

DNA Packaging in Dividing Cells

From Chromatin Networks to Chromosome Structures

Loose Chromatin Fiber (Nucleosomes)

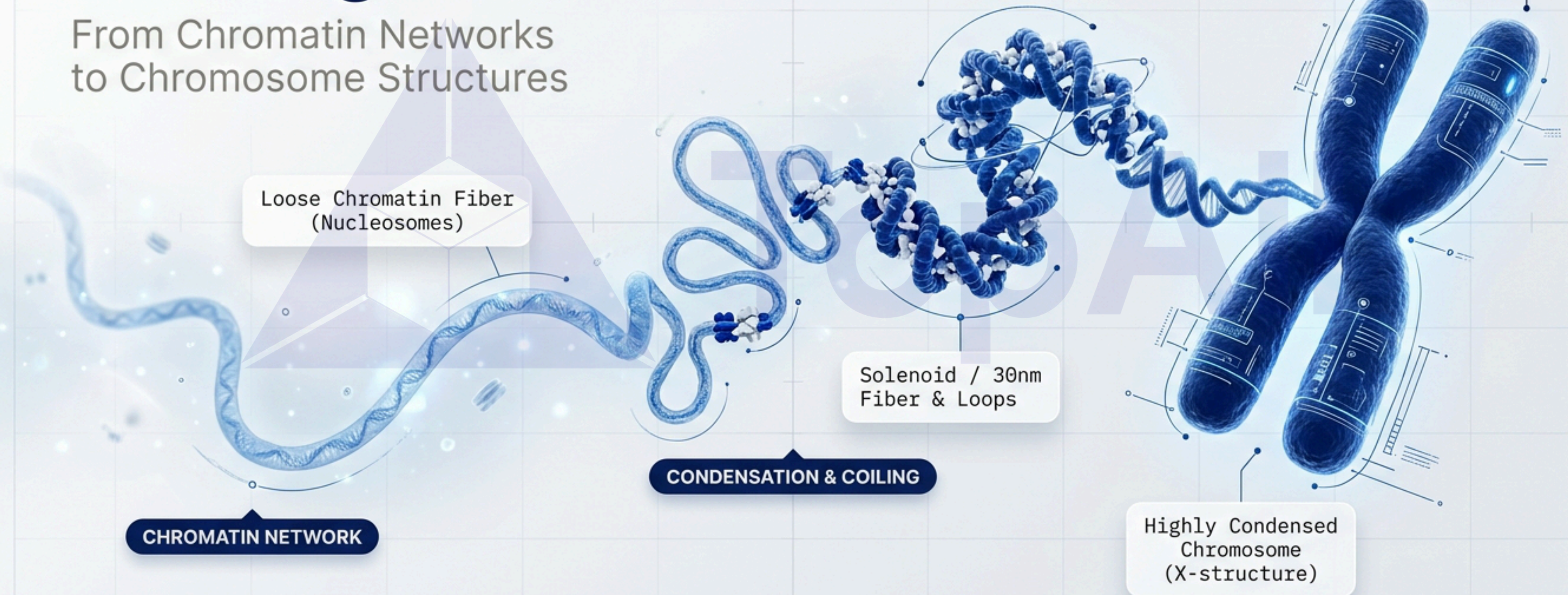
CHROMATIN NETWORK

Solenoid / 30nm
Fiber & Loops

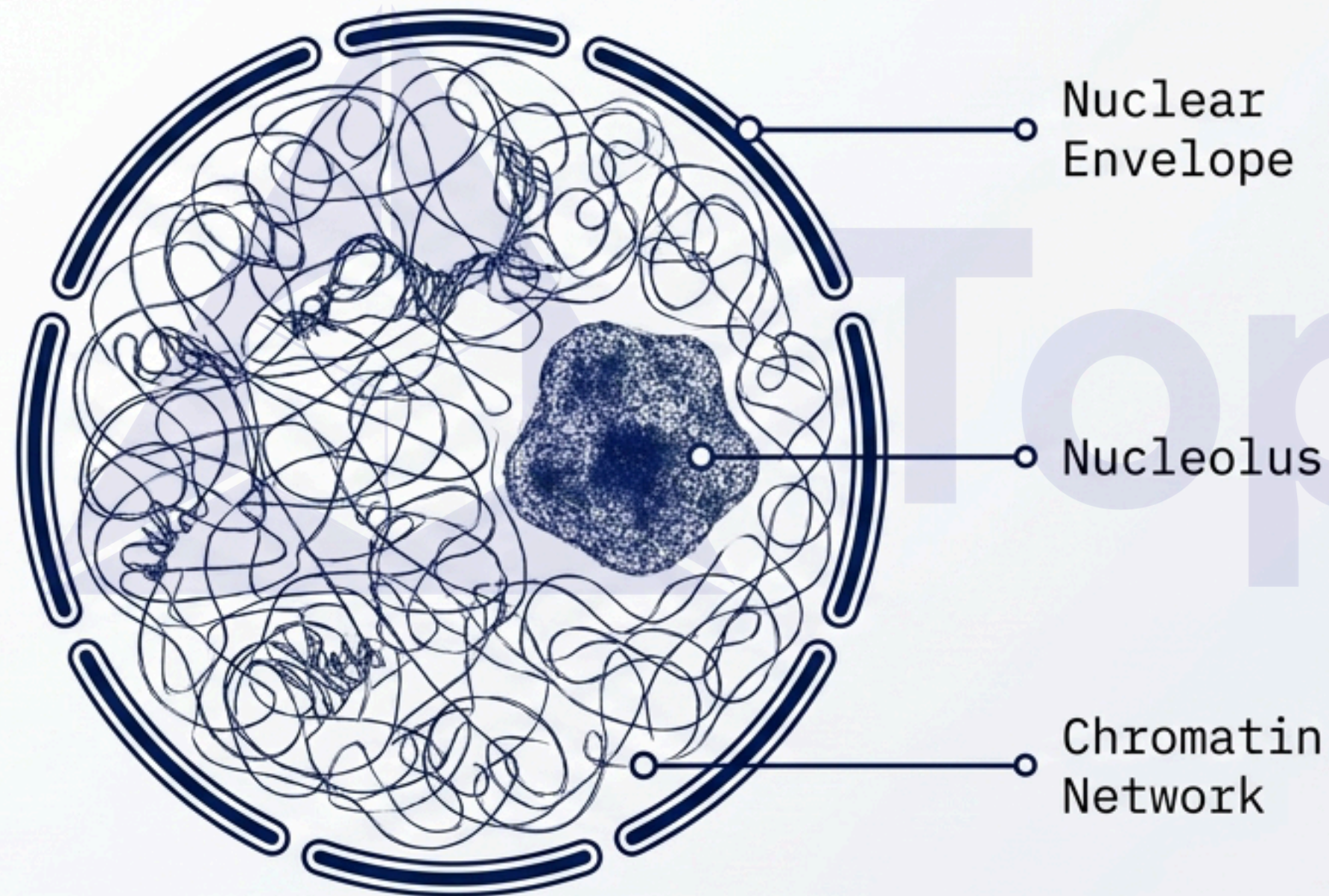
CONDENSATION & COILING

METAPHASE CHROMOSOME

Highly Condensed
Chromosome
(X-structure)



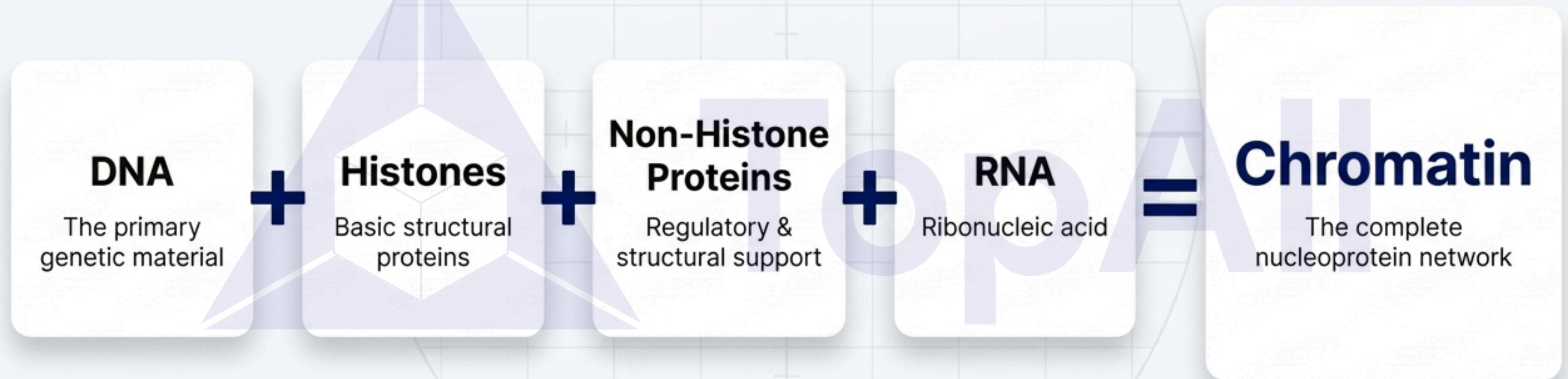
The Interphase Nucleus: Chromatin



During interphase (when the cell is not dividing), the nucleus does not contain visible chromosomes.

Instead, it holds highly extended and elaborate nucleoprotein fibers known as chromatin. This represents the unstructured resting state of the genetic material.

The Molecular Makeup of Chromatin



ⓘ Scale of Packaging: A single microscopic human cell contains an approximately 2-meter-long thread of DNA, which must be systematically distributed among 46 chromosomes (23 pairs).

Condensation: The Shift to Cell Division

During different stages of cell division, the indistinct network of chromatin rapidly condenses. Highly structured chromosomes become visible, replacing the standard interphase nucleus.

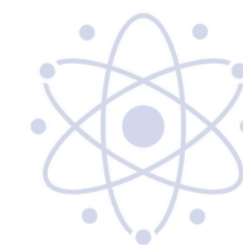


 **Form Follows Function:** Condensing 2 meters of DNA into rigid chromosomes is essential to ensure the massive genetic molecule is safely and evenly distributed to daughter cells without tangling or breaking.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

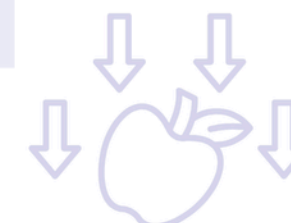
Practice Now



At prep.topall.app

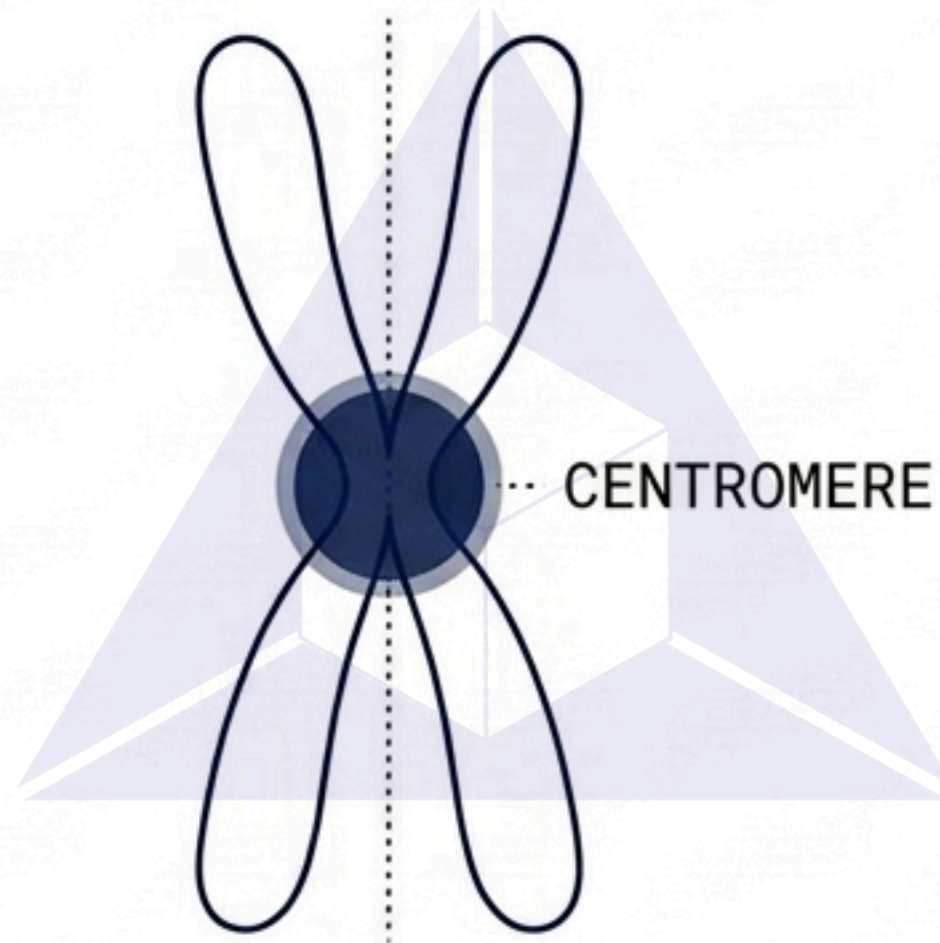
Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



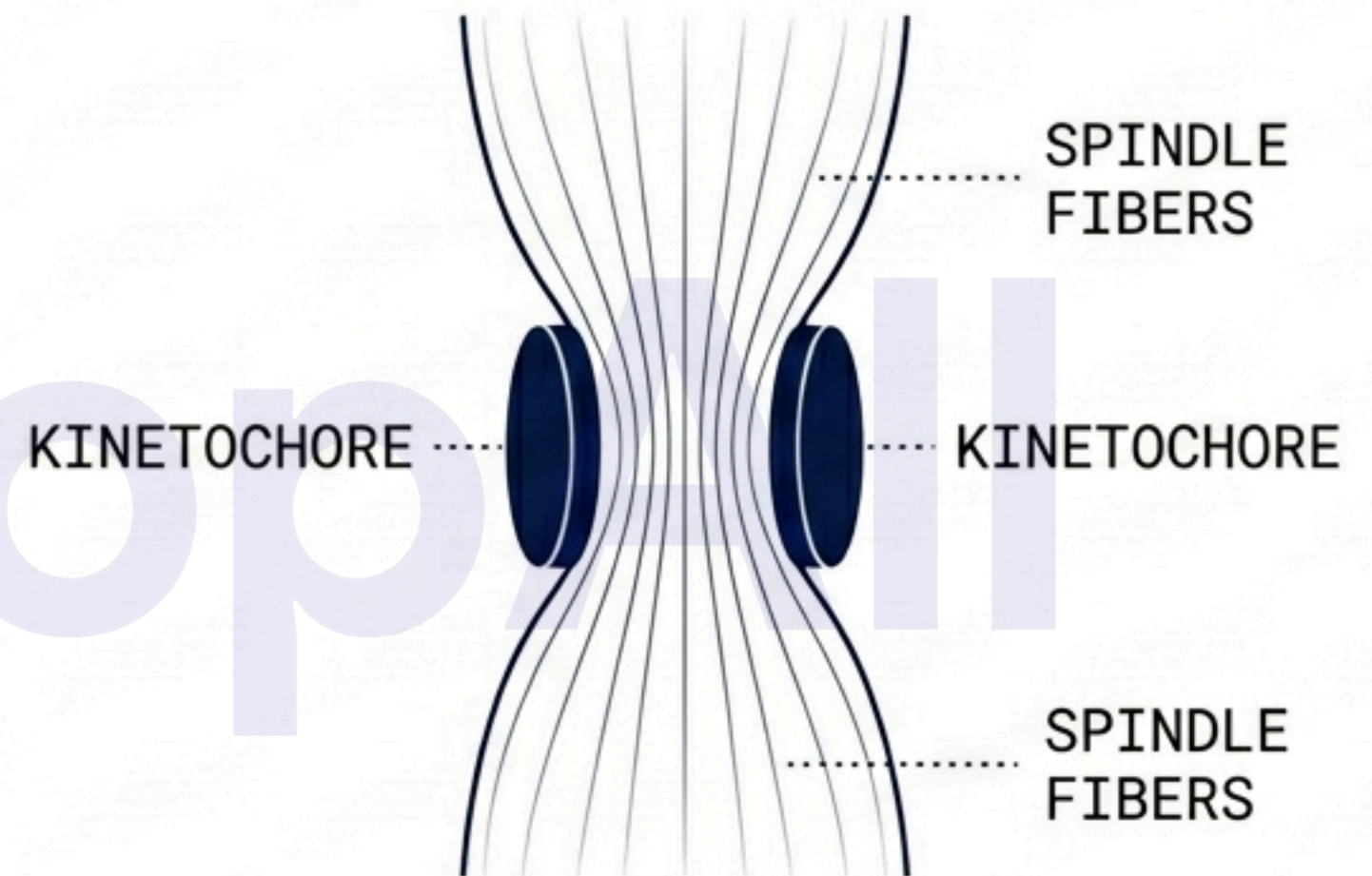
Core Anatomy: Centromere and Kinetochore

01 | The Primary Constriction



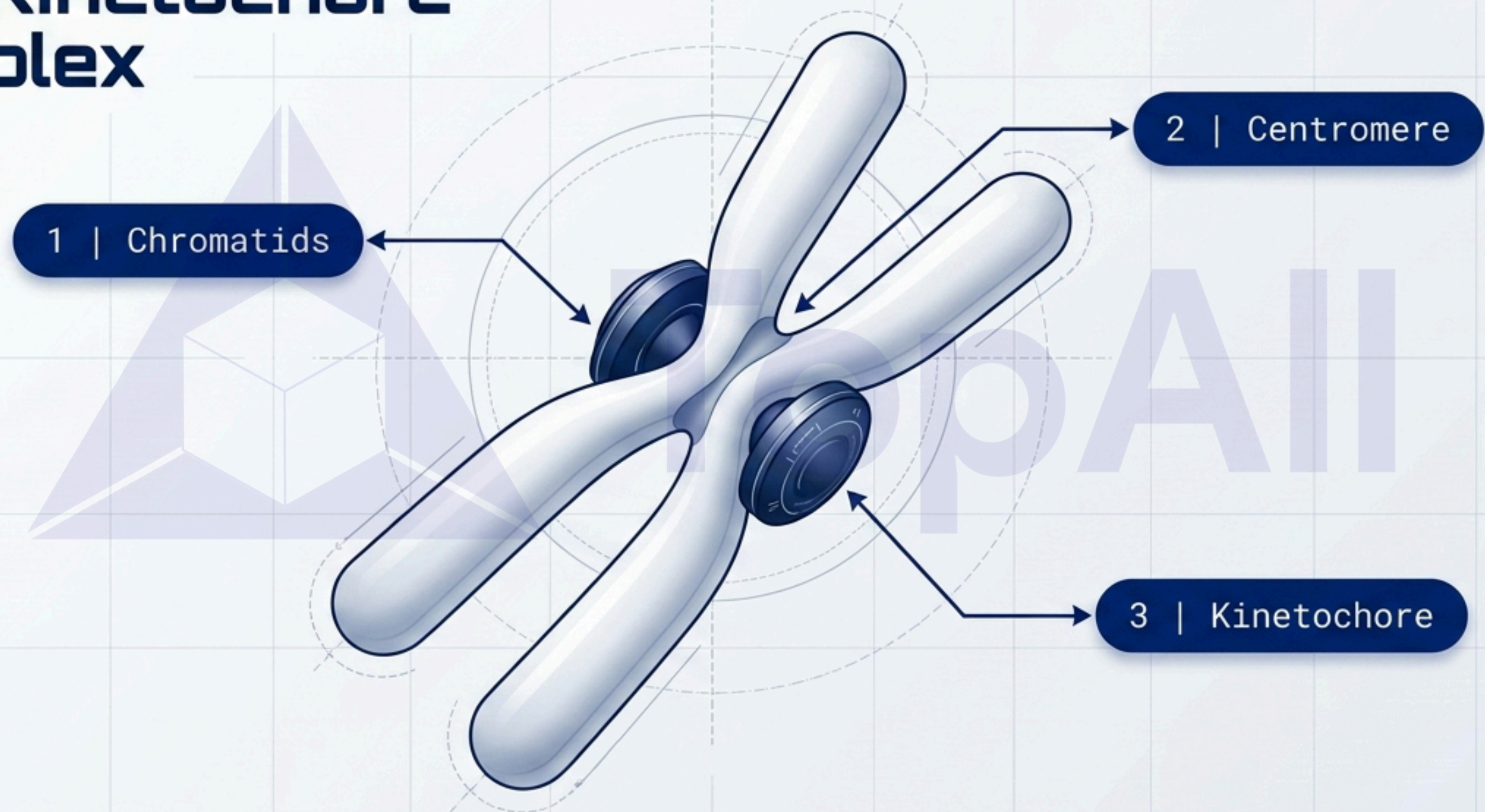
Every visible, dividing chromosome has a primary constriction called the centromere. It serves as the physical bridge holding the two identical chromatids together.

02 | The Anchor Points



Located on the sides of the centromere are disc-shaped structures called kinetochores. These act as the mechanical attachment points for the cell's spindle fibers during division.

Structural Blueprint: The Kinetochore Complex



Morphological Classification by Centromere Position

Chromosomes are classified into four distinct types based solely on the location of the primary constriction (centromere). Shifting the centromere alters the relative length of the chromosome arms, creating a distinct morphological spectrum.

1. Metacentric

Features a middle centromere, forming two equal arms.

2. Sub-metacentric

Centromere is positioned slightly away from the middle, resulting in one shorter arm and one longer arm.

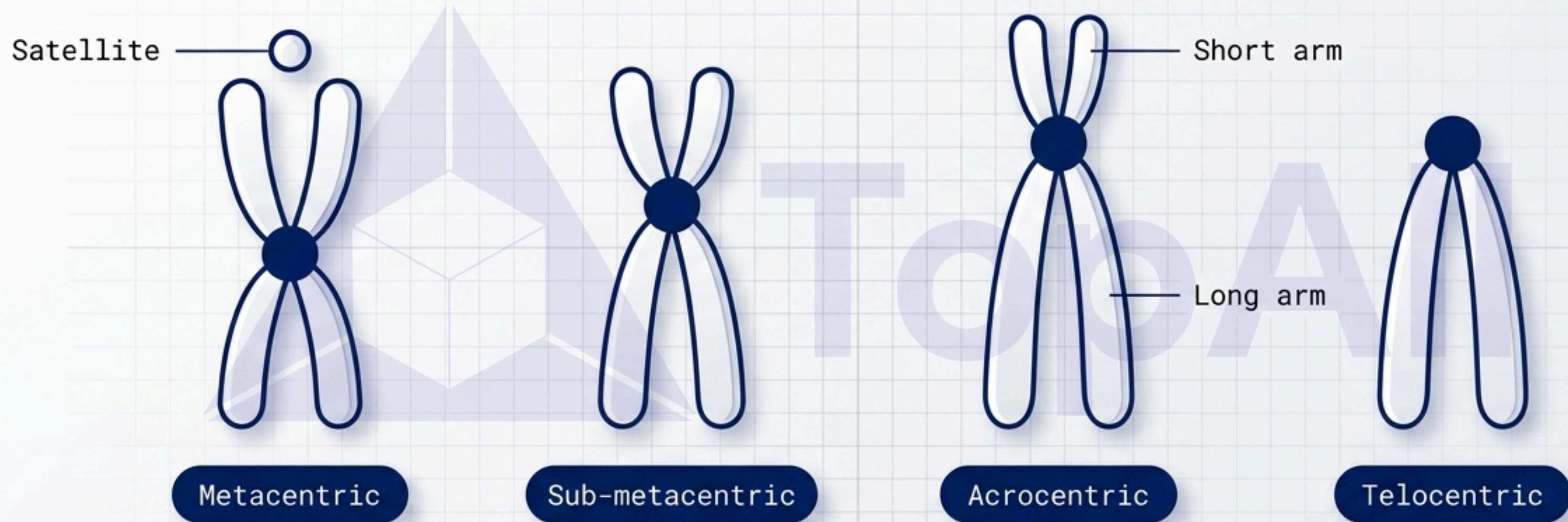
3. Acrocentric

Centromere is situated close to its end, forming one extremely short arm and one very long arm.

4. Telocentric

Features a terminal centromere located at the very tip of the chromosome.

The Chromosome Spectrum



Secondary Constrictions: A few chromosomes possess non-staining secondary constrictions at a constant location. This gives the appearance of a small, detached fragment at the tip, known as a satellite.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis