Lecture 37: Transcriptional Regulation

1. Please identify the TRUE statements associated with cis-factors that regulate transcription (choose all that apply)
    a. Cis-factors are proteins which bind regulatory DNA sequences
    b. Promoters and repressors are both examples of cis-factors
    c. Enhancers and silencers are both examples of cis-factors
    d. Silencer elements are cis-factors that bind to regions of the DNA known as repressors.

2. Helix-turn-helix, B-zip, zinc-finger domains are all examples of *{DNA-binding domains **(DBD)**/effector domains (ED)}*

3. Effector Domains participate in gene activation or repression by:
    a. Recruiting other proteins that stabilize or inhibit the binding of the polymerase to the promoter
    b. Interacting with polymerase itself to stabilize or inhibit the polymerase on the promoter
    c. Interacting with mediator proteins that bridge to the polymerase
    d. All the above
    e. a. and b. only.

4. In transcription factors that have a helix-turn-helix domain, both helices interact with bases in the major groove to make stable associations with the DNA True ***False***

5. Which of the following have helix turn helix domains?
    a. CAP
    b. The lac repressor
    c. The trp repressor
    d. Homeodomain proteins
    e. Estrogen receptor
    f. All the above
    g. Only a. through d.
    h. Only a., b., and c.

6. Of the transcription factors in Q5, which are examples of eukaryotic factors?__d and e

7. Many prokaryotic genes organized into transcription units by function – those genes involved in the same pathway are regulated by one promoter region. Such polygenic units are called __operons_____

8. In the repressor-inducer complex involved in the regulation of this transcriptional unit, what are the identities of the repressor and the inducer?
    a. Repressor:_____lac repressor_____
    b. This protein is transcribed from what gene?__*lac I*____
    c. Inducer:_____Allolactose_____
    d. This inducer is produced from what disaccharide?___Lactose_____
    e. When the repressor is bound by the inducer, the repressor's affinity for DNA is {increased/***decreased***}.

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9. What effect does the presence of the following carbohydrates in the growing medium have on the regulation of transcription of the *lac z, lac y and lac a* genes.
    a. Lactose forms the inducer allolatose, which through binding the repressor and decreasing its affinity for DNA, allows transcription of the lac operon.
    b. Glucose_When glucose is present in the medium, the CAP protein will not be bound to activate the lac operon above basal levels when lactose is present.

(You should be ready to interpret whether these genes in the lac transcriptional unit will be activated or repressed when given specific scenarios.)

10. Where does the repressor bind in this transcriptional unit?
    a. Promoter
    b. Regulator
    c. Operator
    d. Enhancer

11. When the estrogen receptor, a cell surface protein, binds estrogen, it is endocytosed and then the receptor travels to the nucleus to bind DNA. True ***False***

12. The estrogen receptor affects transcription through directly binding to the polymerase at the site of transcription. True ***False***

Please be prepared to state how the drug Tamoxifen works.