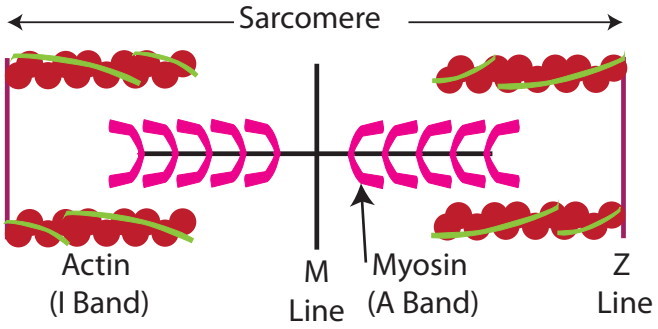
First 2010
VIVA 4

This station is concerned with the physiology and pharmacology related to the musculoskeletal system Candidates were asked to draw and label a sacromere, outline the physiological events relating to muscle contraction, length – tension relationship, muscle relaxants, malignant hyperthermia and dantrolene

"Please draw and label a sarcomere"



"Outline the physiological events leading to contraction"

There is a propogation of nerve signal
Release of ACh at the presynaptic junction
Activation of nicotinic receptors at the neuromuscular junction
Propogation of action potential in th muscle
Release of calcium from the sarcoplasmic reticulum
Exposure of actin to myosin
ATP dependent process of muscle shortening due to the movement of the mysoin tails

"What is the tension length relationship?"

is based on the sliding filament theory
can be represented by a starling force curve, optimal position enables good overlap
contracted is too much overlap and over stretched is insufficent overlap

"Discuss the pharmacology of suxmethonium"

is a depolarising neuromuscular blocking agent used primarily in rapid sequence induction
is presented as a clear colourless solution in vials of 100mg in 2 ml it has a shelf life of 4 weeks
its structure is two linked ACh molecules
mechanism -mimics the action of ACH, binding to the two alpha subunits and depolarises the muscle
side effects: raised IOP/gastric pressure, myalgias, arrhythmias, MH, anaphylaxis, sux apnoea, inceased K
The effective dose for 95% of patients having NMB is around 0.3-0.6mg/kg, but is usually given 1mg/kg
Only about 20% reaches the NMJ due to metabolism by hydrolysation and plasma esterases
It has a very short half life of several minutes, and is excreted in the urine as inactive metabolites

"Can you explain the mechanism of malignant hyperthermia"

the mechanism of MH is due to a genetic susceptibility to the accumulation of intracellular Ca
this only occurs in the presence of certain anaesthetic agents
it is believed that it is the result of an abnormal ryanodine receptor
the symptoms include rigidity, which increases ATP use, causing hyperthermia and lactic acidosis

"What is the treatment for MH?"

appropriate history taking before the anaesthetic can avoid the risk of MH
early recognition look for unexplained tachycardia, hypercapnia (ETCO2) or masseter spasm as first signs
treatment with dantrolene which binds the ryanodine receptors and prevents further Ca release
increased ventilation, and oxygenation, monitoring for hyperkalaemia and ECG changes
cooling and insertion of an IDC is important supportive measures