

CARDIO-VASCULAR SYSTEM

1. Heart rate of a man permanently equals 40 beats per minute. What is the pacemaker?

- A. His' bundle
- B. Purkinje's fibers
- C. His' bundle branches
- D. Sinoatrial node
- E. *Atrioventricular node**

2. An isolated cell of human heart automatically generates excitation impulses with frequency 60 times per minute. What heart structure was this cell obtained from?

- A. Ventricle
- B. Atrium
- C. *Sinoatrial node**
- D. Atrioventricular node
- E. His' bundle

4. A cardiac electric stimulator was implanted to a 75 year old man with heart rate of 40 bpm. Thereafter the heart rate rose up to 70 bpm. The electric stimulator has undertaken the function of the following heart part:

- A. Purkinje's fibers
- B. Atrioventricular node
- C. His' bundle branches
- D. His' bundle fibers
- E. *Sinoatrial node**

5. Examination of an isolated cardiomyocyte revealed that it didn't generate excitation impulses automatically. This cardiomyocyte was obtained from:

- A. *Ventricles**
- B. Purkinje's fibres
- C. Atrioventricular node
- D. His' bundle
- E. Sinoatrial node

6. During an experiment vagus branches that innervate heart are being stimulated. This has stopped conduction of excitement from the atria to the ventricles. The reason for it are electrophysiological changes in the following structures:

- A. Atria
- B. Sinoatrial node
- C. Ventricles
- D. His' bundle
- E. *Atrioventricular node**

7. Speed of excitation conduction was studied in different areas of the isolated heart. In what area is the lowest speed registered?

- A. In Purkinje's fibres
- B. In the ventricular myocardium
- C. In the atrial myocardium
- D. In the atrioventricular node**
- E. In the His' bundle

8. In a healthy adult speed of the excitement conduction through the atrioventricular node is 0,02-0,05 m/s. Atrioventricular delay enables:

- A. *Sequence of atrial and ventricular contractions**
- B. Sufficient force of ventricular contractions
- C. Simultaneity of both atria contractions
- D. Sufficient force of atrial contractions
- E. Simultaneity of both ventricles contractions

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10. A patient has extrasystole. ECG shows no P wave, QRS complex is deformed, there is a full compensatory pause. What extrasystoles are these?

- A. *Ventricular**
- B. Atrial
- C. Sinus
- D. Atrioventricular

11. ECG of a patient with hyperfunction of thyroid gland showed heart hurry. It is indicated by depression of the following elements:

- A. QRS complex
- A. P-Q segment
- B. *R-R interval**
- C. P-Q interval
- D. P-T interval

12. ECG study showed that the T-waves were positive in the standard extremity leads, their amplitude and duration were normal. The right conclusion would be that the following process runs normally in the hearts ventricles:

- A. Relaxation
- B. Excitement
- C. Contraction
- D. Depolarization
- E. *Repolarization**

13. The patient's ECG shows that in the second standard lead from the extremities the P waves are positive, their amplitude is 0,1 mV (norm is 0,07-0,10 seconds). It can be concluded that the following process occurs normally in the cardiac atria:

- A. *Depolarization**
- B. Activation
- C. Relaxation
- D. Repolarization
- E. Contraction

13. A patient has delayed conduction of excitement through the atrioventricular node. What change in ECG will be observed?

- A. Prolongation of Q-T interval
- B. S-T segment displacement
- C. *Prolongation of P-Q interval**
- D. Negative T wave
- E. Prolongation of Q-S interval

13. The patient's ECG shows that in the second standard lead from the extremities the P waves are positive, their amplitude is 0,1 mV (norm is 0,07-0,10 seconds). It can be concluded that the following process occurs normally in the cardiac atria:

- A. *Depolarization**

- B. Activation
- C. Relaxation
- D. Repolarization
- E. Contraction

14. EEG of a patient shows prolongation of T-wave. This is caused by deceleration in ventricles of:

- A. Depolarization and repolarization
- B. Contraction
- C. Depolarization
- D. Relaxation
- E. *Repolarization**

15. During preparation of a patient to a heart surgery it was necessary to measure pressure in heart chambers. In one of them pressure varied from 0 mm Hg up to 120 mm Hg within one cardiac cycle. Which heart chamber is it?

- A. *Left ventricle**
- B. Left atrium
- C. –
- D. Right ventricle
- E. Right atrium

3. Heart rate of a 30-year-old man under emotional stress reached 112 bpm. The reason for the heart rate increase is the altered condition of the following conducting system of the heart:

- A. His bundle branches
- B. Purkinje's fibers
- C. His' bundle
- D. *Sinoatrial node**
- E. Atrioventricular node

16. A man's heart rate was measured according to his pulse. It equaled 120 bpm. What is the duration of one cardiac cycle?

- A. 0,8
- B. 1,0
- C. 0,9
- D. *0,5**
- E. 0,7

Electrocardiogram analysis demonstrates that cardiac cycle of human equals 1 second. It means that heart rate per minute equals:

- A. 50**
- B. 100**
- C. 70**
- D. 80**
- E. *60**

An animal experiment is aimed at studying the cardiac cycle. All the heart valves are closed. What phase of cardiac cycle is characterized by this status?

- A. *Isometric contraction**
- B. Asynchronous contraction
- C. Protodiastolic period
- D. Rapid filling

Experimental stimulation of the sympathetic nerve branches that innervate the heart caused an increase in force of heart contractions because the membrane of typical cardiomyocytes permitted an increase in:

- A. Potassium ion exit
- B. Potassium ion entry
- C. Calcium ion exit
- D. *Calcium ion entry**
- E. Calcium and potassium ion exit

During ventricular systole the cardiac muscle does not respond to additional stimulation because it is in the phase of:

- A. Relative refractoriness
- B. There is no correct answer
- C. Subnormal excitability
- D. *Absolute refractoriness**
- E. Hyperexcitability

A patient complains of palpitation after stress. The pulse is 104 bpm, P-Q=0.12 seconds, there are no changes of QRS complex. What type of arrhythmia does the patient have?

- A. *Sinus tachycardia**
- B. Sinus arrhythmia
- C. Ciliary arrhythmia
- D. Sinus bradycardia
- E. Extrasystole

A fixed-run taxi passenger has a sudden and expressed attack of tachycardia. A doctor travelling by the same taxi has managed to slow down his heart rate by pressing upon the eyeballs and thus causing the following reflex:

- A. Frank-Starling mechanism
- B. Bainbridge reflex
- C. Hering-Breuer reflex
- D. Holtz's reflex
- E. *Danini-Aschner reflex**

18. In course of an experiment a peripheral section of n.vagus of an experimental animal is stimulated. What changes will be observed?

- A. Increase of respiration rate
- B. Bronchi dilation
- C. *Heart rate fall**
- D. Pupil dilation
- E. Heart hurry\

19. A peripheral segment of vagus nerve on a dog's neck was being stimulated in course of an experiment. The following changes of cardiac activity could be meanwhile observed:

- A. Enhancement of atrioventricular conduction
- B. Heart hurry
- C. Heart rate and heart force amplification
- D. * Heart rate fall**
- E. Increased excitability of myocardium

20. During fighting a man had a cardiac arrest as a result of a hard blow to the upper region of anterior abdominal wall. Which of the described mechanisms might have provoked the cardiac arrest?

- A. Peripheral reflexes
- B. Sympathetic conditioned reflexes
- C. Sympathetic unconditioned reflexes
- D. Parasympathetic conditioned reflexes
- E. ***Parasympathetic unconditioned reflexes**

During the sports competition a boxer received a strong blow to the abdomen, which caused a knockout due to a brief drop in blood pressure. What physiological mechanisms are the cause of this condition?

- A. Ischemia of the central nervous system
- B. Abrupt change in body fluid volume
- C. ***Stimulation of the parasympathetic nerves**
- D. Stimulation of sympathetic nerves
- E. Alteration of transcapillary exchange

21. A patient who suffers from severe disorder of water-salt metabolism experienced cardiac arrest in diastole. What is the most probable mechanism of cardiac arrest in diastole?

- A. ***Hyperkalemia**
- B. Hypokalemia
- C. Organism dehydration
- D. Hyponatremia
- E. Hypernatremia

22. The minute blood volume in a patient with transplanted heart has increased as a result of physical activity. What regulative mechanism is responsible for these changes?

- A. Sympathetic unconditioned reflexes
- B. Sympathetic conditioned reflexes
- C. ***Catecholamines**
- D. Parasympathetic conditioned reflexes
- E. Parasympathetic unconditioned reflexes

23. Vagus branches that innervate heart are being stimulated during an experiment. This causes reduction of heart rate due to the intensification of the following process (through the cell membrane of cardiac pacemaker):

- A. Calcium ion yield
- B. Calcium and potassium ion yield
- C. Calcium ion entry
- D. Potassium ion entry
- E. ***Potassium ion yield**

25. Arterial pressure of a surgeon who performed a long operation rose up to 140/110 mm Hg. What changes of humoral regulation could have caused the rise of arterial pressure in this case?

- A. Activation of kallikrein-kinin system
- B. ***Activation of renin-angiotensin system**
- C. Inhibition of sympathoadrenal system
- D. Activation of sympathoadrenal system
- E. Activation of formation and excretion of aldosterone

A patient has insufficient blood supply to the kidneys, which has caused the development of pressor effect due to constriction of arterial resistance vessels. This condition results from the vessels being strongly affected by the following substance:

- A. *Angiotensin II**
- B. Angiotensinogen
- C. Renin
- D. Norepinephrine
- E. Catecholamines

A patient with hypertensive crisis has increased content of angiotensin II in blood. Angiotensin pressor effect is based on:

- A. Prostaglandin hyperproduction
- B. Vasopressin production stimulation
- C. Activation of kinin-kallikrein system
- D. Activation of biogenic amine synthesis
- E. *Contraction of arteriole muscles**

26. Blood minute volume of a 30 year old woman at rest is 5 l/min. What blood volume is pumped through the pulmonary vessels per minute?

- A. 2,0 l
- B. 2,5 l
- C. 1,5 l
- D. *5,0 l**
- E. 3,75 l

27. A patient under test was subjected to a moderate physical stress. His minute blood volume amounted to 10 l/min. What blood volume was pumped through his lung vessels every minute?

- A. 7 l/min
- B. 5 l/min
- C. *10 l/min**
- D. 4 l/min
- E. 6 l/min

Vascular System

24. Examination of a man established that cardiac output equaled 3500 ml, systolic output – 50 ml. What is the man's heart rate per minute?

- A. 60
- B. *70**
- C. 90
- D. 50
- E. 80

28. An aged man had rise of arterial pressure under a stress. It was caused by activation of:

- A. Functions of thyroid gland
- B. Function of adrenal cortex
- C. Hypophysis function
- D. Parasympathetic nucleus of vagus
- E. *Sympathoadrenal system**

29. Systemic arterial pressure of an adult dropped from 120/70 to 90/50 mm Hg that lead to reflex vasoconstriction. The vasoconstriction will be maximal in the following organ:

- A. *Bowels**

- B. Adrenals
- C. Heart
- D. Kidneys
- E. Brain

30. Systemic arterial pressure of an adult dropped from 120/70 to 90/50 mm Hg that lead to reflex vasoconstriction. The vasoconstriction will be minimal in the following organ:

- A. Skin
- B. Skeletal muscles
- C. Bowels
- D. *Heart**
- E. Liver

In an elderly person the change of heart force and vessels physical properties were detected; they can be clearly observed on graphic recording of carotid pulse waves. What method was applied?

- A. Myography
- B. Rheography
- C. *Sphygmography**
- D. Plethysmography
- E. Phlebography

31. Atria of experimental animal were superdistended by blood that resulted by blood that resulted in decreased reabsorption of Na^+ and water in renal tubules. This can be explained by the influence of the following factor upon kidneys:

- A. Renin
- B. Vasopressin
- C. Angiotensin
- D. Aldosterone
- E. *Natriuretic hormone**

Due to blood loss the circulation blood volume of a patient decreased. How will it affect the blood pressure in the patient?

- A. Diastolic pressure will decrease, while systolic will increase
- B. *Systolic and diastolic pressure will decrease**
- C. Only systolic pressure will decrease
- D. Systolic pressure will decrease, while diastolic pressure will increase
- E. Only diastolic pressure will decrease

32. Introduction of a big dose of histamine to an experimental animal caused abrupt drop of arterial pressure as a result of:

- A. Constriction of resistance vessels
- B. *Dilatation of resistance vessels**
- C. Increase of heart rate
- D. Decrease of heart rate
- E. Decrease of heart rate and force

33. Short-term physical activity resulted in reflex amplification of heart rate and raise of systemic arterial pressure. What receptors activation was the main cause of pressor reflex realization?

- A. *Proprioceptors of active muscles**
- B. Vascular chemoreceptors
- C. Vascular baroreceptors

- D. Hypothalamus thermoreceptors
- E. Vascular volume receptors

34. In response to change in body position from horizontal to vertical blood circulation system develops a reflexory pressor reaction. Which of the following is its compulsory component?

- A. Decrease in circulating blood volume
- B. * Systemic constriction of the venous vessels**
- C. Weakening of the pumping ability of heart
- D. Increase of the heart rate
- E. Systemic dilation of the arterial resistive vessels

35. A month after surgical constriction of rabbit's renal artery the considerable increase of systolic arterial pressure was observed. What of the following regulation mechanisms caused the arterial pressure change?

- A. Serotonin
- B. * Angiotensin-II**
- C. Adrenaline
- D. Vasopressin
- E. Noradrenalin

A patient has insufficient blood supply to the kidneys, which has caused the development of a pressor effect due to the constriction of arterial resistance vessels. This is the result of the vessels being greatly affected by the following substances:

- A. Norepinephrine
- B. * Angiotensin-II**
- C. Rennin
- D. Catecholamines
- E. Angiotensinogen

36. A 63 year old patient with collapse presentations was delivered to the emergency hospital. A physician has chosen noradrenalin against hypotension. What is the mechanism of action?

- A. Activation of serotonin receptors
- B. Activation of dopamine receptors
- C. Block of M-cholinoreceptors
- D. * Activation of α_1 – adrenoreceptors**
- E. Activation of β -adrenoreceptors

37. A 49 year old woman spent a lot of time standing. As a result of it she got edema. What is the likely cause of the edema?

- A. * Increase in hydrostatic pressure of blood in veins**
- B. Decrease in hydrostatic pressure of blood in veins
- C. Decrease in hydrostatic pressure of blood in arteries
- D. Increase in oncotic pressure of blood plasma
- E. Increase in systemic arterial pressure