

Conj 537 lecture 1

Thursday, November 5, 2009.

3:20 to 4:40, FHCRC Day Campus, Weintraub Bldg, room. B-072/074

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(my lecture handouts, slides and homework can be found here)

Transcription initiation and activation in prokaryotes

1. Protein-DNA interactions and specificity in promoter recognition

2. Structure of RNA polymerase, holoenzyme, and holoenzyme-DNA complex. Models for closed and open polymerase complexes. Mechanisms of elongation by RNA polymerases.

3. Positive and Negative Gene Regulation and cooperative protein-DNA interactions:

Multiple mechanisms of activation by Catabolite activator protein (CAP)

A different mechanism for activation by lambda C1

Specificity in activation mechanisms?

Suggested Readings

Genes and Signals. Ptashne, M., and Gann, A. (2002). Cold Spring Harbor Laboratory Press. CSHL, NY. (chapter 1). **[on reserve in FHCRC library]**

Mechanisms in transcriptional regulation. Courey A.J. (2008). Blackwell publishing, Malden MA. (chapters 1-2, 4 (4.1-4.2)) **[on reserve in FHCRC library]**

FOR NEXT LECTURE, READ THE FOLLOWING PAPER AND BE PREPARED TO DISCUSS:

Struhl, K. (2007). Transcriptional noise and the fidelity of initiation by RNA polymerase II. Nat Struct Mol Biol. 14:103-105.

Be prepared to answer the discussion points listed on the following page:

1. What is the main hypothesis of the commentary?
2. What is the classic view of the transcriptional landscape? How is the biological fidelity of an event measured? What is Struhl's estimate of amount of transcription occurring on classically defined genes?
3. Explain how Struhl estimated the number of Pol II molecules engaged in production of mRNA? Do you have any comments or questions about his assumptions used for the estimate?
4. Is the estimate supported by any experimental data? If so, what is the data?
5. How does Struhl estimate the fidelity of the transcription process? Do you agree with his assumptions?
6. Struhl makes a point that it is important to determine the biological significance of this transcription. What are some of the criteria that can be used to determine this and the advantages/disadvantages of these methods?
7. By what mechanism could the act of transcription be biologically important rather than any specific RNA product being made?