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MED PG THRISSUR

AIIMS

Recall November 2017

Questions and Answers with Explanations

- 300 Plus potential images useful for AIIMS and NEET examinations
- Separate list of images asked in AIIMS November 2017
- Topic-wise list of questions asked in AIIMS November 2017
- Exclusive chapter on Emergency Medicine
- Tips to crack PG Entrance Examinations

Interactive post-publication support site for MED PG THRISSUR AIIMS Recall November 2017
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Contents

Tips for Cracking PG Entrance Examinations *ix*
Topic-wise List Asked in AIIMS November 2017 *xiii*
Images Asked in AIIMS November 2017 *xix*

Chapter 1. Anatomy **1**
Chapter 2. Physiology **27**
Chapter 3. Biochemistry **37**
Chapter 4. Pathology **46**
Chapter 5. Microbiology **68**
Chapter 6. Forensic Medicine and Toxicology **85**
Chapter 7. Pharmacology **92**
Chapter 8. Obstetrics and Gynecology **105**
Chapter 9. Surgery **124**
Chapter 10. Orthopedics **139**
Chapter 11. Social and Preventive Medicine **146**
Chapter 12. Ophthalmology **153**
Chapter 13. Dermatology **168**
Chapter 14. Ear, Nose and Throat **171**
Chapter 15. Anesthesia **177**
Chapter 16. Radiology **181**
Chapter 17. Psychiatry **183**
Chapter 18. Pediatrics **189**
Chapter 19. Medicine **191**
Chapter 20. Emergency Medicine **204**

2

CHAPTER

Physiology

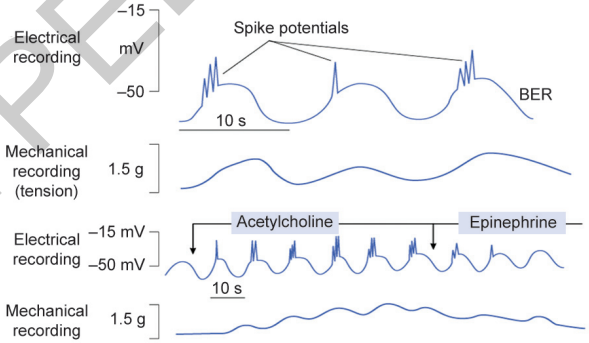
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1. Slow waves are generated by:

A. Myentric neurons
B. Smooth muscle
C. Interstitial cells of cajal
D. Parasympathetic neurons

ANS. **C**

- Slow waves are the oscillating membrane potential between -60 and –40 mv in smooth muscle of GI smooth muscle.
- They are also called basal electric rhythm (BER)
- BER is maximum at duodenum (12/minute) and minimum at ileum (2/min)
- Acetyl choline increases BER and adrenergic stimulation decreases BER



- Another topic asked in last November AIIMS 2016 was regarding migratory motor complex.
- Migratory motor complex in the gut are initiated by motilin.
- The contractions migrate at a rate of 5 cm/min and also occur at intervals of approximately 90 min.

- Migrating motor complex (MMC) appear during fasting and are inhibited by meal.
- When a meal is taken, motilin is supressed and MMC is abolished.
- Gastric secretion, bile flow and pancreatic secretion increase during each MMC.

2. Reflex responsible for tachycardia during right atrial distension is:

A. Bezold Jarisch reflex B. Bain-bridge reflex
C. Cushing reflex D. J reflex

ANS. **B**

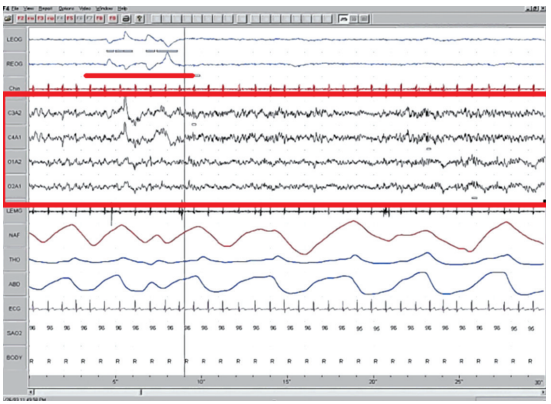
The **Bain-bridge reflex**, also called the atrial **reflex**, is an increase in heart rate due to an increase in central venous pressure. Increased blood volume is detected by stretch receptors (cardiac receptors) located in both atria at the venoatrial junctions.

- *Stimulus:* Increase in venous return
- *Receptors:* Both right and left atria
- *Afferent:* Vagus
- *Efferent:* Sympathetic nerves
- *Effect:* Tachycardia

Other important cardiac reflexes are:

- **Bezold-Jarisch reflex:**
  - *Stimulus:* Intracardiac injection of chemicals like serotonin , capsaicin, veratridine
  - *Afferent:* Unmyelinated vagal C fibers
  - *Response:* Hypotension bradycardia
  - Mediated by serotonin
- **Marey's law:** HR and BP are inversely related.

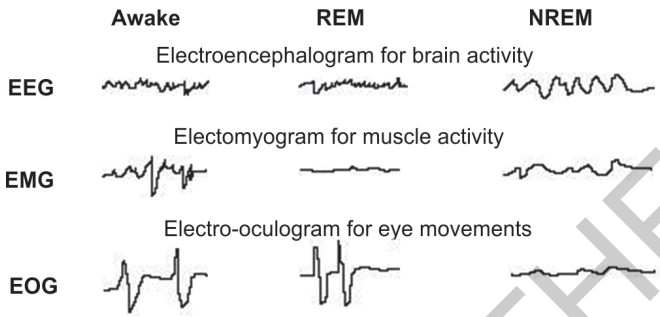
3. Identify the stage of sleep from the given picture:



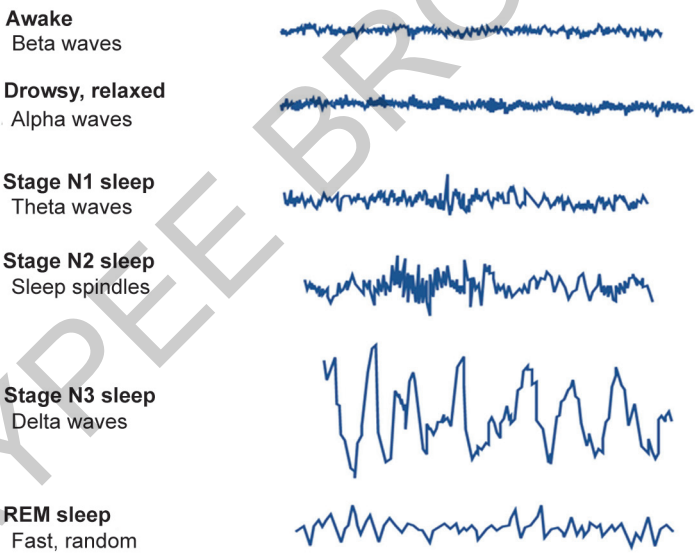
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A. Stage I NREM
B. Stage 2 NREM
C. Stage 3 NREM
D. REM

ANS. **D**



Patterns of EEG in various stages of sleep



Disorders of sleep:

REM phase:

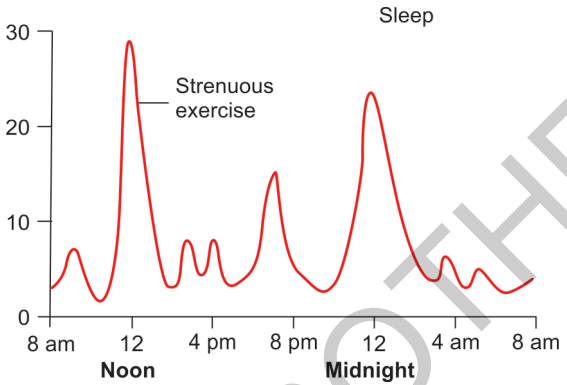
- Nightmares
- Narcolepsy
- Nocturnal penile tumescence

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NREM phase

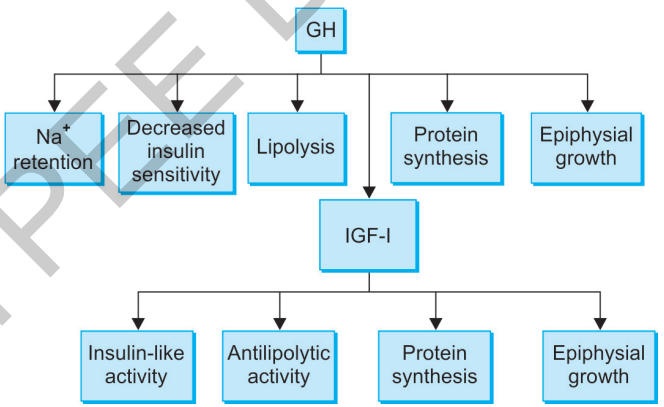
- Night terrors
- Somnambulism
- Bruxism

4. Identify the hormone from the picture.



A. GH
B. Cortisol
C. Estrogen
D. Insulin

ANS. **A**



Factors that stimulate or inhibit secretion of growth hormone	
Stimulate growth hormone secretion	*Inhibit growth hormone secretion*
• Decreased blood glucose • Decreased blood free fatty acids • Starvation or fasting, protein deficiency • Trauma, stress, excitement	• Increased blood glucose • Increased blood free fatty acids • Aging • Obesity

Contd...

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Contd...

• Exercise • Testosterone, estrogen • Deep sleep (stages II and IV) • Growth hormone-releasing hormone	• Growth hormone inhibitory hormone (somatostatin) • Growth hormone (exogenous) • Somatomedins (insulin-like growth factors)

5. Feed forward control system is employed during regulation of:

A. Blood volume
B. pH
C. Temperature
D. Blood pressure

ANS. **C**

There is a control system in our body when no stimulus is required but still the system anticipates and make corrective changes. Such system is called feed forward or anticipatory or adaptive control.

Examples

- Temperature control
- Cephalic phase of gastric secretion
- Thinking about exercise itself increases heart rate and respiratory rate.
- Role of cerebellum in motor coordination.

6. Efferent arteriolar constriction causes all *except*:

A. Decrease in GFR
B. Decrease in renal blood flow
C. Decrease in oncotic pressure in peritubular capillaries
D. Increased hydrostatic pressure in glomerular capillaries

ANS. **C**

Effect of efferent arteriolar constriction

- Efferent arteriolar constriction causes a biphasic response on GFR.
  - If there is more than three-fold increase in resistance—GFR decreases because of decrease in renal blood flow and increased colloid osmotic pressure.
  - If there is less than three-fold increase in resistance—GFR increases because of increase in pressure gradient.
- Efferent arteriolar constriction reduces peritubular capillary hydrostatic pressure, which increases net tubular reabsorption
  - Increase in proteins that escape filtration in glomerular capillaries rises oncotic pressure in the glomerular capillaries and peritubular capillaries.

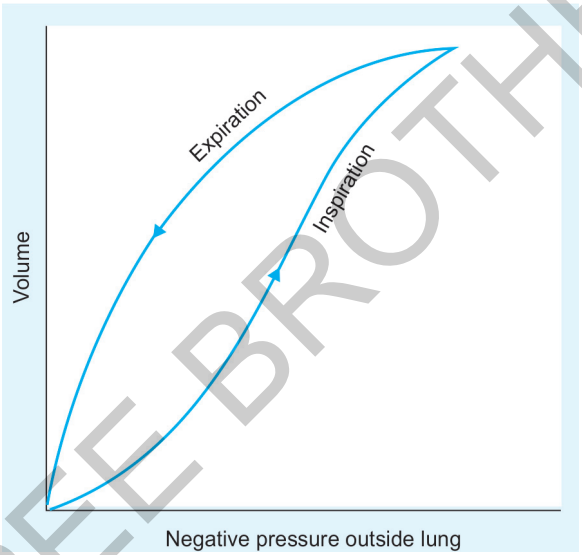
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Effect of afferent arteriolar constriction on GFR
There is decrease in GFR and decreased renal blood flow

Effect of dilatation of afferent arteriole on GFR
There is increase in GFR and increase in renal blood flow

Effect of dilatation of efferent arteriole on GFR (effect of ACEI on GFR)
There is decrease in GFR an increase in renal blood flow.

7. Difference in trajectory between inspiratory loop and expiratory loop in the curve is due to:



A. Difference in alveolar pressure during inspiration and expiration
B. Difference in concentration of surfactant during inspiration and expiration
C. Difference in airway resistance during inspiration and expiration
D. Inspiration is active and expiration is passive

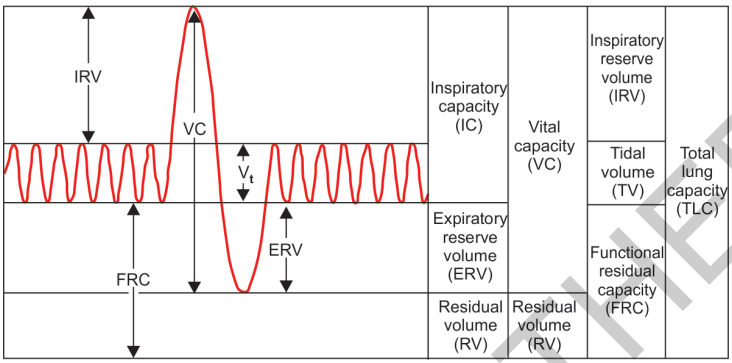
ANS. **B**

The difference between the inspiratory and expiratory paths-hysteresis—exists because a greater transpulmonary pressure is required to open a previously closed airway, owing to a deficit of surfactant at the air-water interface, than to keep an open airway from closing, reflecting abundant surfactant.

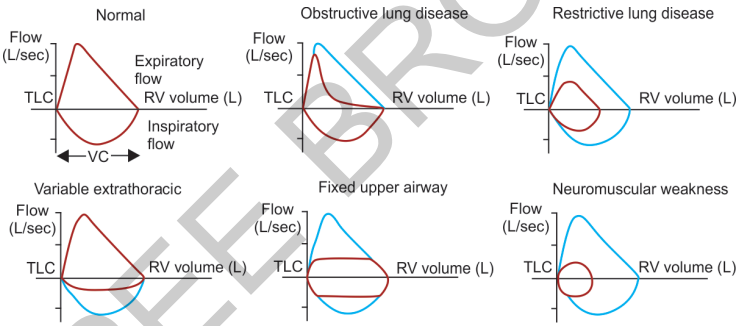
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Other important areas in respiratory physiology includes:

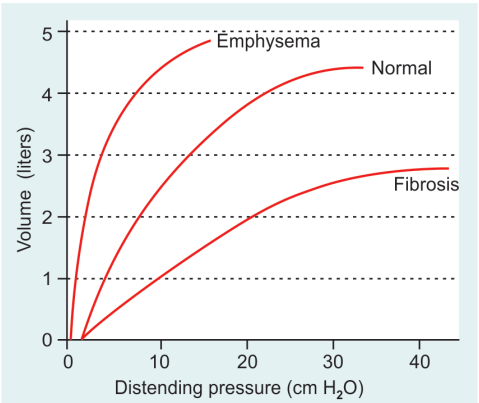
Spirometry



Flow volume loop in various conditions



Compliance

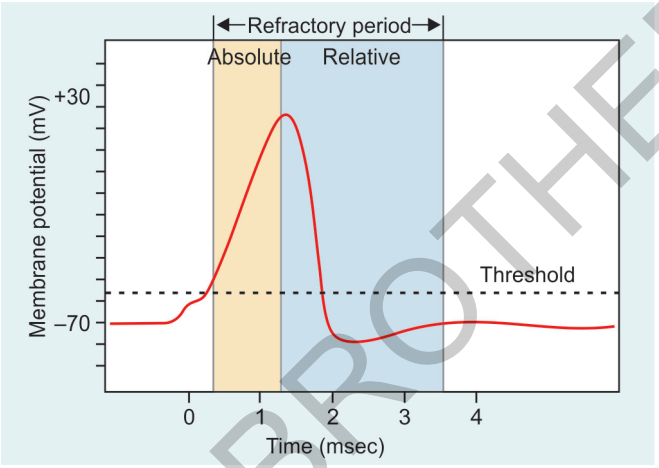


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8. Absolute refractory period is due to:

A. Opening of calcium channels
B. Closure of potassium channels
C. Closure of active gates of sodium channel
D. Closure of inactive gates of sodium channel

ANS. **D**



Absolute refractory period

- Corresponds to the period from the time the firing level is reached until repolarization is about one-third complete.
- There is no excitation of the nerve during this period.
- The reason for absolute refractory period is because of closure of inactivation Na^+ channels.

Relative refractory period

- Begins from the remaining part of repolarization to the end of action potential.
- Suprathreshold stimulus produces action potential in relative refractory period.
- The reason for relative refractory period is because the K^+ conductance is higher than at rest, and the membrane potential is closer to the K^+ equilibrium potential and, therefore, farther from threshold, more inward current is required to bring the membrane to threshold.

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9. X,Y and Z are three ions permeable. X=-50, Y=-30. If at RMP when there is no net electrogenic transfer, what is the value of Z?

A. +20 B. –20
C. +80 D. –80

ANS. **C**

- No net electrogenic transfer at RMP means X + Y + Z = 0
- Other important points in relation to permeablity:

Nernst equation

It is used to calculate the potential generated due to movement of freely diffusible ions acrosss a semi-permeable membrane.

$V_m = RT/zF (\text{In } c_o/c_i)$

Where, V_m = membrane potential
R = the gas constant, 8.3 JK–1 mol^{-1}
T = temperature, 298 K
F = Faraday's constant, 96500 C mol^{-1}
z = Valence of the ion
c_o = External concentration of ion
c_i = Internal concentration of ion.

Gibb's equation

This is used to govern the distribution of ions across a semipermeable membrane. But remember, the potential generated is always calculated by Nernst equation.

Goldman's equation

The **Goldman–Hodgkin–Katz voltage equation**, more commonly known as the **Goldman equation**, is used in cell membrane physiology to determine the reversal potential across a cell's membrane, taking into account all of the ions that are permanent through that membrane.

10. Which group of nerve fibres are least susceptible to LA?

A. A alpha B. A beta
C. B D. C

ANS. **D**

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Erlanger-Gasser classification of nerves			
Fiber types	*Function*	*Average fiber diameters (μm)*	*Average conduction velocity (m/s)*
Aα	Primary muscle spindle afferents, motor to skeletal muscle	15	100 (70–120)
Aβ	Cutaneous touch and pressure afferents	8	50 (30–70)
Aγ	Motor to muscle spindle	5	20 (15–30)
Aδ	Cutaneous temperature and pain afferents	<3	15 (12–30)
B	Sympathetic preganglionic	3	7 (3–15)
C	Cutaneous pain afferents sympathetic postganglionic	1	1 (02–2)

LA susceptiblity: A delta>gamma>A beta>A alpha>B>C
Hypoxia: B > A > C
Pressure: A > B > C
[*Source:* The New York School of Regional Anesthesia (NYSORA)]

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