

Condensin is a multi-subunit protein complex that plays a critical role in the organization and compaction of chromosomes during cell division. It is involved in the structural and dynamic changes of chromatin that occur during mitosis and meiosis. Here are some key points about condensin:

Structure: Condensin is composed of two structural maintenance of chromosomes (SMC) proteins, SMC2 and SMC4, which form a V-shaped heterodimer. The SMC proteins are ATPases and contain ATP-binding Walker motifs. Each SMC subunit has a globular ATPase head domain connected to a long coiled-coil arm, which allows for interaction between the SMC subunits.

Subunit composition: In addition to the SMC subunits, condensin complexes also contain regulatory subunits. In vertebrates, the condensin I complex consists of SMC2, SMC4, and three non-SMC subunits: NCAPD2, NCAPG, and NCAPH. The condensin II complex has a similar structure but contains different non-SMC subunits, including CAPD3, CAPG2, and CAP-H2.

Chromosome compaction: During mitosis, condensin is responsible for condensing the duplicated DNA strands into compact, rod-like structures called chromosomes. It helps in the resolution of sister chromatids, enabling their proper segregation to daughter cells.

Chromosome organization: Condensin not only compacts chromosomes but also contributes to their three-dimensional organization. It plays a role in the formation of chromatin loops and the establishment of topologically associated domains (TADs), which are important for proper gene regulation and chromosome architecture.

Dynamic regulation: The activity of condensin is tightly regulated throughout the cell cycle. It is phosphorylated by various kinases, including cyclin-dependent kinases (CDKs) and polo-like kinases (PLKs), to control its localization, association with chromatin, and activity.

Roles beyond mitosis: While condensin's primary function is in mitosis and meiosis, it also has roles in other cellular processes, including DNA repair, transcriptional regulation, and maintenance of genome stability.

Understanding the mechanisms and regulation of condensin is crucial for comprehending the processes of chromosome condensation, segregation, and genome organization during cell division. Ongoing research continues to shed light on the precise functions and molecular interactions of condensin in various cellular contexts.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

<https://neurosurgerywiki.com/wiki/doku.php?id=condensin>

Last update: **2024/06/07 02:52**

