PrepLadder

Last 5 Years PYQs in Physiology for NEET PG

Q1. A person develops headache and breathlessness on a trekking expedition following a rapid ascent to over 3000 meters above sea level. Which of the following is not used in the treatment of this condition?

1. IV digoxin
2. Immediate descent
3. Administration of oxygen
4. Tablet acetazolamide

Ans. 1) IV digoxin

- IV digoxin is not used in the treatment of the condition described. Digoxin is a medication commonly used for heart conditions such as heart failure and atrial fibrillation.
- Altitude sickness is managed by
    - Immediate descent greatly improves the symptoms.
    - Diuretics: Acetazolamide is the preferred diuretic. It inhibits carbonic anhydrase and increases bicarbonate excretion in urine, thus decreasing alkali load.
    - Steroids: Glucocorticoids decrease cerebral edema.
    - Oxygen therapy: Hyperbaric oxygen is very useful if pulmonary edema is present.
    - Nifedipine: Calcium channel blockers like nifedipine help to reduce pulmonary arterial pressure.

Q2. Prolactin level is highest during?

1. 24 hours after ovulation
2. 24 hours after delivery
3. REM sleep
4. After running four 1 hours

Ans. 1) 24 hours after delivery

- Prolactin levels are highest after delivery, specifically around 24 hours after giving birth. This surge in prolactin secretion stimulates milk production and lactation in breastfeeding mothers. The high levels of prolactin help initiate and maintain breastfeeding and support the production of breast milk.

Q3. What does the C wave of the JVP represent?

1. Tricuspid bulge into right atrium during isovolumetric ventricular contraction
2. Contraction of right atrium

3. Passive filling of right atrium
4. Passive emptying of right atrium

Ans. 1) Tricuspid bulge into right atrium during isovolumetric ventricular contraction

- The ‘c’ wave of the jugular venous pulse (JVP) represents the bulging of the tricuspid valve into the right atrium during isovolumetric ventricular contraction.

Q4. The protein in the glomerular basement membrane responsible for charge-dependent filtration is?

1. Fibronectin
2. Heparan sulfate
3. Collagen Type IV
4. Entactin

Ans. 2) Heparan sulfate

- The protein in the glomerular basement membrane responsible for charge-dependent filtration is heparan sulfate.
- Heparan sulfate is a type of glycosaminoglycan (GAG) that is a key component of the glomerular basement membrane (GBM) in the kidney.
- Heparan sulfate has negative charges that repel negatively charged proteins, contributing to the selective filtration of molecules based on their charge.

Q5. In patients undergoing warfarin therapy, which clotting factor would display a decrease in gamma carboxyglutamate residue?

1. Factor 2
2. Factor 11
3. Tissue factor
4. Factor 5

Ans. 1) Factor 2

- The clotting factor that would have a decreased gamma carboxyglutamate residue vitamin in patients on warfarin therapy is Factor 2, also known as prothrombin.
- By inhibiting the regeneration of reduced vitamin K, warfarin decreases the availability of active vitamin K in the body. This results in impaired carboxylation of clotting factors, leading to decreased gamma carboxyglutamate residues. Among the clotting factors affected by warfarin therapy, Factor 2 (prothrombin) is one of them. Therefore, patients on warfarin therapy would have decreased gamma carboxyglutamate residues in Factor 2.

Q6. Calculate the sodium deficit in a 30-year-old man weighing 70 kg with a sodium level of 120 mEq/L.

1. 280 mEq
2. 480 mEq
3. 840 mEq
4. 1400 mEq

Ans. 3) 840 mEq

- To calculate the sodium deficit, the following formula can be used:
- **Sodium Deficit (mEq) = (Desired Sodium - Current Sodium) x Total body water (TBW)**
- **Total body water (TBW) = 60% of total body weight.**
- **TBW = 0.6 x 70 = 42.**
- Desired sodium is 135 to 145 mEq/L, so taking an average value of 140 mEq/L.
- Substituting the values in the formula:
    - Sodium Deficit = (140 - 120) x 42.
    - Sodium Deficit = 840 mEq

Q7. A person after sleeping overnight with the arm under his head now experiences paresis but no numbness in the morning. Which of the following is the best explanation for it?

1. A fibers are more sensitive to pressure than C fibers
2. A fibers are more sensitive to hypoxia than B fibers
3. A fibers are more susceptible to pressure changes than C fibers
4. A fibers are more susceptible to hypoxia than C fibers

Ans. 1) fibers are more sensitive to pressure than C fibers

- The person experiences paresis (muscle weakness) but no numbness, indicating that motor function is affected but the sensory function is preserved. In this scenario, pressure on the nerves during sleep likely affects the larger, myelinated motor neurons (A fibers) more than the smaller, unmyelinated sensory neurons (C fibers). Fibers carry motor signals to muscles and are more susceptible to pressure, leading to temporary muscle weakness without sensory deficits.

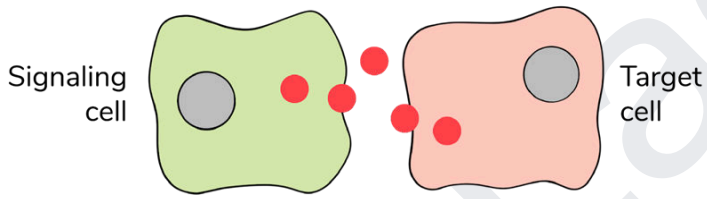
Q8. What mechanism is observed in the baroreceptor reflex among the options listed below?

1. Feedforward
2. Positive feedback
3. Negative feedback
4. Both A & B

Ans. 3) Negative feedback:

- The baroreceptor reflex is a negative feedback mechanism that helps regulate blood pressure. It involves the baroreceptors, which are stretch receptors located in the walls of blood vessels, such as the carotid sinus and aortic arch, as well as the heart. These receptors detect changes in blood pressure and send signals to the brain, specifically the cardiovascular control center in the medulla oblongata, to initiate a response.
- An increase in BP results in activation of the nucleus tractus solitarius (NTS), which activates the CVLM (caudal ventrolateral medulla) and inhibits the RVLM (rostral ventrolateral medulla), which is responsible for the inhibition of sympathetic stimulation, resulting in decreased cardiac output and contractility.
- If there is a decrease in BP, it will not activate NTS and CVLM, which in turn do not inhibit the RVLM and increase cardiac output by sympathetic supply.

Q9. Which of the following types of cell-to-cell signaling is depicted in the image below?

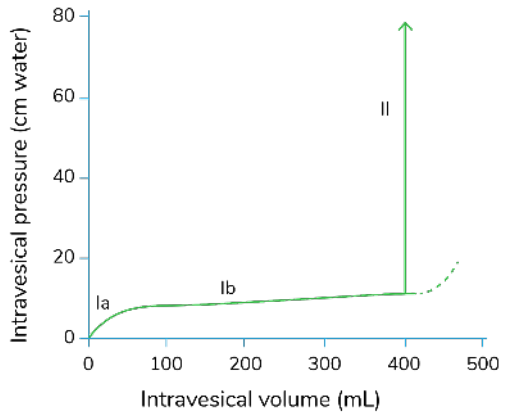


1. Paracrine
2. Autocrine
3. Endocrine
4. Merocrine

Ans. 1) Paracrine

- In paracrine signaling, the signaling molecule is released by a cell and acts on nearby cells to trigger a response.
- The signaling molecule can diffuse through the extracellular matrix and reach neighboring cells.
- An example of paracrine signaling is the release of growth factors by cells during tissue repair.

Q10. Which of the following statements is true regarding the given cystometrogram?

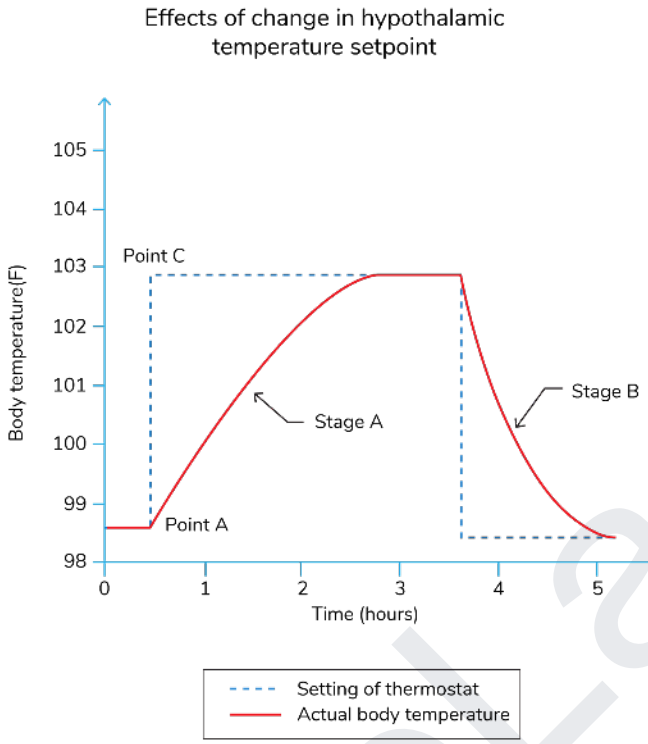


1. Segment Ia is due to residual urine
2. Segment Ib is due to Laplace law
3. Micturition fails to happen in segment II
4. Micturition occurs in segment Ib

Ans. 2) Segment LB is due to Laplace law:

- Segment Ib is due to Laplace law, where volume is increased but there is no rise in pressure.
- This law states that the pressure in a spherical viscus is equal to twice the wall tension divided by the radius.
- In the case of the bladder, the tension increases as the organ fills, but so does the radius. Therefore, the pressure increase is slight until the organ is relatively full.

Q11. What changes do not occur in stage A as compared to stage B when the hypothalamic thermostat in a patient is reset from point A to point C, as depicted below?



1. Shivering
2. Vasoconstriction
3. Sweating
4. Epinephrine secretion

Ans. 3) Sweating

- The hypothalamic thermostat controls the body's core temperature by initiating either heat production or heat loss mechanisms to maintain a set point. When the set point is changed, the body responds by adjusting its temperature through various mechanisms.
- When thermostat pressure is changed from point A to point C, it increases the thermostat pressure. All the mechanisms for raising the body temperature are brought into play, that are:
    - Vasoconstriction.
    - Piloerection.
    - Epinephrine release.
    - Shivering.

- Sweating and vaporization are observed when the thermostat temperature is set to a low temperature.

Q12. According to the myogenic hypothesis of renal autoregulation, the afferent arterioles contract in response?

1. NO
2. Noradrenaline
3. Calcium
4. Adenosine

Ans. 3) Calcium

- According to the **myogenic hypothesis, it suggests** that when the **afferent arterioles experience an increase in blood pressure or stretch,** it **triggers the opening of calcium channels** in the **smooth muscle cells of the arterioles.**
- The **influx of calcium ions** leads to vasoconstriction, reducing the blood flow and **preventing excessive pressure within the glomerulus.** This response helps maintain a **relatively constant blood flow and glomerular filtration rate** despite changes in systemic blood pressure.

Q13. Which of the following is not a characteristic of decerebrate rigidity according to the Herrington classification?

1. Rigidity occurs in all the muscles of the body
2. Increase in the rate of discharge of the γ efferent neuron
3. Increased excitability of the motor neuron pool
4. Mid-collicular lesion can lead to decerebrate rigidity

Ans. 1) Rigidity occurs in all the muscles of the body

- Decerebrate rigidity primarily **affects the extensor muscles of the limbs**, leading to the **characteristic posture of rigid extension.** It does **not affect all the muscles of the body equally**.
- According to the **Herrington classification,** decerebrate rigidity is a form of **abnormal muscle tone that occurs due to damage or dysfunction in the** medulla, resulting in increased activity of motoneurons that facilitate stretch reflexes.
- Facilitation of stretch reflexes occurs due to two mechanisms:
    - Increased excitability of the motor neuron pool in general.
    - Increased rate of γ motor neuron discharge.
- Producing a mid-collicular lesion in an experimental animal results in decerebration.

Q14. Which of the options accurately describes decorticate rigidity?

1. It is produced by the removal of cerebral cortex and basal ganglia.

2. Flexion of lower limbs and extension of upper limbs occur.
3. Rigidity is pronounced.
4. It is characterized by flexion of upper limbs and extension of lower limbs.

Ans. 4) It is characterized by flexion of upper limbs and extension of lower limbs.

- Injury to the cerebral cortex results in decorticate rigidity, characterized by upper extremity flexion at the elbow and increased extension in the lower extremities.
- The flexion of the upper extremities is explained by rubrospinal excitation of flexor muscles, while the hyperextension of the lower extremities is due to dysfunction in the medulla, resulting in increased activity of motoneurons that facilitate stretch reflexes.
- Dysfunction in the descending pathways that control muscle tone and movement.

Q15. What would be the duration for preserving red blood cells (RBCs) using Acid Citrate Dextrose (ACD) for storage when phosphate is added alone and when adenine and phosphate are added together to ACD?

1. 35 days and 42 days
2. 21 days and 35 days
3. 28 days and 45 days
4. 35 days and 28 days

Ans. 2) 21 days and 35 days

- **Red Blood Cells (RBCs) Preservation using ACD (Acid Citrate Dextrose)**: ACD is an anticoagulant solution used for the preservation of blood. When RBCs are preserved using ACD alone, the duration of storage is approximately **21 days**.
- **Addition of Adenine and Phosphate to ACD**: Adenine and phosphate are often added to the ACD solution to enhance the preservation of RBCs. With the addition of adenine and phosphate to ACD, the duration of storage is extended to approximately **35 days**.

Q16. Functional residual capacity is:

1. Volume expired after normal inspiration
2. Volume that remains after forced expiration
3. Expiratory reserve volume + residual volume
4. Tidal volume + inspiratory reserve volume

Ans. 3) Expiratory reserve volume + residual volume:

- Functional residual capacity (FRC) is the volume of air that remains in the lungs **after a normal tidal expiration**.
- It is calculated by adding the expiratory reserve volume (the amount of air that can still be exhaled after a normal tidal expiration) to the residual volume and is equal to the 2.3L.