Eukaryotic Transcription Regulation

In eukaryotes, cells regulate transcription and control which genes are transcribed at what times. One method of doing so is a DNA silencer region. Transcription factors can bind this region and repress transcription of adjacent DNA sequences, resulting in decreased transcription. Co-factors can also either deactivate or activate factors, depending on whether transcription needs to be increased or decreased. They do so by binding and either repressing or promoting the factors and DNA transcription. The DNA enhancer region is an area of DNA where transcription factors can bind and recruit polymerase and other transcription factors for initiation. This resulted in increased transcription of genes. In both enhancer and silencer regulation mechanisms, the location of these sequences can be far from the promoter region, often separated by several hundred thousand base pairs in the upstream or downstream direction.

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DNA Silencer Region

DNA Silencing-plug

A DNA silencer region is an area that represses DNA transcription by being antagonistic to promoter regions.

Transcription Factors bind Silencer Region

Train-scribe Flagger holding Silencer-plug

Transcription factors bind the silencer region, and these are called repressors. They reduce the ability of polymerase to bind to the DNA promoter region.

Decreased Transcription

Down-arrow on plug

The result of binding the DNA silencer region is decreased transcription.

Co-factors can deactivate factors

Crow-flagger Breaking Flag

Co-factors can bind to enzmyes, known as factors, and deactivate them when transcription isn't needed for a certain gene.

Co-factors can activate factors

Crow-flagger handing over Flag

Conversely, co-factors can activate factors also and increase transcription. Many organic co-factors are vitamins.

DNA Enhancer Region

DNA Enhancer-fuel

The DNA enhancer region is a location in direct contrast to the silencing region. It is an agonist of the promoter region and assists in polymerase binding the promoter.

Transcription Factors bind Enhancer Region

Train-scribe Flagger holding Enhancer-fuel

Transcription factors bind the enhancer region and indirectly help recruit polymerase and other transcription factors.

Increased Transcription

Up-arrow on transcribed RNA

The activated of an enhancer region results in increased transcription.

Enhancer and Silencer regions can be far from Promoter

Promoter distanced from both Train-scribes at Enhancer and Silencer Regions

Both enhancer and silencer regions can be several hundred thousand base pairs upstream or downstream from the promoter region where RNA polymerase actually binds.