

[Any issues with this task contact Mr Graffagnino](#)

**L02 - Understand the muscular system in relation to
exercise and physical activity**

Content	Notes
Main muscles acting at synovial joints	<ul style="list-style-type: none"> • Shoulder - deltoid, latissimus dorsi, pectoralis major, trapezius, teres major • Elbow - biceps brachii, triceps brachii • Radio-ulnar - pronator teres, supinator muscle • Wrist - wrist flexors, wrist extensors • Vertebral column - rectus abdominus, erector spinae group, internal and external obliques • Hip - iliopsoas, gluteus maximus, gluteus medius, gluteus minimus, adductor longus, adductor brevis, adductor magnus • Knee - rectus femoris, vastus medialis, vastus intermedius, biceps femoris, semimembranosus, semitendinosus • Ankle - tibialis anterior, gastrocnemius, soleus
Types of muscle function	<ul style="list-style-type: none"> • Agonist, antagonist, fixator
Types of muscular contraction	<ul style="list-style-type: none"> • Isometric • Concentric • Eccentric
Structure and function of muscle fibre types	<ul style="list-style-type: none"> • Slow oxidative • Fast oxidative • Fast glycolytic
Link between fibre types and performance	<ul style="list-style-type: none"> • In different types of physical activity and different intensities
Impact of physical activity, training and lifestyle	<ul style="list-style-type: none"> • Short term • Long term • Effects of warm ups and cool downs

An introduction!



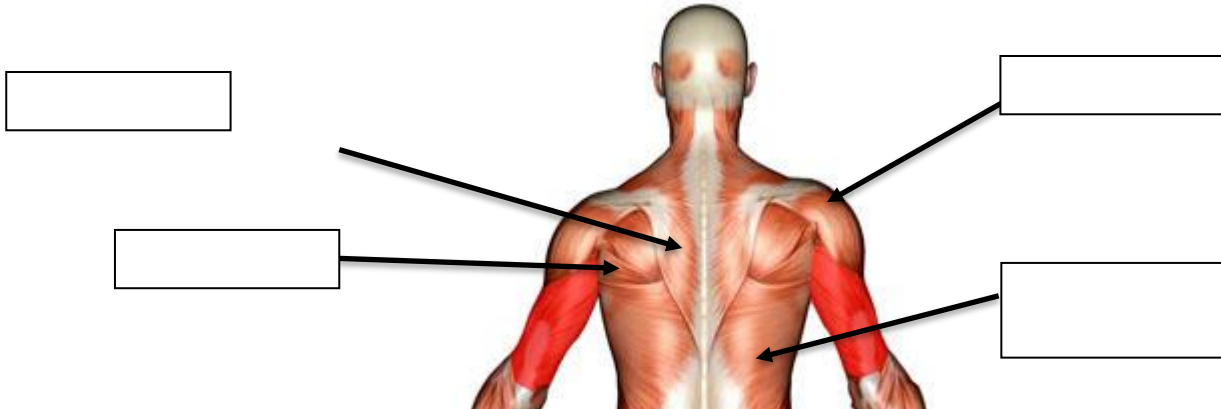
<https://youtu.be/rMcg9YzNSEs>

WATCH IT!
<https://youtu.be/t1zJwD0tWck>



Main muscles at synovial joints

1. Shoulder



2. Elbow

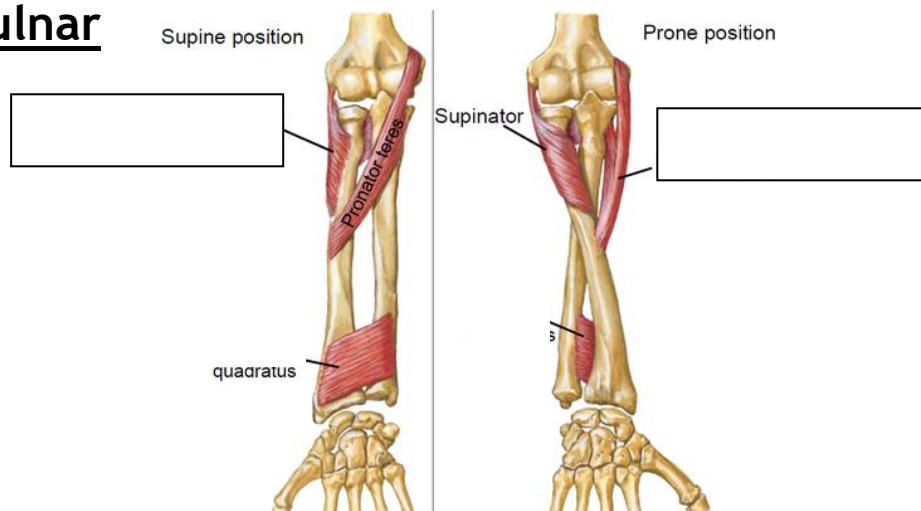


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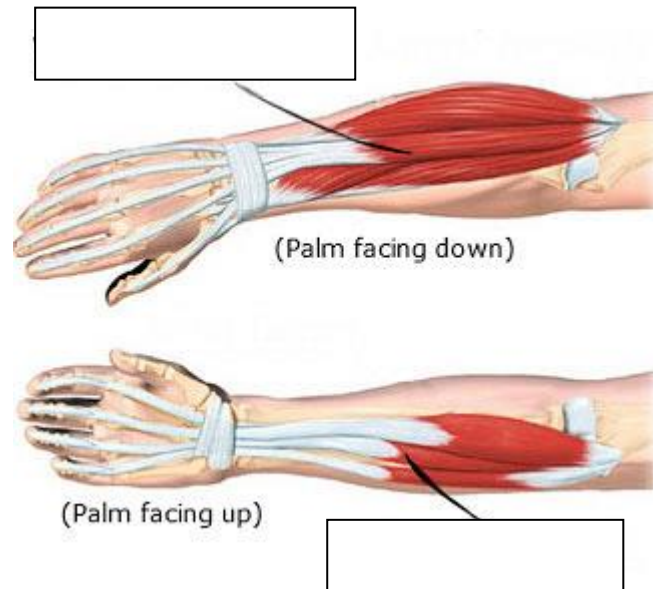
<http://www.teachpe.com/anatomy-physiology/muscles/shoulder-joint-muscles/>



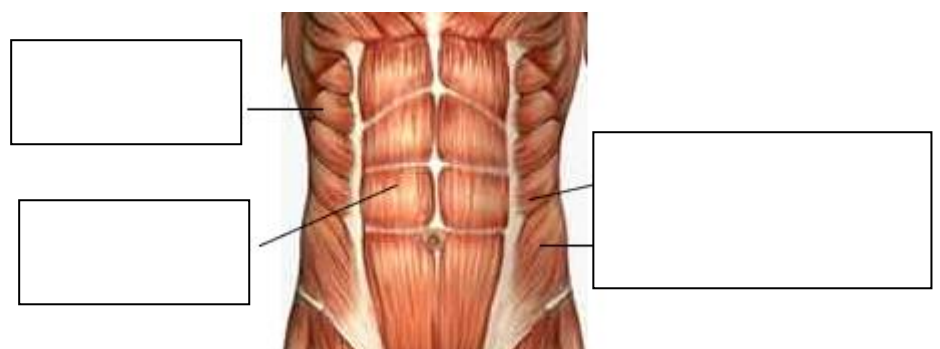
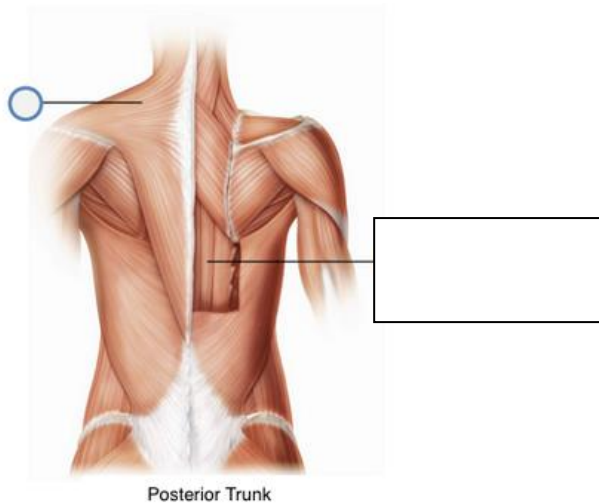
3. Radio-ulnar



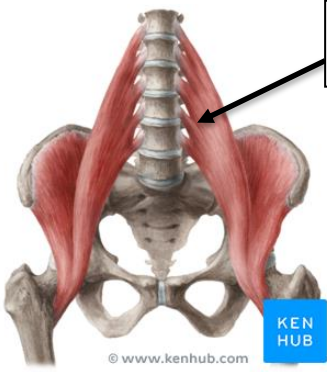
4. Wrist



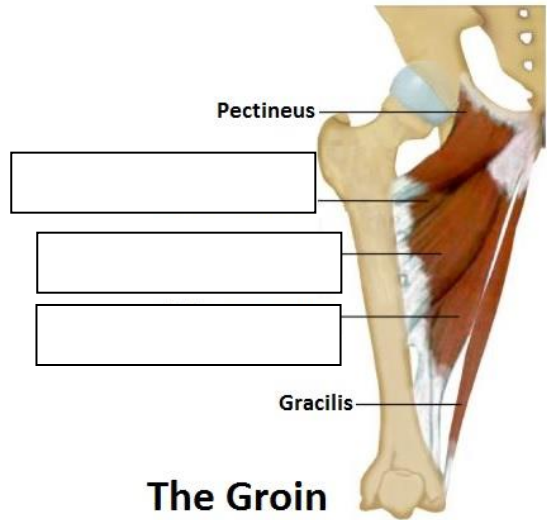
5. Vertebral column



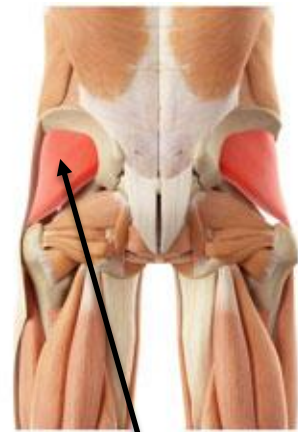
6. Hip



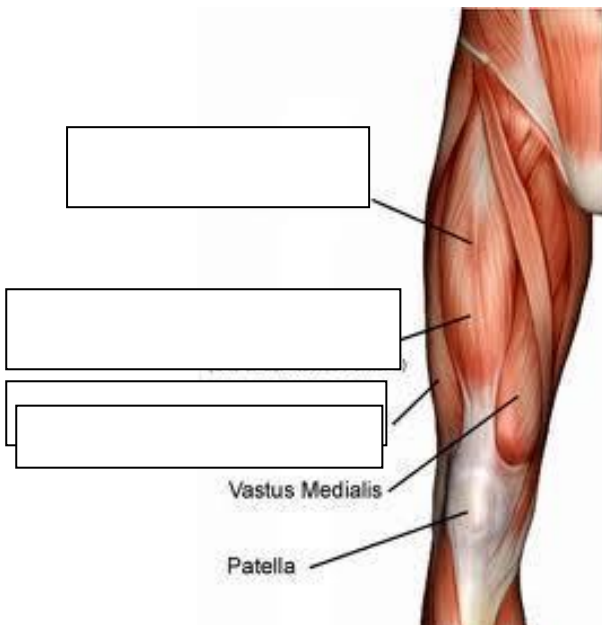
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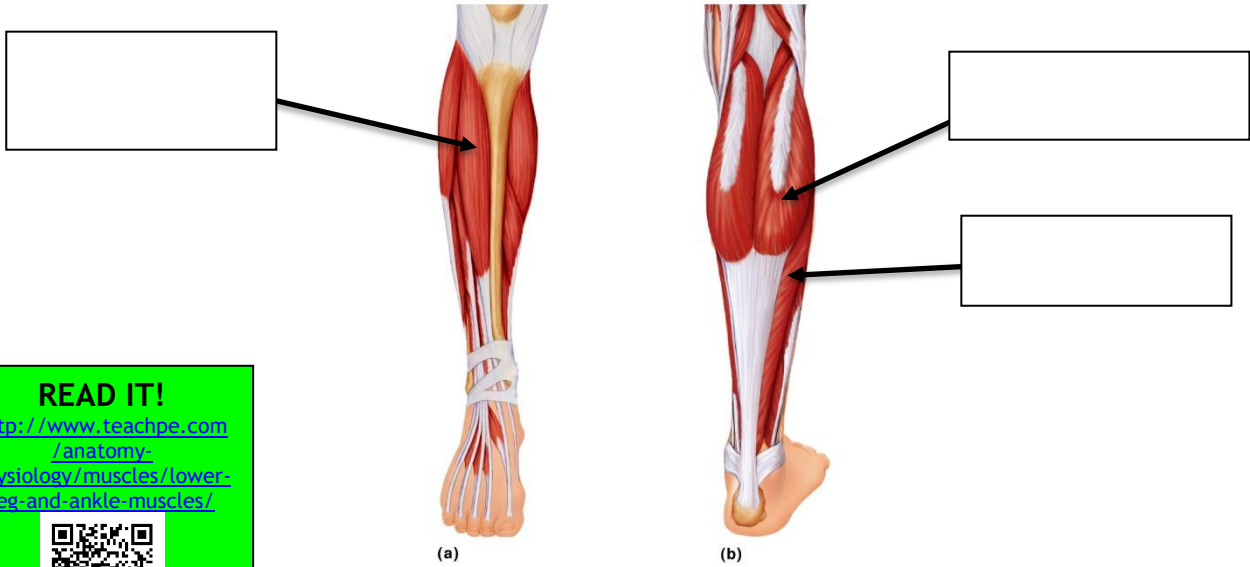


7. Knee



READ IT!
<http://www.teachpe.com/anatomy/physiology/muscles/knee-joint-muscles/>

8. Ankle



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READ IT!

<http://www.teachpe.com/anatomy-physiology/muscles/lower-leg-and-ankle-muscles/>



L3 Cambridge Technicals - Unit 1
Body systems and the effects of physical activity

Complete the table below to show joints, movement and active muscles. Use previous notes to help if necessary.

JOINT	MOVEMENT	ACTIVE MUSCLE
Shoulder	Flexion	
	Extension	
	Abduction	
	Adduction	
	Horizontal flexion	
	Medial rotation	
	Lateral rotation	
Elbow	Flexion	
	Extension	
Radioulnar	Pronation	
	Supination	
Wrist	Flexion	
	Extension	
Vertebral	Flexion	
	Extension	
	Lateral flexion	
Hip	Flexion	
	Extension, abduction	
	Adduction	
	Flexion	
Knee	Flexion	
	Extension	
Ankle	Dorsiflexion	
	Plantar flexion	

Types of muscle function

When completing movements such as walking or squatting, there are a lot of different muscles involved in order to complete the movement smoothly and effectively.

Muscles work in pairs as they can pull but they cannot push.

The roles that a muscle can fulfil during movement are:

1. Agonist

- The agonist in a movement is the muscle(s) that provides the major force to complete the movement. Because of this agonists are known as the '**prime**

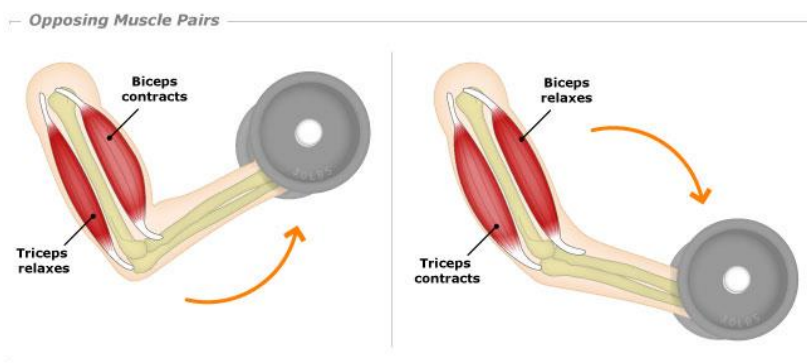


movers'.

In a bicep curl, which muscle is the agonist (the muscle producing the movement)?

2. Antagonist

- The antagonist in a movement refers to the muscles that **oppose the agonist** - in other words, it is the muscle that relaxes when the agonist is producing the movement
- The antagonist doesn't always relax though. Another function of antagonist muscles can be to slow down or stop a movement



- **REMEMBER** - a muscle will take on either the agonist or antagonist role depending on the movement being performed

3. Fixator

- The synergist in a movement is the muscle(s) that **stabilises** a joint around which movement is occurring, which in turn helps the agonist function effectively

Types of muscular contraction

Muscles contract in two different ways: **isotonically** and **isometrically**.

Isotonic contractions

Occur when the muscle changes length when it contracts which results in movement of the limbs

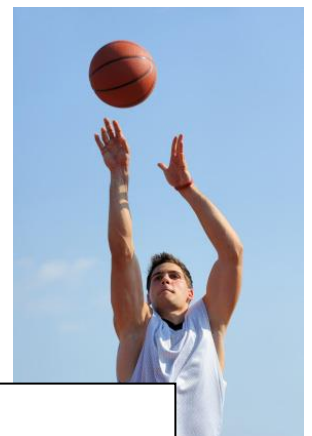
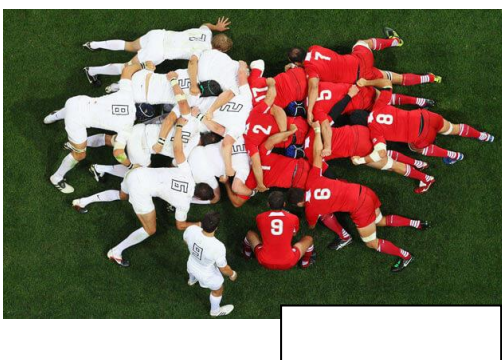
- *Concentric* - muscle contracts and **shortens**
- *Eccentric* - muscle contracts and **lengthens**



Isometric contractions

Occur when the muscle stays the same length. There is no actual movement of either the limb or the joint because the muscles are keeping the joint stationary.

On the pictures below identify which show isometric, concentric or eccentric muscular contractions.



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Body systems and the effects of physical activity

You now need to complete a movement analysis which combines movements, contraction types and active muscles.

Using the bicep curl as an example, describe the movement identifying a description of the movement, the type of contraction and the agonist/antagonist.



Downward phase

- _____
- _____
- _____
- _____

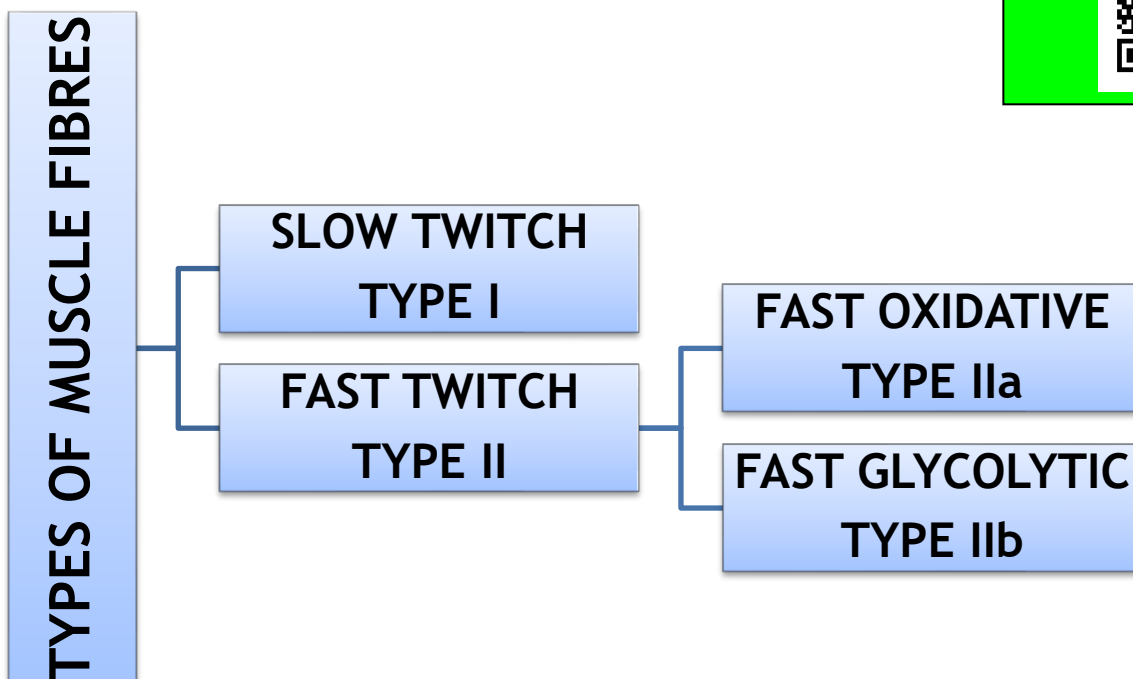
Upward phase

- _____
- _____
- _____
- _____

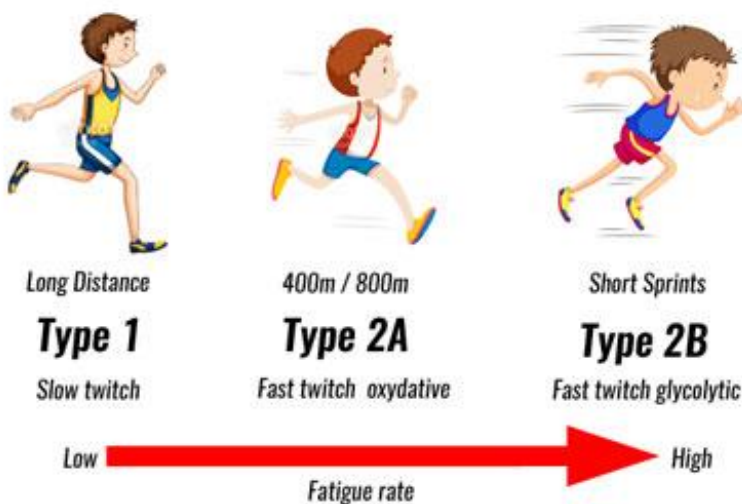
Structure and function of muscle fibre types

There are two different types of muscle fibre in our bodies - **slow twitch** and **fast twitch**. The percentage of fast and slow twitch fibres we have is largely decided by genetics ie what our parents give us, although we can alter the ratio to some degree through training and exercise.

The amount of fast and slow twitch muscle fibres can dictate what type of sports and athletic events we can excel in.



Muscle Fibre Types



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Body systems and the effects of physical activity

- **Slow twitch - Type I**

- _____
- _____
- _____
- _____

- **Fast twitch - Type II**

- _____
- _____
- **Type IIa (fast oxidative)**
 - _____
 - _____
 - _____
 - _____
- **Type IIb (fast glycolytic)**
 - _____
 - _____
 - _____
 - _____

MUSCLE FIBERS FACE OFF	
SLOW TWITCH	FAST TWITCH
Efficient in using oxygen	Do not burn oxygen to create energy
Delayed muscle firing	Fast to fire; best for explosive body movements
Do not fatigue easily	Tire out quickly
Best suited for: endurance sports, including cycling, marathon running and long-distance triathlons!	Best suited for: short bursts of activity, including sprinting races, pole vaulting and cross fit-style events



WATCH IT!
<https://youtu.be/j-mHQAcvZfc>

Muscle fibres and physical activity

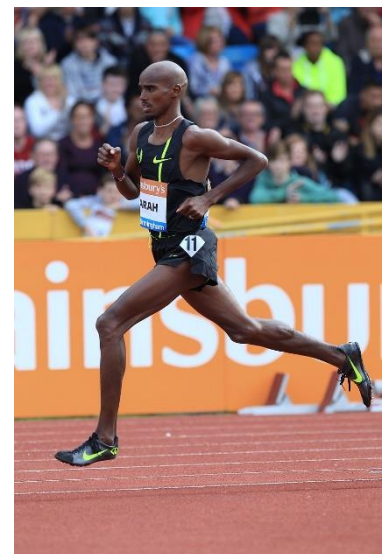
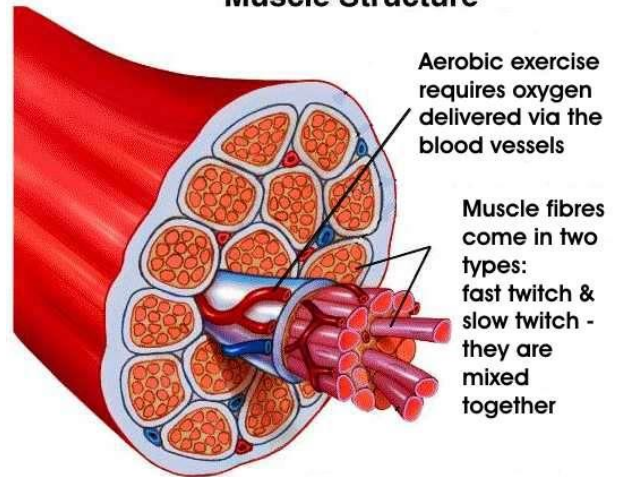
The way that our muscles are made up of the different fibre types will have a direct impact on the types of activity we can be good at.

An athlete such as **Usain bolt** will have a very high percentage of fast twitch (type IIB) fibres in his legs.

Mo Farah will have a higher percentage of slow twitch (type I).

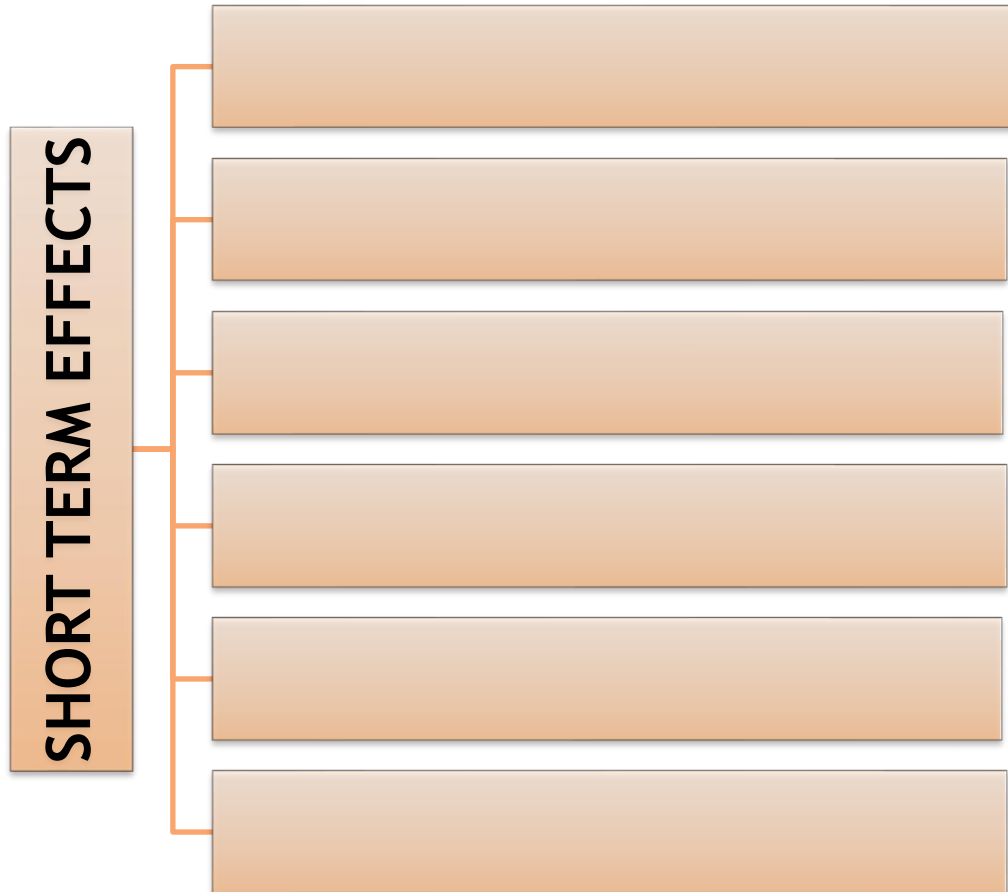
A centre player in netball will have a more balanced percentage of fibres.

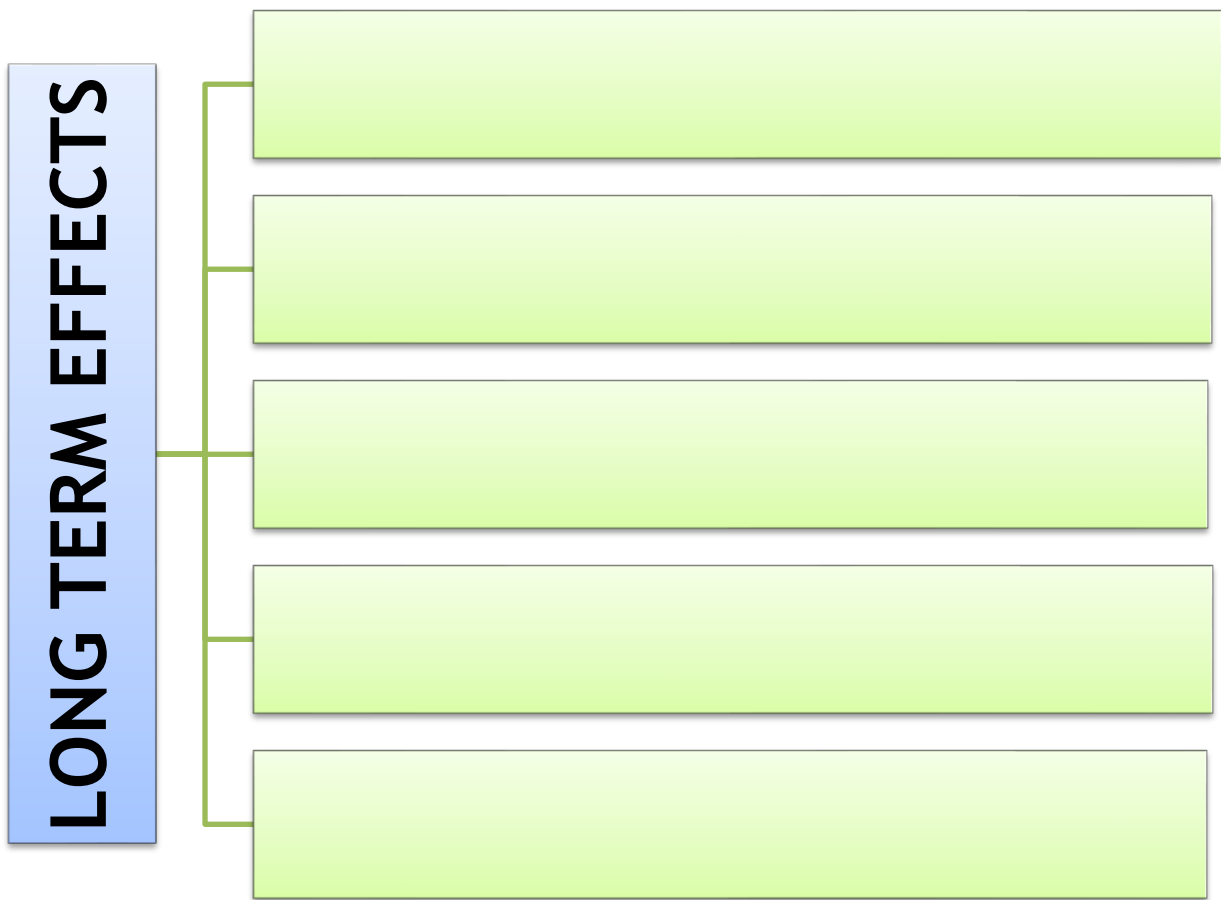
Muscle Structure



Impact of physical activity, training and lifestyle

There are a number of positive effects on the muscular system after a programme of physical activity.





Warm ups and cool downs

Can you describe the effects of warm ups and cool downs on the muscles?

READ IT!
<https://www.brianmac.co.uk/warmup.htm>

