PHYSIOLOGY TEAM 435

جامعة الملك سعود
King Saud University

Physiology
OF THE CARDIOVASCULAR SYSTEM

Regulation Of Blood Pressure

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Arterial Blood Pressure

A 26 years old man came to the ER in King Khalid university Hospital with an ambulance after a car accident; the patient lost a lot of blood in the accident, and vital signs shows a decrease in BP and an increase in pulse rate.

1. In this case the reflex Compensation of the blood flow to the Heart is:

A) Increase blood flow to the Heart but not normal
B) Decrease blood flow to the Heart but not normal
C) Blood flow will remain the same
D) Nothing will change in blood flow

2. In this case above the baroreceptors will not send the inhibitory impulses to the:

A) Vasomotor center
B) Vagal center
C) Vasoconstrictor center

3. In this case the resistance of the vessels in the colon will:

A) Increase
B) Decrease
C) Remain the same
D) Highly decreased

4. What factor makes it easy for chemoreceptors cells to detect changes in O2, CO2, and H+?

A) The blood volume
B) The pulse rate
C) The speed of the blood flow
D) The venous return effectiveness
E)

5.Which one of these is the effect of angiotensin II ?

A) *Vasoconstriction of afferent artery.*
B) *Vasodilation of efferent artery.*
C) *Vasoconstriction of efferent artery.*
D) *Vasoconstriction of both efferent and afferent.*

6.Which mechanisms of these acts when blood flow to brain decreased?

A) *Chemoreceptor reflexes.*
B) *Baroreceptor reflexes.*
C) *CNS ischemic response.*
D) *Atrial regulation.*

7. The long-term mechanism for regulation of blood pressure involves regulating which of the following?

A) *Vessel diameter*
B) *Blood volume*
C) *Contractility*
D) *Heart rate*

8. The aortic arch and the carotid sinus contain nerve endings that monitor blood pressure by the degree of stretch on the vessel wall. These sensors are called:

A) *Atrial baroreceptors*
B) *Arterial baroreceptors.*
C) *Osmoreceptors*

9. A change in blood pressure that increases the impulses to the cardiovascular center results in increased impulses from which branch of the autonomic nervous system? What would be the effect on blood pressure (BP)?

A) *Parasympathetic; increased BP*
B) *Parasympathetic; decreased BP*
C) *Sympathetic; decreased BP*
D) *Sympathetic; increased BP*

10. A change in blood pressure that decreases the impulses to the cardiovascular center results in increased impulses from which branch of the autonomic nervous system? What would be the effect on blood pressure (BP)?

A) Sympathetic; increased BP
B) Parasympathetic; increased BP
C) Sympathetic; decreased BP
D) Parasympathetic; decreased BP

11. Increased activity of the vagus nerve would cause the heart rate to _____.

A) Increase
B) Decrease

12. Increased sympathetic nerve activity at the heart would cause:

A) An increase in heart rate only
B) An increase in both heart rate and contractility
C) A decrease in heart rate and contractility
D) An increase in contractility only

13. The sympathetic nervous system also stimulates the release of epinephrine and norepinephrine from what gland?

A) Pituitary gland
B) Thyroid gland
C) Adrenal gland

14. What cells in the kidney monitor blood pressure, releasing renin when blood pressure is low?

A) Cortical cells
B) Angiotensinogen cells
C) Aldosterone cells
D) Juxtaglomerular cells

15. How does angiotensin II raise blood pressure?

A) Directly by increasing vasoconstriction and indirectly by stimulating aldosterone release
B) Only by increasing sodium (and, thus, water) reabsorption in the kidney
C) Only by causing vasoconstriction

16. An increase in plasma osmolarity stimulates release of what hormone from the posterior pituitary?

A) Renin
B) Antidiuretic hormone (ADH)
C) Aldosterone
D) Angiotensin II

17. An acute decrease in arterial blood pressure elicits which of the following compensatory changes?

A) Decreased firing rate of the carotid sinus nerve
B) Increased parasympathetic outflow to the heart
C) Decreased heart rate
D) Decreased contractility
E) Decreased mean systemic pressure

18. The tendency for blood flow to be turbulent is increased by?

A) increased viscosity
B) increased hematocrit
C) partial occlusion of a blood vessel
D) decreased velocity of blood flow

19. The greatest pressure decrease in the circulation occurs across the arterioles because:

A) They have the greatest surface area
B) they have the greatest cross-sectional area
C) the velocity of blood flow through them is the highest
D) the velocity of blood flow through them is the lowest
E) they have the greatest resistance

20. An increase in arteriolar resistance, without a change in any other component of the cardiovascular system, will produce:

A) A decrease in total peripheral resistance (TPR)
B) An increase in capillary filtration
C) An increase in arterial pressure
D) A decrease in afterload

21. During exercise, total peripheral resistance (TPR) decreases because of the effect of:

A) the sympathetic nervous system on splanchnic arterioles
B) the parasympathetic nervous system on skeletal muscle arterioles
C) local metabolites on skeletal muscle arterioles
D) local metabolites on cerebral arterioles
E) histamine on skeletal muscle arteriole

22. Cardiac output of the right side of the heart is what percentage of the cardiac output of the left side of the heart:

A) 25%
B) 50%
C) 75%
D) 100%
E) 125%

23. Which of the following parameters is decreased during moderate exercise:

A) Arteriovenous O2 difference
B) Heart rate
C) Cardiac output
D) Pulse pressure
E) Total peripheral resistance (TPR)

24. At which site is systolic blood pressure the highest?

A) Aorta
B) Central vein
C) Pulmonary artery
D) Right atrium
E) Renal artery
F) Renal vein

Answers:

Q1: **A**

Q2: **A**

Q3: **A**

Q4: **C**

Q5: **C**

Q6: **C**.

Q7: **B**

Q8: **B**

Q9: **B**

Q10: **A**

Q11: **B**

Q12: **B**

Q13: **C**

Q14: **D**

Q15: **A**

Q16: **B**

Q17 : **A** *(A decrease in blood pressure causes decreased stretch of the carotid sinus baroreceptors and decreased firing of the carotid sinus nerve. In an attempt to restore blood pressure, the parasympathetic outflow to the heart is decreased and sympathetic outflow is increased. As a result, heart rate and contractility will be increased. Mean systemic pressure will increase because of increased sympathetic tone of the veins (and a shift of blood to the arteries).*

Q18 : **C** *(Turbulent flow is predicted when the Reynold's number is increased. Factors that increase the Reynold's number and produce turbulent flow are decreased viscosity (hematocrit) and increased velocity. Partial occlusion of a blood vessel increases the Reynold's number (and turbulence) because the decrease in cross-sectional area results in increased blood velocity (v = Q/A).*

Q19 : **E** *(The decrease in pressure at any level of the cardiovascular system is caused by the resistance of the blood vessels (AP = Q x R). The greater the resistance, the greater the decrease in pressure. The arterioles are the site of highest resistance in the vasculature. The arterioles do not have the greatest surface area or cross-sectional area (the capillaries do). Velocity of blood flow is lowest in the capillaries, not in the arterioles.)*

Q20 : C *(An increase in arteriolar resistance will increase total peripheral resistance (TPR). Arterial pressure = cardiac output x TPR, so arterial pressure will also increase. Capillary filtration decreases when there is arteriolar constriction because P c decreases. Afterload of the heart would be increased by an increase in TPR.)*

Q21 : C *(During exercise, local metabolites accumulate in the exercising muscle and cause local vasodilation and decreased arteriolar resistance of the skeletal muscle. Because muscle mass is large, it contributes a large fraction of the total peripheral resistance (TPR). Therefore, the skeletal muscle vasodilation results in an overall decrease in TPR, even though there is sympathetic vasoconstriction in other vascular beds.)*

Q22 : D *(Cardiac output of the left and right sides of the heart is equal. Blood ejected from the left side of the heart to the systemic circulation must be oxygenated by passage through the pulmonary circulation.)*

Q23 : E *(. In anticipation of exercise, the central command increases sympathetic outflow to the heart and blood vessels, causing an increase in heart rate and contractility. Venous return is increased by muscular activity and contributes to an increase in cardiac output by the Frank-Starling mechanism. Pulse pressure is increased because stroke volume is increased. Although increased sympathetic outflow to the blood vessels might be expected to increase total peripheral resistance (TPR), it does not because there is an overriding vasodilation of the skeletal muscle arterioles as a result of the buildup of vasodilator metabolites (lactate, K+, adenosine). Because this vasodilation improves the delivery of 02, more 02 can be extracted and used by the contracting muscle.)*

Q24 : E *(Pressures on the venous side of the circulation (e.g., central vein, right atrium, renal vein) are lower than pressures on the arterial side. Pressure in the pulmonary artery (and all pressures on the right side of the heart) are much lower than their counterparts on the left side of the heart. In the systemic circulation, systolic pressure is actually slightly higher in the downstream arteries (e.g., renal artery) than in the aorta because of the reflection of pressure waves at branch points.)*