Key Area 2: Exercise physiology | 2.2: Muscular system

Knowledge

Muscle

Muscles are responsible for producing movement through muscle contractions. There are two different types of muscles in the body:

- Voluntary
- Involuntary

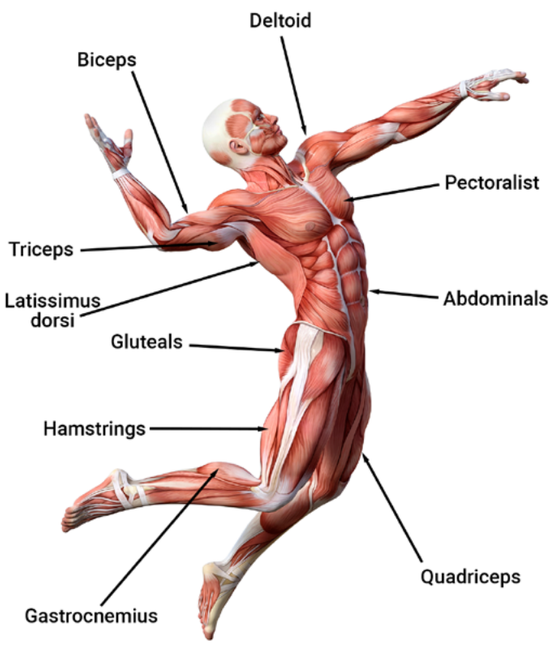
Voluntary muscle

These muscles are attached to the skeleton and contract under conscious control (meaning we control the contraction).

Tendon

Tendons attach muscle to bone where a muscle can pull on bones for movement.

Major skeletal muscle



Involuntary muscle

These muscles work without subconscious control, meaning they contract automatically. They consist of smooth and cardiac muscle.

Skeletal muscle

Skeletal muscles are attached to the skeleton by **tendons**. When the muscle contracts it pulls on the bone and produces movement at the joint. As muscles can only contract, skeletal muscles work in pairs to produce movements such as flexion, extension, adduction, abduction.

Muscle fibres

Skeletal muscles are made up of fibres. There are two types:

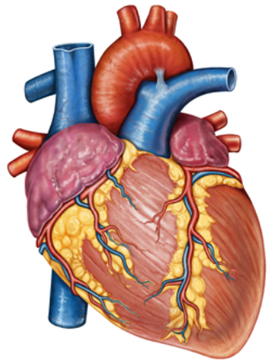
- Slow twitch (Type I)
- Fast twitch (Type II)

Each one has different characteristics:

Characteristic	Muscle fibre type	
	I	II
Colour	Red	White
Energy system	Aerobic	Anaerobic
Fatigue resistant	High	Low
Speed of contraction	Slow	Fast
Force of contractions	Low	High

Cardiac muscle

This muscle is found in the walls of the heart. The cardiac muscle works automatically and never gets tired. It is controlled by regions of the brain.



Smooth muscle

These are found in our internal organs and help the body to function. The smooth muscle can be found in the digestive system. The muscles in the intestines contract to push food through the digestives system so nutrients can be absorbed and used by the body.

Application

A sprinter would need more **fast twitch** (Type II) fibres which will allow for faster muscles contraction and a greater amount of force to help generate speed.

As a 100m sprint lasts around 10 seconds the sprinter would be working in the **anaerobic** (without oxygen) energy system.

The negative effect of this is that the muscles will fatigue quickly due to a build-up of **lactic acid**.

A marathon runner would need more **slow twitch** (Type I) fibres which will allow for slow muscles contraction.

A marathon runner would be working in the **aerobic** (with oxygen) energy system. This will allow the muscles to continue working throughout the duration of the race.