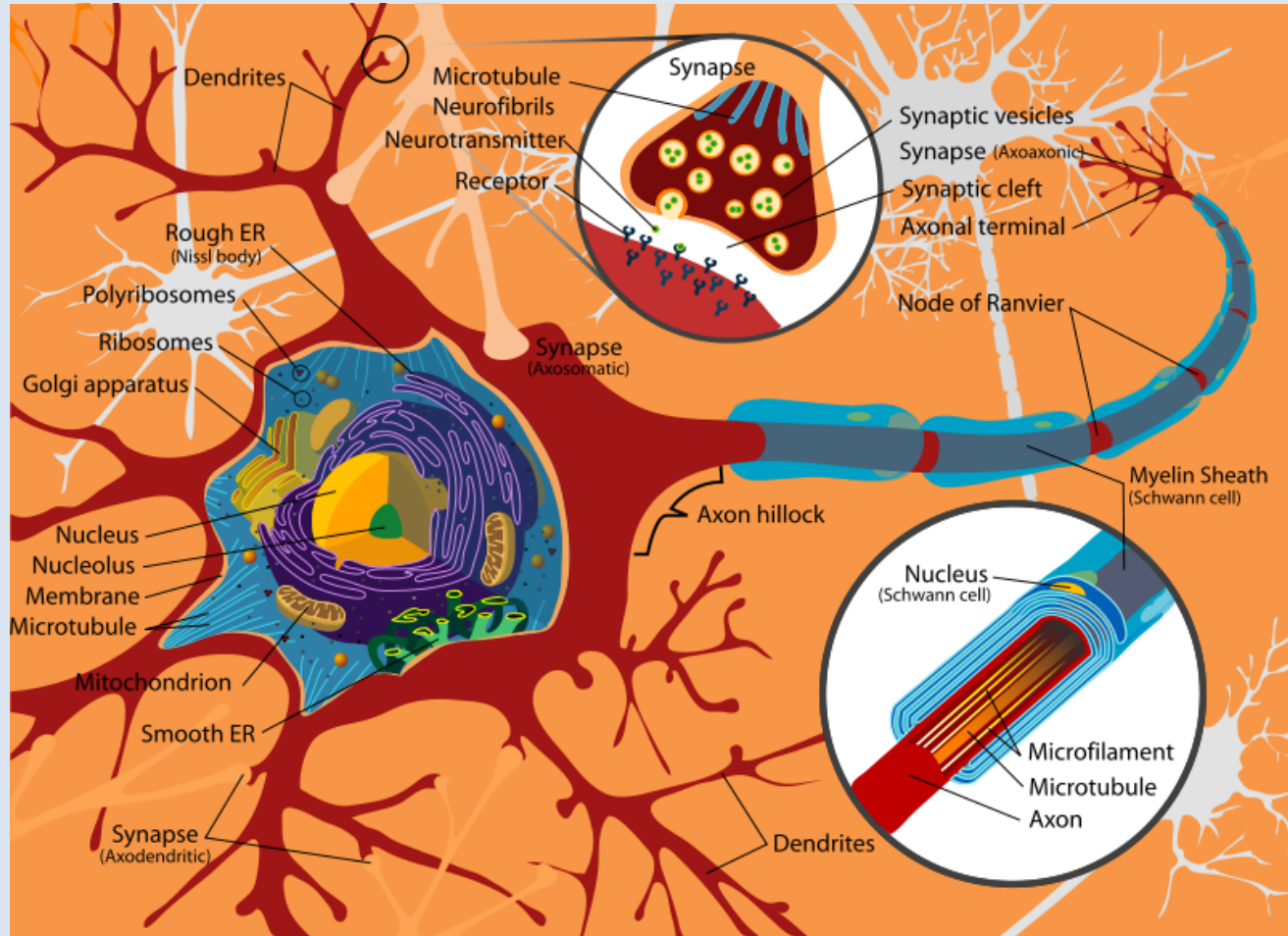


3A/3B FUNCTIONAL ANATOMY

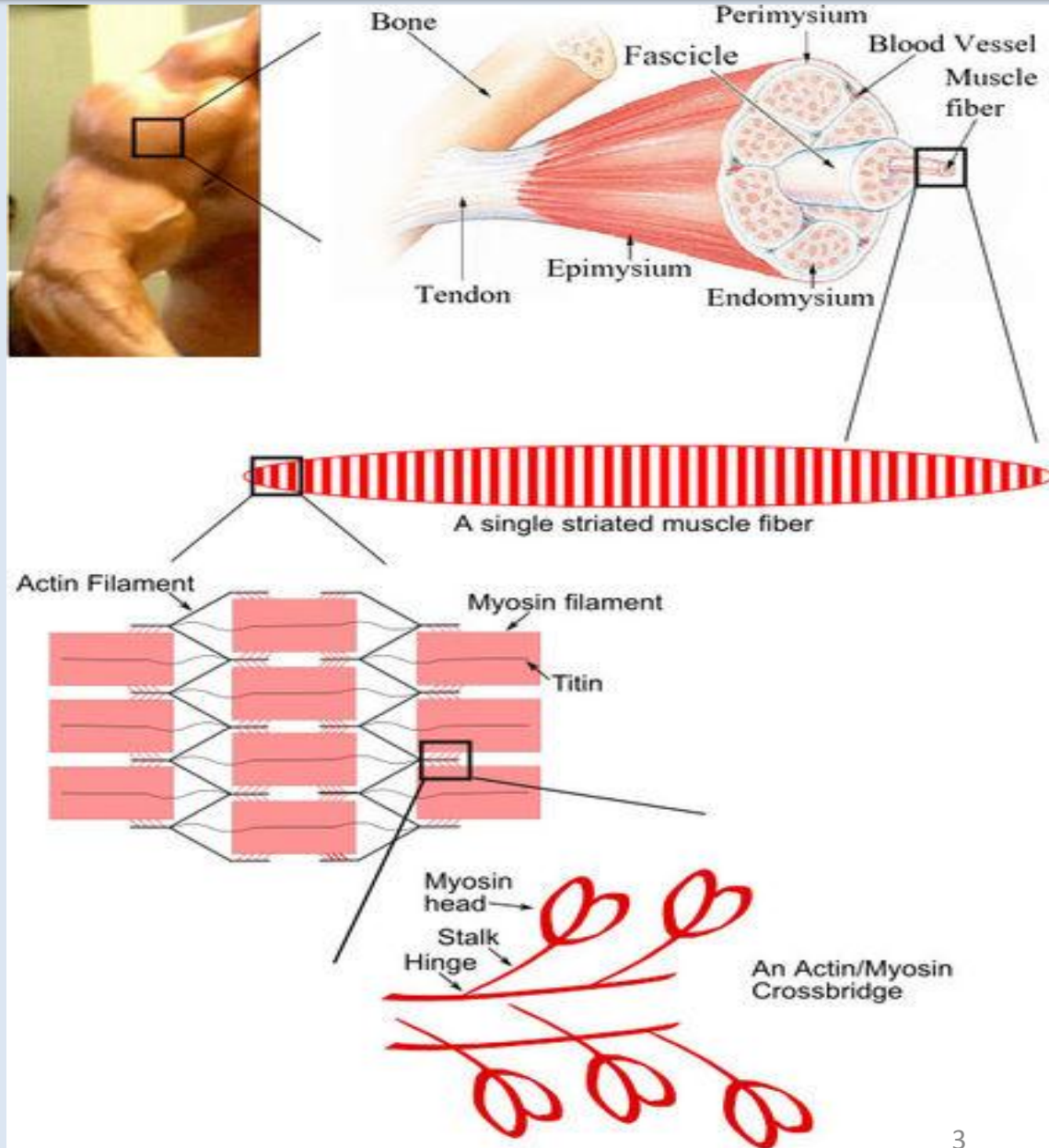


http://commons.wikimedia.org/wiki/File:Complete_neuron_cell_diagram_en.svg

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STRUCTURE OF A SKELETAL MUSCLE

This diagram represents the various levels of skeletal musculature



HOW DO WE PRODUCE MOVEMENT?

The human body is made up of over 600 muscles, working together to provide both conscious and subconscious movements for the human body.

One of the major functions of the muscular system is to produce movement;

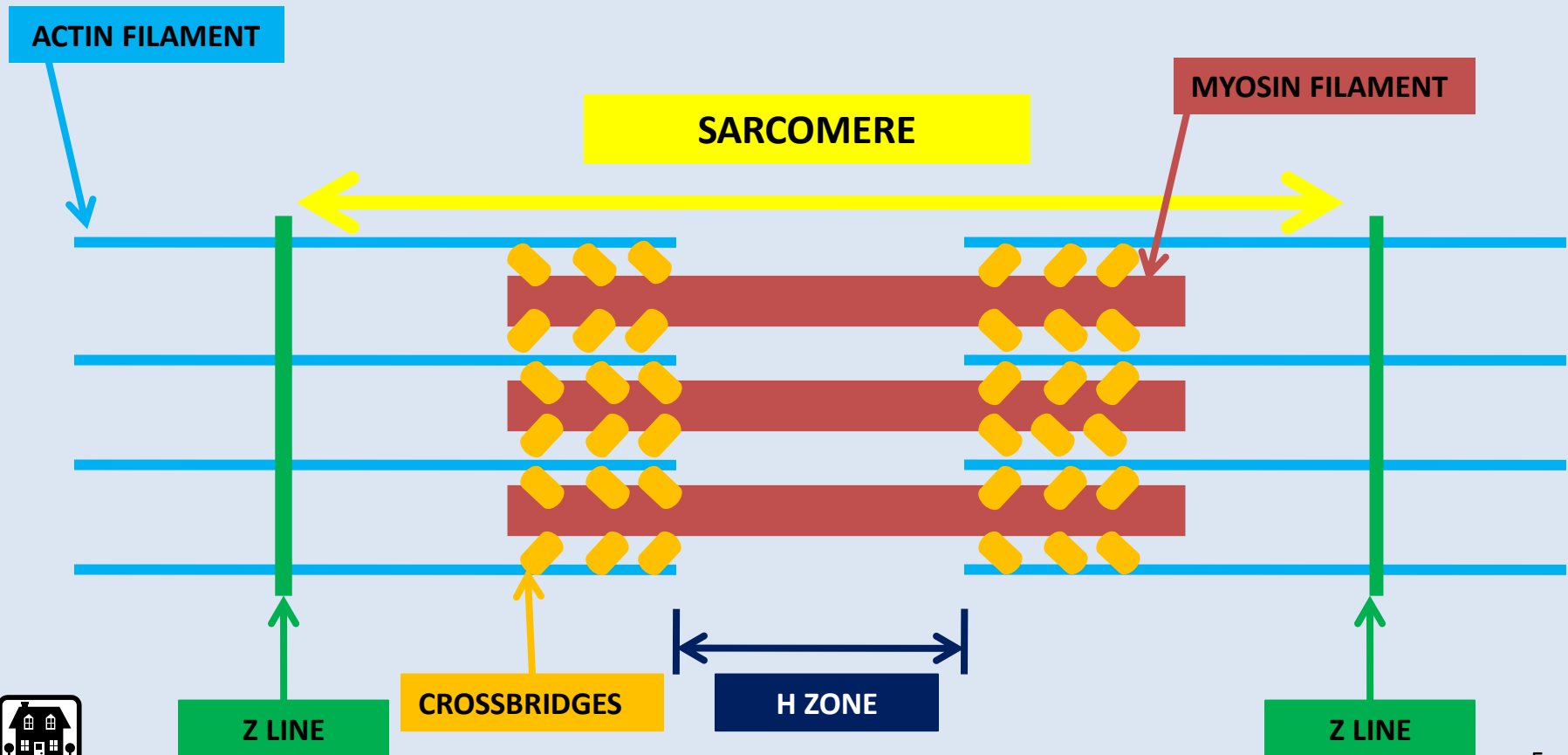
PRODUCE MOVEMENT

- Skeletal muscles which are consciously controlled (voluntary) are attached to bones
- When we want to produce movement e.g. walking, swimming, the CNS sends a message from the brain to the relevant muscle to contract, resulting in “pulling the bone” causing movement to occur.
- This enables the human body to respond quickly to changes in the external environment e.g. changing direction in a game of sport



STRUCTURE OF A SARCOMERE

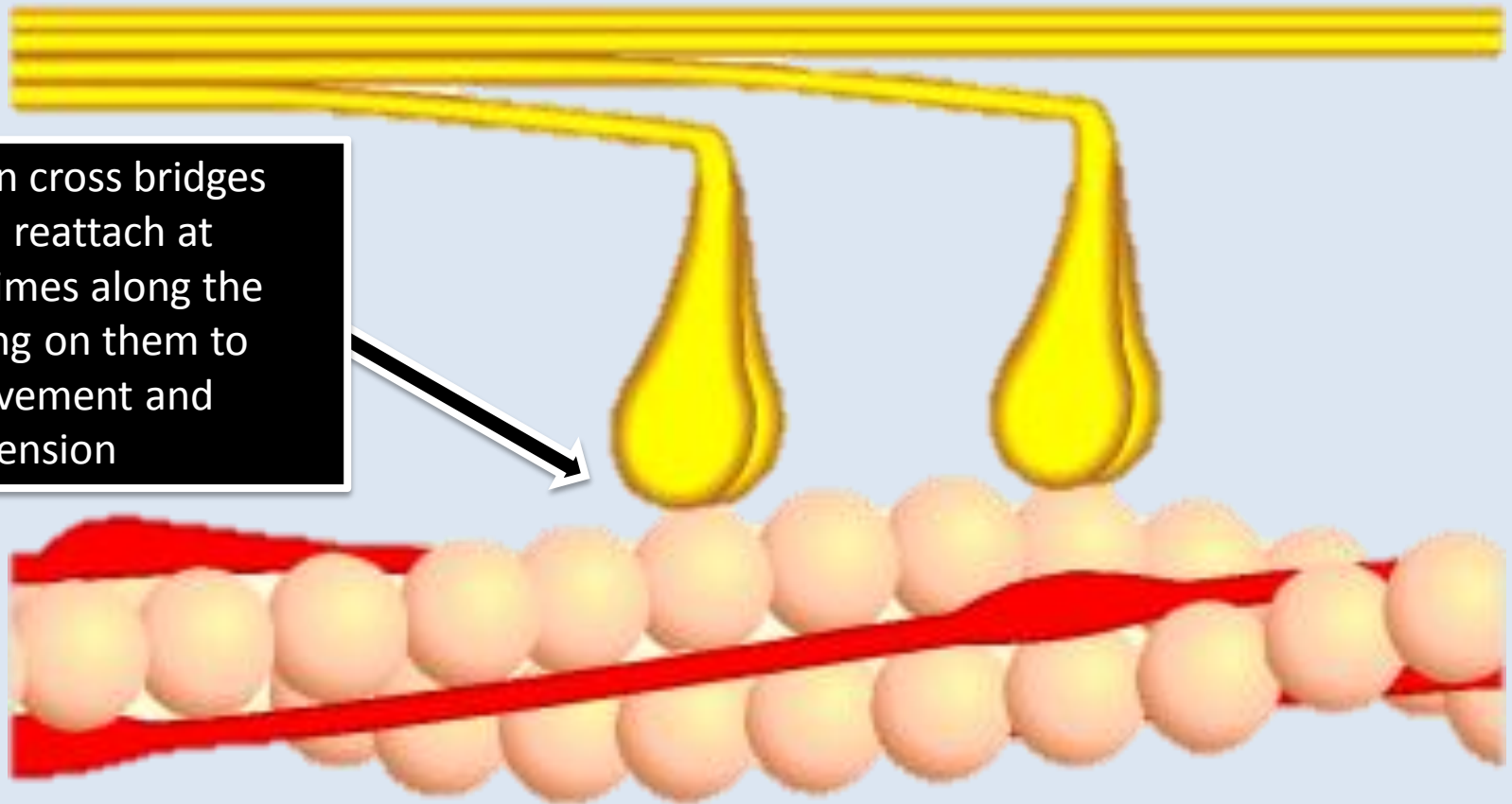
The diagram below shows the part a myofibril called a sarcomere. This is the smallest unit of skeletal muscle that can contract. Each myofibril is made up of many sarcomeres joined end to end which are separated by their Z – lines.



SLIDING FILAMENT THEORY

- Biomechanists use sliding filament theory to explain the shortening of the sarcomere (concentric contraction) and the resulting contraction of the muscle.
 - When there is a neurochemical stimulation, calcium is released into the muscle prompting a reaction in each muscle fibre between the myosin and the actin filaments.
 - Myosin filaments contain **crossbridges** at regular intervals. These cross bridges attach and reattach at different times along the actin pulling on them to create movement and maintain tension
 - This causes the actin to move into the centre of the sarcomere, shortening the myofibril and causing the actin and myosin filaments to be almost fully overlapped when in a fully contracted position
 - As each sarcomere shortens, so does the total length of each muscle fibre
 - When the contraction finishes, the myosin and actin filaments return to a relaxed position

SLIDING FILAMENT THEORY



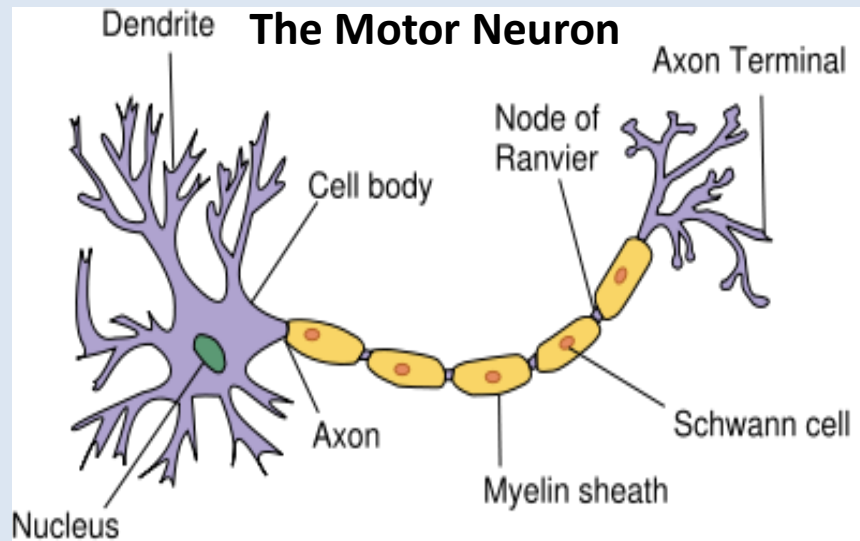
The myosin cross bridges attach and reattach at different times along the actin pulling on them to create movement and maintain tension

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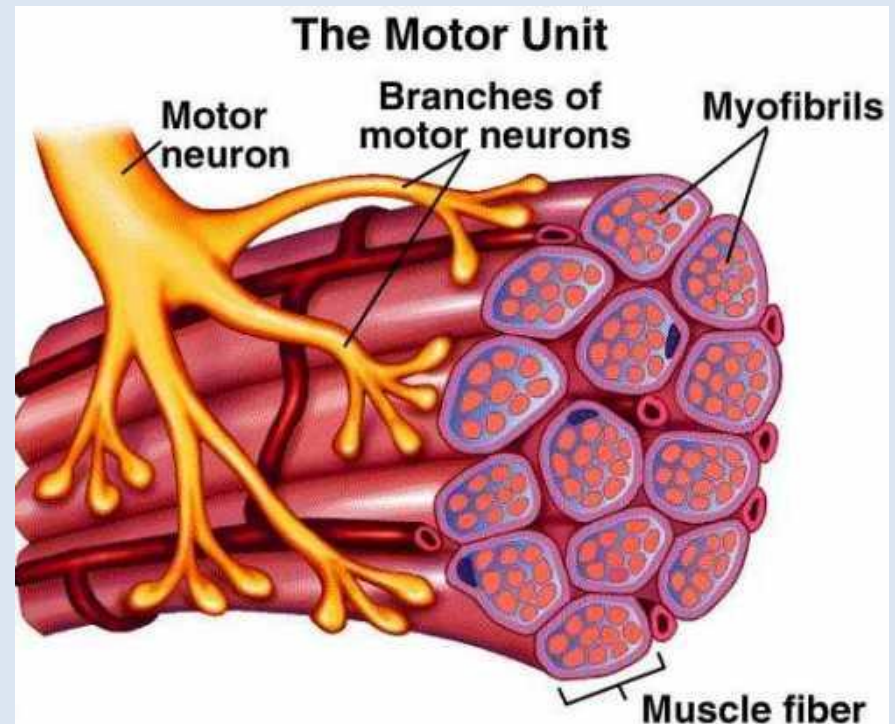
NERVOUS CONTROL OF MUSCULAR CONTRACTION

- Understand the function of the nerve, impulse, spinal chord, motor unit (dendrite, axon, neurone)
- Describe the relationship between muscle contraction and nerve function.

Curriculum Council of Western Australia. Physical Education Studies Support Document 2009.



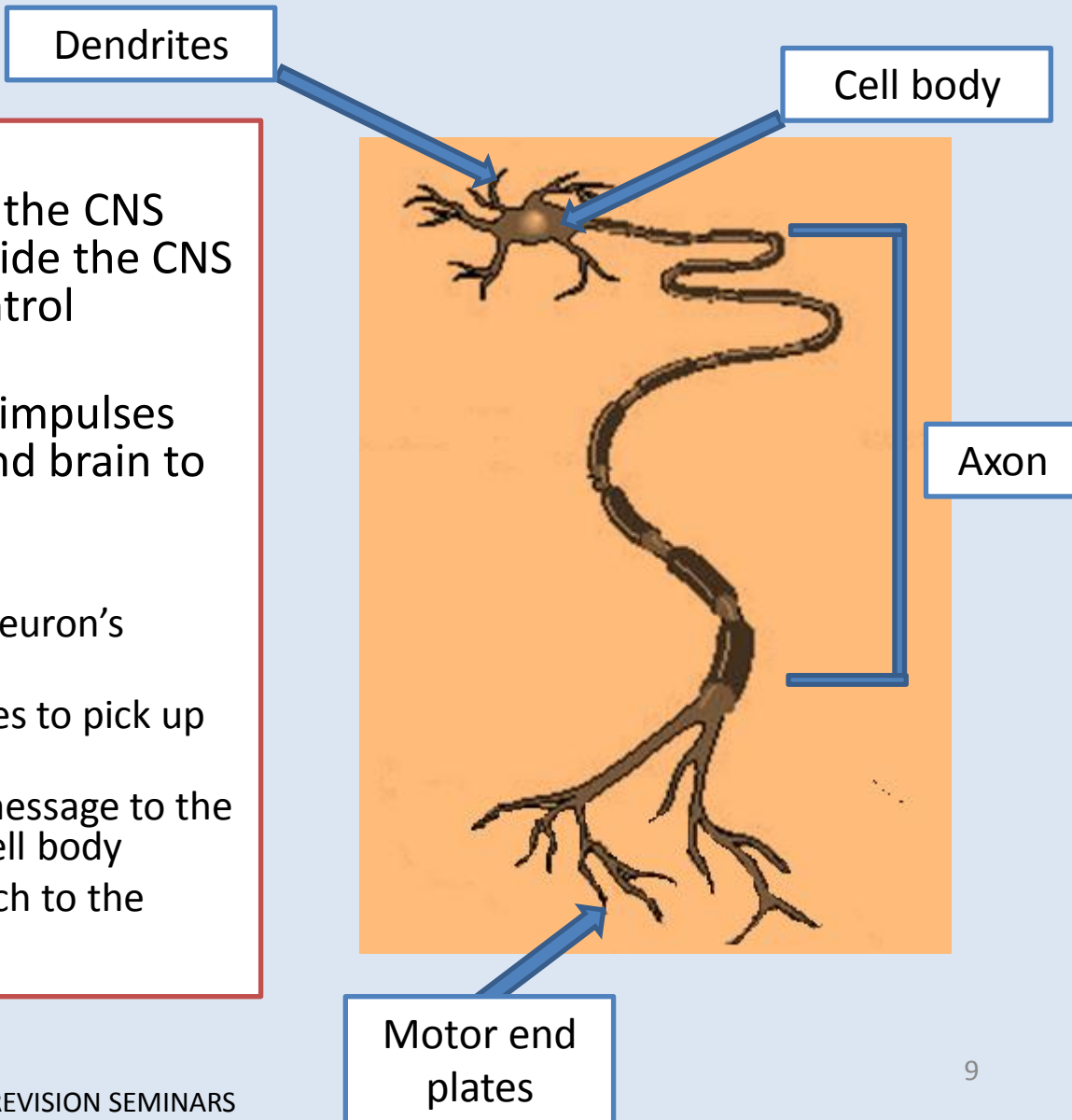
<http://commons.wikimedia.org/wiki/File:Neuron.svg>



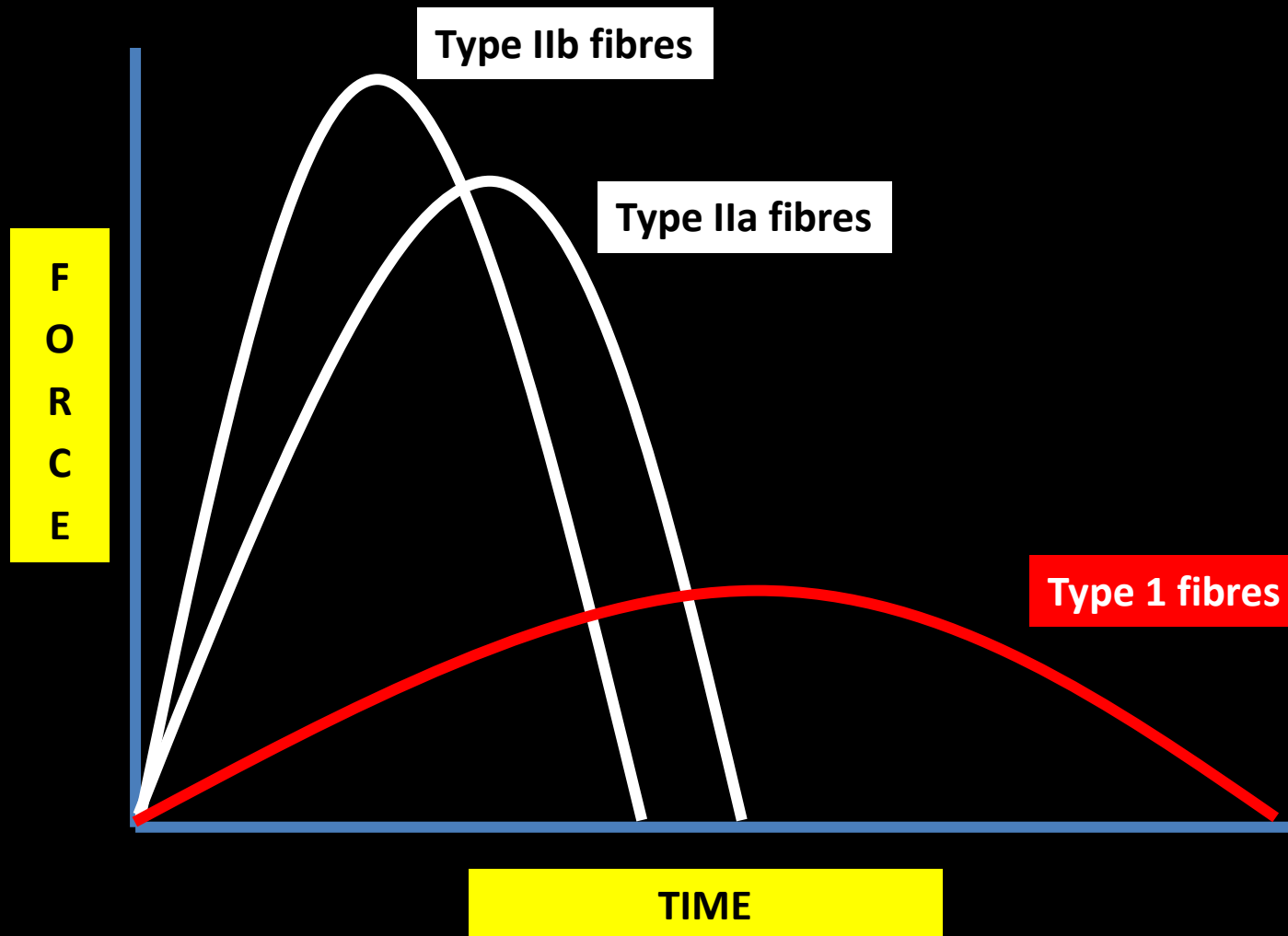
MOTOR NEURON

MOTOR NEURON

- Refers to neurons located in the CNS that project their axons outside the CNS and directly or indirectly control muscles.
- It is responsible for carrying impulses away from the spinal cord and brain to the muscles or glands
- It consists of;
 - A cell body that directs the neuron's activities
 - Dendrites that act as branches to pick up the impulse
 - An axon that transmits the message to the muscle and away from the cell body
 - Motor end plates which attach to the muscle fibres



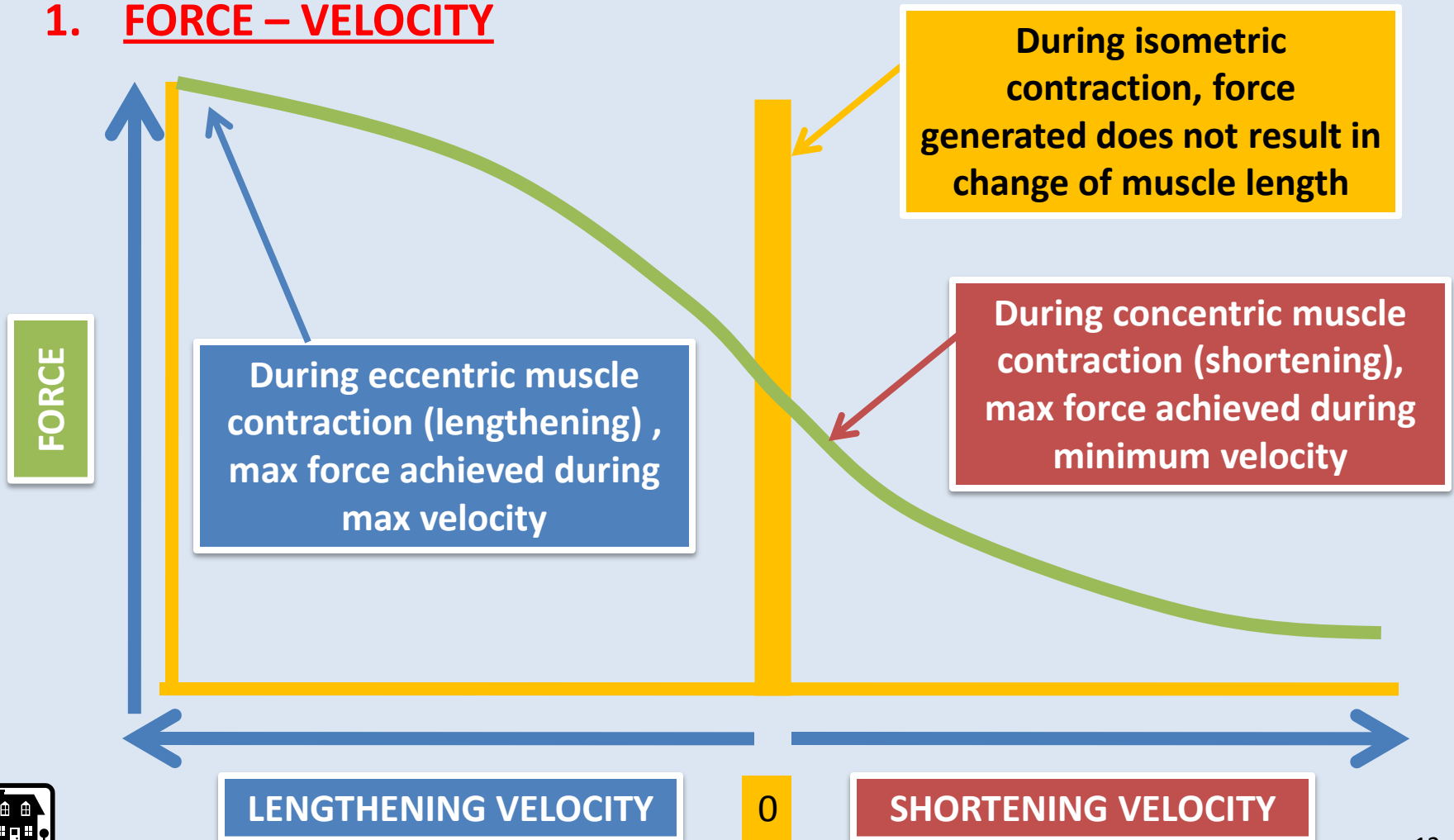
COMPARISON OF FORCE DEVELOPMENT OVER TIME



Fibre Type	Slow Twitch (Type 1)	Fast Twitch (Type 2A)	Fast Twitch (Type 2B)
Contraction Time	Slow	Fast	Very Fast
Size of Motor Neuron	Small	Large	Very Large
Resistance to Fatigue	High	Medium	Low
Activity used for	Aerobic	Long term Anaerobic	Short term Anaerobic
Force Production	Low	High	Very High
Capillary Density	High	Intermediate	Low
Oxidative Density	High	Moderate	Low
Glycolitic Capacity	Low	High	High
Major Fuel Source	Triglycerides and glycogen	Creatine phosphate and glycogen	Creatine phosphate and glycogen

MECHANICAL CHARACTERISTICS OF A MUSCLE

1. FORCE – VELOCITY



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