

Movement and Kidney Review

What I might put on the test:

- 1) Be able to draw and label a sarcomere (sarcomere, actin, myosin, Z-line, dark band, light band) and a kidney (renal artery, renal vein, ureter, cortex, medulla, renal pelvis)
- 2) Be able to outline the process of a muscle contraction from arrival of nerve signal and on.
- 3) Be able to annotate with labels and function: human elbow joint, nephron
- 4) Be able to describe the features of a muscle cell.
- 5) Be able to outline the features that lead to ultrafiltration at the glomerulus and Bowman's capsule area.
- 6) Be able to describe what happens at different parts of the nephron: proximal convoluted tubule, loop of Henle, distal convoluted tubule, and collecting duct.
- 7) Be able to outline the function of ADH and what can interfere with it.
- 8) Be able to distinguish between osmoregulators and osmoconformers.
- 9) Be able to describe how Malpighian tubules work.
- 10) Be able to describe the differences in nitrogenous waste between different organisms (marine, mammals, birds).
- 11) Be able to describe the relationship between loop of Henle length and need to conserve water.
- 12) Be able to describe how kidney failure can be treated (hemodialysis and organ donation).

11.2 Movement

Understanding

- Bones and exoskeletons provide anchorage for muscles and act as levers
- Movement of the body requires muscles to work in antagonistic pairs
- Synovial joints allow certain movements but not others
- Skeletal muscle fibres are multinucleate and contain specialized endoplasmic reticulum
- Muscle fibres contain many myofibrils
- Each myofibril is made up of contractile sarcomeres
- The contraction of the skeletal muscle is achieved by the sliding of actin and myosin filaments
- Calcium ions and the proteins tropomyosin and troponin control muscle contractions
- ATP hydrolysis and cross-bridge formation are necessary for the filaments to slide

Applications and Skills

- Antagonistic pairs of muscles in an insect leg
- Annotation of a diagram of the human elbow
- Drawing labelled diagrams of the structures of a sarcomere
- Analysis of electron micrographs to find the state of contraction of muscle fibres

11.3 The kidney and osmoregulation

Understanding

- Animals are either osmoregulators or osmoconformers
- The Malpighian tubule system in insects and the kidney carry out osmoregulation and removal of nitrogenous wastes
- The composition of blood in the renal artery is different from that in the renal vein
- The ultrastructure of the glomerulus and Bowman's capsule facilitate ultrafiltration
- The proximal convoluted tubule selectively reabsorbs useful substances by active transport
- The loop of Henle maintains hypertonic conditions in the medulla
- The length of the loop of Henle is positively correlated with the need for water conservation in animals
- ADH controls reabsorption of water in the collecting duct
- The type of nitrogenous waste in animals is correlated with evolutionary history and habitat

Applications and Skills

- Consequences of dehydration and overhydration
- Treatment of kidney failure by hemodialysis or kidney transplant
- Blood cells, glucose, proteins, and drugs are detected in urinary tests
- Drawing and labelling a diagram of the human kidney
- Annotation of diagrams of the nephron