Molecular Biology

Biol 480

Topics List

Exam 4

11-8-2014

Exam covers material from Lectures 28-37

Text chapters 14 (small amount) 15, 16, 17 + all material handed out in class. This section of material included more stuff you were asked to study independently—Wikipedia references, figures etc. Most lectures pose some questions---those are always good to study.

**Topics**

**(Chapter 14**)

* Translation and protein folding
* Role of chaperone proteins---example heat shock proteins
* Translation of proteins in ER---N-terminal signal sequence
* Examples of misfolding in proteins

**Chapter 15—Mutation**

Relating genes to proteins through mutation

Thinking of mutations in the context of the central dogma

Classifications of mutations

 Somatic

 Germline

 Autosomal

 Sex-linked

 Dominant

 Recessive

 Explaining dominant and recessive in molecular terms

 Point mutations

 Silent

 Missense

 Nonsense

 Transitions, transversions

 Frameshifts

 Gain and loss of function. Explain at the molecular level

Causes of mutations

 Mistakes in replication

 Changes in nucleotides (usually bases)—several examples

Induced vs. Spontaneous mutations

Normal mutation rates

Mutagens

 Inducing mutations to study something

**Chapter 16—prokaryotic gene regulation**

Basic definition of constitutive vs. regulated gene expression

Reasons for gene regulation in prokaryotes

Catabolic systems

Anabolic systems

Inducers

Repressors

Positive regulation

Negative regulation

Lac operon---know it inside and out!

Cis and trans elements

Know experiments of Jacob and Monod

Know Lac operon mutant designations—understand ways of identifying types of mutants

Trp operon---how is it similar and different from Lac operon

Basics of regulation

Attenuation---just the basic description

Arabinose operon

How is it similar to and different from lac operon

Understand regulation and apply to pGLO regulation

What are reporter genes?

**Chapter 17—eukaryotic gene regulation**

We started with yeast—why?

Why do eukaryotes regulate gene expression (similarities and differences to prokaryotes)

Steps from DNA to active protein---all can serve as regulation points

Review cis and trans elements and how they are identified

Review basics of eukaryotic gene promoter

Role of epigenetics in transcription regulation

 Histone modification

 DNA methylation

Gal gene regulation in yeast

Gene regulation in development---different types of stem cells---how gene regulation drives differentiation

MyoD—transcription regulator in muscle differentiation

Post transcriptional regulation

 Alternative splicing—we discussed two cool examples in *Drosophila*

 RNAi

 Use of miRNAs

 Regulating mRNA stability (mechanisms, examples, tubulin, transferrin receptor)

 Translation control

 Iron metabolism genes example (ferritin)

 Post-translation

 Post=translation modifications

 Protein stability regulation—p53 protein

 Pre-transcription control ---What?!!

 Example---antibody encoding genes.

The End---that’s enough!!!