

# CVS-Physiology

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Archive

Lecture 12

Regulation Of Blood  
Pressure

Corrected by:

# CVS-Physiology

## Lecture 12

1- If blood pressure in the carotid artery falls, the changes that will occur:

- A- Carotid baroreceptors will increase their stimulatory impulses.
- B- Carotid baroreceptors will decrease their inhibitory impulses.
- C- Arteriolar dilatation will occur causing a decrease in peripheral resistance.
- D- Depressor center gives more inhibitory impulses to pressor.
- E- Bradycardia is one result.

**Answer: B- Carotid baroreceptors will decrease their inhibitory impulses.**

2- One of the following is NOT an effect of renin- angiotensin system:

- A- Strong arteriolar VC.
- B- Stimulation of aldosterone release.
- C- Stimulation of vasopressin release.
- D- Stimulation of NA release.
- E- Stimulation of salt and water excretion.

**Answer: E- Stimulation of salt and water excretion.**

3- Immediately after hemorrhage:

- A. There is increase in the muscle tone of abdominal wall muscles.
- B. There is increase in the central venous pressure.
- C. There is conversion of tissue proteins into plasma proteins.
- D. There is Increase in sympathetic discharge to the heart due to increase the firing of baroreceptors.
- E. Anemic hypoxia stimulates release of erythropoietin from the kidney to stimulate erythropoiesis.

**Answer: D (archive's answer, not sure though).**

4- One of the following regulates the fine control of ABP:

- A- Medulla oblongata.
- B- Midbrain.
- C- Hypothalamus.
- D- Pons.
- E- Cerebellum.

**Answer: A- Medulla Oblongata.**

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5- All about baroreceptors are true, EXCEPT:

- A- Could be found in carotid sinus.
- B- Could be found in aortic arch.
- C- Normally firing at late systole.
- D- Monitor arterial blood pressure.
- E- Some are innervated by glossopharyngeal nerve.

Answer: C- Normally firing at late systole

6- One of the following inhibits VMC:

- A- Mild hypercapnia.
- B- Moderate hypoxia.
- C- Left ventricular baroreceptors.
- D- Peripheral chemo receptors.
- E- Central chemoreceptors.

Answer: C- Left ventricular baroreceptors.

### Supplementary Questions: Guyton's Book:

1- A healthy 60-year-old woman with a 10-year history of hypertension stands up from a supine position. Which set of cardiovascular changes is most likely to occur in response to standing up from a supine position?

	Sympathetic Nerve Activity	Parasympathetic Nerve Activity	Heart Rate
A)	↑	↑	↑
B)	↑	↑	↓
C)	↑	↓	↓
D)	↑	↓	↑
E)	↓	↓	↓
F)	↓	↓	↑
G)	↓	↑	↑
H)	↓	↑	↓

Answer: D) Moving from a supine to a standing position causes an acute fall in arterial pressure that is sensed by arterial baroreceptors located in the carotid bifurcation and aortic arch. Activation of the arterial baroreceptors leads to an increase in sympathetic outflow to the heart and peripheral vasculature and a decrease in parasympathetic outflow to the heart. The increase in sympathetic activity to peripheral vessels results in an increase in total peripheral resistance. The increase in sympathetic activity and decrease in parasympathetic outflow to the heart result in an increase in heart rate.

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2- A 60-year-old woman has experienced dizziness for the past 6 months when getting out of bed in the morning and when standing up. Her mean arterial pressure is 130/90 mm Hg while lying down and 95/60 while sitting. Which set of physiological changes would be expected in response to moving from a supine to an upright position?

	Parasympathetic Nerve Activity	Plasma Renin Activity	Sympathetic Activity
A)	↑	↑	↑
B)	↑	↓	↑
C)	↑	↓	↓
D)	↑	↑	↓
E)	↓	↓	↓
F)	↓	↑	↓
G)	↓	↑	↑
H)	↓	↓	↑

**Answer: G)** Moving from a supine to a standing position causes an acute fall in arterial pressure that is sensed by arterial baroreceptors located in the carotid sinuses and aortic arch. Activation of the baroreceptors results in a decrease in parasympathetic activity (or vagal tone) and an increase in sympathetic activity, which leads to an increase in plasma renin activity (or renin release).

3- A 65-year-old man with a 10-year history of essential hypertension is being treated with an angiotensin converting enzyme (ACE) inhibitor. Which set of changes would be expected to occur in response to the ACE inhibitor drug therapy?

	Plasma Renin Concentration	Total Peripheral Resistance	Renal Sodium Excretory Function
A)	↑	↑	↑
B)	↑	↑	↓
C)	↑	↓	↓
D)	↑	↓	↑
E)	↓	↓	↓
F)	↓	↓	↑
G)	↓	↑	↑
H)	↓	↑	↓

**Answer: D)** Angiotensin I is formed by an enzyme (renin) acting on a substrate called angiotensinogen. Angiotensin I is converted to angiotensin II by a converting enzyme. Angiotensin II also has a negative feedback effect on juxtaglomerular cells to inhibit renin secretion. Angiotensin II is a powerful vasoconstrictor and sodium retaining hormone that increases arterial pressure. Administration of an ACE inhibitor would increase plasma renin concentration, decrease angiotensin II formation, enhance renal sodium excretory function, and decrease total peripheral resistance and arterial pressure.

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4- A 55-year-old man with a history of normal health visits his physician for a checkup. The physical examination reveals that his blood pressure is 170/98 mm Hg. Further tests indicate that he has renovascular hypertension as a result of stenosis in the left kidney. Which set of findings would be expected in this man with renovascular hypertension?

	Total Peripheral Resistance	Plasma Renin Activity	Plasma Aldosterone Concentration
A)	↑	↑	↑
B)	↑	↓	↑
C)	↑	↓	↓
D)	↑	↑	↓
E)	↓	↓	↓
F)	↓	↑	↓
G)	↓	↑	↑
H)	↓	↓	↑

**Answer: A)** Stenosis of one kidney results in the release of renin and the formation of angiotensin II from the affected kidney. Angiotensin II stimulates aldosterone production and increases total peripheral resistance by constricting most of the blood vessels in the body.

5- While participating in a cardiovascular physiology laboratory, a medical student isolates an animal's carotid artery proximal to the carotid bifurcation and partially constricts the artery with a tie around the vessel. Which set of changes would be expected to occur in response to constriction of the carotid artery?

	Heart Rate	Sympathetic Nerve Activity	Total Peripheral Resistance
A)	↑	↑	↑
B)	↑	↑	↓
C)	↑	↓	↓
D)	↑	↓	↑
E)	↓	↓	↓
F)	↓	↓	↑
G)	↓	↑	↑
H)	↓	↑	↓

**Answer: A)** Constriction of the carotid artery decreases blood pressure at the level of the carotid sinus. A decrease in carotid sinus pressure leads to a decrease in carotid sinus nerve impulses to the vasomotor center, which in turn leads to enhanced sympathetic nervous activity and decreased parasympathetic nerve activity. The increase in sympathetic nerve activity results in peripheral vasoconstriction and an increase in total peripheral resistance and heart rate.

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6- While participating in a cardiovascular physiology laboratory, a medical student isolates the carotid artery of an animal and partially constricts the artery with a tie around the vessel. Which set of changes would be expected to occur in response to constriction of the carotid artery?

	Sympathetic Nerve Activity	Renal Blood Flow	Total Peripheral Resistance
A)	↑	↑	↑
B)	↑	↓	↑
C)	↑	↓	↓
D)	↑	↑	↓
E)	↓	↓	↓
F)	↓	↑	↓
G)	↓	↑	↑
H)	↓	↓	↑

**Answer: B)** Constriction of the carotid artery reduces blood pressure at the carotid bifurcation where the arterial baroreceptors are located. The decrease in arterial pressure activates baroreceptors, which in turn leads to an increase in sympathetic activity and a decrease in parasympathetic activity (or vagal tone). The enhanced sympathetic activity results in constriction of peripheral blood vessels, including the kidneys. The enhanced sympathetic activity leads to an increase in total peripheral resistance and a decrease in renal blood flow. The combination of enhanced sympathetic activity and decreased vagal tone also leads to an increase in heart rate.

7- A 22-year-old man enters the hospital emergency department after severing a major artery in a motorcycle accident. It is estimated that he has lost approximately 700 milliliters of blood. His blood pressure is 90/55 mm Hg. Which set of changes would be expected in response to hemorrhage in this man?

	Heart Rate	Sympathetic Nerve Activity	Total Peripheral Resistance
A)	↑	↑	↑
B)	↑	↓	↑
C)	↑	↓	↓
D)	↑	↑	↓
E)	↓	↓	↓
F)	↓	↑	↓
G)	↓	↑	↑
H)	↓	↓	↑

**Answer: A)** The arterial baroreceptors are activated in response to a fall in arterial pressure. During hemorrhage, the fall in arterial pressure at the level of the baroreceptors results in enhanced sympathetic outflow from the vasomotor center and a decrease in parasympathetic nerve activity. The increase in sympathetic nerve activity leads to constriction of peripheral blood vessels, increased total peripheral resistance, and a return of blood pressure toward normal. The decrease in parasympathetic nerve activity and sympathetic outflow would result in an increase in heart rate.

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8- A healthy 28-year-old woman stands up from a supine position. Moving from a supine to a standing position results in a transient decrease in arterial pressure that is detected by arterial baroreceptors located in the aortic arch and carotid sinuses. Which set of cardiovascular changes is most likely to occur in response to activation of the baroreceptors?

	Mean Circulatory Filling Pressure	Strength of Cardiac Contraction	Sympathetic Nerve Activity
A)	↑	↑	↑
B)	↑	↓	↑
C)	↑	↓	↓
D)	↑	↑	↓
E)	↓	↓	↓
F)	↓	↑	↓
G)	↓	↑	↑
H)	↓	↓	↑

**Answer: A)** Activation of the baroreceptors leads to an increase in sympathetic activity, which in turn increases heart rate, strength of cardiac contraction, and constriction of arterioles and veins. The increase in venous constriction results in an increase in mean circulatory filling pressure, venous return, and cardiac output.

9- An ACE inhibitor is administered to a 65-year-old man with a 20-year history of hypertension. The drug lowered his arterial pressure and increased his plasma levels of renin and bradykinin. Which mechanism would best explain the decrease in arterial pressure?

- A- Inhibition of angiotensin I
- B- Decreased conversion of angiotensinogen to angiotensin I
- C- Increased plasma levels of bradykinin
- D- Increased plasma levels of renin
- E- Decreased formation of angiotensin II

**Answer: E)** The conversion of angiotensin I to angiotensin II is catalyzed by a converting enzyme that is present in the endothelium of the lung vessels and in the kidneys. The converting enzyme also serves as a kininase that degrades bradykinin. Thus, a converting enzyme inhibitor not only decreases the formation of angiotensin II but also inhibits kininases and the breakdown of bradykinin. Angiotensin II is a vasoconstrictor and a powerful sodium-retaining hormone. The major cause for the decrease in arterial pressure in response to an ACE inhibitor is the decrease in formation of angiotensin II.

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10- A 25-year-old man enters the hospital emergency department after severing a major artery during a farm accident. It is estimated that the patient has lost approximately 800 milliliters of blood. His mean blood pressure is 65 mm Hg, and his heart rate is elevated as a result of activation of the chemoreceptor reflex. Which set of changes in plasma concentration would be expected to cause the greatest activation of the chemoreceptor reflex?

	Oxygen	Carbon Dioxide	Hydrogen
A)	↑	↑	↑
B)	↑	↓	↑
C)	↑	↓	↓
D)	↑	↑	↓
E)	↓	↓	↓
F)	↓	↑	↓
G)	↓	↑	↑
H)	↓	↓	↑

**Answer: G)** When blood pressure falls below 80 mm Hg, carotid and aortic chemoreceptors are activated to elicit a neural reflex to minimize the fall in blood pressure. The chemoreceptors are chemosensitive cells that are sensitive to oxygen lack, carbon dioxide excess, or hydrogen ion excess (or fall in pH). The signals transmitted from the chemoreceptors into the vasomotor center excite the vasomotor center to increase arterial pressure.

11- A balloon catheter is advanced from the superior vena cava into the heart and inflated to increase atrial pressure by 5 mm Hg. An increase in which of the following would be expected to occur in response to the elevated atrial pressure?

- A- ANP
- B- Angiotensin II
- C- Aldosterone
- D- Renal sympathetic nerve activity

**Answer: A)** Atrial natriuretic peptide is released from myocytes in the atria in response to increases in atrial pressure.

12- An increase in atrial pressure results in which of the following?

- A- Decrease in plasma ANP
- B- Increase in plasma angiotensin II concentration
- C- Increase in plasma aldosterone concentration
- D- Increase in sodium excretion

**Answer: D)** An increase in atrial pressure would also increase plasma levels of atrial natriuretic peptide, which in turn would decrease plasma levels of angiotensin II and aldosterone and increase sodium excretion.

13- Which set of changes would be expected to occur 2 weeks after a 50% reduction in renal artery pressure?

	Plasma Renin	Plasma Aldosterone Concentration	Glomerular Filtration Rate
A)	↑	↑	↑
B)	↑	↑	↓
C)	↑	↓	↓
D)	↑	↓	↑
E)	↓	↓	↓
F)	↓	↓	↑
G)	↓	↑	↑
H)	↓	↑	↓

**Answer: B)** Constriction of the renal artery increases release of renin, formation of angiotensin II and aldosterone, and arterial pressure. A 50% reduction in renal artery pressure would be below the range of renal autoregulation and would result in a decrease in the glomerular filtration rate.

14- An increase in which of the following would be expected to occur in a person 2 weeks after an increase in sodium intake?

- A- Angiotensin II
- B- Aldosterone
- C- Potassium excretion
- D- ANP

**Answer: D)** An increase in sodium intake would result in an increase in sodium excretion to maintain sodium balance. Conversely, potassium excretion would only transiently increase after an increase in sodium intake. Angiotensin II and aldosterone would decrease in response to a chronic elevation in sodium intake, whereas plasma atrial natriuretic peptide levels would increase.

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Archive

Lecture 15

X

Corrected by:

X

1- Which of the following decreases during aerobic exercise?

- A- Renal blood flow
- B- Mean arterial blood pressure
- C- Cerebral blood flow
- D- Blood temperature
- E- Heart rate

**Answer: A. Renal blood flow**

2- Which of the following decreases in active muscle:

- A- Temperature
- B- BP
- C- HR
- D- Blood vessel diameter

**Answer: B. BP**

3- The blood flow increase in exercise in all the following except?

- A- muscles
- B- Heart
- C- Lungs
- D- Kidneys
- E- None of the above

**Answer: D. Kidneys**

4- All of the following are correct about what occurred during exercise, except?

- A- vasoconstriction
- B- vasodilation
- C- constant O<sub>2</sub> in gut

**Answer: C. constant O<sub>2</sub> in gut**

5- Decrease total peripheral resistance?

**Muscular exercise**

6- Exercise increases which of the following?

A- Skin blood flow

B- Cerebral vascular resistance

C- Renal vascular

**Answer: A. Skin blood flow**

