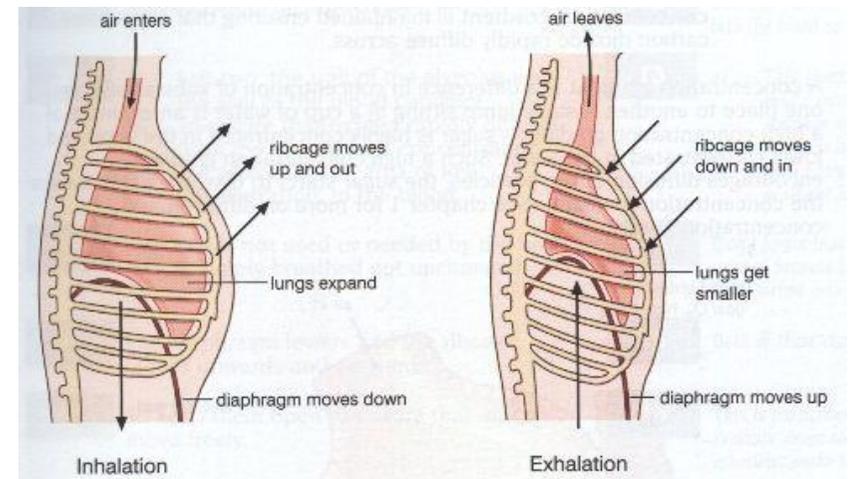
Mechanics of breathing

Inhalation:

- Intercostal muscles **contract**, lifting the rib cage up and out
- Diaphragm **contracts** into a flattened shape

Exhalation:

- Intercostal muscles **relax**.
- Rib cage moves inwards and downwards.
- Diaphragm **relaxes** into a dome shape.



Aerobic and anaerobic exercise

Aerobic - Exercise **whilst using oxygen** (e.g. jogging for long periods of time)

Anaerobic – Exercise **without using oxygen** (short, fast movements such as tackling an opponent or sprinting past an opponent. Lasts a few seconds)

Short term effects of exercise (what happens straight away)

Increased heart rate

Increased stroke volume & cardiac output

Increased breathing rate

Increased body temperature

Long term effects of exercise

Lower resting heart rate

Increased size of heart

Increased lung capacity

Body shape may change

How can you link anaerobic (tackling, sprinting) and aerobic exercise (running around during an 80 minute game) to different parts of Netball?

Synovial Joints – link to a movement:

CHEST PASS

Hinge joint: Elbow

Components of a synovial joint:

Ligaments: attach bone to bone

Cartilage: covers ends of bone, providing a smooth, friction-free surface

Synovial fluid: lubricates the joint

Synovial membrane: produces synovial fluid which lubricates a joint



Examples of answering questions and linking content to the Netball:

Short antagonistic pair example:

“The hinge joint at the elbow allows flexion and extension. When **performing a chest pass** flexion occurs at the elbow where the bicep contracts and the tricep relaxes. When **releasing the ball** during extension the tricep contracts and the bicep relaxes. Tendons connect muscle to bone and ligaments hold bone to bone. The tendons and ligaments enable the movement of the Humerus, Radius and Ulna. When the bicep contracts it pulls on tendons causing the radius and ulna to move and create the flexed position. Similar occurs when the tricep contracts it pulls on tendons which causes the radius and ulna to move and create the extended position where the ball is released **during the chest pass.**”

A chance to try at home:

- Explain how synovial joints are required to perform a chest pass in netball. (Include all the key words from the orange box!)
- Explain the long and short term effects of exercise and how the long term effects could improve performance. (Ensure you link it to Netball!)