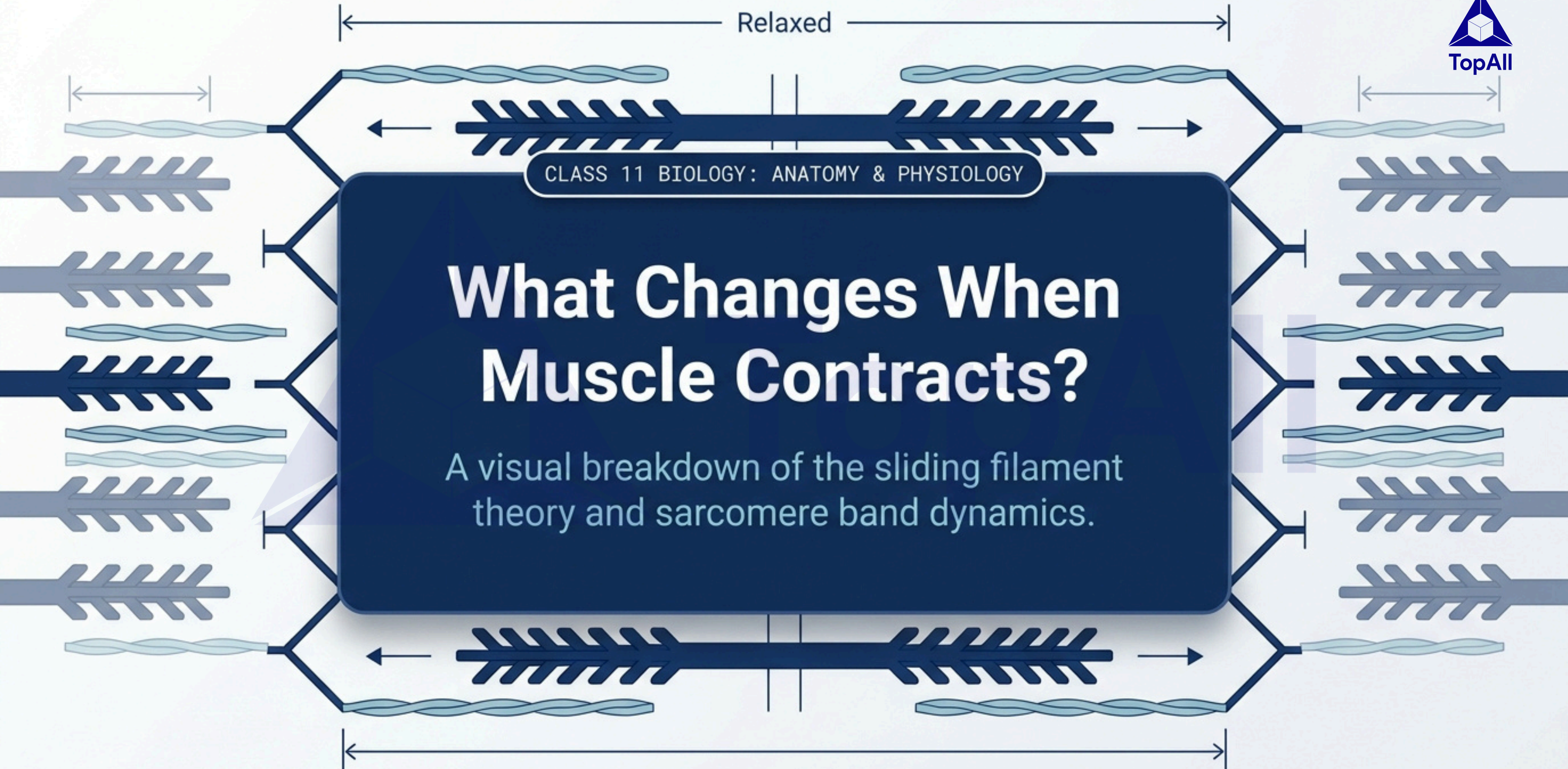


CLASS 11 BIOLOGY: ANATOMY & PHYSIOLOGY

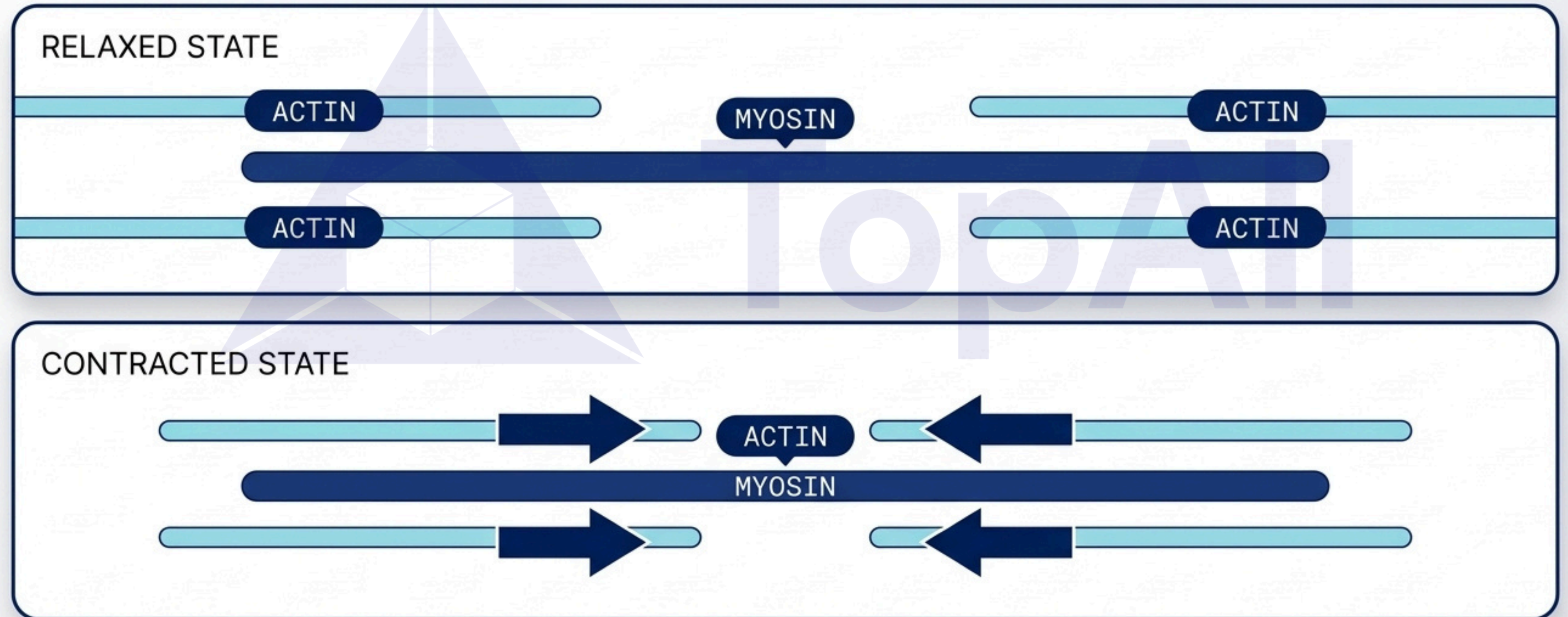
What Changes When Muscle Contracts?

A visual breakdown of the sliding filament theory and sarcomere band dynamics.



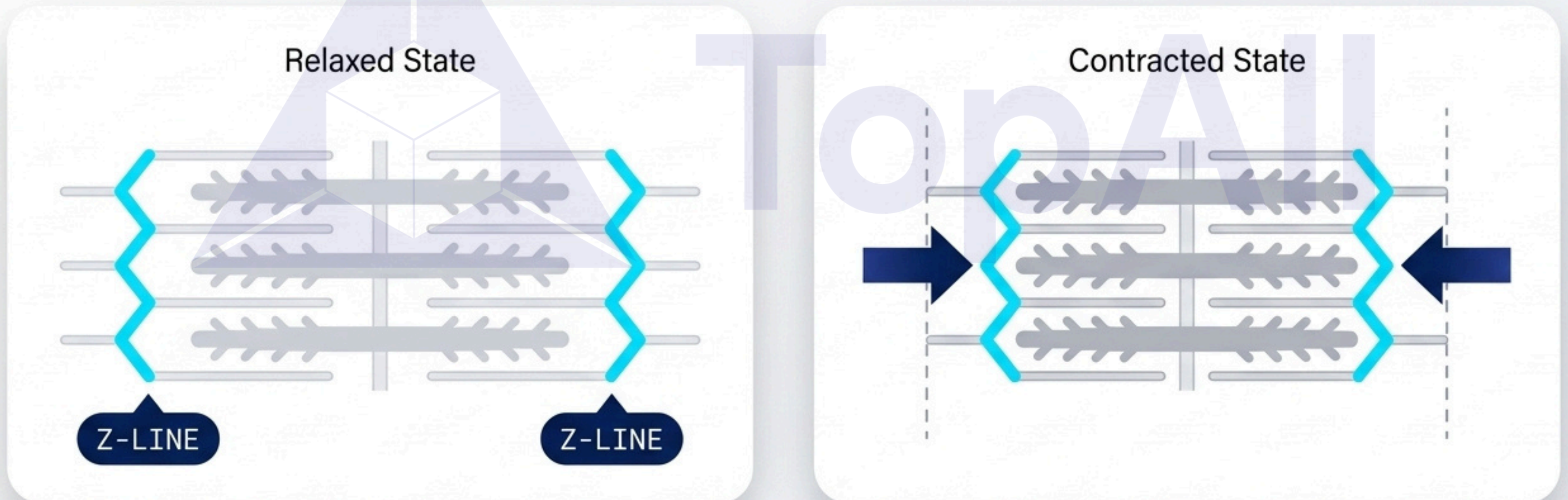
Thin Filaments Slide Over Thick Filaments

Muscle contraction is driven by a single mechanical action: actin filaments are pulled over stationary myosin filaments toward the center of the unit.



Z-Lines Move Inward

As the actin filaments are pulled, they drag their anchoring structures with them, physically pulling the boundaries of the functional unit closer together.





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

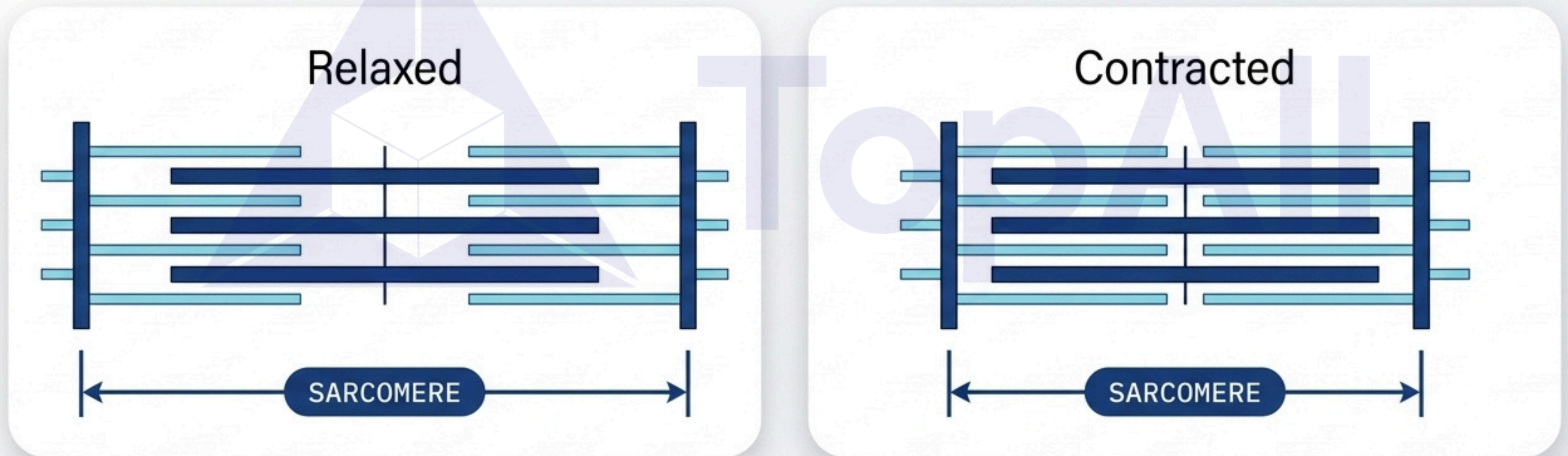
Key Highlights

- » 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



The Sarcomere Shortens

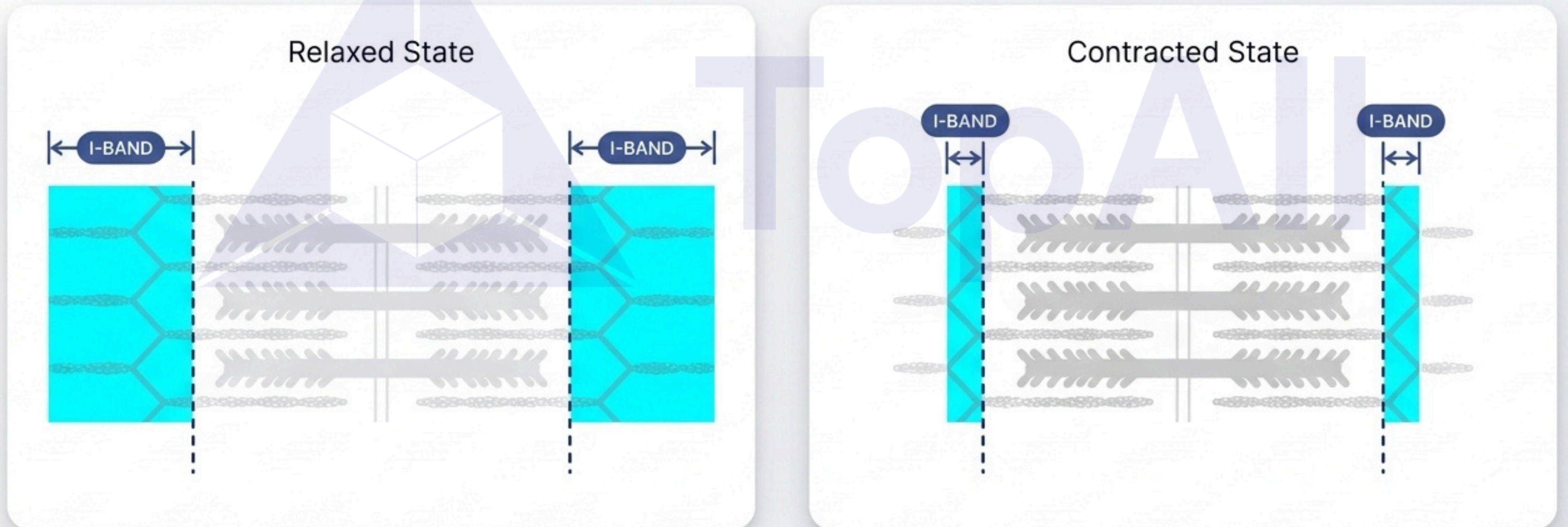
The distance between two successive Z-lines constitutes the functional unit of contraction. When the boundaries pull inward, the entire unit physically shrinks.



The shortening of thousands of consecutive sarcomeres along a myofibril is what causes a whole muscle to contract.

The I-Band Reduces

The I-band is the region containing only thin actin filaments. As these filaments slide inward over the thick filaments, the “actin-only” non-overlapped zone visually shrinks.



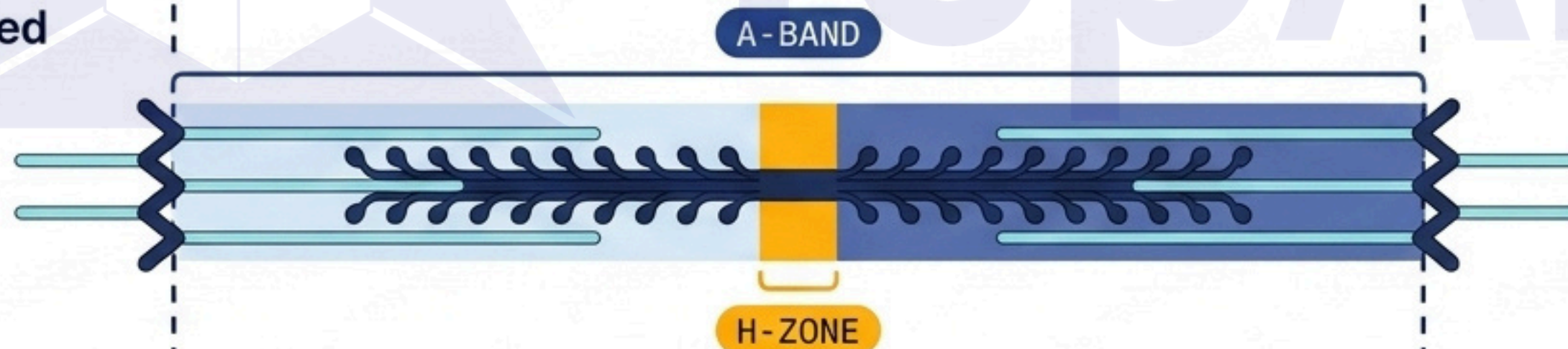
H-Zone Reduces, A-Band Remains Static

The central gap where there is no actin overlap disappears, but the total length of the thick myosin filaments never changes.

State 1: Relaxed



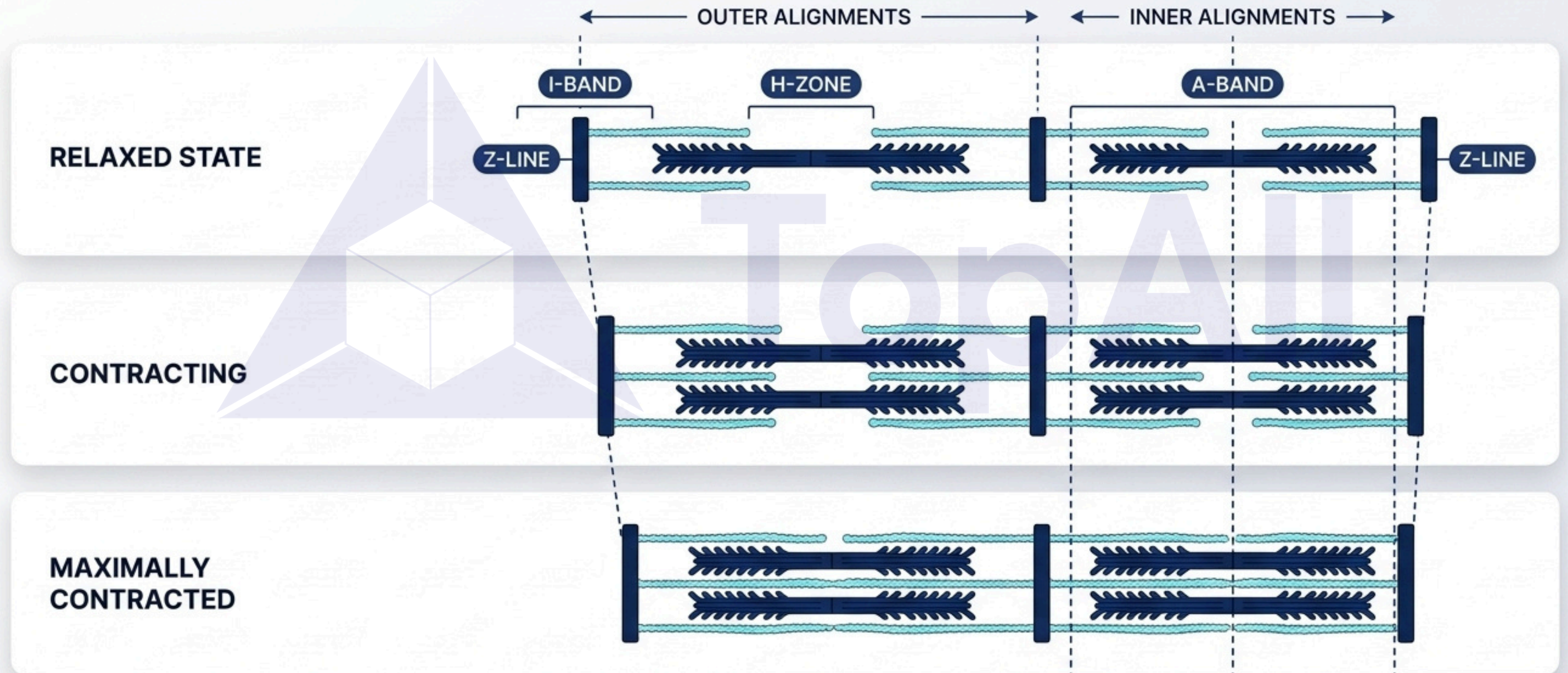
State 2: Contracted



Crucial Distinction: The A-band represents the entire length of the thick filament, regardless of overlap. Therefore, it cannot shorten.

The Contraction Sequence

Tracing the continuous geometric transformation of the sarcomere from rest to maximum contraction.



Diagnostic Cheat Sheet

What happens to each structural component during muscle contraction?

Component	Fate
SARCOMERE	Shortens (overall functional unit contraction)
Z-LINES	Move Inward (pulled by actin)
I-BAND	Reduces (more overlap with thick filaments)
H-ZONE	Reduces / Disappears (actin filaments meet in the center)
A-BAND	Remains Unchanged (thick filament length is constant) ✓



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