**Regulation of Gene Expression in Eukaryotes**

In all organisms, certain genes are expressed at any given time while other genes are not. Both prokaryotes and eukaryotes regulate gene expression at the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ stage. However, the greater \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of eukaryotic cells makes it possible for gene expression to be regulated at many other stages as well.

**There are multiple points where a Eukaryotic gene expression can be regulated**



*Let’s talk about a couple of them…*

1. **Regulation of Chromatin Structure**

*The packaging of DNA:*

Histones

* a small protein with an overall **\_\_\_\_\_\_\_\_\_\_**charge that bind **\_\_\_\_\_\_\_\_\_\_**DNA in the chromatin structure

Nucleosomes

* a bead like unit of DNA, consists of DNA wrapped around **\_\_\_\_\_\_\_\_\_\_\_.**

DNA methylation

The addition of **\_\_\_\_\_\_\_\_\_\_\_\_**groups to DNA which causes DNA to be more **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and *reduces* gene expression

Histone Acetylation

Acetyl groups are added to amino acids of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**and makes the chromatin *less* tightly packed and **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**transcription.

**2. Regulation of Transcription Initiation**

DNA control elements that bind transcription factors are involved in regulation.  (page 359 Campbell)



**Regulated Transcription**

Transcription Factors:

* a regulatory proteins that bind to\_\_\_\_\_\_\_\_\_\_ and affects transcription

Transcription Initiation Complex:

* the completed assembly of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_bound to a promoter

Enhancer Regions:

* DNA sequence\_\_\_\_\_\_\_\_\_\_ from the gene, contains control elements

Activators:

* bind to certain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to form initiation complex



**3.  Post Transcriptional Regulation**

Occurs after transcription and just after translation, when proteins are processed.

example:  *micro* RNA (*miRNA*) and *small interfering* RNA (*siRNA*) can bind to \_\_\_\_\_\_\_\_\_and degrade the mRNA or bind to mRNA and block its \_\_\_\_\_\_\_\_\_\_\_

**Protein Degradation**

A**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, an enormous protein complex shaped like a trash can, chops up unneeded proteins.

**3.  Post Transcriptional Regulation**

**Epigenetic inheritance**

These chromatin modifications do not entail a change in the DNA **\_\_\_\_\_\_\_\_\_\_\_** however, they may be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**in future generations of cells.  This is called epigenetic inheritance.  The DNA sequence is not changed, just its **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.