Heterochromatin & Euchromatin

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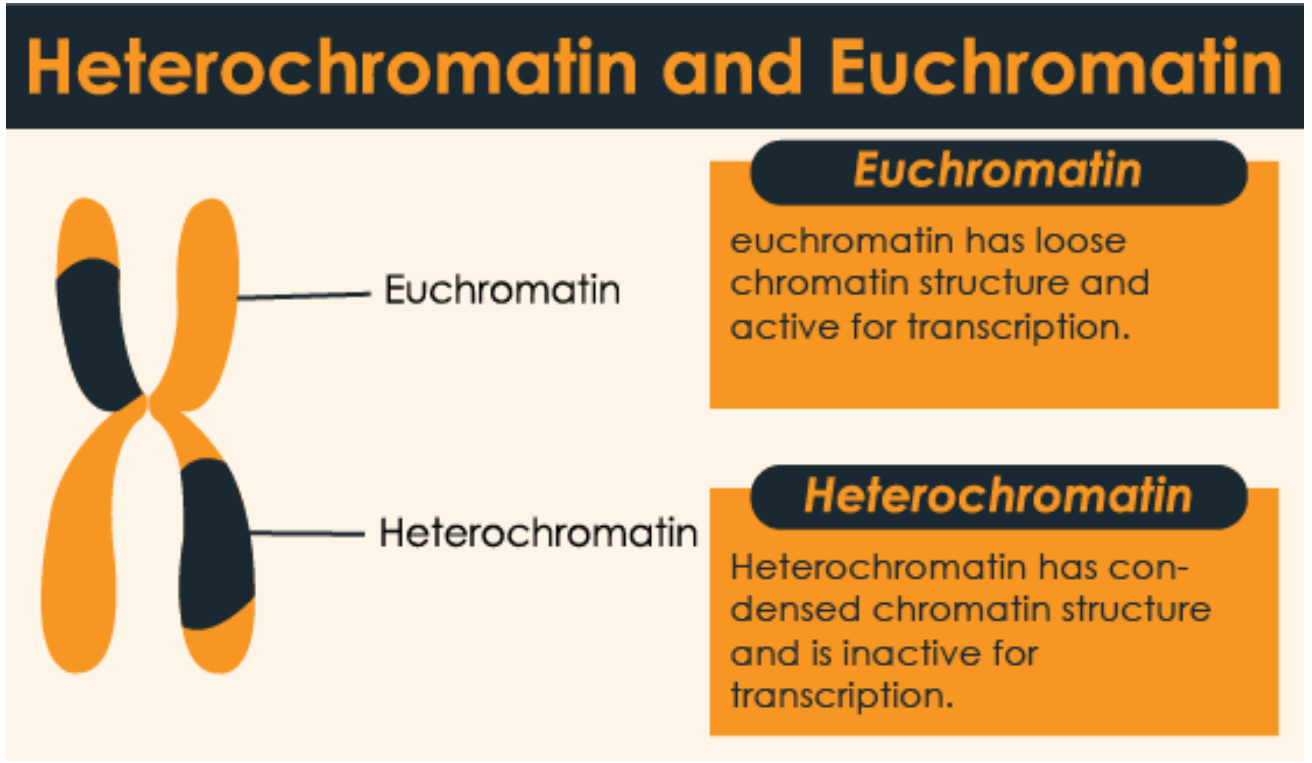
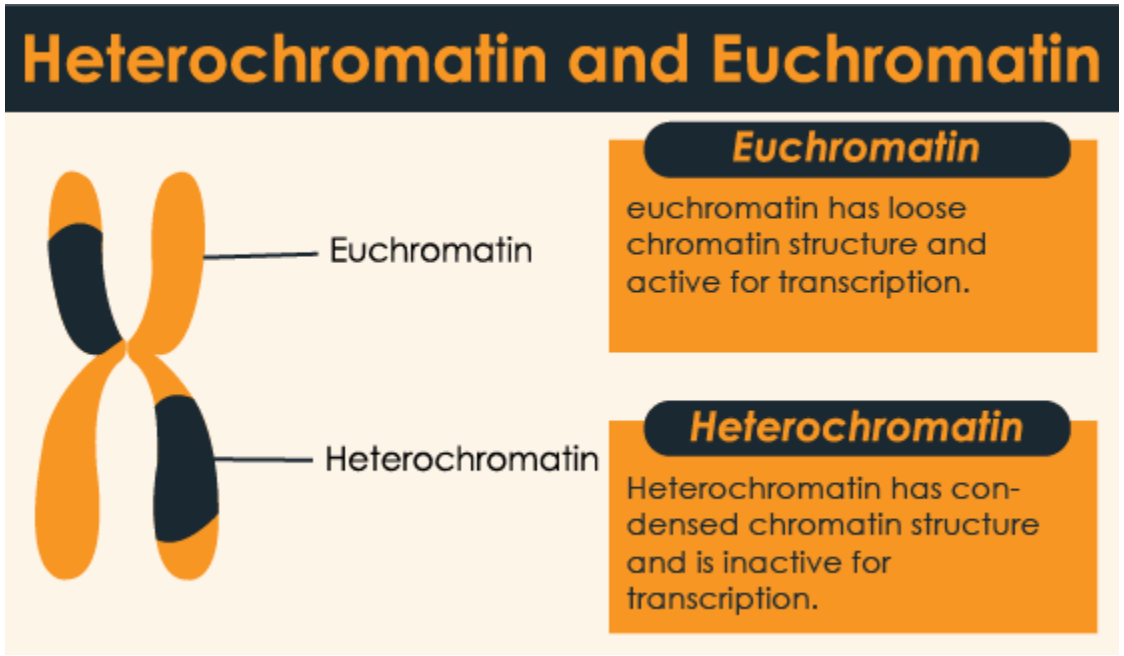


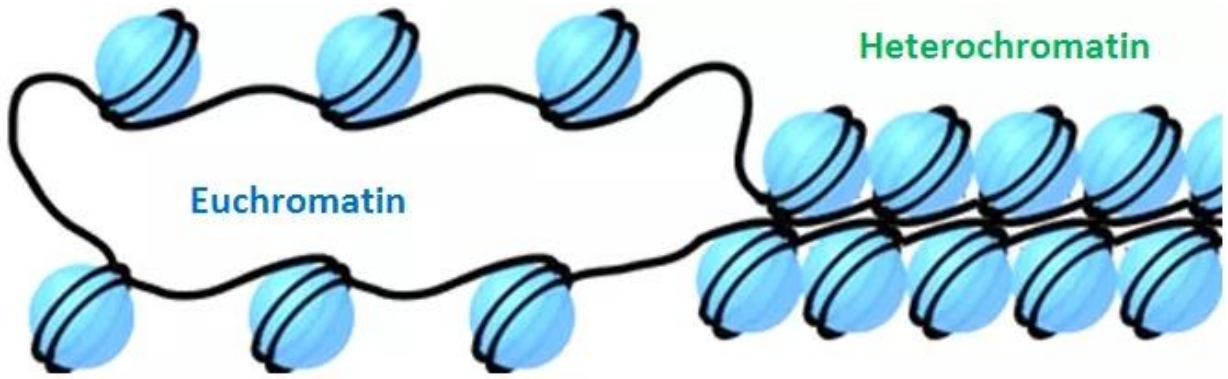
INTRODUCTION

- The term Heterochromatin and Euchromatin was coined by Emil Heitz in 1928.
- Heterochromatin and Euchromatin are the parts of the chromatin.
- DNA protein complex found in the eukaryotes.
- These were take part in the protection of DNA inside the nucleus.



1. Heterochromatin

- The regions of the chromosome that appear relatively condensed and stained deeply with DNA specific strains.
- It is tightly packed form of DNA, containing transcriptionally inactive sequences.
- This chromosome is different from euchromatin in that the genes in these chromosomes are usually inactivated and are not expressed.
- Heterochromatin is present in the nucleus towards the periphery.
- It is also not present in prokaryotic cells, indicating this form appeared later during evolution.



1. Heterochromatin

Two types of Heterochromatin

i. Constitutive heterochromatin

- It is most common type of Heterochromatin.
- This types of heterochromatin contain highly repetitive sequence of DNA called Satellite DNA, which have structural role in the chromosome.
- Constitutive heterochromatin usually packages the same sequences of DNA in all cells of the same species.
- It is usually present in telomeres and centromeres region of the chromosome.
- In humans, genes 1, 9, 16, and the Y chromosomes in men contain larger quantities of this heterochromatin.

1. Heterochromatin

ii. Facultative heterochromatin

- Facultative heterochromatin is partially or completely heterochromatin.
- Facultative heterochromatin packages genes that are usually silenced through various mechanisms.
- The best example of that is X chromosome in mammalian females.
- One of which is active or Euchromatic and another is inactive or heterochromatic or Barr body at interphase..
- The facultative chromosome is not repetitive but has the same structural components as the constitutive heterochromatin.
- The formation of facultative heterochromatin is regulated by the process of morphogenesis or differentiation.

1. Heterochromatin

- Heterochromatin has multiple functions. Some of which include gene regulation and chromosomes integrity.
- The tightly packaged DNA in heterochromatin prevents the chromosomes from various protein factors that might lead to the binding of DNA or the inaccurate destruction of chromosomes by endonucleases.
- Besides, heterochromatin also allows gene regulation and the inheritance of epigenetic markers.

2. Euchromatin

- Euchromatin is the lightly packed form of chromatin that is rich in gene concentration.
- It is often under active transcription.
- Euchromatin comprises the most active portion of the genome within the nucleus, 92% of the human genome is euchromatic.
- Under an electron microscope, it appears as an elongated 10 nm microfibril.
- The structure of euchromatin can be represented as an unfolded set of beads in a string where the beads are the nucleosomes.
- The nucleosomes contain histone proteins that coat a particular number of DNA around.

2. Euchromatin

- In euchromatin, the wrapping around by histone proteins is loose, and thus the individual DNA sequences might be accessible.
- Unlike heterochromatin, euchromatin doesn't exist in two forms.
- It only exists as constitutive euchromatin.
- Euchromatin is extremely important as it contains genes that are transcripted into RNA, which are then translated into proteins.
- The unfolded structure of DNA in euchromatin allows regulatory proteins and RNA polymerase to bind to the sequences so that the process of transcription can initiate.

2. Euchromatin

- It is possible for some genes in the euchromatin to be converted into heterochromatin when they are not to be transcribed and are no longer active.
- The transformation of euchromatin to heterochromatin acts as a method for regulating gene expression and replication.
- For this purpose, some genes like housekeeping genes are always arranged in euchromatin conformation as they have to be continuously replicated and transcribed.

Thank You