

## Exam Copy 253

**NROSCI/BIOSC 1070 and MSNBIO 2070**

**Exam # 2**

**October 27, 2017**

<b>Total POINTS: 100</b>	<b>20% of grade in class</b>
--------------------------	------------------------------

1) An individual with untreated emphysema and COPD reports to the hospital emergency department.

a) The patient was found to have a normal arterial blood oxygen content. Briefly describe the physiological mechanism accounting for this, despite the fact that the patient has severe pulmonary disease. **(4 points)**.

b) Would intravenous injection of bicarbonate likely improve the patient's condition or make it worse? Provide a brief explanation for your answer. **(4 points)**.

## Exam Copy 253

c) If the patient does not receive treatment, would they likely develop heart failure? Provide a brief explanation for your answer. **(4 points)**.

d) How would vital capacity differ in this patient from a normal individual? Provide a brief explanation for your answer. **(2 points)**.

## Exam Copy 253

e) How would inspiratory reserve volume differ in this patient from a normal individual? Provide a brief explanation for your answer. **(2 points)**.

f) How would expiratory reserve volume differ in this patient from a normal individual? Provide a brief explanation for your answer. **(2 points)**.

g) How would transpulmonary pressure differ in this patient from a normal individual? Provide a brief explanation for your answer. **(2 points)**.

## Exam Copy 253

- h) How would the firing rate of peripheral chemoreceptor afferents differ in this patient from a normal individual? Provide a brief explanation for your answer. **(2 points)**.
- i) What are the two most likely treatments that would be provided to the patient in the emergency room to stabilize their condition? Provide a brief explanation for your answer. **(4 points)**.

## Exam Copy 253

- 2) During a routine medical examination, a quadriplegic patient is found to have high blood pressure. Would it be prudent for the physician treating the patient to prescribe an ACE inhibitor to take when they get home? Provide a brief explanation for your answer. **(5 points)**.
- 3) An army medic is treating a soldier on the battlefield who is believed to have high intracranial pressure following a head injury. As treatment options, the medic can provide the soldier intravenous hypertonic saline, hypotonic saline, or isotonic saline. Which of these solutions would be most helpful for treating the wounded soldier? Provide a brief explanation for your answer. **(5 points)**.

## Exam Copy 253

4) A neuroscientist is conducting an experiment on an anesthetized and artificially ventilated animal. The GABA receptor agonist muscimol is injected into the animal's CVLM to inhibit the activity of neurons located there. Indicate the effect, if any, of inhibition of CVLM neurons on the following physiological parameters. Provide a brief explanation of your answer.

a) Blood pressure. **(4 points)**.

b) Activity of vagal efferent fibers that innervate the SA node. **(4 points)**.

c) Plasma levels of angiotensin-2. **(4 points)**.

## Exam Copy 253

- 5) Mast cells, a type of white blood cell, release histamine when activated by allergens. If a large number of mast cells are activated, blood pressure drops considerably and the patient experiences shock. Histamine produces several physiological effects that cause additional filtration from capillaries, and thus a loss of plasma volume. Describe two distinct actions of histamine that serve to increase capillary filtration. **(6 points)**.
- 6) Nesiritide (Natrecor) is a synthetic form of B-type natriuretic peptide. Nesiritide has been used to treat patients with congestive heart failure. Describe two actions of Nesiritide that would be beneficial for patients with heart failure. **(6 points)**.

## Exam Copy 253

- 7) Coumadin (warfarin) is a commonly prescribed drug that reduces the risk of heart attacks. Discuss the actions of warfarin, and why these actions reduce the risk of heart attacks. **(8 points)**.
- 8) The following blood gases are determined for a patient: pH 7.46, pCO<sub>2</sub> 32 mm Hg, HCO<sub>3</sub><sup>-</sup> 23 mEq/L.
- a) Is the alkalosis respiratory or metabolic in origin? **(2 points)**
  - b) Is the alkalosis partially compensated or uncompensated? **(2 points)**
- 9) The following blood gases are determined for a patient: pH 7.31, pCO<sub>2</sub> 50 mm Hg, HCO<sub>3</sub><sup>-</sup> 22 mEq/L.
- a) Is the acidosis respiratory or metabolic in origin? **(2 points)**
  - b) Is the acidosis partially compensated or uncompensated? **(2 points)**



## Exam Copy 253

10) The following blood gases are determined for a patient: pH 7.30, pCO<sub>2</sub> 46 mm Hg, HCO<sub>3</sub><sup>-</sup> 16 mEq/L.

a) Is the acidosis respiratory or metabolic in origin? **(2 points)**

b) Is the acidosis partially compensated or uncompensated? **(2 points)**

11) An astronaut has been living on the International Space Station for 2 months. Indicate how the following physiological parameters differ from those prior to the astronaut leaving Earth. **(2 points each; 4 points total)**

a) Atrial natriuretic factor

*Higher*

*Lower*

*Same*

b) Aldosterone

*Higher*

*Lower*

*Same*

12) A person is exercising vigorously in hot weather. How does oxygen delivery to the following organs change during exercise? **(2 points each; 6 points total)**

a) Brain

*Higher*

*Lower*

*Same*

b) Heart

*Higher*

*Lower*

*Same*

c) Skin

*Higher*

*Lower*

*Same*

## Exam Copy 253

- 13) Oxygen delivery is greatly enhanced to working muscle during exercise. In one sentence each, discuss five factors that contribute to increasing oxygen delivery to working muscle. **(2 points each; 10 points total)**

**Factor 1:**

---

**Factor 2:**

---

**Factor 3:**

---

**Factor 4:**

---

**Factor 5:**

## Exam Copy 253

Please Take This Page With You As A Record of Your  
Exam #

<p><b>Exam # 2</b> <b>October 27, 2017</b></p>
--

## Exam Copy 253

Please Print Your Name Below  
This page will be filed away until exam grading is  
complete.

---

Print Your Name

**Exam # 2**  
**October 27, 2017**