

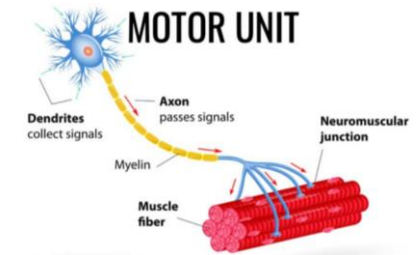
Keywords	
Word	Definition
Slow Oxidative Muscle Fibres	Type 1 muscle fibres, high aerobic capacity, recruited for endurance based activity.
Fast Oxidative Glycolytic Muscle Fibres	Type 2a muscle fibres, medium aerobic capacity, high anaerobic capacity, recruited for events such as 800m/1500m.
Fast Glycolytic Muscle Fibres	Type 2x muscle fibres, high anaerobic capacity, high force production, recruited for events such as 100m/200m sprint.
Functional Characteristics	What the fibre can do as a result of its structural characteristics.
Structural Characteristics	The physical make-up of the fibre.
Proprioceptors	Sensory cells found in the muscles, tendons and joints. Muscle spindles and Golgi-tendon organs are types of proprioceptors
Myoglobin	Oxygen carrying pigment in the muscle fibre which transports oxygen to the mitochondria for respiration.

Key skills

- Analysis of muscle fibre characteristics to ascertain the fibres functional abilities.
- Evaluation of PNF theory

The Motor Unit

A motor unit consists of the motor neuron and the muscle fibres it innervates. The motor neuron is attached to the same type of muscle fibres, eg. all Type1 or All Type2a.

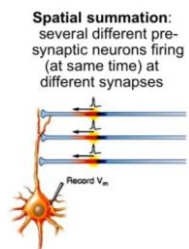
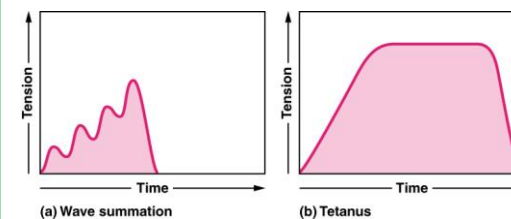


Altering Strength of Contraction

A performer needs to alter the strength of muscular contraction to exert the correct amount of force to perform a skill accurately. To do this, the following occurs:

- Type of motor unit recruited, fast or slow twitch fibres
- Size of motor unit recruited, small or large number of fibres within the motor unit.
- Number of motor units recruited, more or less motor units.

Wave Summation, the greater the frequency of stimuli, the greater tension will develop in the muscle causing a greater force of contraction. This produces a forceful, sustained, smooth muscle contraction known as a **tetanic contraction**.



Spatial Summation, impulses are received at different places on the neuron which add up to meet the muscle's threshold and produce a contraction. More and larger motor units are recruited this way and these can be alternated to increase the muscle's endurance capacity and delay fatigue by rotating motor units recruited within the muscle.

Proprioceptive Neuromuscular Facilitation (PNF)



A partner will perform a passive stretch on the target muscle to its point of resistance for 30secs.



The muscle spindles will detect the length and speed of the stretch. If stretched too far a stretch reflex will occur.

PNF IS REPEATED UNTIL NO MORE GAINS CAN BE MADE



The performer will isometrically contract the target muscle against the partner for 10 seconds



The golgi tendon organs are activated as they detect tension in the muscle and the tendon. They send inhibitory signals which overrides the stretch reflex, known as autogenic inhibition.



The partner will extend the stretch further the second time and hold for 30 seconds.



Autogenic inhibition causes a sudden relaxation of the target muscle. The partner is then able to stretch the target muscle past its original point of resistance, increasing flexibility.

PNF as a Specialist Training Method

- One of the most effective forms of flexibility training.
- For advanced performers or performers with higher levels of flexibility.
- Higher flexibility increases performance in many sports, so it is a method for all types of performers.
- Higher risk of injury, a thorough warm-up is required. Recovery is needed after each PNF session. It is a time consuming method of training
- A knowledgeable partner is required to gain the most from PNF.

Box 6: Pathway

Previous knowledge: Components of fitness, methods of training, principles of training.

Future links: Specialist training methods.

Careers: Physiotherapy, Sports Therapy, Sports Medicine, Exercise Physiologist.

Box 7: Cross curricular links