

Quiz 1
BI-374, Spring '06, Dr. C. S. Tritt

Each problem is worth the same amount. Write your answers on one side of the paper provided with reasonable margins and put your name (or initials) on each page. This is a one hour, closed book, closed notes test.

Each problem scored and 10 point scale. Total points off deducted from 160 and the result divided by 1.6.

1. Define homeostasis.

Homeostasis are processes involved in maintaining the internal (to the organism, external to the cells) environment. Defining hemostasis (preventing blood loss) was -3. Just saying maintaining pH (or any other single variable) was also -3.

2. Explain (in very general terms) a benefit of secreting inactive pro-enzymes and hormones.

Having circulating pro-enzymes and hormone provides for a faster response than would be possible if the material would have to be secreted when needed. Saying prevents early action was -3 (statement is true for enzymes, but not hormones and missing the main reason).

3. In which direction (in to or out of the capillary) would fluid transport occur under the following conditions: capillary hydraulic pressure = 20 mm Hg, capillary colloid osmotic (oncotic) pressure = 28 mm Hg, interstitial hydraulic pressure = -3 mm Hg and interstitial oncotic pressure = 8 mm Hg.

$P_{\text{net, out}} = 20 - 28 - (-3 - 8) = 3$ mm Hg (any and all sign errors -5 resulting in the wrong net value) so the transport would be out of the capillary. If not values were given, "Out" was a sufficient answer. Getting the correct value (3 mm Hg), but saying transport would be inward was -3.

4. Briefly describe how is the typical negative tissue pressure is produced and maintained.

The lymphatic system (8 pts). Specifically the pumping action of the lymphatic system involving valves and skeletal muscle contraction. Just saying lymphatic pump was good for full credit. Not saying lymphatic was -7.

5. Sketch the general shape of the oxygen-blood dissociation curve (be sure to label the axis).

See notes. Axis labels worth 3 points each. General (S) shape worth 3.

6. Sketch the pH-Bicarbonate diagram (be sure to show and individually label the blood buffer lines and isobars).

See notes. Axis labels, blood buffer lines and isobars each worth 3 points.

7. Name or describe two forms in which carbon dioxide is carried in the blood.

Bicarbonate, carbamino (saying combined with Hb was sufficient) and dissolved. Could also say, "in plasma and RBC's."

8. What is the acid-base status of a patient has a pH of 7.33, a base excess of 12.0 mEq/l and a PCO₂ of 80.0 mm Hg.

Compensated, respiratory acidosis (4 off for 1 term wrong or missing, 3 points per term thereafter).

9. Name something that can cause platelet activation.

Damaged vascular wall (generally unfamiliar surfaces and specifically collagen), ADP, Thromboxane A₂. Also accepted thrombin and other platelets for full credit.

10. Define fibrinolysis and anticoagulation such that the difference between these processes is emphasized.

Fibrinolysis is the breakdown (dissolution) of existing thrombi (blood clots) while anticoagulation is the prevention of their formation.

11. What makes heparin a particularly good anticoagulant to use during cardiopulmonary bypass surgery?

Its action can be quickly and easily reversed (using protamine). Not saying something like this was -3.

12. Briefly explain the technical difference between ventilation and respiration.

Ventilation is the movement of air into and out of the lungs while respiration is the cellular processes associated with the use of oxygen. Saying stuff about active and passive processes -5 (remember the machines should be called ventilators).

13. What part (inspiration or expiration) is normally active (requires muscle contraction)?

Inspiration is normally active. This was an all or nothing questions.

14. Name and briefly describe three types of cells typically found in alveoli.

Type I - form the wall, Type II - secrete surfactant, Macrophages - fight infection and/or clean up debris. Not providing descriptions -3.

15. Sketch a spirometer tracing showing the FRC, TV, IC, IRV, TLC, ERV and RV.

See slide show. Each missing labeled item -2 up to a maximum of 10 points off.

16. What is the mechanical significance of the FRC in terms of lung and chest wall recoil forces?

The FRC is the lung volume at which the recoil of the lung balances the recoil of the relaxed chest wall. Not saying relaxed (or something like it) was -1.