A level Biology A

H420/03 Unified biology

Question Set 13

1 The process of ultrafiltration in the kidney shares similarities with the formation of tissue fluid.

(a)* Describe the similarities and differences between ultrafiltration and the formation of tissue fluid. **[6]**

SIMILARITIES
- small molecules are filtered from / diffuse out of blood
- both processes occur in capillaries
- large molecules / proteins / cells remain in the blood
- high hydrostatic pressure in both processes, which is greater than oncotic pressure in both
- many molecules (water, sugars, ions) reabsorbed back into capillaries
- blood vessels become narrower to maintain hydrostatic pressure
- both involve basement membrane

DIFFERENCES
- filtrate enters Bowman's capsule and then PCT in kidney but tissue fluid bathes cells / enters intercellular space
- molecules that are not reabsorbed by capillaries form urine in the kidney but molecules that are not reabsorbed from tissue fluid will enter cells
- knot of capillaries in ultrafiltration but a network of capillaries in formation of tissue fluid

(b) A person's glomerular filtration rate (GFR) provides an indication of the health of their kidneys. The GFR is a measure of the volume of blood that can be filtered by the kidneys every minute. GFR can be estimated by monitoring the blood concentration of creatinine, which is a breakdown product of creatine phosphate in muscles.

(i) Suggest **two** characteristics of a patient that must be taken into account when using this GFR measurement to diagnose kidney damage.

Explain why each characteristic must be considered.

1 age - kidney function & GFR declines with age

2 gender - men have higher muscle mass in general

[4]

(ii) If kidney damage is suspected, the patient's urine is likely to be tested for the protein albumin.

Explain why the presence of albumin in the urine indicates kidney damage. **[1]**

large protein should remain in blood and not enter Bowman's capsule / nephron

Total Marks for Question Set 13: 11