



Introdução à Biologia Celular e Molecular (aula 01)

Curso de Especialização na Área da Saúde – 2025/2026 Bases Técnicas em Vacinas e Biofármacos

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Constituição de um organismo eucarioto

- O corpo é constituído de órgãos
- Os órgãos não são homogêneos e divididos em diferentes tecidos
- Os tecidos são constituídos de células
- Há diferentes tipos de células
- As células têm vários organelas
 - Núcleo
 - Mitocôndria
 - Retículo endoplasmático
 - Lisossomo
 - Endossomo
 - Vacúolos
 - Golgi
 - etc

A célular de um eucarioto e a membrana plasmática

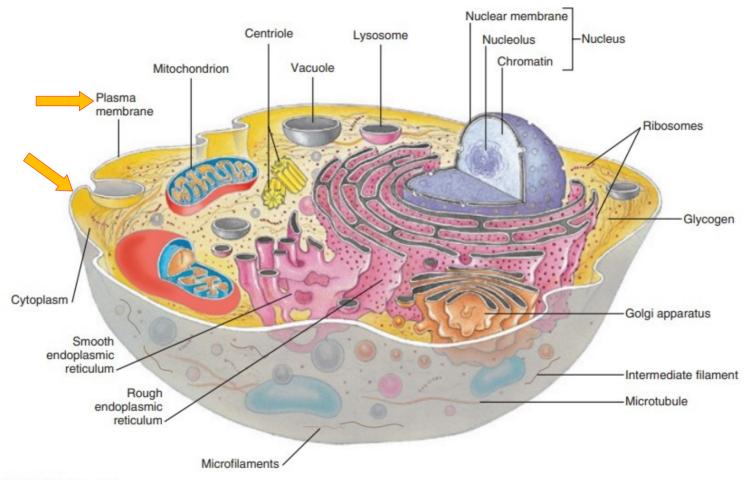
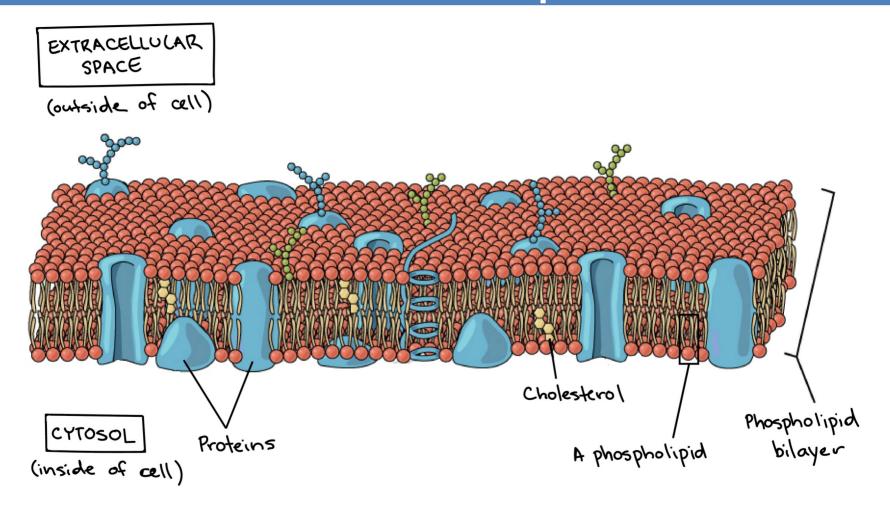


FIGURE 3-1 The cell.

Plasma membrane ~ Membrana plasmática ~ 10 nm



Vários organelas tem membrana bilipidica

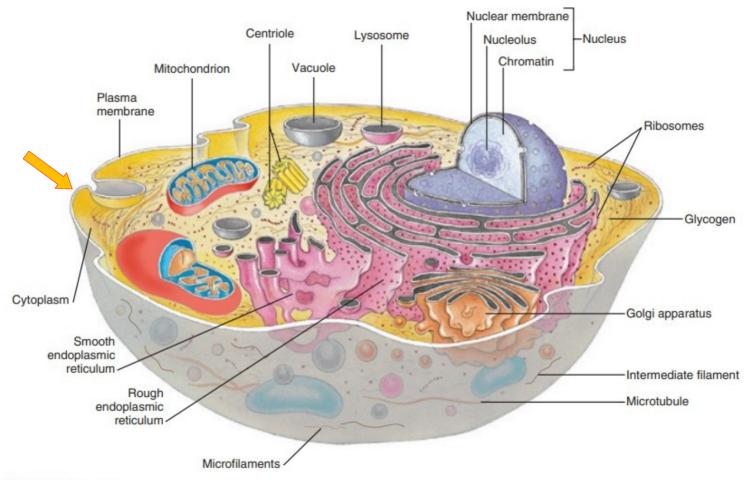


FIGURE 3-1 The cell.

Vários organelas tem membrana bilipidica

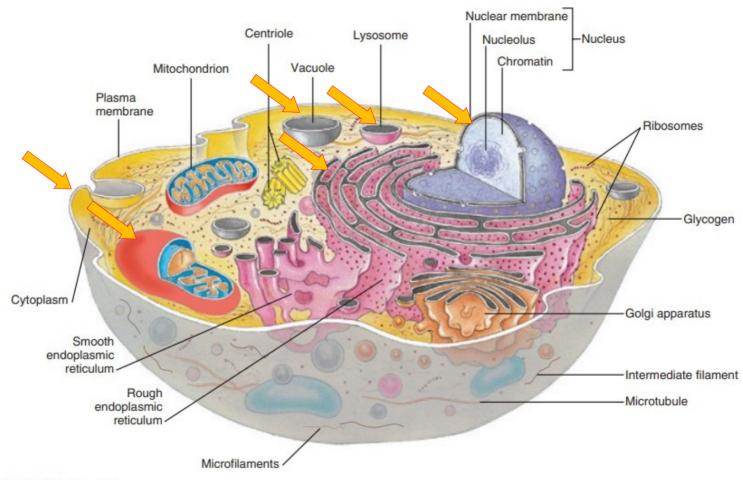
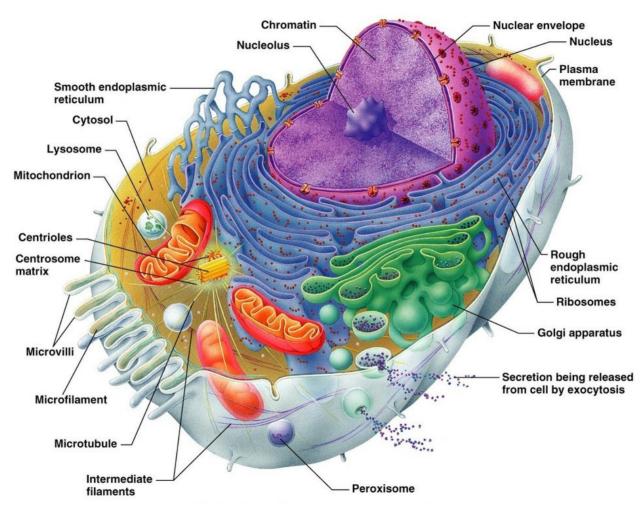
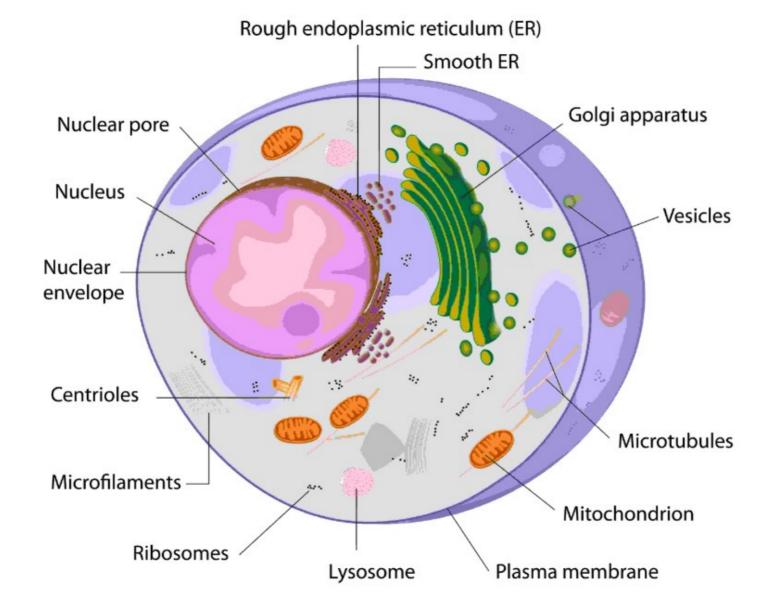


FIGURE 3-1 The cell.

A célula

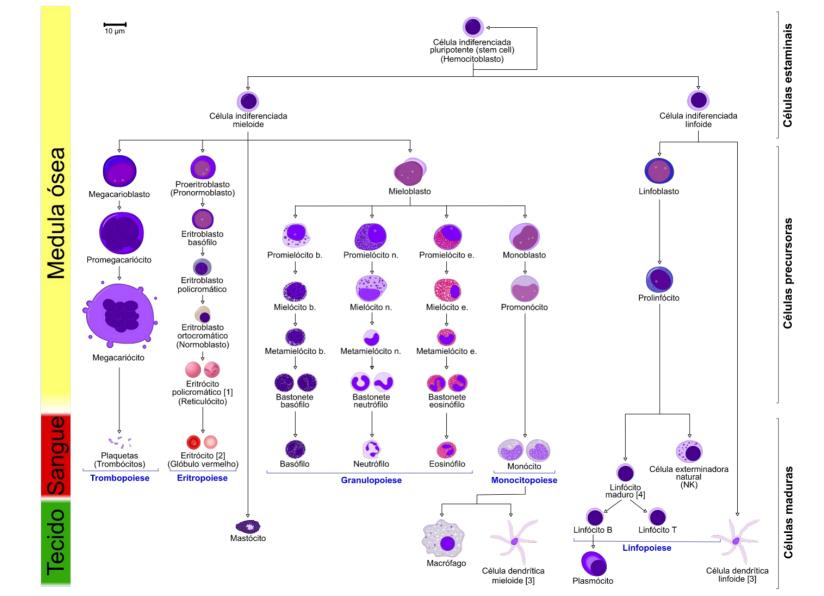


https://quizlet.com/316605229/human-cell-diagram/



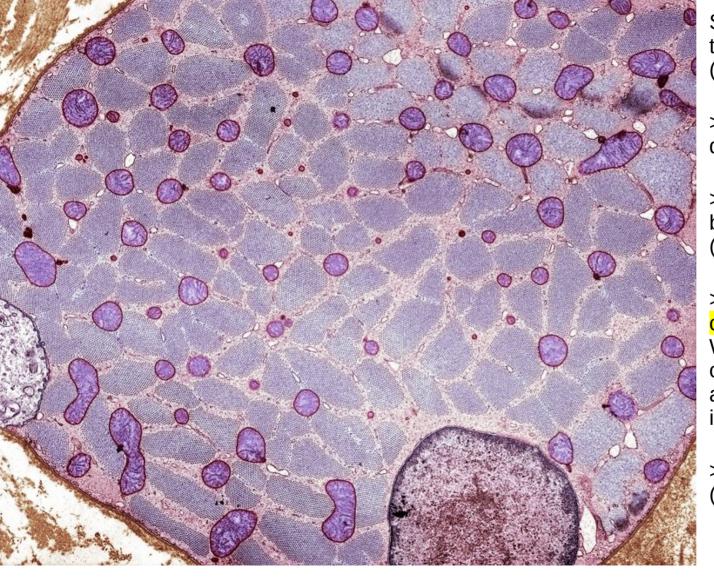
As células são entidades especializadas

Mas o cromossomo "é um só"! Como?



O que é isto???

https://www.sciencephoto.com/media/303254/view/skeletal-muscle-cell-tem



Skeletal muscle cell, coloured transmission electron micrograph (TEM).

- >> The nucleus (bottom right) is displaced to the edge of the cell
- >> by the abundant supply of bundles of contractile myofilaments (purple).
- >> Myofilaments are proteins consisting of myosin and actin. When the cell is stimulated to contract, the myofilaments interact and slide past each other, resulting in a shortening of the cell.
- >> An abundance of mitochondria (dark purple), which produce

https://www.innerbody.com/image/musc01.html



Na mitose, obviamente, ocorre a duplicação dos cromossomos. Em que fase?



Na meiose ocorre a duplicação dos cromossomos?



Quantas vezes ocorre a duplicação de material genético na mitose e na meiose?

Actively dividing eukaryote cells pass through a series of stages known collectively as the cell cycle: two gap phases (G1 and G2); an S (for synthesis) phase, in which the genetic material is duplicated; and an M phase, in which mitosis partitions the genetic material and the cell divides.

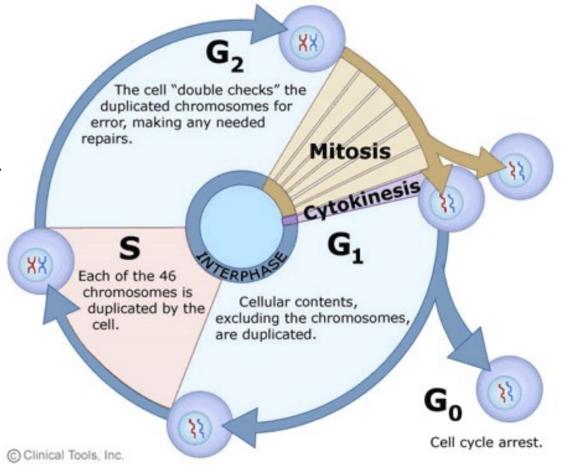
G1 phase. Metabolic changes prepare the cell for division. At a certain point - the restriction point - the cell is committed to division and moves into the S phase.

S phase. DNA synthesis replicates the genetic material. Each chromosome now consists of two sister chromatids.

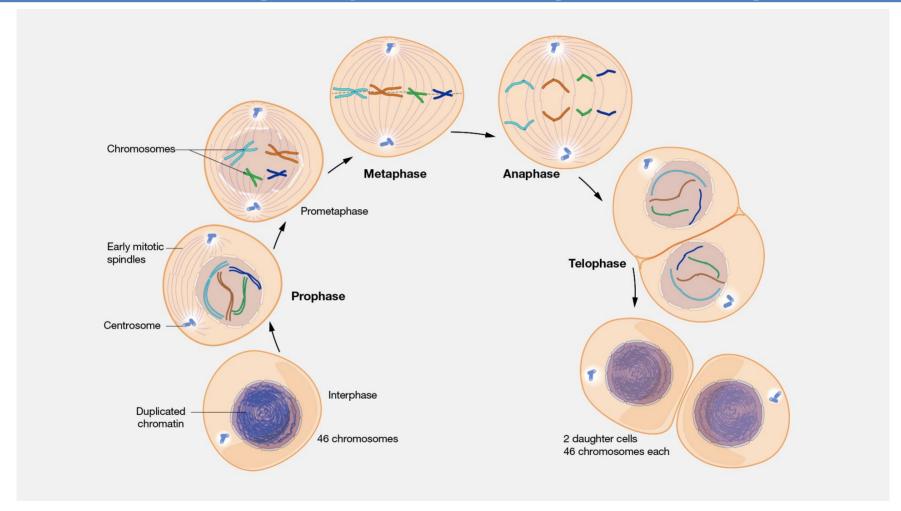
G2 phase. Metabolic changes assemble the cytoplasmic materials necessary for mitosis and cytokinesis.

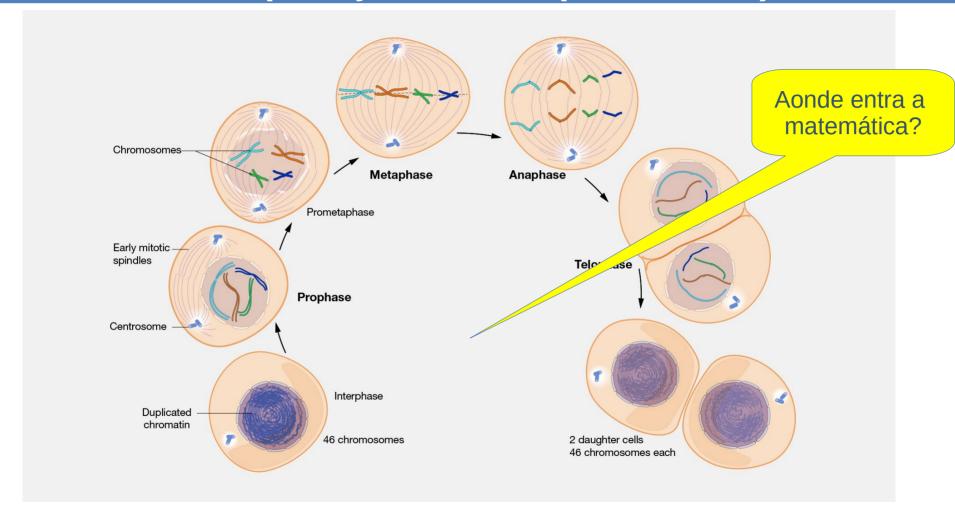
M phase. A nuclear division (mitosis) followed by a cell division (cytokinesis).

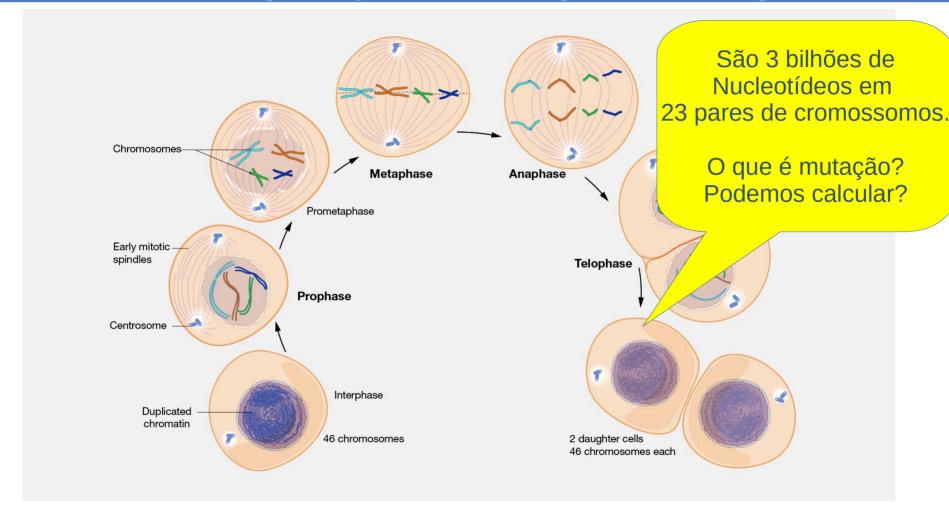
The period between mitotic divisions - that is, G1, S and G2 - is known as interphase.



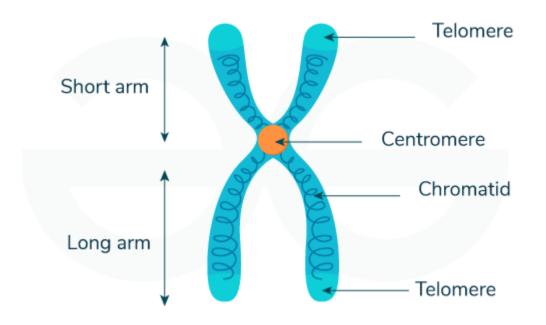




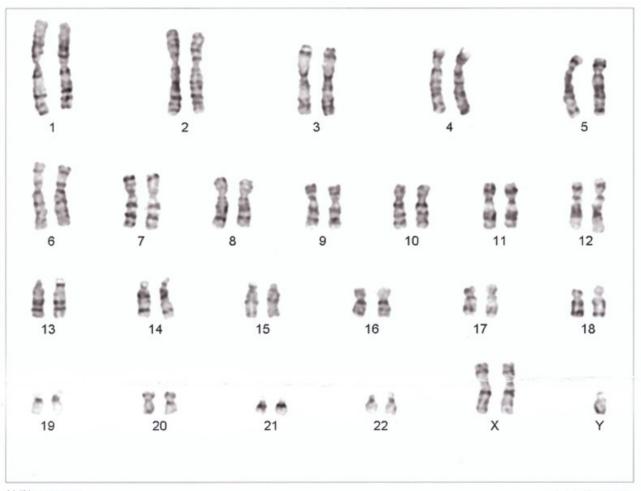




Um cromossomo



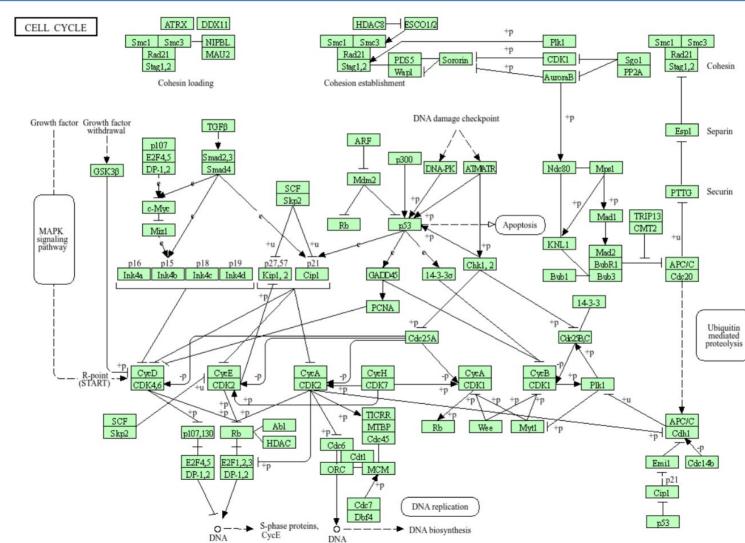
23 pares de cromossomos



核型: 47, XXY Cell No.: 003



Pathway: Cell Cycle - KEGG



Na meiose ocorre a duplicação dos cromossomos?

Meiosis

Meiosis is the form of eukaryotic cell division that produces haploid sex cells or gametes (which contain a single copy of each chromosome) from diploid cells (which contain two copies of each chromosome). The process takes the form of one DNA replication followed by two successive nuclear and cellular divisions (Meiosis I and Meiosis II). As in mitosis, meiosis is preceded by a process of DNA replication that converts each chromosome into two sister chromatids.

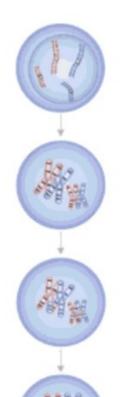
Meiosis I

Prophase I chromosomes begin to condense

homologous chromosomes pair crossing over occurs

recombinant chromosomes

Metaphase I spindle fibers attach to chromosomes chromosomes line up in center of cell



Anaphase I

chromosomes start to move to opposite ends of cell as spindle fibers shorten

Telophase I

chromosomes reach opposite ends nuclear membrane forms

Cytokinesis cell division occurs

C Clinical Tools, Inc.



sperm cell precursor



Meiosis II

Cytokinesis cell division occurs

© Clinical Tools, Inc.







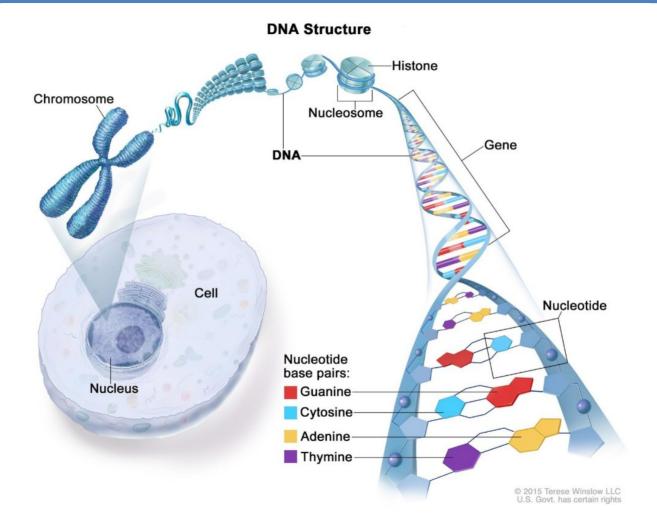




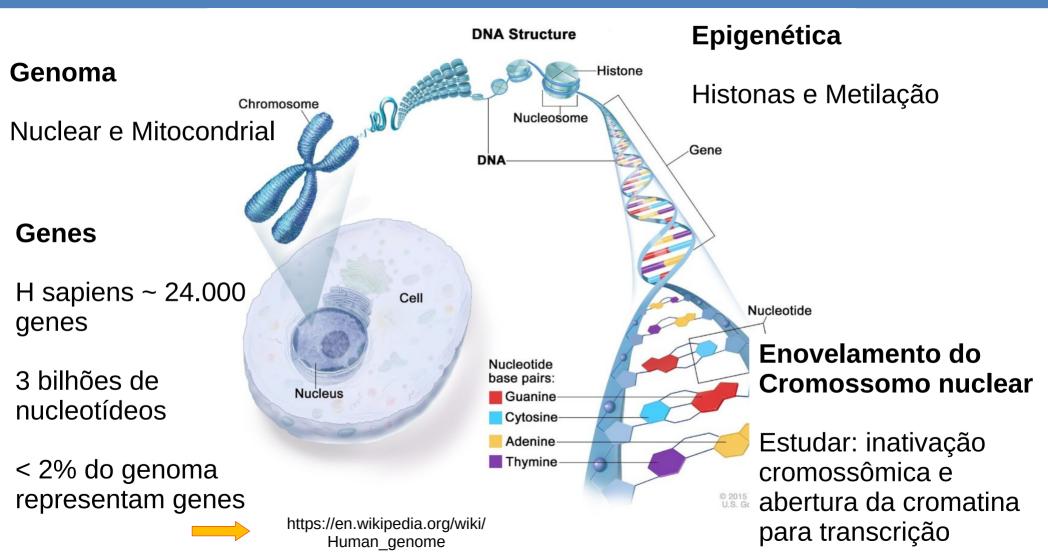
Para duplicar o material genético se faz necesário

Abrir a cromatina, abrir o nucleossomo, acoplamento da polimerase e proteínas assistentes

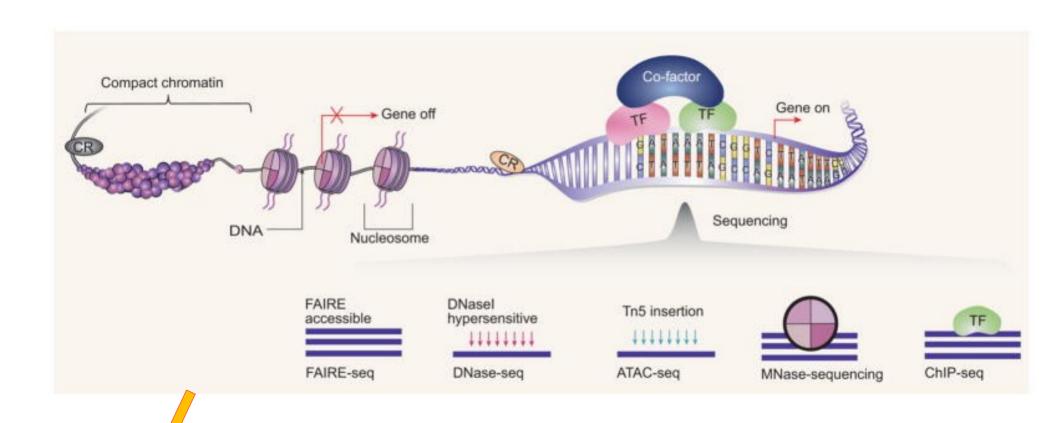
Cromossomo



Cromossomo



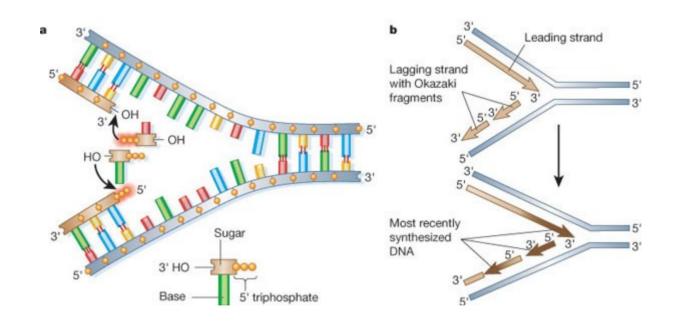
Abertura da cromatina



Wang Y, Jiang R, Wong WH. Modeling the causal regulatory network by integrating chromatin accessibility and transcriptome data. Natl Sci Rev. 2016 Jun;3(2):240-251. doi: 10.1093/nsr/nww025. Epub 2016 Apr 19. PMID: 28690910; PMCID: PMC5501464.

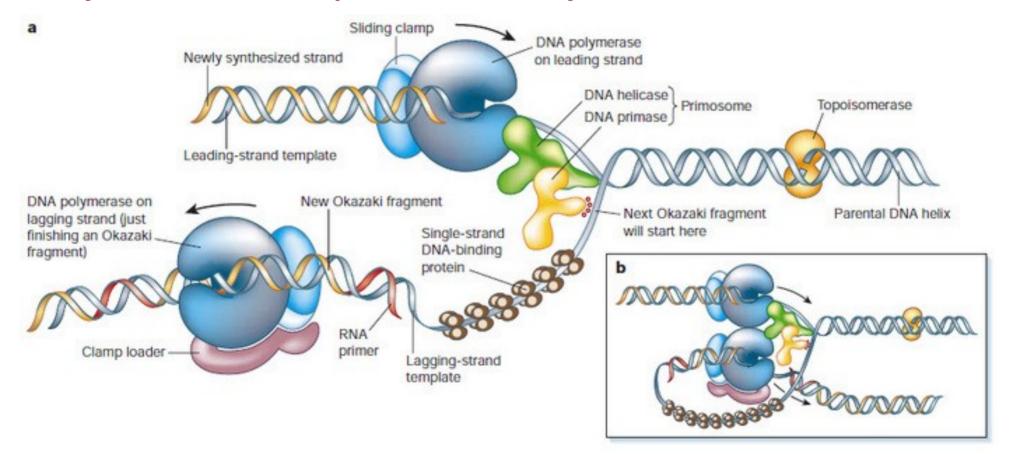
Xu J, Liu Y. Probing Chromatin Compaction and Its Epigenetic States in situ with Single-Molecule Localization-Based Super-Resolution Microscopy. Front Cell Dev Biol. 2021 Jun 10;9:653077. doi: 10.3389/fcell.2021.653077. PMID: 34178982; PMCID: PMC8222792.

Duplicação do material genético



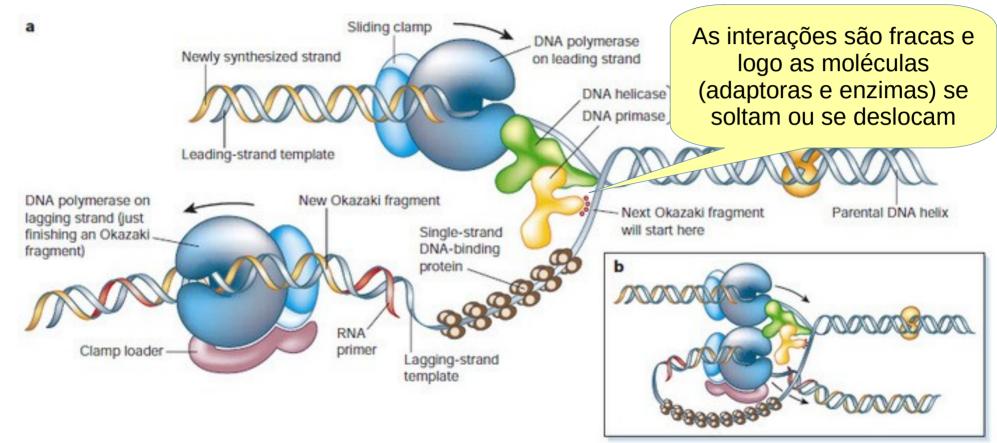
Duplicação do material genético

The Key Proteins at the Replication Fork: Polymerases, Primases, and Helicases



Duplicação do material genético

The Key Proteins at the Replication Fork: Polymerases, Primases, and Helicases





Assista o vídeo

Polimerase (visão molecular)



https://www.youtube.com/watch?v=N6zcsSTV2Ew

https://www.youtube.com/watch?v=6hcK--4S68U





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