

Biochemistry 694:301  
Final Exam, Deis  
Mon., May 8, 2006

Name \_\_\_\_\_

Row Letter \_\_\_\_ Seat Number \_\_\_\_\_

This exam consists of two parts. Part I is multiple choice. Each of these 25 questions is worth two points. Answer the Part I questions on this sheet, below. Answer the Part II questions on the question pages.

Please use BLOCK CAPITAL letters like this --- A, B, C, D, E. Not lowercase!

- |          |           |           |
|----------|-----------|-----------|
| 1. _____ | 10. _____ | 18. _____ |
| 2. _____ | 11. _____ | 19. _____ |
| 3. _____ | 12. _____ | 20. _____ |
| 4. _____ | 13. _____ | 21. _____ |
| 5. _____ | 14. _____ | 22. _____ |
| 6. _____ | 15. _____ | 23. _____ |
| 7. _____ | 16. _____ | 24. _____ |
| 8. _____ | 17. _____ | 25. _____ |
| 9. _____ |           |           |

GRADE:

Part I Total \_\_\_\_\_

Part II:

II-1 \_\_\_\_\_

II-2 \_\_\_\_\_

II-3 \_\_\_\_\_

II-4 \_\_\_\_\_

II-5 \_\_\_\_\_

Part II Total \_\_\_\_\_

Total, I & II \_\_\_\_\_

1. The function of Carnitine is
  - A. redox cofactor
  - B. one carbon carrier
  - C. help digest meat
  - D. transport fatty acids
  - E. cleave chymotrypsinogen
  
2. Fatty acids with pre-existing "odd" double bonds require what extra enzyme(s)?
  - A. Debranching enzyme
  - B. Isomerase only
  - C. Reductase only
  - D. both Isomerase and Reductase
  - E. Transferase
  
3. Odd chain fatty acids require what unusual cofactor to metabolize Prop CoA?
  - A. PLP
  - B. THB
  - C. SAM
  - D. B-12
  - E. TPP
  
4. Complete breakdown of stearyl CoA (18:0) would yield how many high energy phosphate bonds ("ATP")?
  - A. 106
  - B. 108
  - C. 116
  - D. 122
  - E. none
  
5. Sulfanilamide blocks what?
  - A. DHFR in cancer cells
  - B. Formylation of Met
  - C. Synthesis of dTMP
  - D. Folate synth. by bacteria
  - E. UV rays, it's sunscreen
  
6. Lack of Phenylalanine Mono-oxygenase ("Phe Hydroxylase") can cause
  - A. Gout
  - B. Leukemia
  - C. Phenylketonuria
  - D. Lesch Nyhan Syndrome
  - E. none of the above
  
7. Ubiquitin is
  - A. another name for Coenzyme Q
  - B. an enzyme that breaks down proteins
  - C. a small protein marker for protein turnover
  - D. a folding chaperone
  
8. Guanine Hypoxanthine Phosphoribosyl Transferase is an enzyme from what pathway?
  - A. Pentose Phosphate
  - B. Purine Salvage
  - C. Pyrimidine de novo
  - D. Thymidine Synthesis
  - E. Amino Acid Catabolism
  
9. Which amino acid is *not* "essential" in humans?
  - A. Asparagine
  - B. Valine
  - C. Threonine
  - D. Lysine
  - E. Methionine

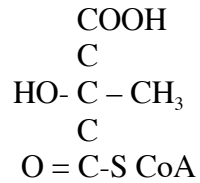
10. Thymine is produced when dUMP reacts with:  
A. CH<sub>2</sub>-THF  
B. CH<sub>3</sub>-THF  
C. S-Adenosyl Methionine  
D. Formyl THF  
E. none of the above
11. Taq DNA Pol is used in PCR because  
A. it is not processive  
B. it is inexpensive  
C. works at high temperature  
D. doesn't require a primer  
E. none of the above
12. A small plasmid of 300 base pairs is observed to have 30 right handed twists and 4 right handed "writhes" or supercoils. What is the linking number of this plasmid?  
A. 34  
B. 30  
C. 26  
D. 7.5
13. If the first half of a restriction cleavage site has the sequence TGCG then the whole sequence (on one strand) must be:  
A. TGCGTGCG  
B. TGCGACGC  
C. TGCGCGCA  
D. TGCGGCGT  
E. TGCGHIJK
14. Running 30 cycles of PCR should increase the amount of target DNA by how much?  
A. 30 times as much  
B. 1,024 times  
C. 100,000 times  
D. a million times  
E. a billion times  
F. a trillion times
15. The "trombone model" of DNA synthesis on the lagging strand is necessary because  
A. the two DNA Pol III enzymes are connected as a dimer  
B. DNA Ligase requires a loop of DNA  
C. n' and dnaB are part of the primosome  
D. DNA Pol I isn't processive enough
16. Urinary tract infections can be treated with ciprofloxacin or nalidixic acid. What process is inhibited by these compounds in the target bacteria?  
A. ligation by DNA ligase  
B. transcription by RNA Pol  
C. replication by DNA Pol's  
D. translation by ribosomes  
E. DNA Gyrase cleave/ligation
17. Thymine dimerization is mainly caused by  
A. nicotine  
B. pollutants  
C. too much studying  
D. sunlight  
E. TMP Dimerase

18. When bases like pseudouridine and ribothymidine are produced in tRNA, the process is called:  
A. post-transcriptional modification  
B. post-translational processing  
C. post-replication methylation
19. Which "factor" brings f-Met-tRNA<sub>F</sub> to the 30S initiation complex?  
A. IF-1  
B. IF-2  
C. IF-3  
D. RF-2  
E. EF-7
- 20.\* The picture to the right illustrates a tRNA bound to an amino-acyl tRNA synthetase enzyme. One of the ovals is the activation site, the other is the  
A. A site  
B. P site  
C. E site  
D. editing site  
E. DNA binding site
21. What happens when Cys-tRNA<sub>Cys</sub> is chemically modified to Ala-tRNA<sub>Cys</sub>?  
A. ribosome rejects the "wrong" aa-tRNA  
B. Alanine is used, at Alanine codons only  
C. Alanine is incorporated at Cysteine codons  
D. No effect on anything
22. In E. coli, how many amino-acyl tRNA synthetase enzymes are there?  
A. 5  
B. 10  
C. 20  
D. 36  
E. 61
23. The ribosome binding site in prokaryotic mRNA has a sequence like AGGAG which binds to a sequence near the  
A. 3' end of 5S rRNA  
B. 3' end of 23S rRNA  
C. 3' end of 16S rRNA  
D. 3' end of tRNA  
E. 3' end of mRNA
24. Erythromycin blocks which step of protein synthesis in eubacteria?  
A. Initiation  
B. Introduction  
C. Peptide Synthesis  
D. Translocation  
E. Termination
25. Two free points. Want them? A. yes B. no

PART II Answer these questions here on the question pages.

1. a. Production of Ketone Bodies comes from breakdown of HMG CoA (shown below). Draw a line where the molecule breaks apart and draw both products:

(3)



- b. Show Fatty Acid beta oxidation starting with Butyryl CoA (4:0) and ending with Acetyl CoA. Don't name enzymes but do draw structures and show cofactors.

(3)

- c. Draw S-Adenosyl Methionine, and the Schiff base formed by PLP and Alanine (as done in class). Structures are required, not reactions or processes.

(4)

2. Show the cyclic portion of the Urea Cycle. Draw all reactants and products and indicate all cofactors.

(8)

b.\* Complete the structures shown below:

N5, N10 methenyl THF

N5 Formyl THF

(2)

3. a. The electrophoresis ladder represented below runs downward, i.e. smallest molecules are at the bottom. It was generated by the Sanger Dideoxy Method. What sequence is represented on the gel (i.e. give the sequence shown, and not the opposite strand).

(5)

- b. Name five enzymes or proteins that are necessary at the replication fork AND describe the function each fulfills. Sketch the fork and indicate direction of synthesis for each strand.

(5)

4. a. Matching (all choices are prokaryotic)

(4)

1000 per second \_\_\_\_\_

a. ribosome making peptides

50 per second \_\_\_\_\_

b. DNA Pol I adding nucleotides

15 per second \_\_\_\_\_

c. RNA Pol adding nucleotides

10 per second \_\_\_\_\_

d. DNA Pol III adding nucleotides

b. How does RNA Polymerase "know" how to stop making RNA? Describe the two main mechanisms of chain termination and tell how the enzyme participates in each of them.

(6)

5. a. Diagram the Elongation process for prokaryotic translation. Be sure to name all Factors and cofactors as well as showing the ribosomes etc. as done in class. Name each step of Elongation.

(7)

b.\* Two of the most important factors in Elongation are shown below. Name the two factors, and very briefly state why they have to resemble each other in shape and size.