

1. Gibbs-Donnan equilibrium is mainly by:

- A. Ca
- B. Phosphate
- C. Bicarbonate
- D. Protein

Ans: D

Donnan and Gibbs showed that in the presence of a non-diffusible ion (protein), diffusible ions distribute themselves differentially at equilibrium.

2. Calculate ECF volume from the following. 10gm mannitol injection given in venous blood. At equilibrium, urinary excretion 10% & plasma concentration of mannitol is 65mg/100ml.

- A. 14L
- B. 10L
- C. 28L
- D. 12L

Ans: A

This is based on formula; $V = (Q - e) / c = 9000\text{mg} / 0.65\text{mg/ml} = 13.8\text{L}$

3. Which of the following hormone have intracellular receptor:

- A. Thyroxin
- B. Glucagon
- C. Epinephrine
- D. Parathormone

Ans: A

Thyroxin has intranuclear receptor. All others hormones in this option have membrane receptors.

4. In negative feedback, feedback gain is infinity in which of the following

- A. Temperature control in hypothalamus
- B. Blood volume control by kidney
- C. Blood pressure control by baroreflex
- D. No such infinite feedback gain is not possible

Ans: B

For a given intake of salt and a given functional state of the kidneys, there is only one single arterial pressure that will provide a balance between intake and output of salt. Because of this the arterial pressure, in the long run, will always attempt to return exactly to this pressure level (error = 0).

5. In skeletal muscle DHPR & RYR receptors are coupled by?

- A. Chemically
- B. Mechanically
- C. Electrical followed by mechanical
- D. Electrical

Ans: C

Electrical activation of T-tubules activates DHPR channel on it, which interact mechanically with RyR on SR membrane for release of calcium. If it's not in option, then single best is mechanical.

6. 65 year old male patient visited to ER for chest pain and his BP was measured as SBP 190 mmHg, DBP 100 mmHg, Pulse pressure 90 mmHg.

Which of the following parameter that should decrease for this high pulse pressure

- A. Arterial wall compliance
- B. Stroke volume
- C. Cardiac output
- D. Myocardial contractility

Ans: A

Low compliance increases SBP, rising the PP.

7. Which of the following is not required for calculation of creatine clearance ?

- A. Urine creatine
- B. Serum creatinine
- C. Volume of urine in 24 hrs
- D. Volume of serum in the kidney in 24hrs

Ans: D

This clearance estimation based on UV/P formula. 24 hour urine is collected and creatinine concentration is measure.

8. Single neuron receive 500 inputs from 150 different sensory cells

- A. Feedback inhibition
- B. Feedforward excitation
- C. Convergence
- D. Divergence

Ans: C

This is an example of convergence of input signals (excitatory or inhibitory) from multiple sources.

9. Mechanism of Transcutaneous electrical stimulation (TENS) for pain management of pain:
- Inhibitory neurotransmitter at spinal cord
 - Adrenergic receptor stimulation
 - Gating at spinal cord
 - Supraspinal control

Ans: C

Modulation of gate-control mechanism of pain serves as the rationale behind the use of transcutaneous electrical nerve stimulation (TENS) for pain relief. This method uses electrodes to activate $A\alpha$ and $A\beta$ fibers near the injury.

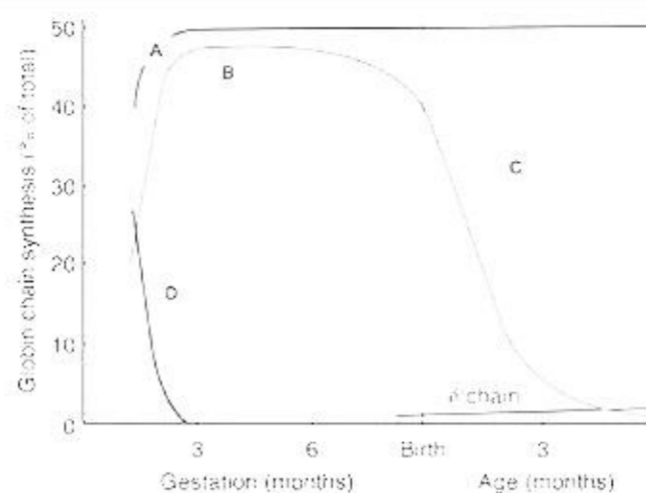
10. In physiology viva, examiner asked to student "who recorded first human EEG?. Student responded 'I don't know'. Examiner felt bad and decide to give him a hint, "the name rhymes with what you get at McDonald's" Then the student gave the right answer. Here, the student uses which type of memory:
- Priming
 - Reflex
 - Associated learning
 - Declarative memory

Ans: Priming

Priming is the facilitation of the recognition of words or objects by prior exposure to them and is dependent on the neocortex. Students answer "Hans Berger recorded the first human EEGs in 1924!!!".

Associative learning relates to classical and operant conditioning in which one learns about the relationship between one stimulus and another. This type of memory is dependent on the amygdala for its emotional responses and the cerebellum for the motor responses.

11. The graph below shows the normal rate of synthesis of the various haemoglobin chains in utero, and after birth. Gamma chain of haemoglobin is indicated by which of the following:
- A
 - B
 - C
 - D



Ans: B

The fetal hemoglobin (hemoglobin F) is composed of $\alpha_2\gamma_2$ [above graph, Chain A: α ; Chain B: γ] In young embryos there are, in addition, ζ and ϵ chains [Chain D in above graph], forming Gower 1 hemoglobin ($\zeta_2\epsilon_2$) and Gower 2 hemoglobin ($\alpha_2\epsilon_2$).

Analysis: All questions are from basic textbook only (Ganong/Guyton) and all questions are from simple principle of physiology only. No controversial questions.