

Level 3 PT YMCA Awards Park Centre A&P Muscles  
Structure Function Contractions Fibres Types

List and describe the three muscle types in the body: P18/19

1 Cardiac Heart Myocardium

2 Smooth Involuntary

3 Skeletal Voluntary Striated Striped

What surrounds each muscle fibre? Endomysium

What surrounds each fascicle (bundles of fibres)? Perimysium

What surrounds the whole muscle (bundles of bundles of fibres)? Epimysium

What are the connective tissues made of? Collagen fibres

What are the two contractile protein strands within muscle fibres called? Actin and myosin

What are the sections of the myofilament called where the Actin and Myosin cross bridging (sliding filament theory) takes place? Sarcomere

*Cross Bridges project from Myosin filaments – the Myosin Head*

*The Myosin Heads 'walk' along the Actin pulling it closer to the midline of the sarcomere*

*This is known as the Sliding Filament Theory*

Online content: video to watch: <https://www.youtube.com/watch?v=BMT4PtXRCVA>

What does Calcium do to make this process happen? Calcium allows myosin head to connect with actin, by binding with troponin to open binding sites for cross bridging to take place. Tropomyosin, that usually blocks the binding site, is inhibited to allow this to happen.

Where is Calcium stored? Sarcoplasmic Reticulum within Sarcoplasm

What role does Sodium play in muscle contraction? Changes electrical conductivity of cell so activity can take place

What is the chemical structure of ATP? Adenosine and Three Phosphates

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Where are there limited stores of ATP? In the muscles

What is the role of ATP in Sliding Filament Theory?

ATP activates the myosin head so it can continue to 'cross bridge' with actin allowing more action can take place

*Nerve impulses from Motor Neurons cause Myosin heads to interact with Actin Filaments*

*Axons carry messages from motor neurons to muscles*

*Dendrites receive messages from muscles to sensory neurons*

What are the three types of skeletal muscle fibre types and list some of their characteristics

1 Slow Oxidative – low firing threshold, low to medium intensity, contract smoothly and slowly, good blood supply – capillary supply, high in mitochondria, as aerobic energy can only be produced within mitochondria, resistant to fatigue as they only give off heat water CO<sub>2</sub> that the body can deal with easily

2a Fast Oxidative Glycolytic – intermediate fibres, not true SO or FG, but have mixed characteristics of both

2b Fast Glycolytic – contract quickly, generate lot of force, use only glycogen, need large stimulus – high firing threshold, short duration, not reliant on oxygen, can only use glycogen, gives off lactic acid, contain more myosin and actin so fibres are thicker, not a good blood supply, not many mitochondria, low myoglobin levels

What is the usual muscle fibre recruitment pattern when performing an activity? Slow twitch first, then fast twitch as intensity increases

What factors will affect the muscle fibre recruitment patterns? Exercise intensity, fitness levels, skill levels and coordination, movement of specific activity

How does muscle Hypertrophy occur? New myosin and actin fibres are laid down around the outside of the existing myofibril

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How is Hypertrophy different from muscle Hyperplasia? The splitting of a muscle fibres to produce more fibres.

In humans is Hypertrophy or Hyperplasia more likely? Hypertrophy

What adaptations take place in muscle fibres with prolonged endurance/aerobic training? P24

What adaptations take place with prolonged resistance/strength training? P25

Where in the body are you likely to have a lot of slow twitch/type 1 muscle fibres? Postural muscles, around spine, soleus and so on

NOTES: