Definitions-Biology

1 Histones

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Hyperaccetlation of the histones leads to unfolding of the chromatin that should facilitate the general accessibility of factors to the DNA [1].

2 Enhancers

An Enhancer is a short (20-400bp,[2]) region of DNA that can be bound with proteins to activate transcription of a gene or genes. These proteins are usually referred to as transcription factors. Enhancers are discrete DNA elements that contain specific sequence motifs with which DNA-binding proteins interact and transmit molecular signals to genes [1].

Enhancers increase transcription of genes in a manner that is independent of their orientation and distance relative to the RNA start site [1]

3 Promoters

Promoters (or core promoters) are located within ± 40 nucleotides from the RNA start site [1].

4 Insulators

5 Promoter-Enhancer Interactions

In the majority of cases , action of enhancers involves enhancer-promoter interaction through proteins bound at the enhancer and promoter, accompanied by formation of an intervening chromatin loop [2].

There are two mechanisms by which enhancer-promoter selectivity might be achieved. First, there could be specific interactions between enhancer - binding proteins and factors that interact with the promoter. Second, boundary elements (insulators) could be used to block undesired enhancer-promoter interactions [1].

How might enhancer binding proteins and their associated co-activators establish productive interaction with the promoter? One option is the DNA looping. A "facilitated tracking" mechanism for enhancer function is postulated to allow enhancer bound complex containing DNA-binding factors and co-activators "tracks" via small steps along the chromatin until it encounters the promoter, at which a stable looped structure is formed [1].

References

[1] Elizabeth M. Blackwood and James T. Kadonaga. Going the distance: A current view of enhancer action. *Science*, 281(5373):60–63, July 1998.

[2] Olga I. Kulaeva, Ekaterina V. Nizovtseva, Yury S. Polikanov, Sergei V. Ulianov, and Vasily M. Studitsky. Distant activation of transcription: Mechanisms of enhancer action. *Molecular and Cellular Biology*, 32(24):4892–4897, December 2012.