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Academic Advance
Basic Sciences Refreshment.

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While waiting for the academic advance in the form of new discoveries and inventions we are presenting you the subject materials for practising your Technical English. This is a continuous endeavour to encourage you to accept the idea (English is basic to academic advance) and take it seriously. By referring to the questions in the SMJ vol.9 number 1 you can enjoy the refreshment answers to anatomy, biochemistry, and physiology--several answers a piece. Still more to come in the next numbers. Stay with us! Don' t go away!

Answers to Anatomy Questions

1. D. The lingual artery branches from the external carotid artery and passes deep to the posterior belly of the digastric muscle to enter the submandibular triangle. In this triangle, the lingual artery passes deep to the hyoglossus muscle while the hypoglossal nerve passes superficial to the hyoglossus muscle.

2. A. The pharyngeal plexus is formed by the pharyngeal branches of the vagus and glossopharyngeal nerves and sympathetic fibers. The glossopharyngeal fibers are sensory from the upper two thirds of the pharyngeal mucosa and the vagal fibers are motor to most of the muscles of the pharynx. The sympathetic fibers are mainly vasomotor.

3. B. The posterior cricoarytenoid muscle is the only abductor of the vocal folds. The other intrinsic muscles adduct the vocal folds, adjust tension on the folds, or close the laryngeal inlet during swallowing.

4. C. Cervical vertebrae characteristically have short bifid spines, small bodies, and foramina in the transverse processes of vertebrae C1-C6.

5. D. The retropharyngeal space is bounded posteriorly by prevertebral fascia, laterally by the carotid sheath, and anteriorly by the buccopharyngeal fascia.

6. E. In the gluteal region, most of the major structures are located inferior to the piriformis except the superior gluteal nerve and vessels.

7. B. The sensory branches of the mandibular nerve provide somatic afferent sensation from the teeth of the lower jaw.

8. B. In the gluteal region, the gluteus medius and minimus muscles are the abductors and medial rotators of the thigh. The other gluteal muscles function in lateral rotation or extension of the thigh.

9. C. On the sternocostal surface of the heart, the coronary sulcus separates the right atrium from the right ventricle while the anterior interventricular sulcus separates the right ventricle from the left ventricle. mouth and slides posteriorly when the mandible is elevated during closing of the mouth.

10. C. The common peroneal nerve branches from the sciatic nerve at the superior aspect of the popliteal fossa and then courses along the lateral boundary of the fossa with the tendon of the fibula to enter the leg where it can be damage if the fibula is fractured.

Answers to Biochemistry Questions

101. D. The gastrin in a test system competes with a fixed amount of 125_I-gastrin for a fixed amount of an antigastrin antibody. More gastrin in the test system will decrease the amount of precipitated 125_I. Increasing the amount of the radioisotope in the system will increase the amount precipitated.

102. C. the alpha amino and alpha carboxyl groups are blocked by the acetyl and amide groups, respectively. This means that the only dissociating groups are the gamma carboxyl of the glutamyl residue and the epsilon amino group of the lysyl residue. The pH value at which the peptide is neutral is midway between the pKa values of the two dissociating groups.

103. E. Although presented in double-reciprocal (Lineweaver-Burk) form, the plot is not linear, thus it cannot display classical Michaelis-Menten kinetics or any simple variant represented by competitive or noncompetitive kinetics.

104. E. Globular proteins typically display the polar groups toward the surface; the nonpolar groups are sequestered in the interior.

105. B. Trypsin, like the other serine proteases, forms an acyl-enzyme intermediate; aldolase forms a Schiff base intermediate with dihydroxyacetone phosphate.

106. C. Phosphorylase and the transferase remove the outer tier of a glycogen molecule; ie, those glucosyl residues from the nonreducing ends to the first (1-->6) branch. The resulting limit dextrin must have these branches removed by the glucosidase before phosphorylase can continue to act.

107. B. One mole of ATP is consumed in the hexokinase step and another in the phosphofructokinase step. Per mole of glucose, 2 mol of ATP are formed in the glyceraldehyde-3-phosphate dehydrogenase step and another 2 mol are formed in the pyruvate kinase step.

Answers to Physiology Questions

201. A. 1,2, and 3 are all characteristics of cell membranes. However, phospholipids are acidic in nature and therefore bear a fixed negative charge.

202. E. All of the components mentioned in the question are properties of proteins in cell membranes.

203. B. The "fluid mosaic model for cell membranes" emphasizes the dynamic relationship between the various components of the cell membrane, including intrinsic and extrinsic proteins. However, the model does not explain how those proteins are synthesized or incorporated into the cell wall.

204. A. Calcium ions, cAMP, and diacylglycerol are second messengers in the various modes of cellular transduction. However, phosphotidylinositol 4,5-bisphosphate is a phospholipid of the inner leaflet of the plasma membrane and is not considered a second messenger, but is acted upon by phospholipase to produce diacylglycerol and inositol 1,4,5-trisphosphate, which are considered second messengers.

205. A. The resting membrane potential of excitable cells such as muscle or nerve is due to the efflux of net positive charge out of the cell. This is accomplished by an electrogenic pump which pumps three sodium ions out of the cell while pumping two potassium ions into the cell, resulting in a net negative intracellular charge. The resting membrane potential is directly proportional to this unequal distribution of ions across the cell membrane. Any influence which affects this distribution, ie, subthreshold stimulus, which results in a localized depolarization, will affect the resting membrane potential.

206. C. The fact that the pump requires ATP (and ADP, though neither are used up) and is responsible for maintaining an ionic gradient precludes any suggestion of passive ionic fluxes attributed to the pumping mechanism itself. Experiments have shown that following direct introduction of sodium ions into a nerve cell the resting membrane potential returns to normal within 15 minutes, suggesting that the pump can actually modulate the excitability of cells. Not only is the pump sensitive to drugs such as Quabain it is also sensitive to hormones such as epinephrine, which increases sodium efflux and potassium influx.

207. B. Excitation involves voltage-gated channels which open first to sodium then to potassium ions, exciting a region which, during the regenerative process, excites the region next to it in progressive fashion.

208. E. In animals there are at least five classes of transport ATPases. Four classes use a mechanism of E1-E2 conformational changes and a phosphoenzyme intermediate. Three classes transfer a high-energy phosphate to the Beta carboxyl group of an aspartyl residue on the cytoplasmic side. Interestingly, only the $Na^+ + K^+ - ATPase$ is blocked by cardiac glycosides.

209. B. The accumulation of protein in the cell is mediated by a sodium-dependent transport process. Even with neutral amino acids, the entry of proteins into the cell makes the cell interior more positive, therefore the transport is considered electrogenic in nature. Drugs such as Quabain do not affect protein transport directly, but because the protein transport mechanism requires a sodium gradient, Quabain affects protein transport indirectly by the resulting run-down of the sodium-ion gradient.

210. E. In contrast to action potentials, slow potentials posses the following characteristics: they are highly localized responses having no threshold; they sum both spatially and temporally with other slow potentials in the same cell; some are depolarizing while others are hyperpolarizing; and whenever an action potential is initiated it is triggered by a slow potential with sufficient amplitude.