



## PTS Reading Week Question Series 2021

### IMMS

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1. Define a single nucleotide polymorphism
2. Which cells produce elastin?
3. In which tissue type is Type V collagen found?
4. What is the relationship between albumin and oedema?
5. What are the sites of synthesis of: ADH, aldosterone and renin?
6. Describe the action of renin?
7. Which 2 proteins are involved in the generation of ciliary movement?
8. Which type of collagen is found in basement membrane?
9. Define the terms osmosis, osmotic pressure, osmolality, and oncotic pressure
10. Total body water is distributed into 3 compartments (intracellular, interstitial, intravascular)- how is the TBW distributed by volume?
11. What is a gene sequence coded in?
12. What is a promoter sequence coded in?
13. During transcription, what do specific amino acids bind to?
14. What is the transcriptome composed of?
15. Where does alternative splicing producing different gene products occur?
16. What is sickle cell anemia caused by?

17. What happens to abnormal HbS in hypoxia or deoxygenated states?
18. In which tissue of the body does capillary occlusion cause the acute pain crises found in sickle cell anaemia?
19. What are the 3 types of cytoskeleton and what size are they each?
20. Define gonadal mosaicism and non-disjunction
21. By which process is ATP formed during glycolysis?
22. What are the net products of glycolysis?
23. When is beta oxidation used?

## Answers and Explanations

1. SNP= DNA sequence variation that occurs at a single nucleotide
2. Fibroblasts produce elastin
3. Type V collagen is found in the placenta
4. Low albumin leads to decrease in oncotic pressure, this causes water to diffuse from the blood into the interstitial fluid
5. ADH is produced in the hypothalamus, aldosterone is produced in the adrenal cortex, renin is produced by the juxtaglomerular cells in the kidney
6. Renin converts angiotensinogen into angiotensin I
7. Tubulin and dynein are involved in the generation of ciliary movement
8. Type IV collagen is found in basement membrane
9. Osmosis: diffusion of water through semi permeable membrane from region of higher to lower water potential. Oncotic pressure: pressure caused by the difference in protein concentration between the plasma and interstitial fluid causing water to move from the interstitial fluid into plasma- form of osmotic pressure exerted by proteins. Osmotic pressure: pressure applied to a pure solvent to prevent it from passing into a given solution by osmosis. Osmolality: the number of particles dissolved in kg of fluid (osmolarity: particles per litre fluid)
10. TBW: 28L intracellular, 11L interstitial, 3L plasma
11. A gene sequence is coded in single strand DNA
12. A promoter sequence is coded in single strand DNA
13. Amino acids bind to tRNA
14. The transcriptome is composed of all the RNA present in the cell
15. Alternative splicing occurs in mRNA
16. Sickle cell anemia is caused by an autosomal recessive mutation in beta globin chain
17. In hypoxia, HbS polymerises and crystallises
18. Capillary occlusion in the bone causes acute pain crises in sickle cell anaemia

19. Types of cytoskeleton filaments: actin 5nm, intermediate filaments eg desmin/nuclear laminin/vimentin/keratin 10nm, microtubule 25nm
20. Nondisjunction: occurs when homologous chromosomes fail to separate in M1 OR sister chromatids fail to separate in M2. Gonadal Mosaicism: occurs when precursor germline cells to ova or spermatozoa involve a mixture of 2 or more genetically different cell lines- this may occur due to random mutation in the germline cells that undergo mitosis leading to mutated gametes, or due to errors in mitosis during gametogenesis; the result is such that one cell line is normal and the other is mutated.
21. In glycolysis, ATP is formed by substrate level phosphorylation
22. The net products of glycolysis are 2 ATP molecules and 2 pyruvate molecules (aerobic), or 2 ATP molecules and 2 lactate (anaerobic)
23. Beta oxidation is used in aerobic conditions as fuel when there is increased demand e.g. during fasting or states of low blood glucose. However it cannot be used as fuel for the nervous system because fatty acids cannot pass the blood-brain barrier

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