EXCITATION –CONTRACTION COUPLING.

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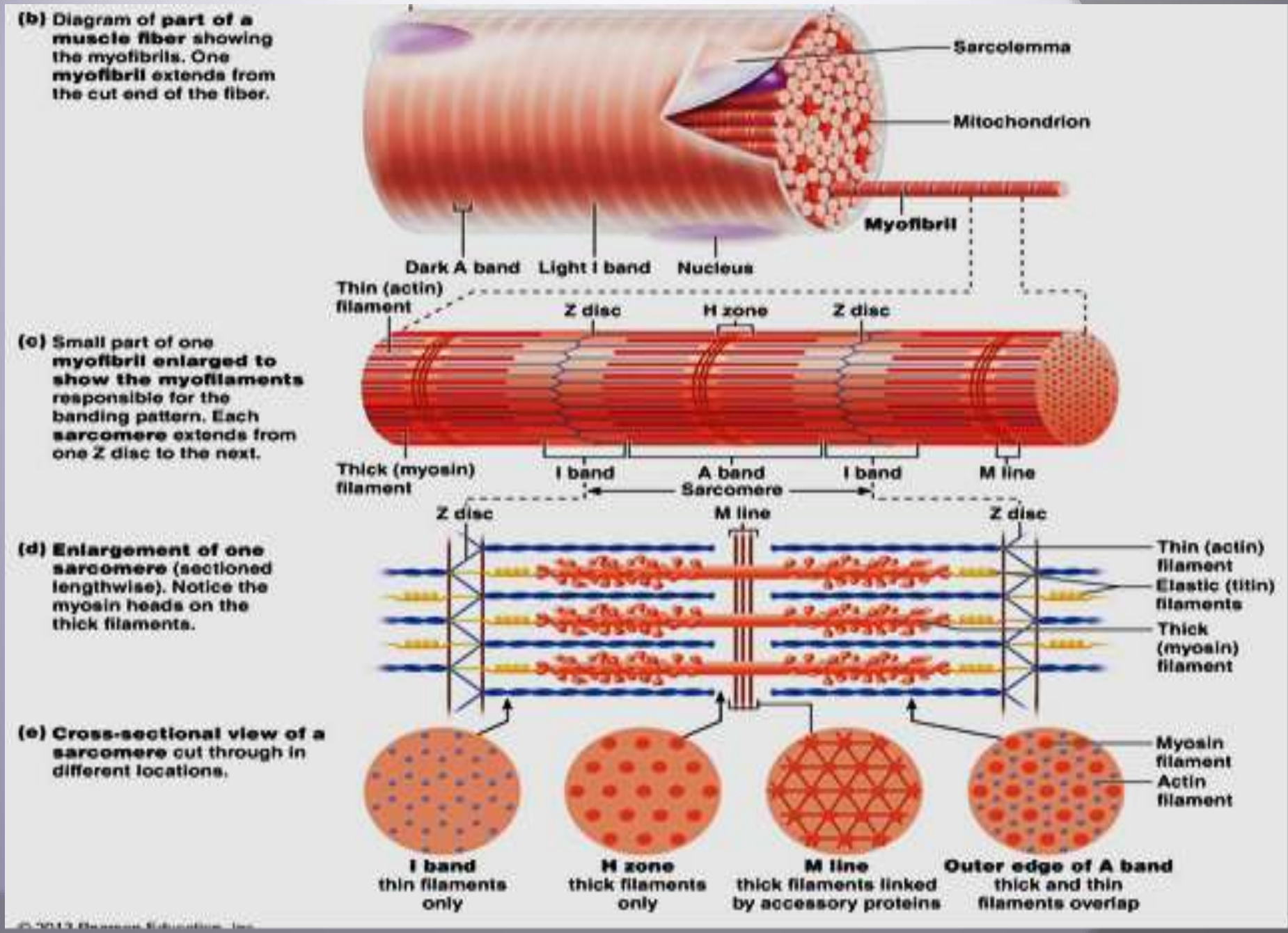

(b) Diagram of part of a muscle fiber showing the myofibrils. One myofibril extends from the cut end of the fiber.
Sarcolemma
Mitochondrion
Myofibril
Dark A band
Light I band
Nucleus
(c) Small part of one myofibril enlarged to show the myofilaments responsible for the banding pattern. Each sarcomere extends from one Z disc to the next.
Thin (actin) filament
Z disc
H zone
Z disc
Thick (myosin) filament
I band
A band
I band
M line
Sarcomere
(d) Enlargement of one sarcomere (sectioned lengthwise). Notice the myosin heads on the thick filaments.
Z disc
M line
Z disc
Thin (actin) filament
Elastic (titin) filaments
Thick (myosin) filament
(e) Cross-sectional view of a sarcomere cut through in different locations.
Myosin filament
Actin filament
I band
thin filaments only
H zone
thick filaments only
M line
thick filaments linked by accessory proteins
Outer edge of A band
thick and thin filaments overlap

Muscle proteins

[A] Contractile proteins:

1- Myosin: -Myosin is complex protein with M.W. 480,000.

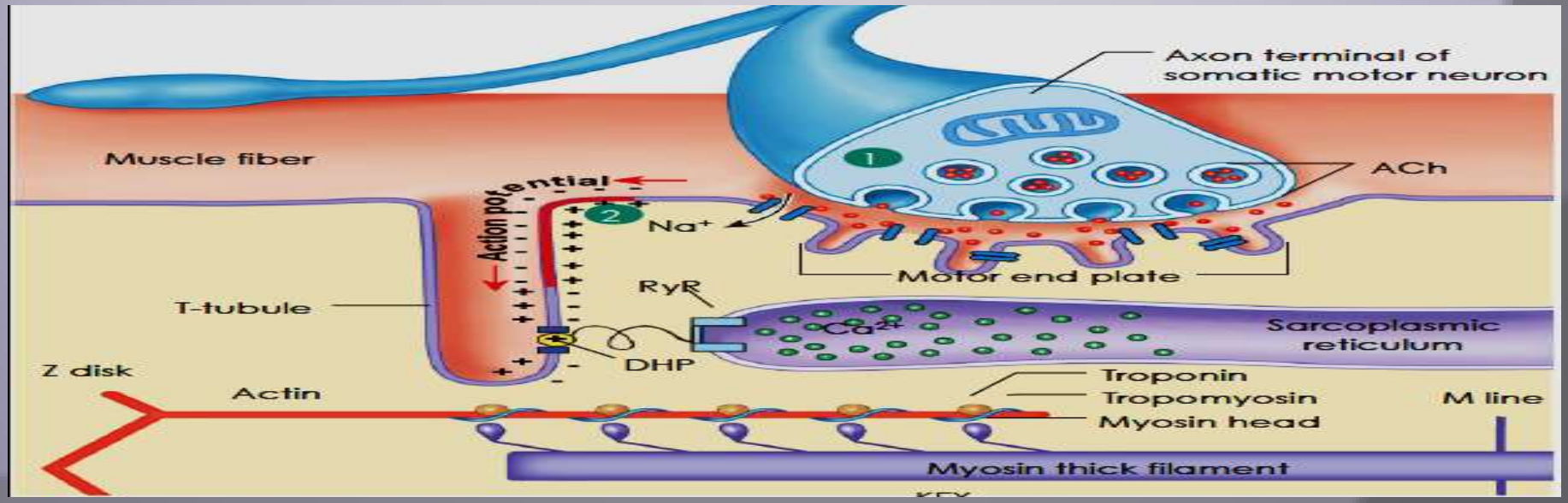
-Composed of 6 polypeptide chains (2 heavy chains and 4 light chains).

-The 2 heavy chains wrap spirally around each other as double helix forming long tail (light meromyosin) and arm (heavy meromyosin) while the terminal part combine with the 4 light chains forming 2 globular heads ,one head contains actin-binding sites and the other contain sites of ATP hydrolysis.

-Cross bridges arise from the head with arm of 2 flexible points called hinges (one between arm and tail and the other between the arm and heads) to bind to the actin.

2- Actin: - It is small globular protein with M.W. 42,000.

- The globules attached to each other to form filamentous structure arranged in two chains as long double helix.



[B] Regulatory protein:

1- Tropomyosin:

-It is long filament of two polypeptide chains twisting on each other and located between the 2 chains of actin covering its active sites which combine to myosin and keeps the actin structure.

2- Troponin:

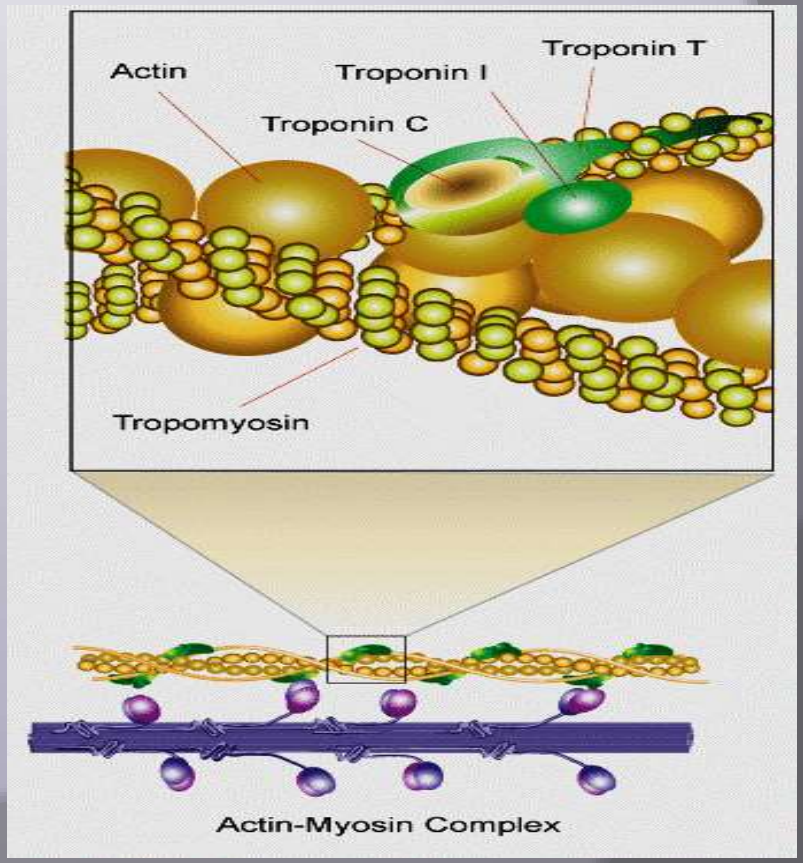
-Small globules located at intervals along tropomyosin.

-Of 3 subunits with MW 18,000-25,000.

1-Troponin T: binds troponin to tropomyosin.

2-Troponin I: inhibit binding of actin & myosin.

3-Troponin C: bind Ca+2 ions contraction.



Thank You