

Answer 9 of the following 12 questions. 5 pts. each

1. How does the 5' Cap get added?

- ① 1 subunit remove phosphate 5' end
- ② Transfer GMP to 5' end
- ③ Transfer methyl group from SAM to 2' oxygen on GMP

2. How does the Poly A tail get added?

- ① Cleavage & specificity factors form an unstable complex at AAUAAA site
- ② Additional proteins - cleavage stimulatory factors interact w/ GU region - cleavage 1 - cleavage 1
- ③ Poly A polymerase - links cleavage to Poly A addition
- ④ Cleavage
- ⑤ Protein folding

3. How does splicing occur?

- ① U1 & U2 bind - 3' & 5' splicing site
- ② U4 & U6 form a complex & associate w/ U5 & then U1-U2-mRNA complex
- ③ Complex rearranges - "catalytically active"
- ④ 1<sup>st</sup> transesterification
- ⑤ Rearrangement
- ⑥ Second Transesterification
- ⑦ Protein folding

5. How does the mRNA get transported to the ribosomes?

- ① Exportin 1 - binds Ran, GTP, & cargo
- ② Exportin interacts w/ FG repeats in nuclear pore
- ③ Ran GTP → Ran GDP, cargo released
- ④ Exportin, GDP, & Ran transported back to the nucleus

6. What are some of the cytoplasmic mechanisms of post transcriptional control?

- micro RNA
- RNA interference
- Cytoplasmic polydetylation
- Localization
- Surveillance
- Degradation

7. How are rRNAs processed?

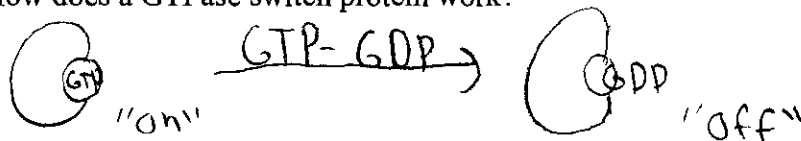
8.) How are tRNAs processed?

- ① Replacement of the U residue on the 3' end w/ CCA  
- CCA is important is amino acid charging
- ② Addition of methyl & isopentyl groups
- ③ Conversion of uridine to pseudouridine, dihydrouridine & ribothymidine

9.) What are some examples of second messengers?

- cAMP
- DAG
- cGMP
- IP<sub>3</sub>
- Ca<sup>+</sup>

10.) How does a GTPase switch protein work?



The GTPase switch is "on" when GTP is bound & "off" when GTP is not bound

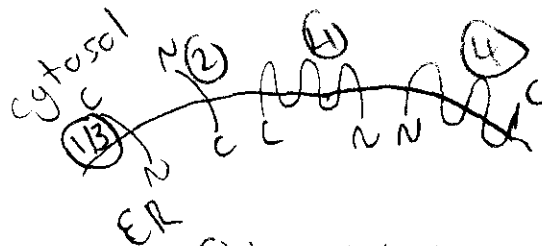
11.) What protein modifications occur in the ER?

- Proper folding & assembly
- Glycosylation
- Disulfide bond formation
- Proteolytic ~ secretory vesicles

12. What is alternative splicing?

Describe the how proteins are transported into 3 of the 5 following spaces - 5 pts. each

13. Mitochondria matrix



14.) ER membrane  
4 ways

- ① Cleaved N terminus  
N terminus in ER lumen
- ② No cleaved seq  
N terminus in cytosol
- ③ like 1 but no cleaved seq.
- ④ multipase membrane proteins

15.) Intermembrane space of the mitochondria  
2 ways

- A ① Proteins translocated by TOM/TIM channels
- ② Import channel moved
- ③ Both seq. cleaved
- B ① enter through pores

16. Thylakoid

17. Peroxisome

2 ways

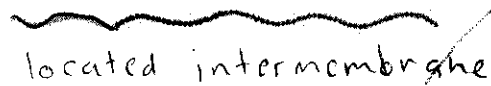
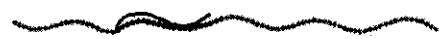
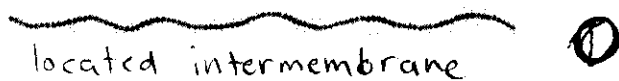
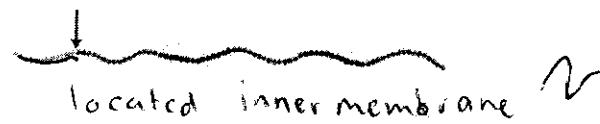
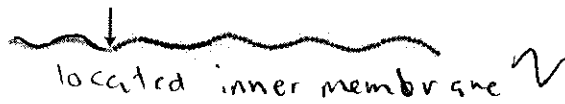
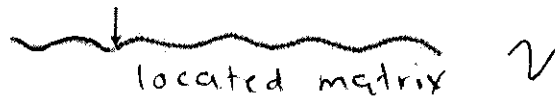
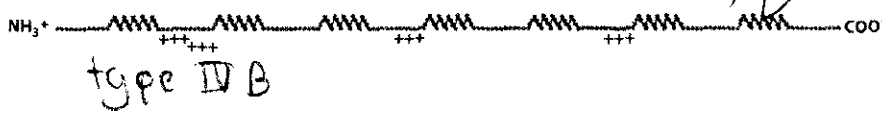
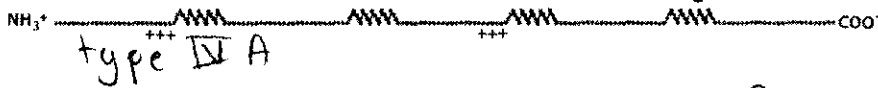
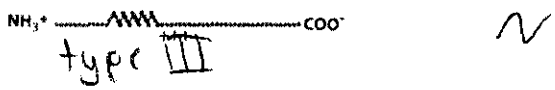
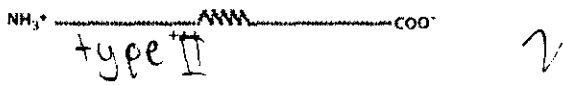
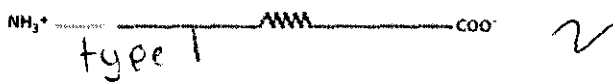
PTS-1

- ① PTS1 binds Pex5
- ② Bind receptor Pex14
- ③ Import channel open
- ④ Pex 5 + Pex 14 dissociate

PTS-2

- unknown mechanism
- involves Pex 10, 12, & 2

Identify 10 of the 12 signal sequences. 2 pts apiece.



~ stop transfer

+++ positively charged amino acids

↓ site of cleavage

hydrophobic stop transfer

- signal sequence

Essay – 20 pts.

Pick one of the following signal pathways and diagram in detail.

Cytokine receptors  
Receptor Tyrosine Kinases  
MAP kinase  
Phosphoinositides  
NF- $\kappa$ B  
Notch/Delta

Ligands: Membrane bound Delta or Serrate Proteins  
Receptors: Extracellular subunit of Notch receptor  
noncovalently associated with transmembrane-  
cytosolic subunit  
Signal Transduction: Intramembrane proteolytic cleavage  
of receptor transmembrane domain w/  
release of a cytosolic segment that functions  
as a co-activator for nuclear transcription  
factors

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