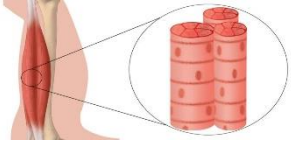


Component 1 The Muscular System

Classification of muscles:

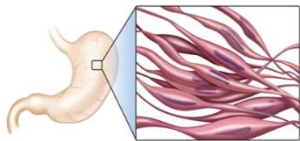
Voluntary muscles

- Found on the skeleton e.g. biceps triceps & quadriceps
- Conscious control
- Attach to the skeleton to create movement



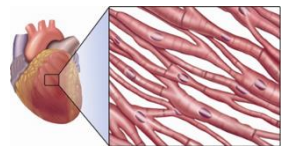
Involuntary muscles

- Found in the stomach, intestines & blood vessels
- Unconscious control
- Contract slowly and rhythmically

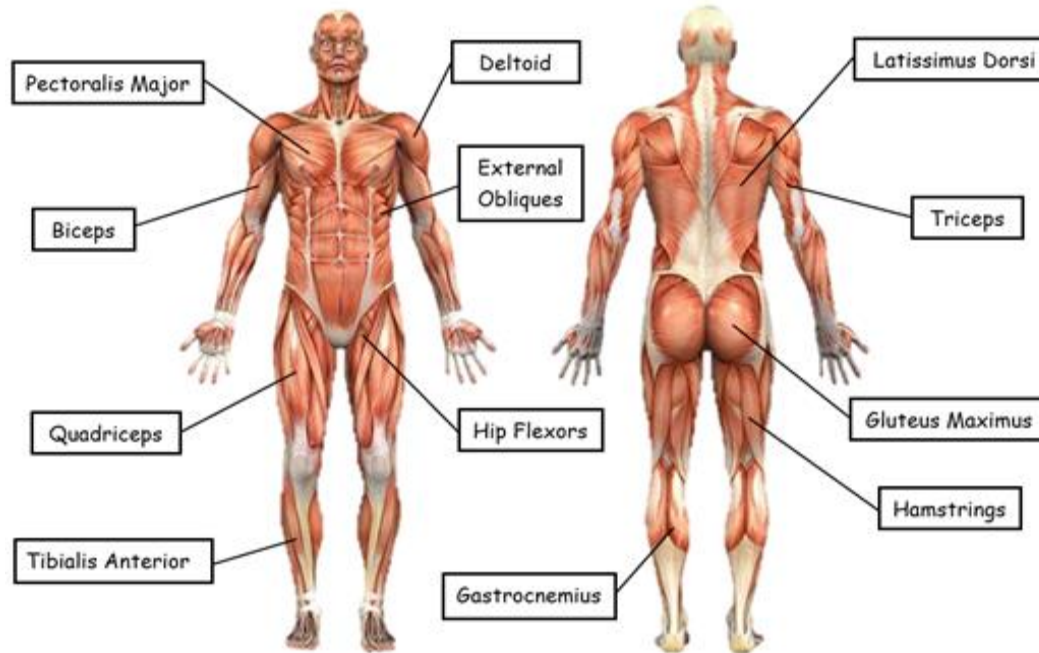


Cardiac muscle

- Found in the wall of the heart
- Unconscious control
- Do not tire



Voluntary muscles of the body:



Muscle fibres:

Type I (Slow Twitch)

- Aerobic events
- Marathon running

Type IIa (Fast Twitch)

- 400m race

Type IIx (Fast Twitch)

- Anaerobic events
- 100m sprint

Characteristic	Slow Twitch Type I	Fast Twitch Type IIa	Fast Twitch Type IIx
Force of Contraction	Low	High	Very high
Speed of Contraction	Slow	Medium	Fast
Resistance to Fatigue	High	Moderate	Low
Aerobic or Anaerobic	Aerobic	Aerobic & Anaerobic	Anaerobic
Myoglobin	High	Medium	Low
Mitochondria	High	Medium	Low
Capillary Network	Good	Moderate	Low

Muscles and their function:

Muscle	Location	Function	Sporting Example
Deltoid	Shoulder	Move the upper arm in all directions from the shoulder	Serve in tennis Front Crawl
Pectoralis Major	Chest	Adducts the arm at the shoulder	Forehand drive in tennis Hand off in rugby
Latissimus Dorsi	Back muscle	Adducts and extends the arm at the shoulder	Butterfly stroke Pull ups
Biceps	Front of Upper Arm	Elbow flexion (bending)	Boxing Uppercut Preparing to Throw a javelin
Triceps	Back of Upper Arm	Elbow extension (straightening)	Press-up Hand off in rugby
External Obliques	Side of the abdomen	Pulls the chest downwards Flexion & rotation at vertebrae	Crunches
Gluteus Maximus	Form the buttocks	Adducts and extends the hips pulling the leg backwards	Pull leg back before kicking a ball
Hip Flexors	Front of the hip	Flexes the hip, moves the hip upwards	Lifting knees when sprinting
Quadriceps	Front of Upper Leg	Knee extension (straightening)	Kicking a ball Jumping upwards on a lay-up shot
Hamstrings	Back of Upper Leg	Knee flexion (bending)	Bending knee before kicking a ball
Gastrocnemius	Calf muscle	Plantar flexion, points the toes	Running, jumping and gymnastics
Tibialis Anterior	Shin	Dorsi flexion, pulls toes upwards	Ski jumping Hurdling

Antagonistic muscle pairs:



When we bend the elbow (flexion) the biceps contract and the triceps relax
Agonist = Biceps
Antagonist = Triceps



When we straighten the elbow (extension) the triceps contract and the biceps relax
Agonist = Triceps
Antagonist = Biceps

Other antagonistic pairs include:

- Quadriceps & Hamstrings
- Hip flexors & Gluteus Maximus
- Gastrocnemius & Tibialis Anterior

The skeletal system and muscular system work together. Bones provide anchors for muscles to attach. Muscles attach to bone through tendons, when muscles contract, they pull on bones to create movement.