

Q4 Describe the factors that affect the flux of potassium across the cell membrane (March 2012)

Potassium

- Total amount of potassium in the body 40-45 mmol/kg.
- Major intracellular cation (ICF concentration 150mmol/L, extracellular concentration 3.5-5mmol/L)
- Distribution of K is ICF = 90%, ECF = 2% and Bone = 8%.

Functions of potassium

- Maintenance of the resting membrane potential and generation of action potentials
- Intracellular tonicity and pH regulation
- DNA and protein synthesis
- Growth and enzyme function

Factors affecting potassium flux across the membrane:

- Plasma K levels → as per Fick's Law of Diffusion, the diffusion of a substance across a semipermeable membrane is directly proportional to the concentration gradient across the membrane.
- Temperature → temperature affects the calculation of the Nernst equation
- Aldosterone → upregulates Na/K ATPase to increase K uptake into cell
- Insulin → upregulates the Na/K ATPase pump
- Adrenaline → upregulates Na/K ATPase, mediated by beta2 receptor activation
- Acid base status → in acidaemia, upregulation of the K/H⁺ antiporter occurs (pumping H⁺ into cell and K⁺ out of cell). Reduced activity of the Na/K ATPase may also occur
- Osmolality → cellular dehydration causes a relative increases in intracellular K concentration, promoting diffusion out of the cells
- Exercise → will decrease pH levels hence increasing plasma K