

# Anatomy and Physiology – Year 7 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 Rugby 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 Rugby 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.

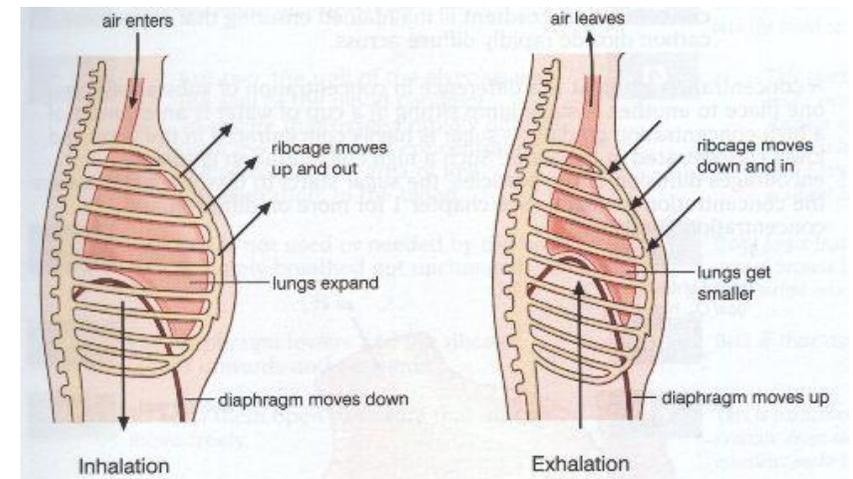
### Mechanics of breathing

#### 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 Rugby?

## Synovial Joints – link to a movement:

### Pass in Rugby



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 Rugby:

Short antagonistic pair example:

“The **hinge joint** at the **elbow** allows **flexion and extension**. When **performing a pass in Rugby** **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 pass**. ”

## A chance to try at home:

- Explain how synovial joints are required to perform a chest pass in Rugby. (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 Rugby!)