

ZOO502 – ANIMAL PHYSIOLOGY & BEHAVIOR

ALL OBJECTIVES & SUBJECTIVES FROM PAST FILES FOR MID TERM

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**OBJECTIVES**

1. Walter Cannon coined the term homeostasis in ----- **1929**
2. The amount of solute that passes through a unit area of membrane every ... in one direction is called membrane flux. ----- **Second**
3. Delayed rectifiers are ... channels. ----- **Voltage-Gated K⁺**
4. Voltage-gated Na⁺ channels are: ----- **Fast Acting Channels**
5. Diffusion is a ... transport & occurs -the expense of energy.----- **Passive, Without**
6. Which one of the following is not correct about ion channel proteins? ----- **Have Hydrophilic Passageways That Facilitate Quick Flow Of Water Molecules & Ions In Dissolved Fluid**
7. Which of the following is a correct statement? ----- **Symporters Are Coupled Transporters That Transfer Two Solutes In The Same Direction**
8. Clotting of blood in response to an injury is an example of -- **Positive Feedback System**
9. -- are also known as “delayed rectifiers” -- **Voltage-Gated Potassium Channels**
10. Release of oxytocin during labor is an example of ---- **Positive Feedback System**
11. ... of digestive tract is specialized for grinding & mixing. ----- **Smooth Muscles**
12. Concentration of potassium is... times higher inside the cell than outside.- **10-20**
13. In ... feedback systems the end product works to stop or slow down the process.---- **Negative**
14. -- is the tendency of an organism to maintain relative internal stability---- **Homeostasis**
15. Adaptation is: **All Generally, Not Reversible , Ensures Survival Of The Species , A Slowly Occurring Evolutionary Process**
16. Antidiuretic hormone can increase water permeability of renal collecting duct in mammals up to ... times. ----- **10**
17. Facilitated diffusion is the ... diffusion through the membrane down the concentration gradient ... the proteins. ----- **Passive, With**
18. Control of blood glucose by insulin is an example of: -- **Negative Feedback System**
19. Donnan Equilibrium phenomenon was discovered by Frederick Donnan in: ----- **1911**
20. A slowly occurring evolutionary process which is not reversible is called:--- **Adaptation**
21. Non diffusible ... produce Donnan effect i.e. unequal distribution of ions across the membrane. ----- **Anions**
22. A depolarization in the range of ... is the threshold that triggers AP. **-55 Mv To -33mv**
23. Which is not the feature of voltage-gated calcium channels?----- **These Are Delayed Rectifiers**
24. Which of the following statement is true about action potential? ----- **Repolarization Due To Outflow Of K⁺**
25. An adaptive change with in an animal due to chronic exposure to new naturally occurring conditions is: - ----- **Acclimatizatio**
26. Membrane potential varies b/w:----- **-30 To -100mv**
27. Diameter of membrane channels is less than: ----- **1.0nm**
28. -----Action potential is inflow of ----- **Na⁺ Depolarization**

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29. Equation indicate blood flow: ----- **$V = Q/A$**
30. Which of the following statement is true about action potential----- **Repolarization Due To Outflow Of K^+ .**
31. Which law is not applicable to animal physiology? ----- **Acceleration Law**
32. Action potential is inflow of ----- **Na^+ Depolarization**
33. Which of the following statement is correct about action potential ____ **Inflow Of Sodium Ion (Depolarization) 34 – 35**
34. Non diffusible _____ produce Donnan effect ----- **Solute**
35. Channels are involved in producing action potential-- **Na^+ And K^+**
36. A slowly occurring evolutionary process ----- **Adaptation**
37. Changes are induced experimentally in the laboratory ----- **Acclimation**
38. Donnan equilibrium is characterized by a reciprocal distribution of the ----- **Anions And Cations**
39. Concentration of K^+ is ____ times higher inside the cell than outside ----- **10-20**
40. Electrical transmission has been discovered in _____ **All**
41. The receptor molecules are typically ----- **Proteins.**
42. Cold Receptors are ----- times more common in skin than heat receptors.--- **3.5**
43. Which of the following incorrect statement ----- **Receptors Of Sour Tastes Are G Protein-Coupled Receptors**
44. In Equation η Stand For ----- **Viscosity Of Blood Vessel**
45. ---is a protein that contains 191 amino acids in a single chain.--- **Growth Hormone**
46. Achromatic vision which is produced of . ----- **Rods.**
47. Rhythmic discharge rate of A-V node : ----- **40 To 60 Times Per Minute.**
48. Each molecule of this protein can bind around ----- Ca^{2+} .----- **50**
49. Myocyte are ----- muscle.----- **Cardiac**
50. Thick Filaments composed of about ----- myosin molecules.----- **300**
51. Mineralocorticoids include ----- **Corticosteroids.**
52. Disease is Not a Pharmacological applications **Anemia**
53. Increases blood Ca^{2+} levels; decreases blood phosphate level... **Parathormone (Pth)**
54. Inhibits release of growth hormone **Somatostatin**
55. ACTH is play role in the ----- **Circadian Rhythms.**
56. Which is not a part of cell body?----- **Myelin Sheath**
57. Oxytocin stimulates in ----- **Birds.**
58. target cell usually has some ----- Receptors. ---- **2000 To 100,000**
59. Myocytes are muscles..... **Cardiac.**
60. Synaptic cleft is ----- **Wide 20nm**
61. Troponin has a high binding affinity for ----- **Ca^{2+}**
62. The delta cells, about ----- of the total----- **10 Per Cent ,**
63. The visible spectrum for human eyes lies between the wavelengths of--- **400-740 Nm.**
64. Voltage is measured in **Milivolt.**
65. Changed induced in lab **Acclima**

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66. Intestine is target tissue of.....**PTH**
67. Neurohypophysis is**Posterior Lobe**
68. Giant axons of arthropds molluscs.....**30m/Sec**
69. Speed of propagation of action potentials in molluscs is----- **30m/S**
70. Which of the following is incorrect statement?----- **Receptors Of Sour Tastes Are G Protein-Coupled Receptors**
71. ... is a disease not a pharmacological application.----- **Anemia**
72. Which of the following is not fast inhibitory transmitter?-----**Acetylcholine**
73. Acetylcholine is released in:----- **Synaptic Cleft**
74. ... induces hallucination----- **Mescaline**
75. Fast inhibitory transmitters are:----- **Gaba & Glycine**
76. Ache abundantly found in: -----**Synaptic Cleft**
77. Rod photoreceptors are sensitive to: -----**Low Intensity Dimmer Light**
78. Which is not an example of mechanical stimulus: -----**Allergens**
79. More than ... receptors are present for bitter taste.----- **30**
80. Which of the following monitor the position of muscles and joints:---- **Proprioceptors**
81. Taste receptors in terrestrial vertebrates are not located in/on: -----**Larynx**
82. The knob of dendrites has ... olfactory cilia.----- **4-25**
83. Each hair cell has 20 to ... nonmotile stereocilia.----- **300**
84. Meissner's corpuscles are linked to: -----**Sense Of Touch**
85. Sensory sensilla are the organs of ... in insects.----- **Taste**
86. Merkel disks are associated with the reception of ...-----**Vibration**
87. Human ear can detect sound: -----**20 To 20000 hertz**
88. Hair cells have resting potential of----- **60mv**
89. Achromatic vision which is produced of:----- **Rods**
90. Inhibits release of growth hormone: -----**Somatostatin**
91. ACTH play role in the:----- **Circadian Rhythm**
92. The visible spectrum for human eyes lies b/w the wavelength of: ----**400-740nm**
93. Each opsin molecule consists of ... transmembrane domains. -----**Seven**
94. Substance released via duct system and effects an epithelial of target cell: -----**Exocrine Secretion**
95. Which is not the part of organ of Corti: ----- **Reissner'S Men**
96. Electoreceptors of platypus are present on: -----**Its Bill**
97. Loss of ... is called protanope.----- **Red Cones**
98. Human retina has ... rods.----- **125 Million**
99. Human retina has ... cones.----- **6 Million**
100. Rods are more sensitive to: -----**Light**

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101. Sensory layer of eye with photoreceptor cells rods & cons is: -----**Retina**
102. Effect on neighboring cells:----- **Paracrine Secretion**
103. Adenohypophysis has ... pituitary lo-----**Anterior**
104. ACTH is a peptide hormone comprising single chain of: ---**39 Amino Acids**
105. Hypothyroidism causes: ----- **Cretinism & Goiter**
106. Adrenal cortex produces two major types of steroid hormones: ---**Mineralocorticoids & Glucocorticoids**
107. The genes for...cone pigments are closely linked on the X chromosome.-**Red & Green**
108. A color blind person who lacks ... cones called deuteranope. -----**Green**
109. Example of apocrine release: -----**Mammary Gland**
110. Acts as enteric neurotransmitter for feeling of pain: -----**Substance P**
111. Pituitary gland release ... hormones. ----- **9**
112. Salivary glands produce saliva that is delivered to the oral cavity through: -----**Submandibular & Parotid Ducts**
113. Mammals have ... adrenal glands. -----**Two**
114. Cold Receptors are...more common in skin than heat receptors.---- **3.5 Times**
115. Example of peptide hormone:----- **Oxytocin**
116. Growth hormone is a protein that contains ... amino acids.----- **191**
117. Mineralocorticoids include: -----**Corticosteroids**
118. Troponin has a high binding affinity for: -----**Ca²⁺**
119. The delta cells, about ... of the total.-----**10%**
120. Anterior pituitary gland released:-----**FSH**
121. Oxytocin stimulates motility of the oviduct in:----- **Birds**
122. Intestine is the target tissue of: -----**PTH**
123. Neurohypophysis is: -----**Posterior Lobe**
124. Example of steroid hormone: -----**Aldosterone**
125. Pituitary gland is ... in diameter. -----**1cm**
126. Melatonin belongs to----- **Pineal Gland**
127. Pineal gland found in dorsal surface of ... in vertebrates. -----**Forebrain**
128. Near the end of pregnancy, placental estrogens are--times more than the normal level.---**30**
129. Which of the following hormone is released from anterior lobe of pituitary gland? -----**Luteinizing Hormone**
130. InsP3 causes release of Ca²⁺ from intracellular stores that causes the cell to:- **Depolarize**
131. InsP3 release calcium ion from stores: -----**Within The Cell**
132. Thyroglobulin is stored within the thyroid gland in large: **Follicles**
133. Interstitial tissues constitute ... of adult testes mass. -----**20%**

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134. Adenohypophysis contains ... types of glandular cells that synthesize & secrete six hormones. ----**Five**
135. Catecholamines conversion of tyrosine to dopa & dopamine occurs in the: **Cytosol**
136. Parathormone over secretion leads to:- ----- **Softness Of Bone**
137. Type of secretion in which entire cell ruptures and breakup to release its content? ---**Holocrine Secretion**
138. Glycosuria is the secretion of glucose into the:----- **URINE**
139. The islets of Langerhans contain: -----**All Alpha, Beta, Delta & PP Cells**
140. Adrenal cortex synthesize and secrete a family of steroid hormones collectively called: -----
Corticosteroids
141. An absolute deficiency of insulin due to loss of pancreatic beta-cell causes:--- **Diabetes Mellitus Type I**
142. ... are involved in spermatogenesis. -----**Germ Cells**
143. Seminiferous tubules are located within the: -----**Testes**
144. Insulin is secreted from the ... of islets of Langerhans----- **Beta Cells**
145. Major stimulus for the beta cells to secrete insulin is high blood...level. --**Glucose**
146. Amine hormones thyroid & adrenal medullary hormones are synthesized by the action of enzymes on amino acid:----- **Tyrosin**
147. Each molecule of calsequestrin protein can bind around: -----**52 Ca²⁺**
148. Thick filaments are composed of about ... -----myosin molecule----- **300**
149. Troponin has a high binding affinity for: -----**Ca²⁺**
150. Myosin found in:----- **All Skeletal Muscles Cardiac Muscles Smooth Muscles**
151. Myofibers are ...in diameter, and up to many centimeters in length. --**5 To 100µm**
152. Troponin is sensitive to----- **Ca⁺**
153. Rhythmic discharge rate of A-V node: -----**40-60 Times Per Minute**
154. Myocytes are **Muscles. Cardiac**
155. Voltage is measured in: -----**Millivolts**
156. human S-A node is:----- **3 Mm Wide, 15mm Long, 1mm Thick**
157. Velocity of impulse atrial fiber is: -----**0.3 M/S**
158. Length of muscle twitch is as short as ... or as long as : **10 Milliseconds, 100 Milliseconds**
159. Cardiac output of resting person is:----- **5L/M**
160. When the force exerted by the muscle contraction is equal to the opposing external force: --**Isometric Contraction**
161. Atrial contraction provides only ... volume of total mammalian ventricular output. -----**30%**
162. Rhythmic discharge of S-A node is: -----**70-80/Minute**
163. A cardiac muscle cell (myocyte) contains one nucleus, whereas skeletal muscle cells are:-----
Multinucleate
164. High pressure is: -----**Systolic Bp**

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165. Electric impulse is observed in: -----**Cardiac Muscles**
166. Most neurons have an RMP of ... when no impulse is being conducted---**70mv**
167. In equation η stands for: -----**Viscosity Of Blood**
168. Equation indicate blood flow: ----- **$V = Q/A$**
169. Relative viscosity of plasma: -----**1.8**
170. Fenestrated capillaries are found in: -----**Endocrine Glands**
171. Local vasoconstrictor is: -----**Angiotensin II**
172. ... is formed in lungs, acts as local vasoconstrictor:----- **Angiotensin II**
173. Amount of air that still remain in lungs when they fully collapse.--- **30 To 120ml**
174. Respiratory system of ... is composed of 7 or 9 air sacs.----- **Birds**
175. Central chemoreceptors are located in:--**Medulla Of Mammals & Air Breathing Vertebrates**
176. Which are stenohaline animals:-----**Marine Spider Crab**
177. A camel can loss ... of water & still survive. -----**40%**
178. ... is involve in maintaining pH of urine-----**Ubular Secretion**
179. GFR average an astounding ... per minute. -----**125ml**
180. It requires only ... of water to excrete 1g of urea.----- **0.05 Liters**
181. Esophagus is included in ... division of mammalian digestive tract.----- **4**
182. Goblet cells synthesis and secretes:----- **Mucus**
183. ... is the largest water-soluble essential nutrient. -----**Vitamin B12**
184. Brown fat contains large amount of: -----**Mitochondria 135**
185. Which is neuroethological behavior: **Study Behavior In Laboratory**
186. Agonistic behavior involve ... b/w animals. ----- **Competition**
187. Social behaviors are based on:----- **Competition**
188. Respiratory epithelium has only a thickness of: ----- **0.5 To 15 μ m**
189. Atrial natriuretic peptide (ANP) hormone secreted by:- **Stretch-Sensitive Secretory Cells**
190. Blood with hemoglobin carry ... oxygen per 100ml.----- **20ml**
191. Inspiratory reserve volume: -----**1900ml**
192. DCT secrete:----- **Nh4+, K+, H+**
193. Teleost fish is: -----**Ammonotelic Animals**
194. Esophagus is a part of: -----**Foregut**
195. Duodenum is ... long. -----**25cm**
196. Proteases are:----- **Trypsin, Chymotrypsin, Pepsin**
197. Sweating occur in: -----**Uct (Upper Critical Temperature)**
198. Thickness of muscle fibers:----- **160 To 170 Å**
199. 1 joule of energy is utilized in work, ... of energy is degraded.----- **3joule**

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200. A honey bee finds a food source close to the:----- **Less Than 50m**
201. One female has an exclusive relationship with two or more males: **Polyandrous**
202. Most social behavior based on:----- **Conflict, Competition, Cooperation**
203. Agonistic behavior based on: -----**Threat Display, Attacks, Fights**
204. In mammalian kidney, the pyramids are seen in: -----**Medulla**
205. Which of the following is a part of foregut: -----**Crop**
206. ... of the blood volume entering kidney through renal arteries is removed as filtrate by glomeruli. ----**10%**

SUBJECTIVES

1. What Is The Basic Theme In Physiology 2? Marks

Animal Physiology deals with the study of functions of the tissues, organs and organ systems of animals.

Our major goals of study of animal physiology are to:

Explore the physiological processes that are basic to all animal groups show how they have been shaped by selective forces during evolution

Central themes in animal physiology:

As we study animal physiology and physiological adaptations, we notice several basic themes, repeatedly emerging.

We shall briefly discuss five major themes here, i.e.

- Structure-function relationships
- Adaptation, Acclimatization and Acclimation
- Principle of homeostasis
- Feedback control systems
- Conformity and Regulation

2. Donnan Equilibrium 3marks

Discovery

In 1911 Frederick Donnan discovered the phenomenon of unequal distribution of ions across the two sides of a differentially permeable membrane. This phenomenon is known as Donnan equilibrium and can be defined as:



Definition

“If diffusible solutes are separated by a membrane that is freely permeable to water and electrolytes but totally impermeable to one species of ion, the diffusible solutes become unequally distributed between the two compartments”.

3. Explain Negative Feedback With 2 Example.5

The secretory activities of most endocrine tissues, especially those involved in maintaining homeostasis, are modulated by negative feedback.

In this type of feedback, the hormone itself or products resulting from its action tend to suppress its further release. - -

Negative feedback mechanisms ensure a proper level of hormone activity at the target tissue and prevent its over-activity by over-secretion.

Negative feedback is a type of regulation in biological systems in which the end product of a process in turn reduces the stimulus of that same process. Feedback, in general, is a regulatory mechanism present in many biological reactions. By allowing certain pathways to be turned off and on, the body can control various aspects of its internal environment. This is similar to flipping a switch. Feedback allows the product of a pathway to control the switch. Sometimes referred to as a “negative feedback loop”, negative feedback occurs when the product of a pathway turns the biochemical pathway off

Negative feedback systems: In life, the most common form of regulation encountered is the negative feedback, in which accumulation of an end product works to stop or slow down that process.

Example-1

The breakdown of sugar in the cells generates chemical energy in the form of ATP. When a cell makes more ATP than it can use, the excess ATP "feeds back" and inhibits an enzyme near the beginning of the pathway. This results in temporary stoppage of ATP production.

The figure illustrates the negative feedback:

The three-step chemical pathway shown here converts substance A to substance D. A specific enzyme catalyzes each chemical reaction. Accumulation of the final product (D) inhibits the first enzyme in the sequence, thus slowing down production of more D.

Example-2

The control of blood sugar (glucose) by insulin is another good example of a negative feedback mechanism.

When blood sugar rises, receptors in the body sense a change. In turn, the control center (pancreas) secretes insulin into the blood effectively lowering blood sugar levels. Once blood sugar levels reach homeostasis, the pancreas stops releasing insulin. - -



4. Sensory Adaptation With Example.

Definition

The decrease in perceived intensity, when the intensity of the stimulus has not itself changed, is known as sensory adaptation. The phenomenon is due to reduction in the frequency of sensory response during a sustained stimulus.

Adaptation Example:

Wearing clothing stimulates touch receptors at all points where our garments touch the skin. But we typically adapt to the touch input from our garments. So we can easily detect any new touch stimuli that impinge on our skin, even at locations covered by our clothing.

Other common examples of adaptation under our everyday observation are with the stimuli of smell, hot or cold water and dim or bright intensity of light.

More Examples

- Stimuli of smell
- Hot or cold water
- Dim or bright light

5. Feedback Mechanism Principle And Significance.

Feedback Control System

Definition:

Many biological processes have the ability of self-regulation by a mechanism which is called feedback mechanism. The basic principle of feedback in living systems is that the output or product of a process itself regulates the process.

Significance:

The feedback regulatory processes maintain homeostasis in the cells and the body of multicellular organism as a whole.

Mechanism: Feedback controls regulate particular variables e.g.,

- a. Temperature
- b. Salinity
- c. pH

This regulation requires:

- d. Continuous sampling of controlled variables
- e. Respective corrective actions.



6. What Is Homeostasis. 2marks

Homeostasis

Definition:

During evolution, each species has assumed a specific set of internal environment with an ability to resist environmental changes by making adjustments to keep its internal fluctuations in a narrow range. This ability to protect internal environment from the harms of fluctuations in external environment is termed as homeostasis.

Homeostasis does not mean to keep a fixed internal environment as the changes maintained within a specific range are necessary for normal body functions.

Example:

1. Homeostatic regulation of water
2. Homeostatic regulation of temperature
3. Regulation of pH
4. Regulation of glucose concentration
5. Regulation of osmotic pressure
6. Regulation of oxygen level

7. Positive And Negative Feedback Mechanism. 3marks.

Positive Feedback Systems:

There are many biological processes that are regulated by positive feedback, although they are less commonly found. In positive feedback systems, an end product speeds up its production by enhancing the effect of original stimulus.

The figure explains the positive feedback system in a biochemical pathway. A product stimulates an enzyme in the reaction sequence, increasing the rate of production of the product.

Negative feedback systems:

In life, the most common form of regulation encountered is the negative feedback, in which accumulation of an end product works to stop or slow down that process.

8. What Is The Disease Caused By Hyperthyroidism. 2 Marks

Excessive secretion of thyroid hormone is known as hyperthyroidism.

The most common form of hyperthyroidism is Graves' disease. It is an autoimmune disorder in which antibodies that mimic TSH bind to the receptor for TSH and cause sustained thyroxine production.

- a. high body temp.



- b. profuse sweating
- c. weight loss
- d. Irritability
- e. high blood pressure
- f. protruding eyes (exophthalmia)

9. Write About The Genetic Basis Of Color Blindness. 3 marks

Genetic Basis of Color Blindness

The three types of opsins found in color pigments are encoded by three different genes.

The gene encoding the opsin in blue-absorbing pigment is located on an autosomal chromosome. The genes for red-absorbing and green-absorbing pigments are closely linked on the X chromosome. Color blindness is caused due to a mutation in one of the cone opsin genes, resulting in absence of one type of pigmented cones. A person missing a single type of color receptive cones is unable to distinguish some colors.

10. Note On Axon.

Axon

An axon is a long and thick process that arises from the cell body and has a constant diameter. The lengths of the axons vary from few millimeters to more than a meter. The longest axons are seen in whales, where the axon of a single spinal motor neuron may extend many meters from the base of the spine to the muscles in the tail fin.

Functions

The axons are specialized to conduct signals away from the cell body. They have evolved mechanisms that allow them to carry information for long distances with high fidelity and without loss.

Structural components of axons:

The axon contains a jelly-like semi-fluid substance called Axoplasm, surrounded by the plasma membrane which is called Axolemma. Axon has mitochondria and ER but lacks Nissl's granules. So axons are not involved in protein synthesis.

Axon terminals:

Each axon may divide into numerous branches at its termination. These branches of axon are called axon terminals. Each axon terminal has small extensions called telodendria with enlarged ends called terminal knobs. These knobs have granules or vesicles that contain neurotransmitters. The axon terminals allow transmission of signals to many other neurons, glands or muscle fibers simultaneously.

Axon hillock:



The region of an axon where it joins the cell body is cone-shaped and is called the axon hillock. This is the region where the signals that travel down the axon are generated.

Myelin sheath:

Specialized neuroglial cells, known as Schwann cells are located at regular intervals along the axons of many neurons. These Schwann cells secrete a fatty layer known as myelin sheath, over the axons. The myelin sheath is not continuous, but there are non-myelinated points in between, which are called Nodes of Ranvier.

11. Sensory Organs Of Humans.2 Marks.

The major sensory organs of human body are eyes, ears, nose, tongue and skin.

12. Molecules Structure And Functions 5 Marks

Myosin Molecule

- Each myosin molecule consists of two identical heavy chains which are coiled together to form a long tail. It also has two globular heads which are made from two heavy chains plus three or four calcium-binding light chains.
- The heads form cross bridges between the thick and the thin myofilaments during contraction.

Thin Filaments

- The thin filaments are 7-8 nm thick and extend across the I band.
- They are composed chiefly of actin molecules.
- Thin filaments also overlap myosin filaments in the peripheral darker regions of the A band. In these regions, six actin filaments surround each myosin filament while each actin filament is surrounded by three myosin filaments.
- In thin filaments, actin molecules are arranged in two chains which twist around each other.
- Two strands of another protein tropomyosin twist around the actin and help to stiffen it. In a relaxed muscle fiber, they block myosin binding so that the myosin heads can not bind to the thin filaments.
- Thin filaments also have a three polypeptide complex troponin at intervals of about 40nm along the thin filament.
- One of the troponin polypeptides (TnI) is an inhibitory subunit that binds to actin, other (TnT) binds to tropomyosin and helps position it on actin while third (TnC) binds the calcium ions.
- Both troponin and tropomyosin help control the myosin-actin interactions involved in contractions.

The H Zone

- The center of A band appears lighter than the other regions in a relaxed sarcomere.
- This region is called H zone and contains only thick filaments. There are no overlaps between the actin and myosin in this region.



- The H zone is bisected by a dark line, the M line which contains enzymes important in energy metabolism.

13. What Is Myosin How It Helps In Muscular Contraction

When a muscle contracts, the thin actin filaments slide b/w the thick myosin filaments & move closer to the center of sarcomere. As a result, sarcomere becomes shorter.

14. Photoreceptors 3 Marks

Photoreceptors:

Photoreceptors possess light-sensitive pigments which are carotenoids retinal and 3-dehydroretinal associated with opsin proteins to form rhodopsins. These pigments absorb photons of light energy and then produce a generator potential. External energy, such as light, may strike any part of the body; but only the eyes contain sensory cells that can receive and respond to the stimulus of light and transduce photons into neuronal energy.

15. Taste Buds And Types Of Cell Taste Buds.

Taste buds

The gustatory organs of vertebrates are called taste buds.

The taste bud is composed of about 50 modified epithelial cells including supporting cells (sustentacular cells), basal cells and taste receptor cells.

The basal cells are progenitor cells that give rise to new taste receptors. They regularly generate new sensory taste receptor cells which have an active life of only 10 days.

Taste Receptor Cells

The outer tips of the taste cells are arranged around a minute taste pore. From the tip of each taste cell, several microvilli, or taste hairs, protrude outward into the taste pore to approach the cavity of the mouth. These microvilli provide the receptor surface for taste. Interwoven around the bodies of the taste cells is a branching terminal network of taste nerve fibers that are stimulated by the taste receptor cells.

16. What Is Meant By Range Fractionation, Also Give Its Importance And Give At Least Two Examples.

Definition

In a sense organ, sensory receptors are arranged in an order of increasing sensitivity to different range of intensities of the stimulus. This hierarchical arrangement of receptors is known as range fractionation.

Range Fractionation and Stimulus Intensities

Each individual receptor, in a sense organ, covers only a fraction of the total dynamic range of the stimulus. Receptors work together in an orderly way to provide discrimination of stimulus intensities.



Recruitment Phenomenon

One important implication of range fractionation is the recruitment phenomenon.

- The most sensitive receptors in the population produce a response at stimulus intensities that are just above the threshold. Above that intensity, the most sensitive receptors become saturated.
- If the stimulus energy is increased a little, the less sensitive receptors in the population will join in and respond.
- With still greater stimulus intensities, another, formerly inactive lower-sensitivity population of receptors will join in. – –
- In this way, as the stimulus intensity is increased, receptors that are less and less sensitive will become active, until the least sensitive sensory fibers will finally be recruited, and all receptors will respond maximally.
- At that point, the system will be saturated and therefore unable to detect further increases in intensity. This phenomenon of activation of receptors in a graded fashion is called recruitment.

Importance of Range Fractionation

- It results in increasing the active range of multineural sensory system than the range of any individual single receptor.
- It also increases the overall precision of the sense organ.
- It enables the sensory processing centers of the CNS to discriminate stimulus intensities over a range much greater than that of any single sensory receptor.
- The extended dynamic range of the entire system is possible because individual receptors of a sensory system cover different parts of the full spectrum of sensitivity.

Range Fractionation Example:

Eyes have rod cells which are high sensitivity photoreceptors while cone cells have low sensitivity. At low light intensity, i.e. dimmer light, only rod cells are recruited and we can see dimly, as black/white image. As the brightness increases, cone cells start to recruit and we are able to see colors. Very bright light gives us perception of truly colored image. After the highest intensity limit, increasing intensity does not increase clarity of the image because the system becomes saturated.

17. Write Note On Acetylcholine

Acetylcholine

- The most familiar fast acting neurotransmitter substance is the Acetylcholine.
- In most instances, acetylcholine has an excitatory effect.

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- It also acts as inhibitory transmitter in some instances e.g. at the peripheral parasympathetic nerve endings where it is involved in the inhibition of the heart by the vagus nerves.

Cholinergic Neurons

Neurons that release Acetylcholine are said to be cholinergic. They are widely distributed throughout the animal kingdom. These neurons include:

- vertebrate motor neurons
- preganglionic neurons of the vertebrate autonomic nervous system
- postganglionic neurons of the parasympathetic division of the autonomic nervous system
- many neurons of the vertebrate central nervous system
- a number of invertebrate neurons e.g. cells of the molluscan central nervous system, motor neurons of annelid worms, and sensory neurons of arthropods.

Mode of Action of Acetylcholine

- When acetylcholine (ACh) is released into the synaptic cleft, it binds to the ligand-gated ACh-specific receptors in the postsynaptic membrane.
- The binding causes Na^+ and K^+ ion channels to open briefly that produce an EPSP.

18. Photoreceptors

Photoreceptors

Photoreceptors possess light-sensitive pigments which are carotenoids retinal and 3-dehydroretinal associated with opsin proteins to form rhodopsins. These pigments absorb photons of light energy and then produce a generator potential. External energy, such as light, may strike any part of the body; but only the eyes contain sensory cells that can receive and respond to the stimulus of light and transduce photons into neuronal energy.

19. Basic Type Of Stimuli.

Types of Stimuli Two types:

- External Stimuli** : Stimuli of odor, touch, light, sound and gravitation
- Internal Stimuli** : Stimuli of pain, homeostatic imbalances and blood pressure

20. Taste Buds And Types Of Cell Taste Buds.

Taste buds



- a. The gustatory organs of vertebrates are called taste buds. The taste bud is composed of about 50 modified epithelial cells including supporting cells (sustentacular cells), basal cells and taste receptor cells.
- b. The basal cells are progenitor cells that give rise to new taste receptors. They regularly generate new sensory taste receptor cells which have an active life of only 10 days.

Taste Receptor Cells

- The outer tips of the taste cells are arranged around a minute taste pore.
- From the tip of each taste cell, several microvilli, or taste hairs, protrude outward into the taste pore to approach the cavity of the mouth.
- These microvilli provide the receptor surface for taste.
- Interwoven around the bodies of the taste cells is a branching terminal network of taste nerve fibers that are stimulated by the taste receptor cells.

21. Sensory Adaptation With Example.

Definition

The decrease in perceived intensity, when the intensity of the stimulus has not itself changed, is known as sensory adaptation. The phenomenon is due to reduction in the frequency of sensory response during a sustained stimulus.

Adaptation Example:

Wearing clothing stimulates touch receptors at all points where our garments touch the skin. But we typically adapt to the touch input from our garments. So we can easily detect any new touch stimuli that impinge on our skin, even at locations covered by our clothing. Other common examples of adaptation under our everyday observation are with the stimuli of smell, hot or cold water and dim or bright intensity of light.

More Examples: 1) Stimuli of smell 2) Hot or cold water 3) Dim or bright light

22. Name Different Component Of Membranous Labyrinth.

Membranous Labyrinth:

It consists of three parts:

- a. Three semicircular canals
- b. Vestibule (sacculus and utricles)
- c. Cochlea



- d. The semicircular canals and vestibule are concerned with maintaining balance while cochlea is the sensory structure concerned with hearing

23. What Are The Effect Of Neuromodulation.

The phenomenon of neuromodulation plays critical roles in the development of complex behavioral patterns e.g. happiness, revenge, reward, greed and exploration. Neuromodulation is also involved in the processes of thinking, cognition, planning, learning and memory. Many behavioral problems are also based on neuromodulation e.g. mood swings, sleep disturbances, feelings of stress, anxiety, depression and anger.

24. Exocrine Glands

Exocrine glands Exocrine glands produce fluid secretions that are delivered through ducts onto the epithelial surfaces of the body. Exocrine glands are more easily identified than endocrine glands because of their duct leading to the body surface. The fluid secretions may be either proteins (enzymes) or mucous or both.

Examples:

- ✚ Salivary glands produce saliva that is delivered to the oral cavity for partial digestion of food through parotid and submandibular ducts.
 - ✚ Pancreas produces enzyme-containing pancreatic juice that is delivered to the small intestine through pancreatic duct.
 - ✚ Lacrimal glands produce tears that is delivered through lacrimal duct on the surface of eye to provide lubrication.
 - ✚ Mammary glands produce milk that is delivered through lactiferous ducts to the nipples for nourishing the young.
-
- a) The main function of endocrine glands is to secrete hormones directly into the bloodstream
 - b) The Pineal Gland Runs a Daily Biological Clock.
 - c) The Thyroid and Parathyroid Glands Increase Metabolism and Regulate Calcium Levels.

25. Sensory Organs Of Humans.

The major sensory organs of human body are eyes, ears, nose, tongue and skin.

26. Hair Cilia



Cilia (plural), are small hair-like protuberances on the outside of eukaryotic cells. They are primarily responsible for locomotion, either of the cell itself or of fluids on the cell surface.

27. Difference Pacinian Corpuscles And Meissners Corpuscles.

Meissner's Corpuscles: are the touch receptors. They have encapsulated nerve endings which lie in papillae which extend into the ridges of fingertips. Sense of touch perceived through skin having Meissner's corpuscles

Pacinian Corpuscles: are situated quite deep in the skin. They have encapsulated nerve endings and receive deep pressure stimulus. Pacinian corpuscles that are situated deep in the body and receive pressure stimulus. In the limbs, they receive vibrations.

28. What Is Meant By Sensation?

Sensations arise when sensory receptor cells, receiving a stimulus, transmit signals through the nervous system to particular parts of the brain that interprets or perceives these signals. The subjective description of these neuronal perceptions is termed as sensation.

29. Labeled Line Coding

Each receptor subtype for five kinds of taste sensations is connected to a particular set of axons. In that arrangement, for example, information about "sweetness" would be carried by some specific subset of axons. Such a pattern is called labeled line coding.

30. Taste Buds And Taste Receptors

- The gustatory organs of vertebrates are called taste buds.
- The taste bud is composed of about 50 modified epithelial cells including supporting cells (sustentacular cells), basal cells and taste receptor cells.
- The basal cells are progenitor cells that give rise to new taste receptors. They regularly generate new sensory taste receptor cells which have an active life of only 10 days.

31. Three Function Of The Sensory Transduction

Detection of Stimulus:

- The initial event in all sensory transduction systems is the detection of stimulus.
- Only the stimuli that have a minimum level of energy i.e. threshold are detected.

Threshold of detection:



The smallest amount of stimulus energy that will produce a response in a receptor 50% of the time is called the threshold of detection.

Amplification of Stimulus

- ⇒ In some sensory systems, amplification of stimulus is carried out within the receptor cells, if stimulus energy received at the receptor site is low.
- ⇒ Amplification is mediated by a number of intracellular mechanisms that involve a cascade of chemical reactions in the cell.
- ⇒ It results in amplification of the signal by many orders of magnitude.

Encoding of Signal

- ⇒ Intracellular processing in the receptor cell converts the physical or chemical stimulus into the form of ionic current.
- ⇒ These ionic currents are the encoded form of original stimulus, containing all its attributes.

32. Gastro Intestinal Hormones

Gastrointestinal hormones glucagon, gastrin and cholecystokinin, SubstanceP, endorphins, enkephalins and many other amino acid derivatives.

33. What Is The Function Of Fibers Of Zonula And Ciliary Muscles.

In higher vertebrates, image is focused by changing the curvature and thickness of the lens. The curvature and thickness of the lens is controlled by the suspensory ligaments (fibers of Zonula) and ciliary muscles. Role of Fibers of Zonula The shape of the lens is changed by the fibers of the zonula that held the lens in place. These fibers can exert an outwardly directed tension on the perimeter of the lens. Role of Ciliary muscles Ciliary muscles are attached with the fibers of zonula. Their contraction and relaxation adjust the amount of tension exerted on the lens. When the ciliary muscles contract, the lens is flattened by elastic tension exerted by the fibers of the zonula, which pull the perimeter of the lens outward. In this state, objects far from the eye are focused on the retina, but objects close by would be fuzzy. When the ciliary muscles relax, lens becomes more rounded. This focuses the objects close to the eye.

34. Write About The Genetic Basis Of Color Blindness.3marks

Genetic Basis Of Color Blindness

The three types of opsins found in color pigments are encoded by three different genes. The gene encoding the opsin in blue-absorbing pigment is located on an autosomal chromosome. The genes for red-absorbing and green-absorbing pigments are closely linked on the X chromosome. Color blindness is caused due to a mutation in one of the cone opsin genes, resulting in absence of one type of pigmented cones. A person missing a single type of color receptive cones is unable to distinguish some colors.



35. Write At Least Five Properties Of Hormones.

- a) Hormones act only on specific target cells/tissues
- b) Hormone molecules come into contact with all the tissues in the body during transport through blood, only the cells that contain receptors specific for a particular hormone are affected by it, and generate response.
- c) Hormonal action depend on the type of receptor
- d) The action of a hormone depends on the nature of enzyme cascade linked to the hormone's receptor, as well as the effector molecules expressed in a particular tissue. For this reason, a hormone can act on two or more different types of tissues and generate different types of responses. For example, Antidiuretic hormone stimulates water reabsorption in the nephron of kidney

while the same hormone produces vasoconstriction and increases blood pressure by acting on the walls of arteries. The receptors in kidney nephron tubule and arterial receptors are different, causing the same hormone to generate different responses.

- e) Hormones are active at very low concentration Physiology and Behavior 3 The amount of hormone produced by an endocrine gland is small. It is further diluted in the blood and interstitial fluid. The available concentration for the target cell lies between 10^{-8} to 10^{-12} M and the hormone is still effective at this very low concentration. The high sensitivity of hormonal signaling is due to the high affinity of target cell receptors for hormones.
- f) Hormonal effects are amplified Binding of a hormone molecule to its receptor leads to a cascade of enzymatic steps that amplify the effect; thus just a few hormone molecules can influence thousands or millions of molecular reactions within a cell.

36. Stigma And Ocelli

Eyespot or Stigma

The simplest photoreceptive structures are the Eyespots or Stigma found in some protozoa e.g. euglena. Stigma is a bright red colored structure having carotenoid pigments. It gives a sense of light and dark and helps in phototaxis.

Eyecups or Ocelli

Cnidarians and flatworms have multicellular photoreceptive structures call eyecups or Ocelli. They consist of a cuplike depression containing photoreceptor cells. They cannot form image and only provide the animal a sense of direction

37. Deuteronatope And Paranatope



A person with loss of red cones is called a protanope. In this type, the overall visual spectrum is shortened at the long wavelength end because of a lack of the red cones. A color-blind person who lacks green cones is called a deuteranope. Such a person has a normal visual spectral range because red cones are available to detect the long wavelength red color. - -

38. Mammalian Ear Decision.

The Mammalian Ear

- ✚ Ear is the organ of hearing that detects sound within a particular frequency range.
- ✚ The human ear can detect sound frequencies lying between 20 to 20000 hertz.

Functional Anatomy of Mammalian

Ear waves through three principally different media i.e., air, bone and fluid.

The conducted waves are converted into electrical signals through a series of complex steps.

Mammalian Ear Has 3 Major Divisions:

- External ear
- Middle ear
- Inner ear

The 3 parts are designed to conduct sound External Ear:

External ear includes:

- The pinna (auricle)
- External auditory meatus
- Tympanic membrane (eardrum) .

These structures act as a funnel to collect sound waves from environment Sound is amplified and concentrated onto the eardrum that vibrates

Middle Ear

- ✚ Contains three auditory ossicles malleus, incus, stapes in a series. - -
- ✚ Malleus attached to eardrum and stapes to oval window of cochlea.

Functions of Middle Ear

- Receive sound waves as vibrations from eardrum and transmit them onto oval window of cochlea.

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- Amplify sound waves (more than 20 fold).

Inner Ear

- It consists of a bony labyrinth which is filled with perilymph and has an oval and a round window.
- Oval window receives sound vibrations through stapes.
- In the bony labyrinth lies the membranous labyrinth that is filled with endolymph.

39. Hormones Secreted By Ovaries

I. Estradiol(estrogen)

II. Progesterone

40. Three Main Parts Of Ear

Mammalian ear has 3 major divisions:

1. External ear
2. Middle ear
3. Inner ear

The 3 parts are designed to conduct sound waves through three principally different media i.e., air, bone and fluid.

41. Ca Ion Role In Excitation .

Hair cell excitation due to inward K^+ current also causes the opening of voltage-gated calcium channels. The resultant Ca^{2+} influx causes transmitter (mainly glutamate) release from the basal end of the cell onto the auditory nerve endings, stimulating them to send an electrical signal along the cochlear nerve.

42. Components Of Rhodopsin

A rhodopsin molecule consists of two major components: Opsin protein and a light-absorbing molecule that may be retinal or 3-dehydroretinal. Retinal is the aldehyde of a carotenoid vitamin A1 (Retinol). 3-dehydroretinal is the aldehyde of vitamin A2 (3-dehydroretinol). In addition to these major components, rhodopsin includes a six-sugar polysaccharide chain and a variable number (as many as 30 or more) of phospholipid molecules.

43. Color Blindness (Red & Green)



Color blindness is caused due to a mutation in one of the cone opsin genes, resulting in absence of one type of pigmented cones. A person missing a single type of color receptive cones is unable to distinguish some colors.

Red-Green Color Blindness

The green, yellow, orange, and red colors between the wavelengths of 525 and 675 nm, are normally distinguished from one another by the red and green cones. If either of these two cones is missing, the person cannot distinguish these four colors. The person is especially unable to distinguish red from green and is therefore said to have red-green color blindness.

44. Thermoreceptors Are Found In Skin

Thermoreceptors that keep track of thermal state of the body. They are found scattered on the skin.

45. Hair Cell Cilia Types

- Hair cells are named for the many cilia that project from the apical end of each cell.
- These cilia fall into two classes: kinocilium and stereocilia.

46. Thermoreceptor Types

Warmth and Cold Receptors There are two kinds of thermoreceptors in the external skin and upper surface of the tongue:

- 1) Cold receptors
- 2) Warmth receptors

Both types of receptors are quite sensitive and enable humans to detect a change in skin temp. of as little as 0.01°C .

Cold Receptors

The cold thermoreceptors are 3.5 times more common in skin than heat receptors. They consist of free nerve endings of neurons that have thin myelinated $A\delta$ fibers having faster conduction velocity (19m/s). They increase their firing rate when the skin is cooled below body temperature.

Warmth Receptors

Warmth Receptors increase their firing rate in response to temperatures above body temperature. They consist of free nerve endings of neurons that have unmyelinated C fibers with low conduction speed (0.8m/s). Both these receptors are quite sensitive which enable human beings to detect a change in skin temperature of as little as 0.01°C .

47. What Is The Disease Caused By Hyperthyroidism.2marks?



Excessive secretion of thyroid hormone is known as hyperthyroidism. The most common form of hyperthyroidism is Graves' disease. It is an autoimmune disorder in which antibodies that mimic TSH bind to the receptor for TSH and cause sustained thyroxine production. - -

- high body temp.
- profuse sweating
- weight loss
- Irritability
- high blood pressure
- protruding eyes (exophthalmia)

48. Role Of Corpus Luteum In Pregnancy.

If the released ovum is fertilized and becomes implanted in the endometrium, the developing placenta begins to produce chorionic gonadotropin hormone that maintains an active corpus luteum, so that estrogen and progesterone secretion continues until the placenta fully takes over the production of these hormones, at which time the corpus luteum degenerates. In many other mammals, such as the rat, the corpus luteum, stimulated by prolactin, continues to grow and secrete estrogen and progesterone throughout the gestation period.

49. Abnormalities Due To Growth Hormones

Developmental Abnormalities Due to GH Disturbances in the secretion of growth hormone lead to several patterns of abnormal growth and development in humans:

- Gigantism:** Excessive size and stature caused by hypersecretion of growth hormone during childhood (before puberty).
- Acromegaly:** Enlargement of the bones of the head and of the extremities caused by hypersecretion of growth hormone beginning after maturity.
- Dwarfism:** Abnormal underdevelopment of the body caused by insufficient secretion of growth hormone during childhood and adolescence.

50. Androgen Hormone Secreted By Adrenal Cortex.

The adrenal cortex produces two major types of steroid hormones: the mineralocorticoids and the glucocorticoids collectively called as corticosteroids. These hormones are involved in blood ion and glucose regulation and antiinflammatory reactions.



- ✚ Adrenal cortex also secretes small amounts of sex hormones, especially androgenic hormones.
- ✚ These androgens exhibit about the same effects in the body as the male sex hormone testosterone.

51. What Type Of Cells Are Present In Islet Of Langerhans?

Islets Of Langerhans

The islets contain four types of cells:

- 1) **Beta Cells** : Constitute 60% of the Islets. They secrete insulin
- 2) **Alpha Cell** : Constitute 25% of the islets .They secrete glucagon
- 3) **Delta Cells** : Constitute 10% of islets. Secrete somatostatin that inhibits the secretion of insulin and glucagon
- 4) **PP Cells**: Present in small number. Secrete a hormone of uncertain function called pancreatic polypeptide.

52. Function Of Estrogen In Pregnancy?

During pregnancy, estrogens exert mainly a proliferative function on most reproductive and associated organs of the mother.

They cause:

- ✚ Enlargement of mother's uterus
- ✚ Enlargement of mother's breasts and growth of breast ductal structure ❖ Enlargement of mother's external genitalia.

They also relax the pelvic ligaments of the mother, so that the pubic symphysis becomes elastic. These changes allow easier passage of the fetus through the birth canal.

53. Give The Name Hormone Of Adrenal Cortex

- A. Aldosterone
- B. Cortisol,
- C. Corticosterone
- D. Cortisone

54. Three Growth Hormons.

- 1) Piturity
- 2) Placenta
- 3) Hypothalamus



55. Hormones Released By Thyroid Glandular

Cells Secretion of T3 and T4

The secretion of T4 predominates T3. However the target cells convert most of T4 to T3, which is the active form and carries out the major functional roles. The secretion of these hormones occurs by the stimulation of hypothalamus that releases TSH-releasing hormone (TRH). The stimuli for the release of TRH are stress, cold, low skin temperature and low metabolic rate. TRH acts on anterior pituitary gland that releases thyroid stimulating hormone (TSH). TSH causes the release of thyroid hormones.

56. Functions Of Catecholamines

Catecholamines help the body respond to stress or fright and prepare the body for "fight-or-flight" reactions. The adrenal glands make large amounts of catecholamines as a reaction to stress. The main catecholamines are epinephrine (adrenaline), norepinephrine (noradrenaline), and dopamine.

57. Hypothyroidism

Hypothyroidism usually results from the lack of dietary iodine. It is characterized by two types of diseases:

Cretinism

Iodine deficiency during early stages of development results in cretinism. In cretinism somatic, neural and sexual development is severely retarded, metabolic rate and resistance to infection is reduced.

Goiter

Inadequate production of thyroid hormones in adults leads to excessive production of TSH.

58. Function Of Luteinizing Hormone In Male & Female?

LH stimulates production of estrogen and progesterone by the ovary. It causes ovulation and formation of the corpus luteum.

In males, LH is also called as interstitial cell–stimulating hormone (ICSH) and stimulates testosterone production by the Leydig cells of testes

59. Lobes Of The Pituitary Gland

The pituitary gland is composed of three lobes:

- Anterior lobe (adenohypophysis)
- Intermediate lobe (pars intermedia)



➤ Posterior lobe (neurohypophysis)

Anterior Lobe (Adenohypophysis) The anterior pituitary is fleshy, glandular and highly vascularized in all animals. It contains five types of glandular cells which are controlled by regulatory hormones of the hypothalamus. On stimulation of hypothalamic releasing hormones, they synthesize and secrete six hormones. **Posterior lobe (neurohypophysis)** The posterior pituitary is non-fleshy and nonglandular. It has neural composition and is considered as an extension of the hypothalamus. --

60. What Is Reason Behind Latency Period In Action Potential.

Latency Period in Coupling

It takes several milliseconds to begin contraction after the arrival of an AP. This latency is because of the large size of skeletal muscle fibers which cannot contract unless action potential spreads deep into the fiber to the vicinity of each myofibril. During this latent period, action potential is transmitted along the transverse tubules (T tubules) deep within the fiber.

61. Diff B/W Cgmp And Camp?

A few of such differences include:

- The production of cGMP is catalyzed by guanylate cyclase enzyme from GTP.
- Guanylate cyclase occurs in two forms: one bound to the plasma membrane and one free in the cytoplasm. In contrast, adenylate cyclase is always bound to the plasma membrane.
- Guanylate cyclase becomes active as the Ca^{2+} concentration is increased within the cell, while adenylate cyclase activity is increased when Ca^{2+} conc. is low.
- cGMP activates a specific protein kinase, protein kinase G instead of protein kinase A.

62. Sarcoplasmic Reticulum

- The sarcoplasmic reticulum (SR) is a network of membrane-bound tubules that extends throughout muscle cells on either side of a Z disk and extends from one Z disk to the next as well.
- In many features, it is similar to the endoplasmic reticulum in other cells.
- The SR has a special organization that is extremely important in controlling muscle contraction. --
- That is why the rapidly contracting types of muscle fibers have extensive network of **sarcoplasmic reticulum**

63. Sarcolemma & Sarcolemma

The membrane of the cell is called sarcolemma, its cytoplasm is called sarcolemma and its endoplasmic reticulum is known as sarcoplasmic reticulum.

64. Myosin Molecules Structure And Functions



Myosin Molecule

- Each myosin molecule consists of two identical heavy chains which are coiled together to form a long tail. It also has two globular heads which are made from two heavy chains plus three or four calcium-binding light chains.
- The heads form cross bridges between the thick and the thin myofilaments during contraction. **Thin Filaments**
- The thin filaments are 7-8 nm thick and extend across the I band.
- They are composed chiefly of actin molecules.
- Thin filaments also overlap myosin filaments in the peripheral darker regions of the A band. In these regions, six actin filaments surround each myosin filament while each actin filament is surrounded by three myosin filaments.
- In thin filaments, actin molecules are arranged in two chains which twist around each other.
- Two strands of another protein tropomyosin twist around the actin and help to stiffen it. In a relaxed muscle fiber, they block myosin binding so that the myosin heads can not bind to the thin filaments.
- Thin filaments also have a three polypeptide complex troponin at intervals of about 40nm along the thin filament.
- One of the troponin polypeptides (TnI) is an inhibitory subunit that binds to actin, other (TnT) binds to tropomyosin and helps position it on actin while third (TnC) binds the calcium ions.
- Both troponin and tropomyosin help control the myosin-actin interactions involved in contractions.

The H Zone

The center of A band appears lighter than the other regions in a relaxed sarcomere.

- This region is called H zone and contains only thick filaments. There are no overlaps between the actin and myosin in this region.
- The H zone is bisected by a dark line, the M line which contains enzymes important in energy metabolism

65. What Is Myosin How It Helps In Muscular Contraction

When a muscle contracts, the thin actin filaments slide b/w the thick myosin filaments & move closer to the center of sarcomere. As a result, sarcomere becomes shorter.

66. Group Of Hormones Insoluble In Lipids.

The second messengers involved in signal transduction fall into three distinct groups:

- ⇒ Cyclic nucleotide monophosphates e.g. cAMP (cyclic adenosine monophosphate) and cGMP (cyclic guanosine monophosphate).



- ⇒ Inositol phospholipids e.g. inositol trisphosphate (InsP3) and diacylglycerol (DAG)
- ⇒ Ca²⁺ ions and associated calmodulin

67. Myofilament And Its Types

Each myofibril is composed of myofilaments. Myofilaments are of two types, thin filaments and thick filaments. Thin filaments are composed of actin while the thick filaments are composed of myosin molecules.

68. Hormones In Regulation Of Water And Ions

These hormones include:

- Antidiuretic hormone (ADH)
- Aldosterone
- Atrial natriuretic Hormone
- Calcitonin
- Parathormone

69. The Signaling System Of Camp

Many hormones use the adenylate cyclase–cAMP second messenger system to stimulate their target tissues. The hormone binds with the receptor that is coupled to a G protein. The G protein stimulates the membrane-bound adenylate cyclase enzyme. Activated adenylate cyclase catalyzes the conversion of adenosine triphosphate (ATP) into cAMP in the cytoplasm. The cAMP then activates an enzyme called cAMP-dependent protein kinase. This enzyme phosphorylates specific proteins in the cell, triggering a cascade of biochemical reactions that ultimately lead to the cell's response to the hormone.

70. Muscle Twitch And Tetanus .

The main difference between a skeletal muscle twitch and tetanic contraction is that twitch occurs only momentarily while tetanic contraction occurs in a prolonged and steady state. ... The contractions in muscle twitch are also light while tetanic contraction is characterized by strong contract.

71. Give Sliding Filament Theory,

Sliding Filament Theory H. E. Huxley and A. F. Huxley proposed the sliding filament theory of muscle contraction in 1954. This theory states that during muscle contraction the thin and thick filaments in sarcomeres slide and undergo shifting. When a muscle contracts, the thin actin filaments actively slide



along between the thick myosin filaments and move closer to the center of the sarcomere. As a result, the sarcomere becomes shorter. When a muscle relaxes or is stretched, the overlap between thin and thick filaments is reduced, and the sarcomere elongates. The changes in sarcomere length during contraction and stretch of a muscle, correspond to changes in muscle length

Explanation

In a relaxed muscle fiber, the thick and thin filaments overlap only at the ends of A band. But when muscle fibers are stimulated by the nervous system, myosin heads are attached to the myosin-binding sites on actin in the thin filaments, i.e. cross bridges are formed and the sliding begins.

Head

- During contraction, the A bands (myosin filaments) maintain a constant length, whereas the I bands and the H zone (zones where actin and myosin filaments do not overlap) become shorter and Z lines get closer
- When the muscle is stretched, the A band again maintains a constant length, but the I bands and H zone become longer.
- Neither the myosin thick filaments nor the actin thin filaments change their lengths when a sarcomere shortens or is stretched. It is the extent of overlap between actin and myosin filaments that changes.

Length-Tension curve

One of the strongest pieces of evidence in support of the sliding filament theory comes from the length-tension relation of a sarcomere. Experimental measurement of the shortening of length of sarcomere during contraction and resulting force generates a length-tension curve. This curve explains the assumptions of sliding-filament theory.

Explanation of the Curve

- ⇒ The tension produced by the muscle is maximal when the overlap between thick and thin filaments allows the largest number of cross-bridges to be formed between actin and myosin.
- ⇒ Tension drops off with increased length of sarcomere, because the thick and thin filaments overlap less and fewer crossbridges can be formed.
- ⇒ It also drops off with decreased length, because thin filaments begin to collide with one another, preventing further shortening.
- ⇒ The curve also predicts the consequence of sliding filament theory that no active tension will develop if a sarcomere is stretched so far that there remains no overlap between actin and myosin filaments, making it impossible to develop any crossbridges.

Conclusion

This curve shows that the tension produced by a sarcomere is proportional to its shortening which is due to sliding of thick and thin filaments and formation of cross bridges in the sarcomere during



contraction. These were the proposals of sliding filament theory. So length-tension curve provides a practical proof of this theory.

72. What Are Smooth Muscle And There General Function?.

Smooth Muscles General Features

- ✦ Least specialized muscle fibers.
- ✦ Have myosin similar to that found in contractile nonmuscle cells.
- ✦ Non-striated.
- ✦ Involuntary: under autonomic control.
- ✦ Contract and relax slowly.
- ✦ Capable of more sustained contractions.

73. Name Different Component Involve In The Mechanism Of Conductivity Of Heart.

The atrial internodal pathways that conduct impulse from the S-A node to the atrioventricular (A-V) node.

- ✦ The A-V node, in which the impulse from the atria is delayed before passing into the ventricles.
- ✦ The A-V bundle, which conducts the impulse from the atria into the ventricles.
- ✦ The left and right bundle branches of A-V bundle.
- ✦ Purkinje fibers, which branch off from bundle branches and conduct the cardiac impulse to all parts of the ventricles

74. Pace Marker And It's Types.

Pacemaker

The pacemaker is the excitatory region which generates the rhythmical impulses that control the rhythmicity of cardiac chambers.

Pacemaker Types

Two basic types of pacemakers in animals with pumping hearts:

- ✦ Neurogenic Pacemakers
- ✦ Myogenic Pacemakers

Neurogenic and Myogenic Pacemakers .



In many invertebrate hearts, the pacemaker is neurogenic that consists of neurons. These hearts are known as neurogenic hearts. B. The pacemaker in some invertebrate and all vertebrate hearts is myogenic i.e. consists of specialized self-excitatory muscle cells. Such hearts are known as myogenic hearts

75. Gap Junction.

Writes its works Gap Junctions Electrical activity, initiated in the pacemaker region of the heart, spreads over the entire heart from one cell to another because the cells are electrically coupled via membrane gap junctions. Gap junctions are regions of low resistance between cells and allow current flow from one cell to the next across intercalated disks.

Role of Gap Junctions

- ✚ Allow current flow from one cell to the next.
- ✚ Pacemaker's electrical activity spreads over the entire heart via gap junctions.

76. Define Cardiac And Stroke Volume ?

Cardiac Output

Cardiac output is the quantity of blood pumped into the aorta each minute by the heart. This is also the quantity of blood that flows through the circulation. The average cardiac output for the resting adult is often stated to be almost exactly 5 L/min.

Factors Affecting Cardiac Output

Cardiac output varies widely with the level of activity of the body. The following factors directly affect cardiac output:

- Basic level of body metabolism
- Physical activity of the body
- Age
- size of the body

Stroke Volume

The volume of blood ejected by each beat of the heart is termed the stroke volume. Stroke volume is the difference between the volume of the ventricle just before contraction (end-diastolic volume) and the volume of the ventricle at the end of a contraction (end-systolic volume).

Kinesiology

The study of different types of muscles, lever systems, and their movements is called **kinesiology** and is an important scientific component of human physioanatomy.



77. Tetanus And Types

A tetanic contraction is a sustained muscle contraction evoked by stimulation from simultaneous multiple impulses. Each stimulus causes a twitch.

Types of Tetanus

A tetanic contraction can be either unfused (incomplete) or fused (complete).

Unfused Tetanus

An unfused tetanus is when the muscle fibers do not completely relax before the next stimulus because they are being stimulated at a faster rate.

Fused Tetanus

Fused tetanus is when there is no relaxation of the muscle fibers between stimuli and the twitches overlap. It occurs during a high frequency of stimulation. A fused tetanic contraction is the maximal possible contraction. During tetanized state, the contracting tension in the muscle remains constant in a steady state

78. Uses Of Kymograph

Kymograph A kymograph is a device that graphically records changes in the mechanical activities of animal tissues in the physiological experiments. Uses of Kymograph Since its invention in the 1840s, the kymograph has been used most commonly in the field of medicine to study various physiological and muscular processes. It has been used to study the skeletal muscle contractions (twitch and tetanus) as well as the cardiac muscle activities (cardiac cycle). It is also used to measure blood pressure and rate of respiration. - -

79. Two Vascular Resistance

Vascular resistance is the resistance that must be overcome to push blood through the circulatory system and create flow

- ✚ Systemic vascular resistance (SVR)
- ✚ Total peripheral resistance (TPR)

80. Sensory Receptors Of Cardiovascular System

The body employs a variety of sensory receptors for monitoring the status of cardiovascular system.

- 1) **Baroreceptors:** monitor blood pressure at various sites in the cardiovascular system



- 2) **Chemoreceptors:** monitor CO₂, O₂, and pH of the blood.
- 3) Cardiac mechanoreceptors
- 4) Thermoreceptors

81. Laminar Flow Or Streamline Flow In Pipes (Or Tubes)

Occurs when a fluid flows in parallel layers, with no disruption between the layers. ... Turbulent flow is a flow regime characterized by chaotic property changes. This includes rapid variation of pressure and flow velocity in space and time.



غلطی اسی سے ہوتی ہے، جو محنت کرتا ہے، نگوں کی
زندگی تو دوسروں کی غلطیاں نکالنے میں گزرتی ہے۔

عائزہ رائیس