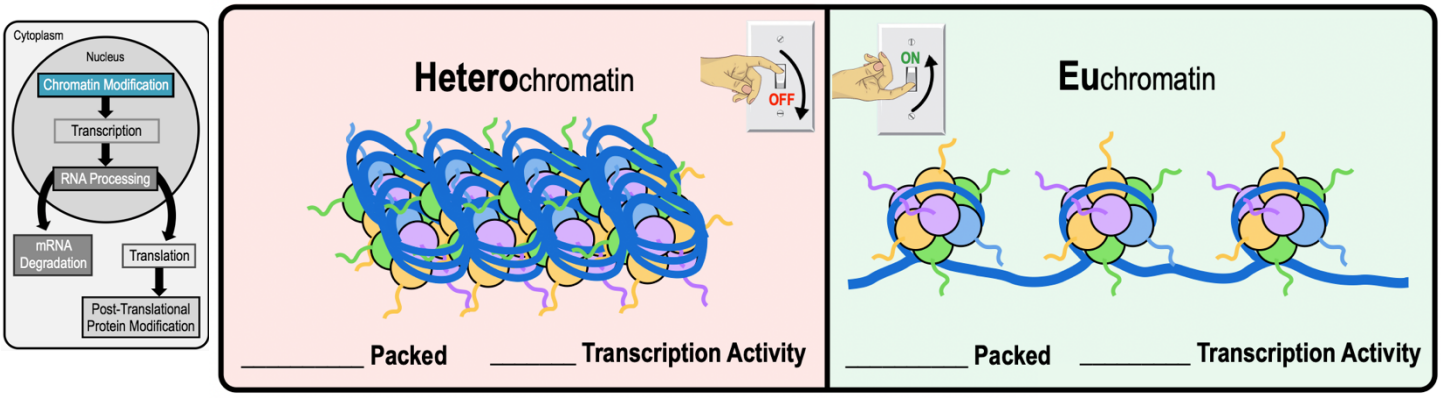
CONCEPT: EUKARYOTIC CHROMATIN MODIFICATIONS

●Eukaryotes can regulate gene expression by modifying the structure of their _____.

●*Recall: Chromatin* are _____ packed/coiled *nucleosomes* (DNA wrapped around units of ___ histone proteins).

- □ Modifications to _____ *proteins* or _____ sequence are made to control transcription.
- □ _____**chromatin:** *condensed* region of genome with *low* transcriptional activity.
- □ _____**chromatin:** *lightly packed* region of genome with *high* transcriptional activity & histone/DNA modifications.

EXAMPLE: Heterochromatin vs. Euchromatin.

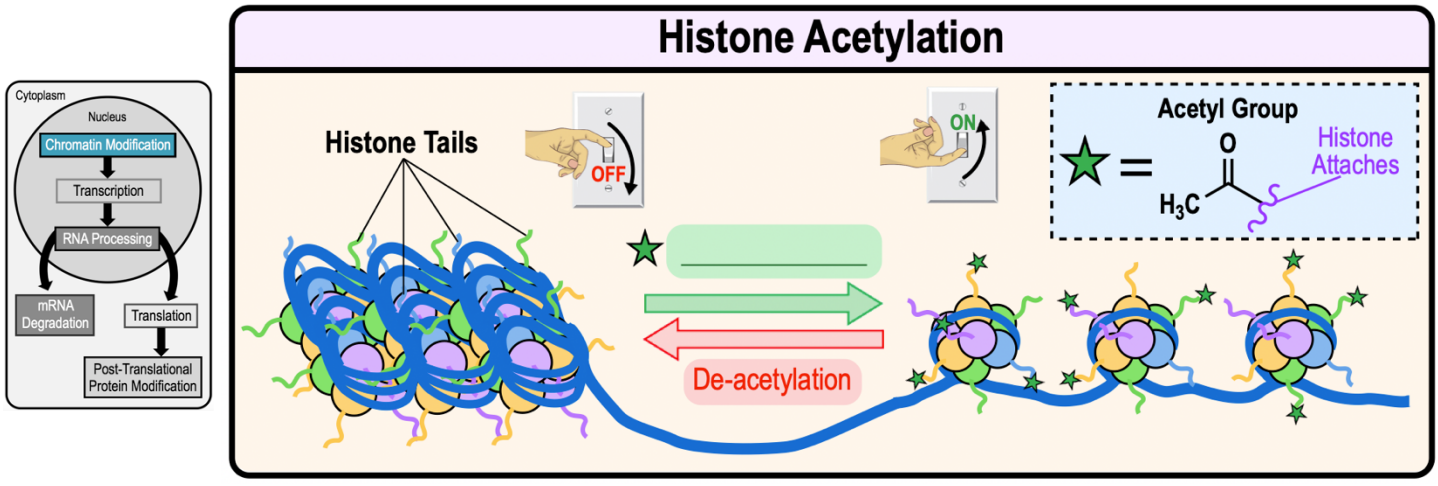


Histone Acetylation

●*Histone proteins* contain long polypeptide "_____" that can be chemically modified by cellular enzymes.

- □ The most common modification is _____: addition of an *acetyl group*.
- □ *Histone acetylation* _____ the chromatin structure, making the DNA accessible to *RNA polymerase*.

EXAMPLE: Histone Acetylation Loosens Chromatin Structure, Forming Euchromatin.



●Removal of acetyl groups (**de-acetylation**) results in _____ packing of the chromatin structure (heterochromatin).

CONCEPT: EUKARYOTIC CHROMATIN MODIFICATIONS

PRACTICE: Histone acetylation is associated with:

a) Activate transcription in that region, RNA Polymerase can easily interact with DNA.

b) Repressed transcription in that region, RNA Polymerase cannot easily interact with DNA.

c) Tightly-packed nucleosomes.

d) No change in chromatin structure or transcription rates.

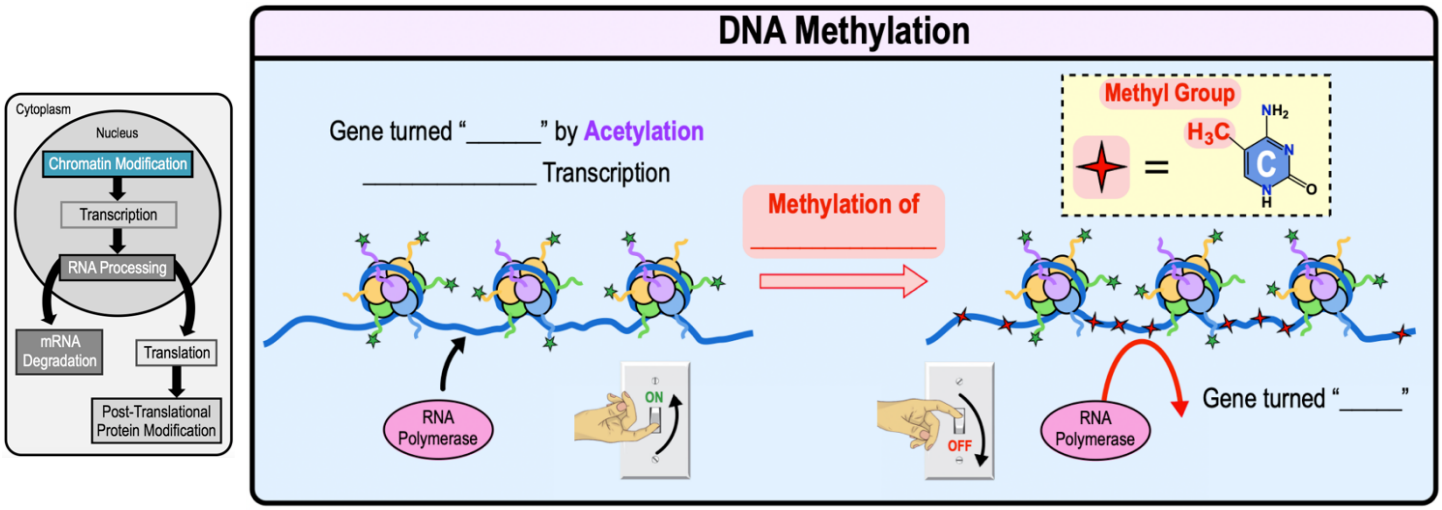
DNA Methylation

●In addition to histone modifications, the _____ sequence can also be chemically modified to regulate transcription.

□ Most common DNA modification is _____: addition of a *methyl group* to Cytosine (C) residues.

●*DNA Methylation* _____ transcription of by *blocking* RNA polymerase access to the promoter.

EXAMPLE: Methylation of Cytosine Nucleotides Blocks Transcription.



PRACTICE: Transcriptional repression by methylation of DNA involves the methylation of which nucleotide?

a) Adenine. b) Uracil. c) Cytosine. d) Thymine. e) Guanine.

PRACTICE: Which of the following causes transcription to be increased for a specific gene?

a) Histones in that region are deacetylated.

b) DNA is methylated in the regulatory region of the gene.

c) Histones in that region are acetylated.

d) The chromatin structure is tightly packed.

e) B and D.