CBT JANUARY 2025
CLASS – XI: BIOLOGY

GENERAL INSTRUCTION :

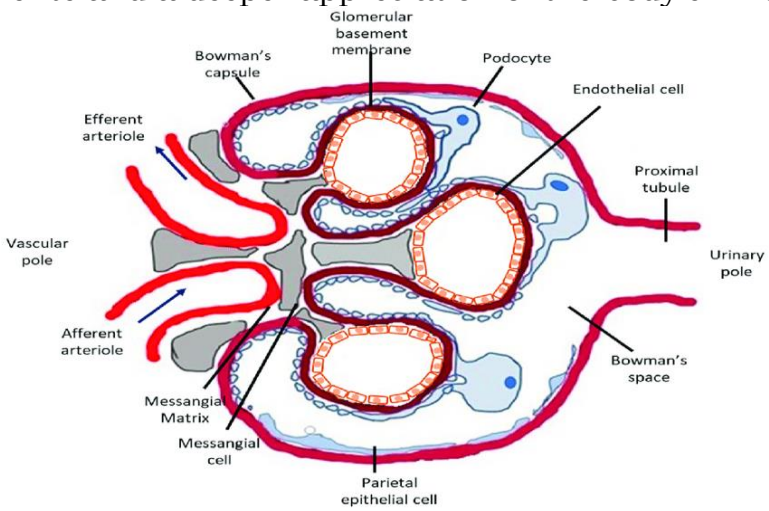
SCORE AND REVIEW OF ALL THE QUESTIONS WILL BE PROVIDED IN THE EMAIL TO ALL THE STUDENTS ON NEXT DAY AND AFTER CLOSING OF QUIZ TIME.
IMPORTANT : ALL THE STUDENTS SHOULD FILL THE CORRECT SCHOOL NAME FROM DROP DOWN BUTTON

CHAPTERS COVERED:
Chapter 16 : Excretory Products and their Elimination
Chapter 17 : Locomotion and Movement

Q.1: The journey of urine formation begins with the intricate process of blood filtration, primarily orchestrated by the glomerulus in the kidneys—a process known as glomerular filtration. Imagine this: each minute, about 1100-1200 ml of blood surges through the kidneys. This volume accounts for nearly 20% of the blood propelled by each heartbeat. It's fascinating to think about the efficiency of this system!

The filtration process is driven by the pressure in the glomerular capillaries, which forces blood through a tri-layered sieve. This sieve comprises the endothelium of the glomerular blood vessels, the epithelial layer of Bowman's capsule, and an intervening basement membrane. The epithelial cells of Bowman's capsule, known as podocytes, are meticulously arranged to create tiny gaps called filtration slits or slit pores. These minute spaces ensure that almost every component of the blood plasma, barring proteins, passes into the lumen of Bowman's capsule, highlighting the precision of what we call ultrafiltration.

Consider the broader implications: this mechanism not only underscores the sophistication of our renal system but also opens doors to innovations in medical technology, such as artificial kidneys and advanced dialysis techniques. As we continue to explore and understand these biological marvels, we pave the way for groundbreaking treatments and a deeper appreciation of the body's innate capabilities.



1 - Podocytes are the special modifications of:
A. Simple cuboidal epithelium
B. Simple squamous epithelium
C. Brush bordered epithelium
D. Columnar epithelium

Answer: Option B is correct.

Feedback: Inner lining of bowman's capsule is lined by simple squamous epithelium which is further modified for ultrafiltration into podocytes to create specialized pores so that blood can be filtered out.

2 Assertion: diameter of efferent arteriole is less than afferent arteriole.
Reason: about 3/4th of the blood content is filtered in ultrafiltration except plasma proteins.

A. Assertion & Reason both correct, Reason is correct explanation of the Assertion
B. Assertion & Reason both correct, but Reason is not correct explanation of Assertion
C. Assertion is true, but Reason is false
D. both Assertion and Reason are false

Answer: Option B is correct.
Feedback: To maintain effective blood pressure diameter of efferent arteriole is reduced as about 3/4th of the blood is being filtered out by the kidney, so to maintain blood pressure diameter of efferent arteriole is reduced. So both the statements are correct.

3 - Which hormone increases the GFR:

A. Renin
B. ANF
C. Both A &B
D. None

Answer: Option A is correct.
Feedback: Renin converts angiotensinogen in blood into angiotensin II which is a potent vasoconstrictor, hence it increases glomerular blood pressure thereby GFR. ANF acts antagonistic to RAAS mechanism.

4. Counter current mechanism is so called because:

A. The flow of filtrate is in opposite direction between loop of Henle and vasa recta
B. Flow of filtrate and blood is in opposite direction between loop of Henle and vasa recta
C. Fluids are in opposite direction between both limbs of loop of Henle and vasa recta
D. Both B & C

Answer: Option D is correct.
Feedback: There is counter current of fluids between both limbs of vasa recta, between both limbs of loop of Henle, between the limbs of vasa recta and loop of Henle. Such counter current helps in maintaining the osmolarity of medullary interstitium from 300- 1200 m osmol/L.

Q.2: The provided graph illustrates the dynamic process of a muscle twitch, which unfolds in three distinct phases: the latent period, the contraction period, and the relaxation period. Each phase offers a fascinating glimpse into the complex mechanics of muscle function.

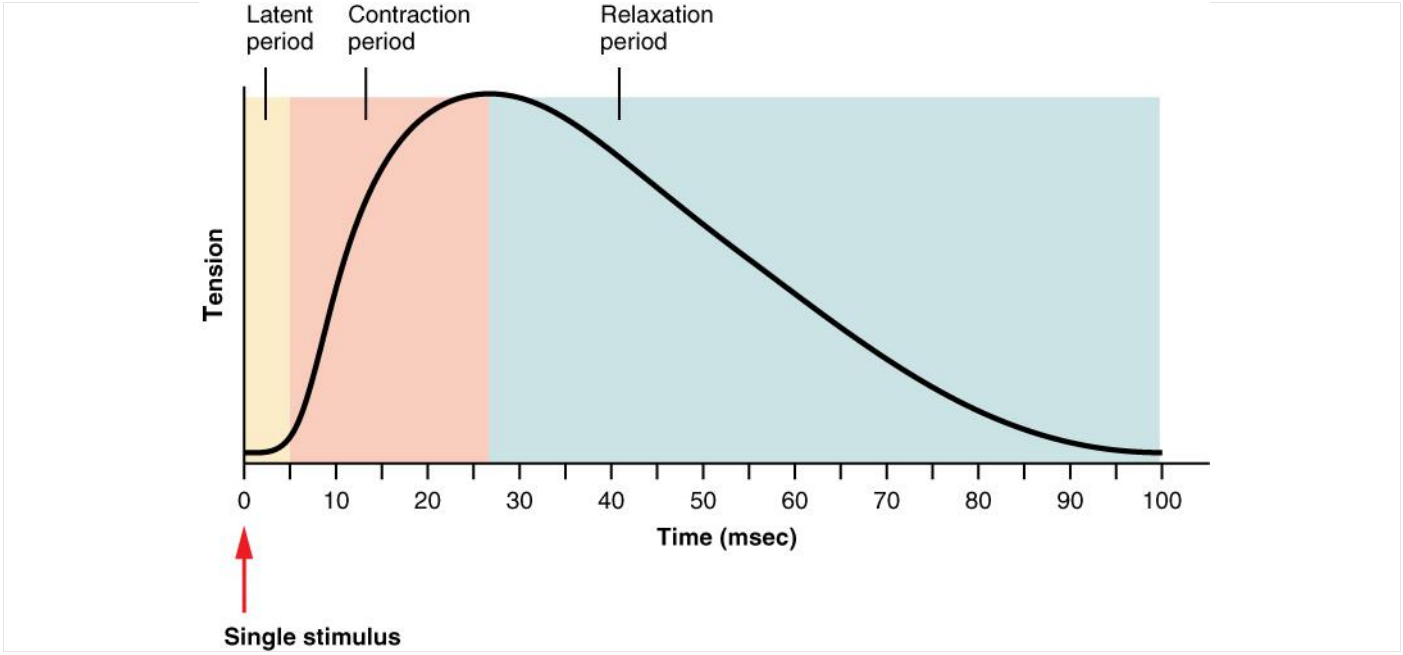
During the latent period, which lasts just a few milliseconds, the muscle prepares to contract. This phase, although seemingly inactive, involves crucial events at the molecular level, such as the release of calcium ions that trigger the contraction process. Next, the muscle enters the contraction period, where tension rapidly increases. This phase highlights the muscle's ability to generate force as actin and myosin filaments slide past each other—a process fueled by ATP.

The relaxation period follows, marked by a gradual decline in tension as the muscle returns to its resting state. Calcium ions are reabsorbed into the sarcoplasmic

reticulum, and the muscle fibers lengthen. This phase is critical for preventing muscle fatigue and ensuring readiness for subsequent stimuli.

Understanding these phases is not merely an academic exercise; it has real-world implications. For instance, advancements in sports science leverage this knowledge to enhance athletic performance and optimize training regimens. In medicine, insights into muscle contraction mechanics aid in the development of treatments for muscle-related disorders, ranging from muscular dystrophy to age-related sarcopenia.

Reflecting on this graph prompts deeper questions about the human body's adaptability and resilience. How can we harness this knowledge to improve human performance and health? What future technologies could emerge from a more refined understanding of muscle dynamics? As we explore these questions, we push the boundaries of both scientific inquiry and human potential.

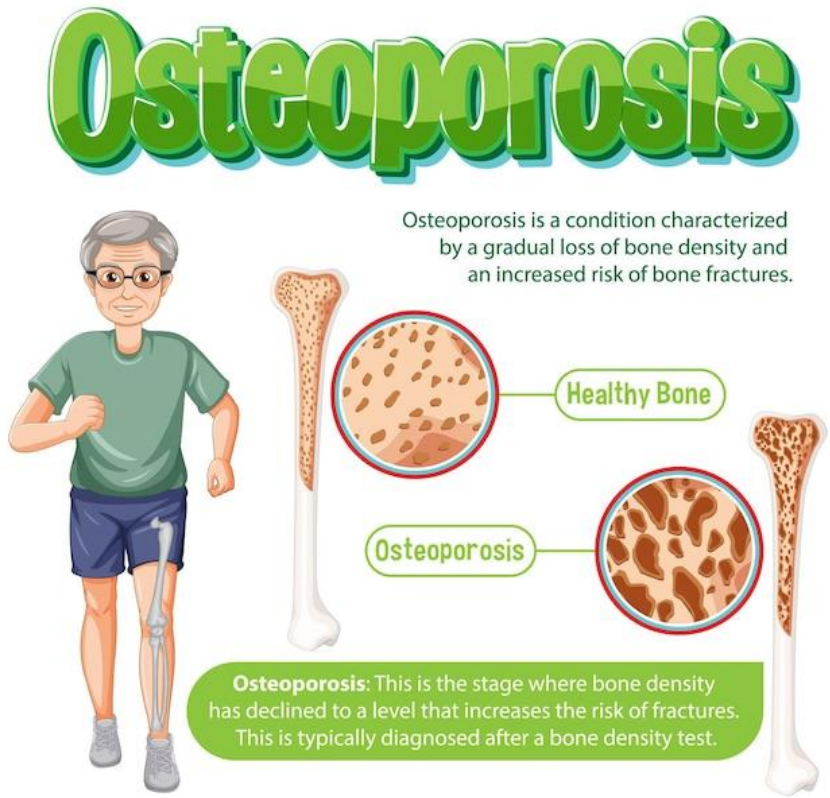


1.What does the rising phase of a muscle contraction graph represent?
A)Relaxation of muscle
B) Contraction of muscle
C) Resting phase of muscle
D) None of the above
Correct Answer: B) Contraction of muscle
Feedback: The rising phase of a muscle contraction graph represents the period when tension or force generated by the muscle increases as it contracts. This occurs as actin and myosin filaments slide closer together, leading to the shortening of sarcomeres and the overall contraction of the muscle.
2.Which of the following best describes the relaxation phase of a muscle contraction graph?
A) Calcium ions are being released from the sarcoplasmic reticulum.
B) Actin and myosin filaments are sliding apart.
C) Troponin is blocking the active sites on actin.
D) None of the above
Correct Answer: A) Calcium ions are being released from the sarcoplasmic reticulum.
Feedback: The relaxation phase of a muscle contraction graph represents the period when muscle tension decreases and the muscle returns to its resting length. This occurs as calcium ions are actively transported back into the sarcoplasmic reticulum, leading to the detachment of myosin heads from actin and the cessation of cross-bridge cycling.

3.During the rising phase of a muscle contraction graph, what physiological process is occurring?

A)Calcium ions are being pumped out of the cytoplasm.
B) Actin and myosin filaments are sliding apart.
C) Actin and myosin filaments are sliding together.
D) Troponin is blocking the active sites on acting.
Correct Answer: C) Actin and myosin filaments are sliding together.
Feedback: The rising phase of a muscle contraction graph corresponds to the period of increasing tension or force generation as actin and myosin filaments slide closer together due to the formation of cross-bridges. This sliding of filaments is essential for muscle contraction to occur.

Q.3: Mr. Kar is a 68-year-old man who has been experiencing frequent fractures, particularly in his wrists and hips. He often complains of back pain and feels like he is shrinking in height.
Mr.Kar has a family history of osteoporosis, with his father having suffered from the condition. He has been a heavy smoker for most of his life and consumes very little dairy products. He has had multiple fractures in the past few years, which have raised concerns about his bone health.
Diagnosis: After conducting bone density scans and other tests, Mr. Kar is diagnosed with osteoporosis, a condition characterized by weakened and brittle bones.



1.ASSERTION: Mr. Kar is recommended a must have change in his life style by adopting smoking cessation to reduce his risk of osteoporosis.
REASON: : Smoking is a modifiable risk factor for osteoporosis

E. Assertion & Reason both correct, Reason is correct explanation of the Assertion
F. Assertion & Reason both correct, but Reason is not correct explanation of Assertion
G. Assertion is true, but Reason is false
H. both Assertion and Reason are false

Correct answer: A
Feedback: Smoking is a modifiable risk factor for osteoporosis, and quitting smoking can help improve bone health and reduce the risk of fractures.

2.What role do calcium and vitamin D supplements play in Mr. Kar's treatment plan?
a) They reduce inflammation in the bones
b) They increase bone flexibility
c) They improve bone density
d) They prevent muscle cramps
Correct answer: c) They improve bone density
Feedback: Calcium and vitamin D supplements are crucial for improving bone density and reducing the risk of fractures in individuals with osteoporosis.

3.Which symptom experienced by Mr. Kar is characteristic of osteoporosis?
a) Blurred vision
b) Frequent fractures, especially in wrists and hips
c) Persistent cough
d) Dizziness
Correct answer: b) Frequent fractures, especially in wrists and hips
Feedback: Osteoporosis is characterized by weakened and brittle bones, leading to an increased risk of fractures, particularly in areas like the wrists and hips.