

LAB TIME ALL

PRINTED NAME _____ KEY _____

Last, First

BI 121

Introduction to Human Physiology

Fall 2011

University of Oregon

Department of Biology

Midterm Examination – Version 3.4

Part I. This section contains 5 short-answer questions worth 4 points each for a total of 20 points. Answer each question directly and concisely using as few words as possible. Be clear in labeling. If you are confused about the wording of a question, please see the friendly proctors in your room. Best of luck! Have fun!!

😊...That's the whole idea--I ❤️ Physiology!!

1. Where does the *citric acid* or tricarboxylic acid cycle take place? (+1) Does this chemical reaction cycle *directly* produce much ATP energy? (+1) What is citric acid cycle's *chief function*? (+2)

Where (precise location)? MITOCHONDRIAL (+ 0.5) MATRIX (+ 0.5)

Much ATP energy (yes/no)? NO (+ 1.0)

Chief function (very few words)? HARVEST/COLLECT/PRODUCE/CULL/DELIVER (+ 1.0) 2e⁻s OR PAIRS OF ELECTRONS (+ 1.0) FOR/TO ELECTRON TRANSPORT CHAIN (ETC)

2. For the *transfer RNA anti-codon* AUU, what is the corresponding messenger RNA codon (+1) and the corresponding DNA code word (+1)? What do these triplets of bases stand for/represent? (+2)

<u>DNA code word</u>	<u>mRNA codon</u>	<u>tRNA anti-codon</u>
ATT (+ 1.0)	UAA (+ 1.0)	AUU

The triplets of bases represent: AMINO ACIDS/BUILDING BLOCKS OF PROTEINS (+ 2.0)
[ALT., + 1.0 IF ONLY PROTEIN INDICATED.]

3. Which of the six nutrients essential for life can be used to derive energy in the form of *adenosine triphosphate* (ATP)? (+3) Which of these energy nutrients can be used by *mitochondrial* powerhouses to produce ATP? (+1)

Energy nutrients? CARBOHYDRATES (+ 1.0), FATS (+ 1.0), PROTEINS (+ 1.0)
[So – 2.0 if only carbohydrates listed.]

Which of the above used by mitochondria? ALL THREE/ALL OF THEM/CARBOHYDRATE 1st, FAT 2nd, PROTEIN VERY LITTLE/MINIMALLY (+ 1.0) [+ 0.5 IF ONLY CARBOHYDRATE OR 1 EN LISTED.]

4. Blood pressure is the force exerted by the blood on *large systemic arteries*. In the space below, draw a figure 8-loop representing the human cardiovascular system. Draw & label two sets of capillaries. Where in the loop is the heart? [Note this in your sketch.] (+1) What does the lower part of the loop represent? (+1) In typical measurements in the doctor's office, where within the loop is blood pressure being estimated? [Make an X to indicate the exact spot.] (+1) What is the optimal blood pressure in millimeters of mercury (mm Hg) relative to *cardiovascular risk*? (+1)

FIGURE-8 DRAWING w/♥ @ CENTER (+ 1.0)

SYSTEMIC/PERIPHERAL CIRCUIT (+ 1.0)

X OR ARROW W/LABEL TO INDICATE LARGE SYSTEMIC ARTERIES (+ 1.0)

< 120/80 MM HG [BOTH MUST BE SATISFIED < 120 SYSTOLIC & < 80 DIASTOLIC] (+ 1.0)

5. What is a *polymer*? (+1) What is a *monomer*? (+1) How is *hydrolysis* related to polymers and monomers? (+2)

Polymer? MANY/REPEATING STRUCTURAL UNITS OR MANY PARTS/COMPONENTS (+ 1.0)
[ALT: A MACROMOLECULE,...]

Monomer? ONE PART/ONE STRUCTURAL UNIT/SINGLE COMPONENT (+ 1.0)

How is hydrolysis related (very few words)? HYDROLYSIS OF DIGESTION (ADDING THE ELEMENTS OF WATER TO SPLIT THINGS APART) CONVERTS POLYMERS INTO MONOMERS (+ 2.0)
[LINKS POLYMERS & MONOMERS IS OK, JUST ABOVE THRESHOLD FOR POINT VALUE.]

Part II: This section contains 40 multiple-choice questions, each worth 2 points for a total of 80 points. Circle the letter corresponding to the correct answer on this test. With a number 2 pencil, fill in the circle corresponding to the correct letter on your *U of O Score Form*. Feel free to show your work or thought processes on this test, but do not make notes/stray marks on the scantron. Verify that you've entered your name and ID# on the scantron. Remember that only one answer is correct & no partial credit will be given. Best of luck! vpl

1. Cells are progressively organized into
 - a. organs, systems, tissues, and finally, the whole body.
 - b. systems, tissues, organs, and finally, the whole body.
 - c. organs, systems, tissues, and finally, the whole body.
 - d. tissues, organs, systems, and finally, the whole body.**
 - e. None of the above.
2. How do *plasma* and *interstitium* differ? What do they have in *common*?
 - a. Plasma is extracellular fluid, whereas interstitium is intracellular fluid; both are within blood, the fluid part of the cardiovascular system.
 - b. Plasma is within the cardiovascular system, whereas interstitium is not, but rather is in tissue spaces; both are extracellular fluid, and mingle at the level of the capillary.**
 - c. Plasma and interstitium are identical; they are synonyms for the straw-colored fluid part of blood.
 - d. Plasma is cytoplasm without organelles, whereas interstitium is extracellular fluid.
 - e. None of the above.
3. What are the 4 Cs for the 4 primary tissue types? Nerve ___, muscle ___, epithelial ___, and connective ____.
 - a. contracts, conducts, covers, connects
 - c. contracts, covers, conducts, connects
 - e. None of these.
 - b. connects, covers, contracts, conducts
 - d. conducts, contracts, covers, connects**
4. Which of the following converts energy so that the homeostatic model's *Controller* can evaluate *input*?
 - a. Δ or corrective change
 - b. effector
 - c. output
 - d. receptor**
 - e. feedback loop
5. Which of the following about negative feedback loops are correct? A negative feedback loop ____
 - a. involves amplification of an original input.
 - b. includes a corrective change that reinforces the original input.
 - c. ultimately must be turned off by a positive feedback loop.
 - d. example includes oxytocin & contraction of the uterus during childbirth.
 - e. None of the above is correct.**
6. List in the correct order, the sequence of steps that occur to maintain blood pressure, when a human subject moves from a seated to a standing position.

1. heart rate increases, blood vessels constrict	4. blood pools in the lower body	7. blood pressure falls
2. baroreceptors detect change in pressure	5. output is sent to heart & vessels	8. blood pressure rises
3. mechanical pressure translated to nerve signal	6. CV control center compares w/set point	9. corrective change

 - a. 1,3,5,7,9,2,4,6,8
 - b. 2,4,5,7,9,8,1,3,6
 - c. 3,2,1,5,6,4,8,7,9
 - d. 4,7,2,3,6,5,1,9,8**
 - e. 5,7,9,8,1,2,3,4,6
7. Which of the following describes the general flow of information within the cell?
From ___ to ___ to ____.
 - a. DNA, protein, RNA
 - b. RNA, protein, DNA
 - c. Protein, DNA, RNA
 - d. DNA, RNA, protein**
 - e. RNA, DNA, protein
8. Why is it important to have organelles and in general, cell compartments?
 - a. To create an assembly of free ribosomes that produces lipids for cell membrane construction.
 - b. So that incompatible reactions can take place simultaneously.**
 - c. It is not important. This is really a false-partitioning of structures which are highly interrelated.
 - d. To separate mitochondrial anaerobic metabolism from cytosolic aerobic metabolism.
 - e. None of the above are correct.
9. Which of the following are thought to act like *intracellular freight trucks*, ferrying either RNA and/or ribosomes, and have been implicated in *cancer cell resistance to chemotherapy*? Are they true organelles?
 - a. peroxisomes, yes
 - b. mitochondria, no
 - c. lysosomes, yes
 - d. Golgi complex, yes
 - e. vaults, no**

10. Which of the following *detoxifies* by way of *oxidative enzymes* and neutralizes hydrogen peroxide with *catalase*?
a. ribosomes **b. peroxisomes** c. glycogen inclusions d. mitochondria e. lysosomes
11. The *rough endoplasmic reticulum*
a. is studded with ribosomes.
b. synthesizes proteins for export from the cell or for use in construction of new cellular membrane.
c. is thought to be continuous with the smooth endoplasmic reticulum.
d. All of the above are correct.
e. None of the above is correct.
12. How is it that human body cells contain *mitochondria derived solely from our mothers*?
a. This is not true. Our body cells contain mitochondria derived from both parents.
b. Sperm mitochondria enter the egg but are tagged for destruction by the protein ubiquitin.
c. Sperm mitochondria never enter the egg, but are used for sperm propulsion, then discarded.
d. Sperm mitochondria enter the egg and evolve into precursor/primordial egg mitochondria.
13. Which of the following *activities* relies most heavily upon the *immediate, ATP-PC energy system*?
a. marathon run b. cross-country skiing c. jumping rope for 10 min **d. 100-m sprint** e. boxing
14. *What is a gene and where are genes located within the cell?*
a. an RNA molecule that is a copy of a section of DNA, nucleus & cytosol
b. a section/stretch of DNA that's a recipe for making a protein, nucleus & mitochondria
c. the subunit of a ribosome for making proteins, cytoplasm & endoplasmic reticulum
d. All of the above are correct.
e. None of the above is correct.
15. Which of the following are *single-stranded* molecules with nucleotide building blocks?
a. DNA b. glycogen c. mRNA d. rRNA **e. Both c. & d.**
16. In *translation*, what role does *tRNA* play?
a. It provides the energy needed to link amino acids together to make a protein at the ribosome.
b. It helps connect the small and large ribosomal subunits to make a functional ribosome.
c. It picks up a specific cytosolic amino acid and delivers it to the ribosome for making proteins.
d. Along with proteins makes up the large subunit of the ribosome or workbench of protein synthesis.
e. None of the above is correct.
17. What are the *micronutrients*, that is, are required in only minute amounts?
a. triglycerides b. glycerol & mineral colloids c. carbohydrates & proteins **d. vitamins & minerals** e. None of these
18. What *major changes* were made to the 1992 USDA Food Pyramid to create the 2005 Food Guidance System?
a. Increased emphasis on daily exercise & reduced kcal intake.
b. 9-A-Day rather than 5-A-Day servings of vegetables & fruits.
c. At least ½ of daily servings of grains, whole grain.
d. Emphasis on good fats, eg Ω-3 fish, walnuts, rather than saturated or trans fat sources.
e. All of the above were changes made to create the new 2005 Food Guidance System.
19. Which of the following categories should be *minimized* in order to promote gradual *weight loss & percentage body fat reduction*?
a. Fats b. alcohols c. proteins d. carbohydrates **e. a. & b. because of their high calorie density**
20. According to a study by Zuti and Golding in 1976, what is *the best way to maintain or increase muscle mass, and to lose %body fat and body weight?*
a. consistent aerobic exercise b. eating < 800 kcal/day c. eliminating dessert d. herbal supplements e. None of these
21. The *gut is not digested* by the *proteolytic enzymes* it makes because it produces _____.
a. inactive precursors b. mucus c. actually, it is digested over time **d. a. & b. are both correct** e. None of these
22. What are the *primary end-products* of *fat/triglyceride digestion*?
a. glucose b. amino acids **c. fatty acids & glycerol** d. ethanol e. None of these

23. Which of the following is one of the *major causes* of *ulcers*?
a. stress b. spicy foods c. smoking d. *Helicobacter pylori* e. None of these
24. Where does chemical digestion of *protein* begin?
a. mouth b. esophagus c. stomach d. small intestine e. large intestine
25. Which of the following *secretions* are released *directly into the blood*, NOT into the gut lumen?
a. mucus b. enzymes c. water & bicarbonate d. hormones e. All of these
26. Which of the following concentrates and stores *bile*?
a. liver b. gall bladder c. small intestine d. large intestine e. None of these
27. *Why* is the *pancreas* unique? It
a. is the retirement center for red blood cells.
b. produces exocrine digestive enzymes and endocrine hormones.
c. makes enzymes specific for digesting all 3 energy nutrients.
d. begins the enzymatic digestion of carbohydrate.
e. Both b. and c. above are correct.
28. Why is it important to have a *parallel rather than series systemic circulation*?
a. so that each organ receives a fresh blood supply rather than used blood from proximal organs.
b. to ensure that there is a gradient of acid-base or pH balance along the distal path of the circulation.
c. so that blind-ended lymphatic vessels can trap run-off from the cardiovascular system when capillaries are injured.
d. to ensure that there is a gradient of oxygen concentration from large arteries, to small arteries to capillaries.
e. None of the above is correct.
29. What is the *normal direction of blood flow* through the *cardiac or heart circulation*?
a. veins to atria to ventricles to arteries to capillaries to veins
b. atria to arteries to ventricles to veins to capillaries to atria
c. arteries to veins to atria to ventricles to capillaries to arteries
d. capillaries to arteries to veins to ventricles to atria to capillaries
e. None of the above is correct
30. Clinically *healthy*, *human heart valves ensure blood flow* that is:
a. unidirectional b. from veins to arteries c. from capillaries to arterioles d. from lymphatics to veins
31. Pretend like you're a *red blood cell* or an erythrocyte *within the inferior vena cava*. List in order, the *valves* you would see traveling through the heart.
a. pulmonary, aortic, mitral, tricuspid
b. aortic, bicuspid, right AV, pulmonary
c. bicuspid, left AV, pulmonary, aortic
d. tricuspid, pulmonary, bicuspid, aortic
e. pulmonary, aortic, right AV, left AV
32. *Elephantiasis* from the mosquito-borne parasitic filaria worm is due to blockage of _____.
a. cardiovascular capillaries b. pulmonary arteries c. systemic veins d. lymph nodes & vessels
33. The *top value* of a *systemic blood pressure measurement* is due to pressure generated by
a. contraction of the right atrium d. contraction of skeletal muscles
b. contraction of the left ventricle e. None of these.
c. relaxation of the left ventricle
34. Which of the following factors may *alter heart rate and blood pressure*?
a. arousal state (awake, drowsy, asleep, unconscious...)
b. bladder and/or bowel distention (if more than semi-filled, then BP higher)
c. menstrual phase (follicular, ovulatory, luteal)
d. smoking status (# & time)
e. All of the above.

35. In an *EKG/electrocardiogram*, what does the *QRS complex* represent? The wave of depolarization travelling through the _____.
a. primer pumps **b. power pumps** c. SA node d. inter-atrial pathway e. AV node
36. Exchange of nutrients, wastes, and gases occurs within which *blood vessels* which are no more than a few cell diameters away from all body cells?
a. venules b. arteries **c. capillaries** d. arterioles e. veins
37. Which of the following are *primary modifiable risk factors* for the development of *cardiovascular diseases*?
a. cigarette smoking b. hypertension c. high fats in the blood d. lack of exercise **e. All of these**
38. A *TIA or transient ischemic attack* is
a. an acute myocardial infarction.
b. a mini-stroke or prelude to a major stroke.
c. associated with angina or chest pain just prior to a heart attack.
d. a form of peripheral vascular disease.
e. None of the above.
39. *Atherosclerosis*
a. is a gruel-like, cholesterol-containing plaque that develops within walls of arteries.
b. may develop in the coronary arteries which surround the heart and lead to a heart attack.
c. may develop in the arteries of the brain and lead to a stroke.
d. All of the above are correct.
e. None of the above is correct.
40. Which of the following *oils/fats* are the best for *heart* and vessel health?
a. Coconut, palm, and palm kernel; that is, superb, tropical vegetable oils which are also cheap.
b. Hazelnut, avocado, peanut, olive and canola oils which are high in mono-unsaturated fat.
c. Organic butter from a dairy animal which has ingested a whole grain diet without pesticides.
d. Animal fats including saturated fats obtained from the marble of a T-bone steak.
e. Crisco

** Please look over your test to make sure that you've answered each question. When you're absolutely certain that you're finished, place this test face down in a pile on the table at the front of the room. Place your UO Score forms/scantrons in a unique pile nearby, again facing down. Thanks for being quiet as you're leaving so that the concentration of others is not disrupted. Remember that we have a lecture on Thursday, but no labs as we're taking a break due to midterms. Thanks sincerely. ☺

Ariel, Dave, Melissa, Holly & Pat

-I:

-II:

-Total:

Midterm Score:

BI 358, FUN QUIZ #2 ☺...I ❤ GI Medical Physiology & Nutrition Forever!

1. Draw a simple sketch to illustrate the gastrointestinal (GI/gut) doughnut analogy. Label the GI lumen (+1) and body (+1). Add an accessory organ of digestion to your diagram (+1), and note specifically the orientation of this organ (+1) relative to the GI lumen and body.
See Slide 30, Lecture 4.
 - +1 Lumen label for doughnut hole.
 - +1 Body label for doughnut dough/body.
 - +1 Accessory organ within body or dough.
 - +1 Accessory organ duct connected to lumen.

[NB: +0.5 total for reasonable attempt at diagram with labels, but incorrect details.]
 2. What is hydrolysis? (+1) What molecules are needed for hydrolysis of digestion to take place? (+3)
See Slides 10 & 12, Lecture 5.
 - +1 adding (elements of) water/H₂O to (chemical bonds to) split apart/dissolve
 - +1 energy nutrients (+0.5 for specific eg only, ie, 1 or 2 of carbohydrate, fat, protein)
 - +1 enzyme/biological catalyst (specific to energy nutrient)
 - +1 water/H₂O
 3. How is it that the stomach itself contains smooth muscle protein layers, yet it secretes a proteolytic/ protein-digesting enzyme and hydrochloric acid. Provide 2 reasons why the stomach does not get enzymatically digested? (+4)
See Slide 22-25, Lecture 5 + notes from chalkboard, Lecture 4.
 - +2 inactive precursor/zymogen release/inactive pepsinogen turned on or converted to active pepsin by hydrochloric acid well into lumen
 - +2 mucus layer protects the gut from digestion and excoriation/corrosion
 4. According to the new US guidelines published in 2011 (ChooseMyPlate.gov), what % of daily grain intake should be whole grains? (+1) Give an example of a 1st ingredient listed within a bread product that indicates a whole-grain product? (+1) What types of vegetables should you emphasize? (+2) See Slides 60-61, Lecture 5
 - +1 50% or more OR ½ or more OR Make half your grains whole OR @ least 3 ounces...
 - +1 whole wheat, cracked wheat, sprouted wheat...
 - +2 For any two of: dark green or leafy green, red, orange, beans, peas, starchy, cruciferous, or specific eg: spinach, kale, broccoli, green beans, carrots & sweet potatoes.
 5. Why do the new US and American Heart Association guidelines suggest eating fish twice per week? (+2) List at least one specific fish that should be avoided or consumed minimally. (+1) Why shun this fish? (+1)
 - +2 for any one of: high source of protein & low source of [saturated] fat, contains Ω-3 fats which benefit heart, contains Ω-3s which decrease arrhythmias/irregular heart beats, ↓ triglycerides/fats in blood, ↓ blood pressure (slightly), ↓ atherosclerotic plaque formation, contains DHA & EPA (esp. deep cold-water) which reduce inflammation, ↓ age-related macular degeneration.
 - +1 for any one of: KISSTT, king mackerel, ice fish, sharks, skates, tile fish, tuna OR older, larger predatory fish or marine mammals
 - +1 mercury [content]. See Slides 6, 19-24, Lecture 6 and <http://www.aha.org>
- BONUS: What is ghrelin & what does it do? (+1) See G&H pp 845-9; Slides 3-6, Lecture 5
- +1 for any of: a stomach hormone that increases feeding, an orexigenic hormone, a hormone released (by cells of fundus of) stomach (also released to small extent by small intestine), a hormone released in response to sleep-deprivation that promotes abdominal obesity, one of the brain-gut-skin peptides, produced by hypothalamus (arcuate nucleus), counterbalance hormone to leptin, hunger hormone, hormone involved in memory, hormone produced by fetal lungs,...



BI 358, FUN QUIZ #3

- 1. Pathogens and parasites cause < 2% of deaths in modern, industrialized countries, yet 70-80% of deaths in less developed countries. Provide two reasons for this striking difference. (+4)**
+2 each for any two of: poor sanitation, contaminated water supply, contaminated food supply, malnutrition, existing infections, patchy inadequately-funded vaccinations, AIDS superimposed on all of these. May be others in unique words.
- 2. What are the two primary functions of the immune system? [According to Dr. Kraig.] (+4)**
+2 recognize self from non-self
+2 remember it
Alt. +2 for any of: acts as protective barrier/prevents entrance of pathogens, recognizes pathogens, detects microbes, communicates to other parts of the immune network, recruit coordinated multi-pronged attack, suppress it (attack), destroys/neutralizes pathogens/combat toxic agents & infections, paves way for tissue repair, ...
- 3. Draw a rough sketch of an antibody molecule. Be sure to include major parts (+2). Provide an immunoglobulin class (+1) & briefly note a unique feature of the class you've picked(+1).**
+1 Y-shaped molecule
+1 noting antigen binding ends/tips of Y or Fc & Fab or constant & variable regions
+1 providing 1 of Ig classes G, A, M, E, or D
+1 general function G = good released in 2^0 response; A = secretory, guards orifices, secreted in breast milk, dimer, weighs down pathogens to carry out GI tract, important in passive immunity mother to child; M = pentamer, macroglobulin, released in 1^0 response, important in initial precipitation/ agglutination; E = monomer attached to mast cells, important in allergic reactions, D = dunno! dumb!, functions largely unknown. Alt. +1 see G&H.
- 4. Identify and list the general functions of three major types of T-cells. (+3) What do B-cells do when they are signaled by T-cell lymphokines/interleukins? (+1)** NB: +½ for each ID, +½ for general function
+1 T-helper/T-/CD-4 cells, commander-in-chief of immune system/activate leukocytes
+1 Suppressor T-cells, prevent run-away immune reaction/inhibit leukocytes
+1 Cytotoxic T-cells, kill infected body cells/cancer cells
+1 B-cells become plasma cells and produce anti-bodies (either of these fine)
- 5. Provide two ways that allergies can be treated. [Remember Dr. Kraig's 3-legged stool!] (+4)**
+2 ea for any two of: avoidance (of allergens, e.g., avoid cat/cat dander, avoid outdoors during high pollen counts), medications, inhalants, eyedrops, allergy shots/high-dose immunotherapy, air filters, encasements (e.g., plastic covers for pillows reduce dust mites, masks decrease pollen exposure),...several options here.

BONUS: Coombs & Gell, Type IV, cell-mediated hypersensitivity reaction to poison oak.
Alt. Type IV delayed-hypersensitivity reaction.