Biology 260 – Human Physiology
Exam #3 – Spring 2002

Please read the instructions to each segment carefully. I expect you to ask questions if there is anything you are not quite sure about. Lori and Sukhee you may ***NOT*** eat all the candy!

Part I: Multiple Choice. This portion of the exam is worth 40% of your total score.
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. The largest total cross-sectional area is found in the
a. aorta.
b. arterioles.
c. capillaries.
d. venules.
e. veins.

____ 2. What is the primary method by which materials such as O_2, CO_2 and nutrients are exchanged between the blood and surrounding tissues?
a. passive diffusion of substances across the capillary wall down their concentration gradients.
b. active transport of materials across the capillary wall.
c. osmotic pressure drawing water and solutes out of the capillary, thereby bringing these dissolved nutrients into contact with the tissue cells.
d. the combined processes of ultrafiltration and reabsorption.
e. bulk flow.

____ 3. Edema could result from
a. blockage of lymph vessels, increased capillary blood pressure, and decreased blood-colloid osmotic pressure.
b. blockage of lymph vessels and increased capillary blood pressure.
c. increased capillary blood pressure and decreased blood-colloid osmotic pressure.
d. blockage of lymph vessels and decreased blood-colloid osmotic pressure.
e. None of these answers.

____ 4. Which of the following is not a function of the lymphatic system?
a. defense against disease.
b. return of fluid to the circulatory system.
c. transport of fat molecules.
d. regulation of sodium balance.
e. return of plasma proteins to the circulatory system.

____ 5. The venous valves
a. actively contract to force blood uphill against gravity.
b. passively close to prevent the backflow of blood in the veins.
c. are positioned at the entrances to the atria.
d. Both (b) and (c) above.
e. All of these answers.

____ 6. The walls of the veins contain smooth muscle innervated by sympathetic nerve fibers. Sympathetic stimulation _____ venous pressure and drives _____ blood into the heart.
a. increases, more.
b. increases, less.
c. decreases, more.
d. decreases, less.
e. None of these answers.

____ 7. Regulation of arterial pressure is mediated by reflex mechanisms. One important pressure receptor, a _____, is located in the _____.
a. chemoreceptor, carotid sinus.
b. exteroceptor, carotid sinus.
c. baroreceptor, carotid sinus.
d. chemoreceptor, skeletal muscles.
e. baroreceptor, skeletal muscles.

____ 8. If the hematocrit is 45, what percentage of the whole blood is composed of plasma?
a. 42%
b. 55%
c. 58%
d. 45%
e. 50%

____ 9. Which is the most abundant type of cellular element in the blood?
a. erythrocytes.
b. neutrophils.
c. leukocytes.
d. lymphocytes.
e. platelets.

____ 10. Erythropoiesis
a. is accomplished in the bone marrow upon stimulation by erythropoietin.
b. is accomplished in the kidneys in response to reduced O_2 delivery to the kidneys.
c. refers to increased RBC count.
d. refers to RBC destruction.
e. None of these answers.

____ 11. The stimulus for increased erythropoiesis secretion is
a. low oxygen levels in the bone marrow.
b. low oxygen levels in the kidney.
c. a hormone produced by the bone mrrow.
d. a hormone produced by the liver.
e. None of these answers.

____ 12. Erythropoietin
a. is secreted by the bone marrow.
b. stimulates red blood cell production.
c. converts prothrombin to thrombin.
d. is deficient in pernicious anemia.
e. More than one of these.

____ 13. Which is not a step in hemostasis?
a. vascular spasms.
b. platelet aggregation.
c. coagulation.
d. thrombopoeisis.
e. fibrinogen activation.

____ 14. What forms the meshwork of a clot?
a. red blood cells.
b. fibrin
c. platelets.
d. thrombin.
e. Hageman factor.

____ 15. Receptors
a. respond to various physical or chemical changes in their environment.
b. change other forms of energy into electrical energy.
c. respond more readily to their adequate stimulus.
d. are found at the peripheral endings of afferent neurons.
e. All of these answers.

____ 16. Which of the following receptors are rapidly adapting?
a. muscle stretch receptors
b. tonic receptors
c. phasic receptors
d. Both muscle stretch receptors and tonic receptors are correct.
e. All of these answers.

____ 17. Which of the following structures normally controls the amount of light entering the eye?
a. ciliary muscle.
b. suspensory ligaments.
c. iris.
d. cornea.
e. lens.

____ 18. The retina
a. is the middle layer of the eye.
b. contains the photoreceptors.
c. becomes specialized anteriorly to form the cornea.
d. secretes the aqueous humor.
e. None of these answers.

____ 19. Color vision
a. is accomplished by rods at night and cones during the day.
b. depends on the three cone types' various ratios of stimulation in response to different wavelengths of light.
c. is usually lost in vitamin A deficiency.
d. depends on activation of a specific cone for each visible color.
e. is made possible by convergence within the cone pathways.

____ 20. Vestibular information is important for all of the following except
a. hearing.
b. maintenance of balance and desired posture.
c. control of eye movement.
d. perception of motion and orientation.
e. None of these answers.

Part II: Matching. This portion of the exam is worth 20% of your total score.
Please answer all the questions below. There is only one option for each term.

Match the following eye disorder with its description.
a. color blindness
b. night blindness
c. glaucoma
d. hyperopia
e. diplopia
f. presbyopia
g. myopia lens
h. cataract
i. astigmatism

____ 21. eyeball too long
____ 22. eyeball too short
____ 23. corrected by cylindrical lens
____ 24. corrected by concave lens
____ 25. corrected by convex
____ 26. corneal surface uneven
____ 27. images from two eyes not fused within cortex
____ 28. increased intraocular pressure
____ 29. opaque lens
____ 30. stiffened lens
____ 31. Vitamin A deficiency
____ 32. lack of a cone type

Match the following term with its description.
a. timbre (quality)
b. pitch (tone)
c. intensity of a sound wave (loudness)

____ 33. Determined by the frequency of sound waves.
____ 34. Dependent on the overtones.
____ 35. Dependent on the amplitude of the sound wave.
____ 36. Measured in cycles per second.
____ 37. Measured in decibels.

Match these blood disorders with their characteristics.

a. aplastic anemia
b. pernicious anemia
c. hemolytic anemia
d. hemorrhagic anemia
e. polycythemia
f. leukemia
g. neutrophilia
h. sickle cell anemia

____ 38. Lack of red blood cell production due to poisoning of the bone marrow.
____ 39. Lack of intrinsic factor.
____ 40. Premature rupture of erythrocytes.
____ 41. Vitamin B_{12} is not absorbed.
____ 42. Associated with prolonged exposure to low oxygen, such as at high altitude or with chronic lung disease.
____ 43. Associated with sickle cell anemia.
____ 44. Frequently associated with bacterial infections.
____ 45. Associated with malaria.
____ 46. Associated with acute loss of blood.
____ 47. Uncontrolled production of white blood cells.
____ 48. Caused by a mutated hemoglobin.

Part III: Fill In The Blank. This portion of the exam is worth 20% of your total score.
Please use the words on the top of the paragraph to fill the gaps below. Each word can only be used only once.

Active, cornea, fibrinogen, heart rate, tectorial membrane, cones, myoglobin, ear, veins, erythropoietin, passive, transport, total peripheral resistance, fovea, cardiac output, arterioles, hemoglobin, waves, diffusion, iris, capillaries, angiotensin, sympathetically, rods, ciliary, parasympathetically, baroreceptors, plasma proteins, tympanic membrane, erythrocytes, leucocytes, rennin, coagulation, oval window, fibrin, eye, circular, lens, auditory nerve, vitreous humor,

There are two types of _____ exchange of substances across a capillary wall: _____ and bulk-flow. Individual solutes are exchanged down their concentration gradients. _____ are large-radius passageways for return of blood to the heart. Venous return can be enhanced by _____ -induced venous constriction and by contraction of the surrounding skeletal muscles. Regulation of mean arterial pressure depends on control of its two main determinants, cardiac output and _____. Carotid sinus and aortic branch _____ continuously monitor mean arterial pressure.

Plasma is a complex liquid that serves as a transport medium for substances being carried through vessels. All plasma constituents are freely diffusible across the capillary walls except the _____, which remain in the plasma and perform a variety of functions. _____ are specialized for their primary function of oxygen transport in the blood. They are packed with _____, which is an iron-containing molecule. Erythrocytes are derived from undifferentiated pluripotent stem cells, upon stimulation by _____, a hormone released by the kidneys in response to reduced oxygen delivery to the tissues.

Clot formation, also known as blood _____, reinforces the platelet plug and converts blood in the vicinity of a vessel into a non-flowing gel. _____, an insoluble threadlike molecule, is laid down as the meshwork of the clot; the meshwork in turn entangles blood cells to complete clot formation.

The eye is a specialized structure that houses the light-sensitive receptors essential for vision perception – namely the _____ and _____ found in the retinal layer. The _____ controls the size of the pupil, thereby adjusting the amount of light permitted to enter the eye. The strength of the lens can be adjusted through action of the _____ muscle to accommodate for differences in near and far vision.

Hearing depends on the ear's ability to convert airborne sound waves into mechanical deformations of receptive hair cells, thereby initiating neural signals. Sound _____ are funneled through the external ear canal to the _____ _____, which vibrates in synchrony with the waves. Middle ear bones amplify and transmit the vibrations to the _____, whose movement sets up traveling waves in the cochlea. Various regions of the basilar membrane selectively vibrate more vigorously in response to different frequencies of the sound.

Part IV: Short Answer. This portion of the exam is worth 20% of your total score.
Please read carefully and answer all the questions below.

Compare tonic and phasic receptors. Use graphs if necessary. Where are tonic receptors located in the body, and where are phsic receptors found? Why?

What are the functions of the semicircular canals, the utricle, and the saccule? Be descriptive.

Describe the three steps of hemostasis.

What is the function of erythrocytes? What do you know about their formation?