CONCEPT: EUKARYOTIC TRANSCRIPTIONAL CONTROL

●Eukaryotes can also regulate gene expression by utilizing _____-binding proteins that bind to regulatory regions in a gene.

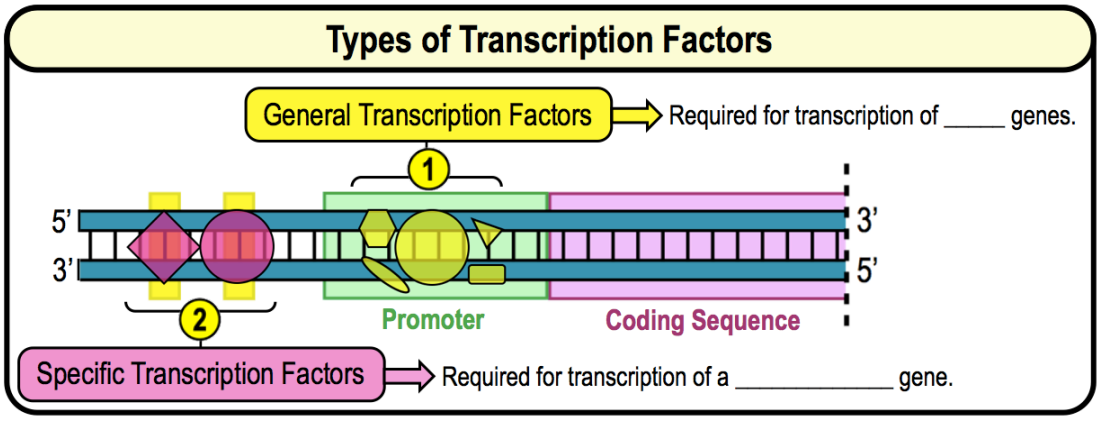
Introduction to Transcription Factors

●*Recall*: transcription initiation in Eukaryotes requires a complex of *transcription factors* bound to the promoter sequence.

●_____ **Factors:** proteins that bind to specific DNA sequences & regulate transcription initiation.

●There are _____ types of transcription factors in Eukaryotes:

1. _____ **transcription factors**
2. _____ **transcription factors**



General Transcription Factors

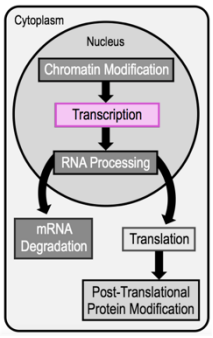
●*Recall:* _____ *transcription factors:* required for the transcription of *every* gene in the genome.

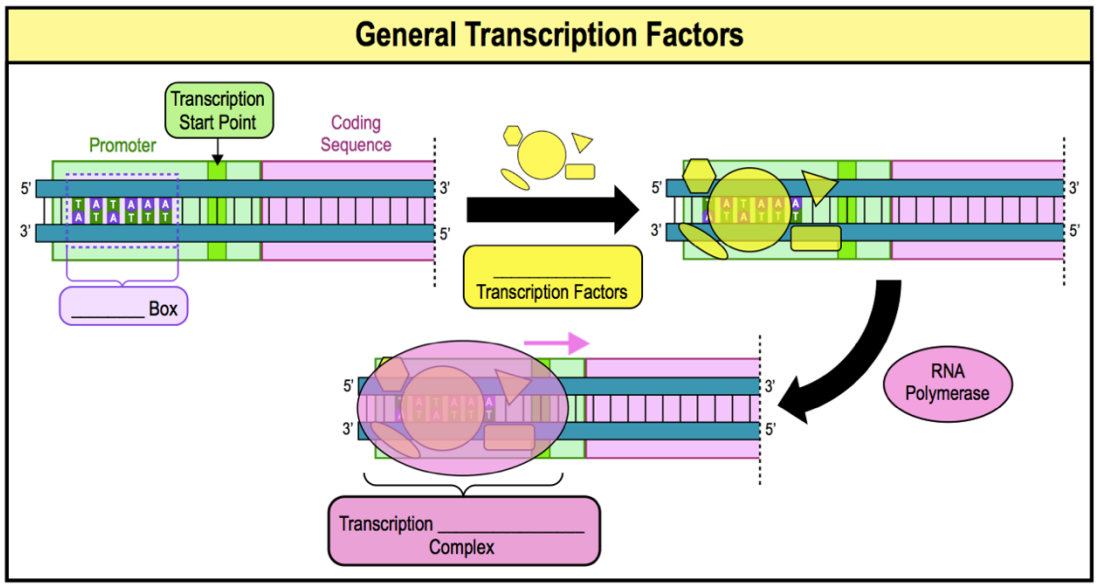
- □ Recruits RNA polymerase to the _____ region of a gene

●**Transcription Initiation complex (_____)**: the entire complex of all *general transcription factors* & *RNA polymerase*.

- □ _____ **Box:** sequence of A T repeats located in the promoter that recruits the *TIC*.

EXAMPLE: General transcription factors bind the TATA box in the promoter & recruit RNA polymerase for transcription.





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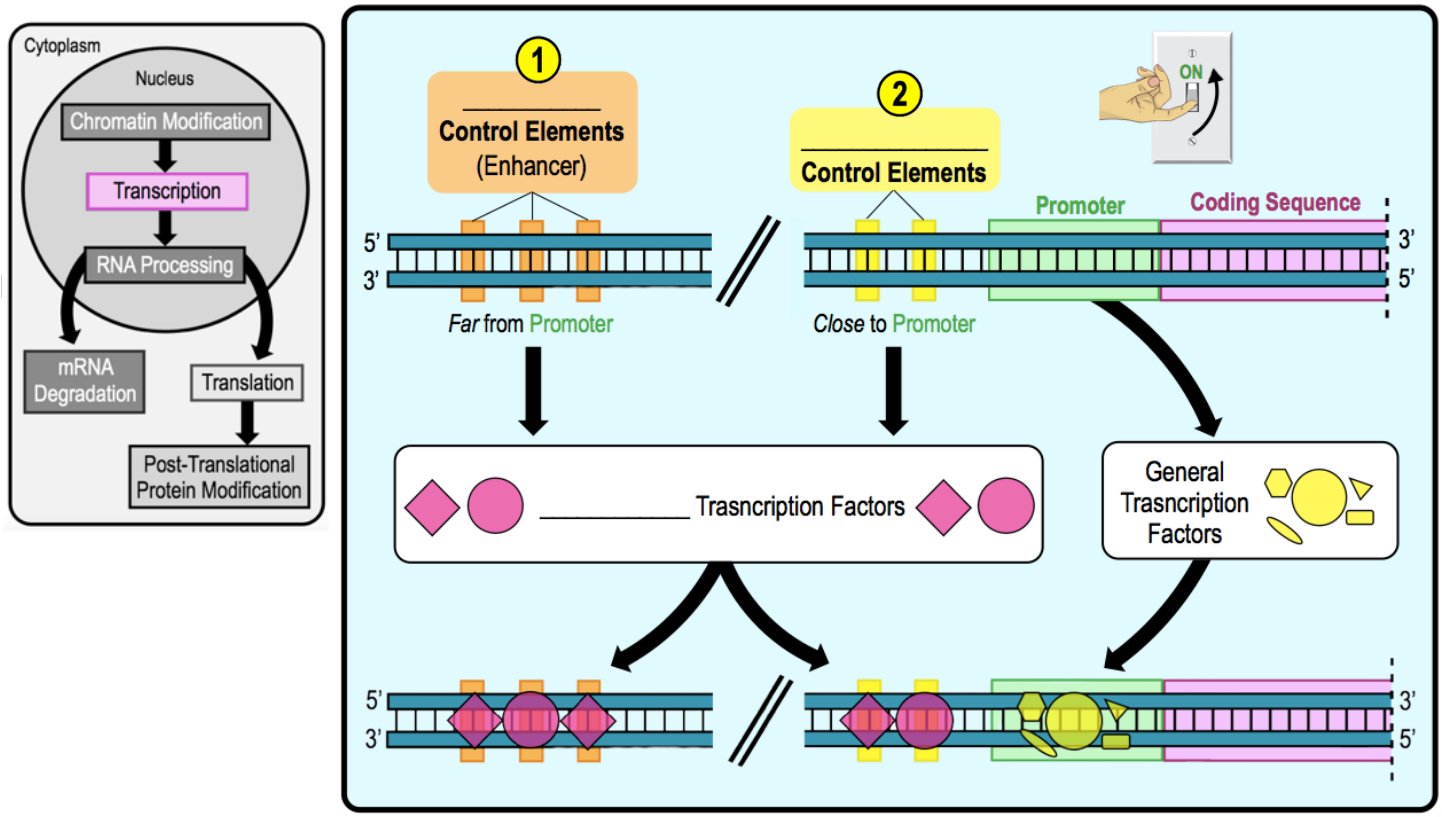
Specific Transcription Factors

- *Recall:* _____ *transcription factors* are only required for increasing the transcription of a *specific* gene.
  - □ _____ **Elements:** regions of noncoding DNA where *specific* transcription factors bind.
    - (1) ***Distal* Control Elements:** located _____ (distant) from the promoter sequence.
      - □ _____**:** groups of *distal* control elements.
    - (2) ***Proximal* Control Elements:** located _____ to the promoter sequence.

EXAMPLE: Specific Transcription Factors can bind Distal or Proximal Control Elements.



PRACTICE: Regulatory segments of DNA that function to increase transcription levels in eukaryotes are called:

a) promoters.
b) silencers.
c) enhancers.
d) transcriptional start sites.
e) activators.

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PRACTICE: Which of the following statements correctly describes the primary difference between enhancers and proximal control elements?

a) Enhancers are transcription factors; proximal control elements are DNA sequences.
b) Enhancers increase transcription of specific genes; proximal control elements inhibit transcription of specific genes.
c) Enhancers are located thousands of nucleotides away from the promoter; proximal control elements are close to the promoter.
d) Enhancers are DNA sequences; proximal control elements are transcription factors.

PRACTICE: Which of the following is NOT true regarding the differences of transcription in eukaryotes and prokaryotes?

a) Eukaryotes use multiple transcription factors to help initiate transcription.
b) Most eukaryotes have regulatory sites that are close to their promoters.
c) Most prokaryotes transcribe multiple genes under the regulation of a single operon.
d) Prokaryotic transcription factors usually interact directly with RNA polymerase while eukaryotic transcription factors do not**.**

PRACTICE: Which of the following statements about transcription factors is **incorrect**:

a) The transcription initiation complex is composed of RNA polymerase, general and specific transcription factors.
b) General transcription factors help initiate transcription of all eukaryotic genes.
c) Specific transcription factors do not bind the promoter of a gene, but to control elements associated with the gene.
d) The transcription initiation complex associates with the TATA box of the promoter to begin transcription.