Chapter 14 Blood Vessels, Blood Flow and Pressure Exam Study Questions

14.1 Physical Law Governing Blood Flow and Blood Pressure
1. How do you calculate flow rate?

2. What is the driving force of blood flow in systemic circuit?

3. What is the driving force of blood flow in pulmonary circuit?

4. How does TPR affect flow rate?

14.2-14.6 The Vasculature
1. What are not included in the microcirculation?
   a. arterioles  b. capillary bed  c. venules  d. artery  e. metarterioles

2. Match the blood vessel to its description.
   i. Arteriole
   ii. Capillary
   iii. Artery
   iv. Vein
   a. These blood vessels are called a pressure reservoir. ________
   b. The elastic recoil of its walls cause diastole causes a continuation of blood flow ______
   c. Its high compliance allows it to hold more a large volume of blood with little change in pressure ______
   d. These blood vessels are referred as resistance blood vessels. __________
   e. These blood vessels are very well innervated. Regulation of its radius determines blood flow ______
   f. The smallest of blood vessels, their thin walls allow for ready exchange of material between ______
   g. This blood vessel has the highest BP. ______
   h. This blood vessel has the largest cross-sectional area and the lowest mean linear velocity. ______
   i. This blood vessel provides the greatest resistance to blood flow. ______
   j. This blood vessel has the lowest BP. ______
   k. This blood vessel is called blood reservoir. ______

3. The contraction and relaxation of ________ causes the changes of arteriole radius and the resistance.
   a. connective tissue
   b. smooth muscle
   c. endothelium
d. lumen
e. valves

4. Which of these factors is extrinsic control of blood flow to organs?
   a. metabolic activity in a particular muscle
   b. sympathetic activity
   c. ADH
   d. Angiotensin II
   e. All of these except a

5. Match the following terms to the appropriate descriptions.
   i. Active hyperemia
   ii. Reactive hyperemia
   iii. Myogenic response
   iv. Perfusion pressure
   a. A constriction of an arteriole in response to stretch of the arteriole smooth muscle and does not require the action of nerve, or chemicals.
   b. The pressure gradient that drives blood flow through a given organ or tissue.
   c. An increase in blood flow to tissues in response to increased metabolic activity.
   d. An increase in blood flow to tissues in response to a previous reduction in blood flow.

6. Choose the best term that fit the description.
   a. Total peripheral resistance
   b. Compliance
   c. Edema
   d. Hypotension
   e. Hypertension

   1) Combined resistance in all blood vessels in systemic circuit.
   2) The term for chronically elevated blood pressure above normal BP
   3) The accumulation of fluid in the interstitial space is called
   4) The term for chronically decreased blood pressure than normal BP
   5) The pressure change with the change of volume

7. For each of the followings, indicate how they affect arteriole radius (Table 14.1 and 14.2)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Vasoconstriction</th>
<th>Vasodilation of the Systemic Arterioles</th>
<th>Neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasopressin</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Oxygen</td>
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<tr>
<td>Angiotensin II</td>
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<tr>
<td>CO₂</td>
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<td></td>
<td></td>
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<tr>
<td>Nitric oxide</td>
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<td></td>
<td></td>
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<tr>
<td>Hydrogen ions</td>
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<td></td>
<td></td>
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<tr>
<td>Sympathetic nervous system activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parasympathetic</td>
<td></td>
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</tbody>
</table>
8. Describe the changes that occur in the cardiac output and distribution of blood flow during exercise.

9. How come the use of nitroglycerin can decrease the chest pain?

14.5 Capillaries and Venules
1. The contraction or relaxation of smooth muscles at these three locations can adjust local control of blood flow through a particular capillary bed.
   i. __________________
   ii. __________________
   iii. __________________

2. List three mechanisms of materials exchange across capillary walls:
   i. ______ ______: small solutes
   ii. ______________: large water soluble proteins
   iii. __________ ________ in the brain.

   What is the main mechanism? ______________

3. Fill in the blanks. Factors that affect the bulk flow across the capillary walls (Table 14.3)

<table>
<thead>
<tr>
<th>Force</th>
<th>Definition</th>
<th>Direction of force (filtration or absorption)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hydrostatic pressure exerted by the present of fluid inside of the capillary</td>
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</tr>
<tr>
<td></td>
<td>Hydrostatic pressure exerted by the present of fluid outside of the capillary</td>
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<tr>
<td></td>
<td>Osmotic force due to presence of proteins in plasma</td>
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</tr>
<tr>
<td></td>
<td>Osmotic force due to presence of proteins in interstitial fluid</td>
<td></td>
</tr>
</tbody>
</table>
| Net Filtration Pressure (NFP)| Difference between forces for filtration and absorption                  | NFP > 0 ____________
                                  |                                                                            | NFP < 0 ____________

4. At arterial end, NFP=12 mmHg, filtration/absorption occurs.

5. Explain the conditions that contribute to filtration and edema.

14.6 Veins
1. According to Figure 14.23, the increases of these four factors ____________________.
   ________________, ________________, ________________ and ________________ will increase the
venous pressure and the venous return. As a consequence, MAP will be ________________ (increased or decreased).

14.7 The Lymphatic System
1. Explain the function of lymphatic system.

14.8 Mean Arterial Pressure and Its Regulation
1. The short term regulation of the mean arterials blood pressure is through n__________ and h_______ control of cardiac function. It includes a negative feedback system called the _____________ reflex (page 420).
2. Short-term/long term regulation of MAP is accomplished by regulating cardiac output and total peripheral resistance.
3. The long term regulation of MAP is done by regulating the _______ volume by the ________ (organ name, page 420).
4. (T/F)MAP is regulated via negative feedback.
5. What is a baroreceptor? And where are arterial baroreceptors located?
6. Where are the low-pressure-baroreceptors located?
7. Describe the baroreceptor reflex and its function in blood pressure regulation.
8. Extrinsic hormonal factors that affect MAP (Table 14.4).
   i. How does epinephrine affect HR and SV and MAP?
      ii. Epinephrine causes vasoconstriction or vasodilation or it depends in arterial smooth muscle.
      iii. How do vasopressin and angiotensin II affect arteriolar smooth muscle and MAP?
      iv. How does epinephrine affect venous smooth muscle and MAP?
9. Complete the labels
10. Tom suffers from hypertension. Which of the following might help deal with his problem? A drug that
   a. blocks beta receptors in cardiac muscle tissue.
   b. stimulates α receptors in cardiac muscle tissue.
   c. blocks α receptors in cardiac muscle tissue.
   d. stimulate beta receptors in cardiac muscle tissue.

11. Cardiovascular functions are also regulated by
   a. Respiratory sinus arrhythmia
   b. Chemoreceptor reflexes
   c. Thermoregulatory responses
   d. All of these