ESSAY PLAN

NERVES (6)

Na^+ - depolansahon
APs.

ATP (1)

PO_4^{3-}
energy
replaced by OH^- which is more stable

(3) PLANTS

H^+
translocahor

(5) KIDNEY

Na^+ - LOOP OF HENLE
lower Ψ

(4) DIGESTION

K^+ carry glucose / AA co-transport

(2) RESPIRATION

oxidative phosphorylah
H^+
↳ cytochrome oxidase
first ETC

*mitochondnal myopathy
reauces ATP produced

ESSAY

Inorganic ions are vital in living organisms as they facilitate essential reactions and processes in living organisms. Phosphate ions play a huge role in the release of energy in the body. PO_4^{3-} ions are found in Adenosine triphosphate which is a phosphorylated RNA nucleotide which acts as the universal energy currency in living organisms. ATP contains an adenine base, ribose sugar and three PO_4^{3-} ions bonded together. The bond between phosphate ions is unstable and so can be hydrolysed rapidly. The breaking of this bond produces 30 kJ of energy. The third PO_4^{3-} is replaced by an OH^- ions which is more stable so the molecule becomes adenosine diphosphate.

Furthermore, ATP is produced during aerobic respiration with oxidative phosphorylatio

being the final step that produces the most ATP. Reduced NAD gives H_2 to cytochrome oxidase which splits it into H^+ and e^-. The e^- then travels down the ETC, releasing energy which pulls H^+ from the matrix into the intermembranal space. This creates a steep H^+ concentration gradient so H^+ travels down the concentration gradient, through H^+ channels associated with ATP synthase. H^+ then turn ATP synthase which smashes ADP + P_i together forming ATP. This H^+ ions are vital in the process of producing ATP, called chemiosmosis. This process occurs in the mitochondria of the cell and diseases like mitochondrial myopathy cause the function of mitochondria to decrease so less ATP is produced.

H^+ ions are also essential in plants during translocation. H^+ ions are actively transported out of companion cells using ATP. This creates a steep H^+ concentration gradient so H^+ ions diffuse back into the companion cell carrying sucrose as well using a co-transporter protein. Sucrose then facilitatedly diffuses into the sieve tube element via the plasmodesmata. This creates a low Ψ in the phloem so water enters via osmosis, creating a high hydrostatic pressure at the source. The sucrose moves from a high hydrostatic pressure at the source to a low hydrostatic pressure at the sink, down a pressure gradient. This is called mass flow. The sucrose then diffuses out of the phloem at the sink.

Additionally, sugars are also absorbed in humans using an inorganic ion. Glucose is absorbed using Na^+ ions in co-transport. Na^+ ions are actively transported out of the epithelial cell. This creates a steep Na^+ concentration gradient between the epithelial cell and lumen of the small intestine. Thus Na^+ diffuses into the epithelial cell from the lumen carrying glucose via a co-transporter protein, down a concentration

gradient. Glucose then enters the blood capillary via facilitated diffusion. Na+ ions are also vital in the reabsorption of water in the Loop of Henle in the kidney. Na+ ions are actively transported out of the ascending limb via Na+ pumps. Thus lowers the ψ of the capillaries and tissues surrounding the descending limb which is permeable to water. Thus water moves from the descending limb into the surrounding capillaries via osmosis and is reabsorbed back into the blood.

Balance?

Relevance?

B - ✓✓✓
R - ✓
Gwc - ✓✓

Kid ✓✓
Dep ✓
Transl ✓✓ B
Resp ✓✓ B
phosphate ✓✓ B.

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Great beyond spec work.