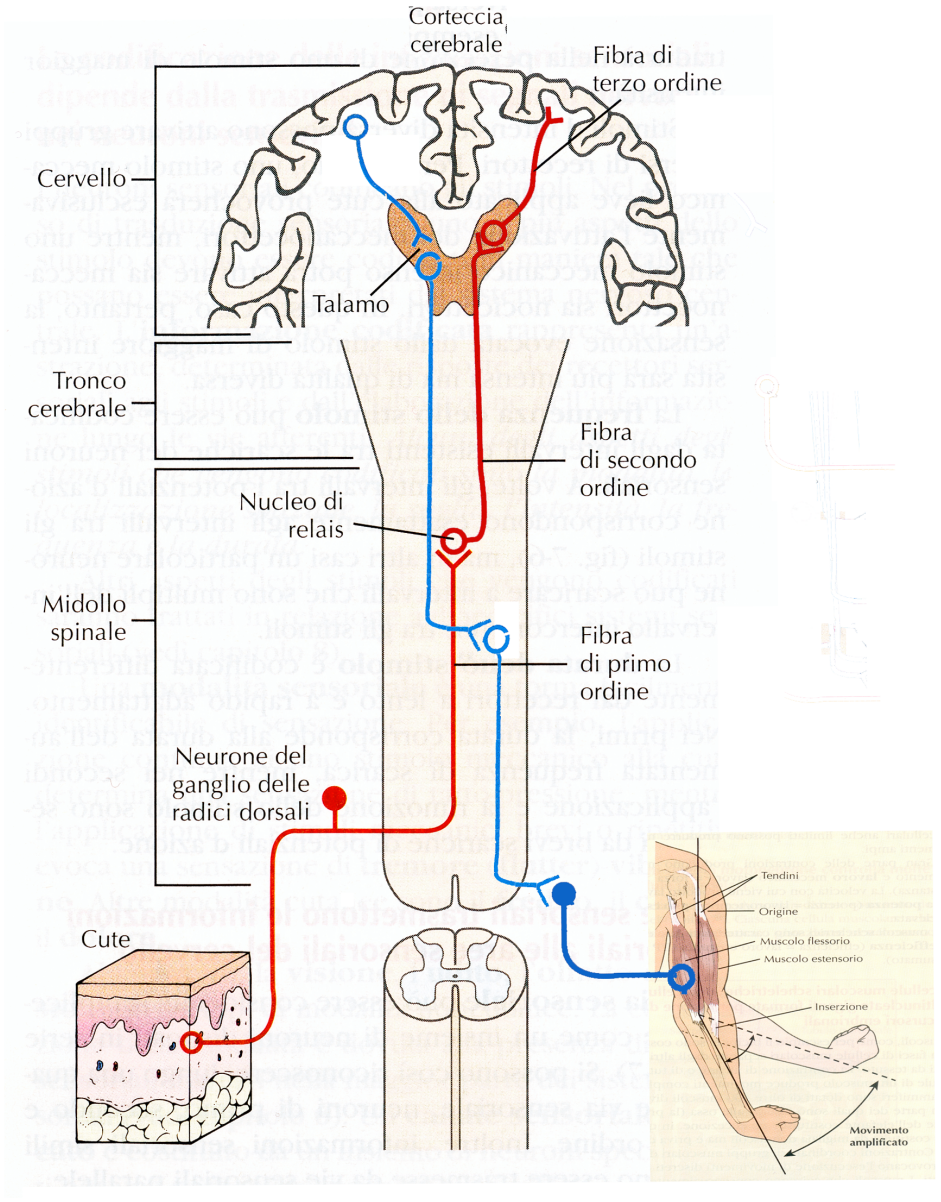
Reazione agli stimoli e azione sull'ambiente esterno

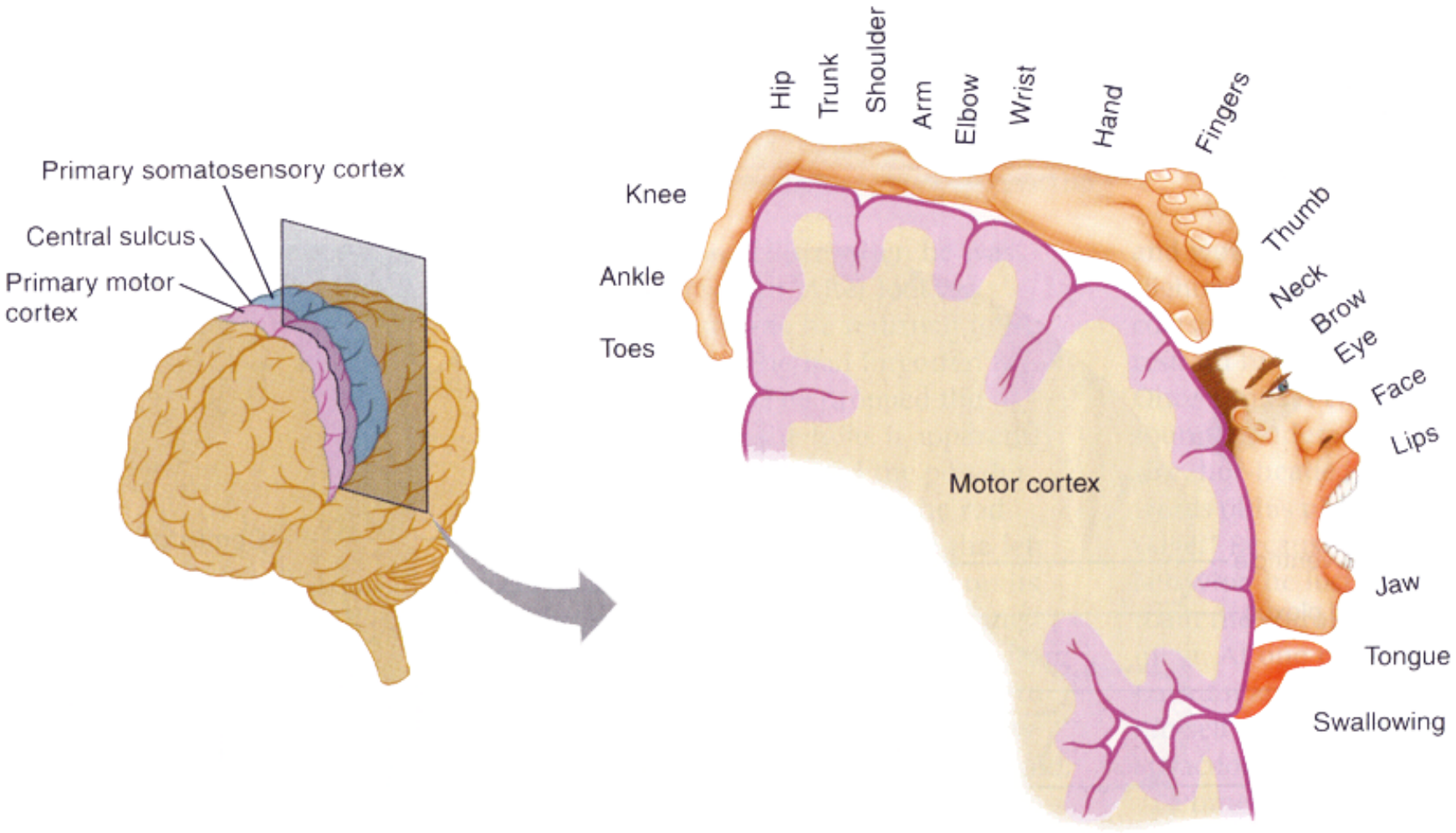
stimolo esterno/interno

muscoli scheletrici
(fibre muscolari scheletriche)

vie nervose efferenti o discendenti
(vie nervose motorie)

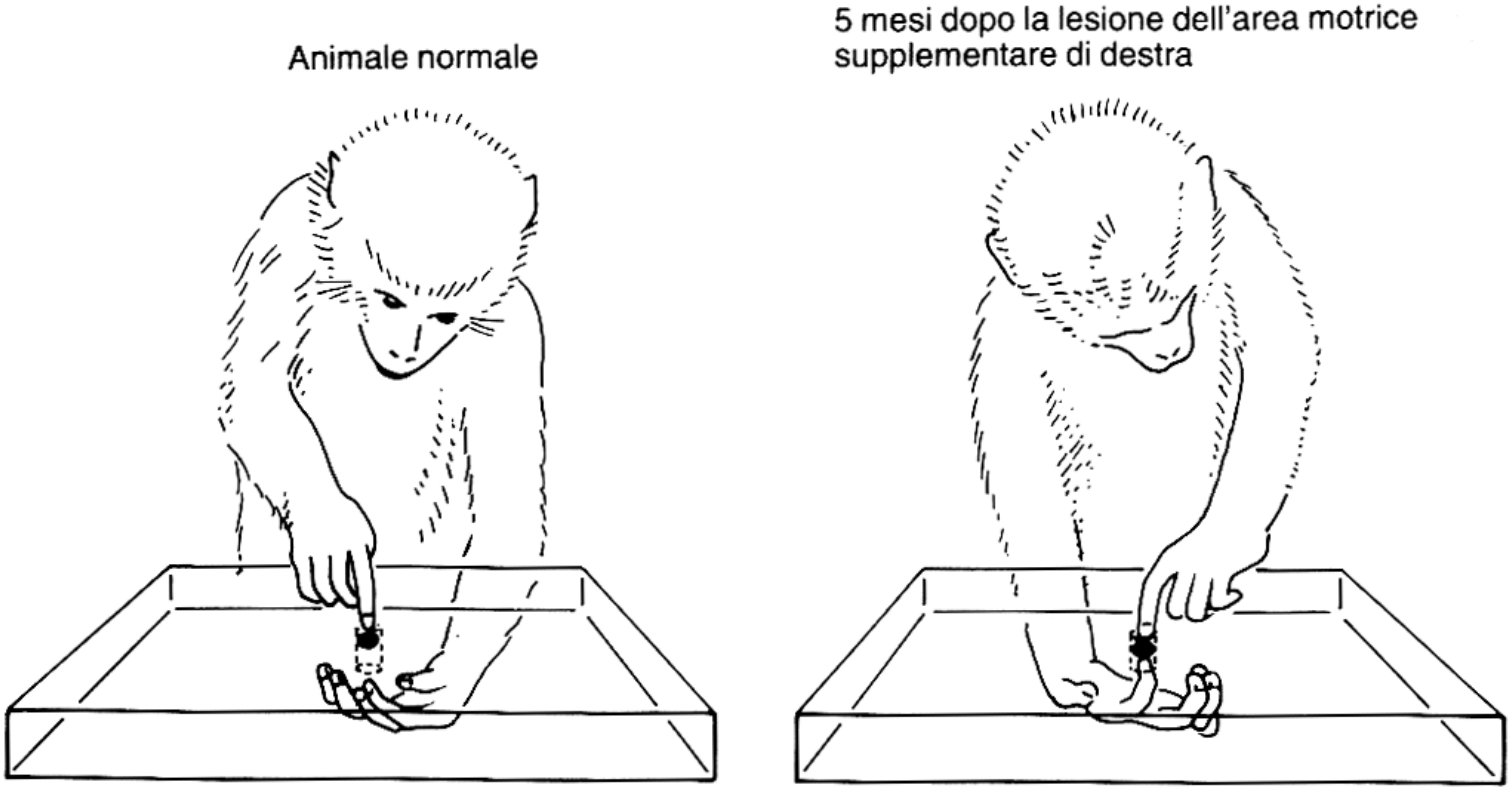


La corteccia motoria primaria



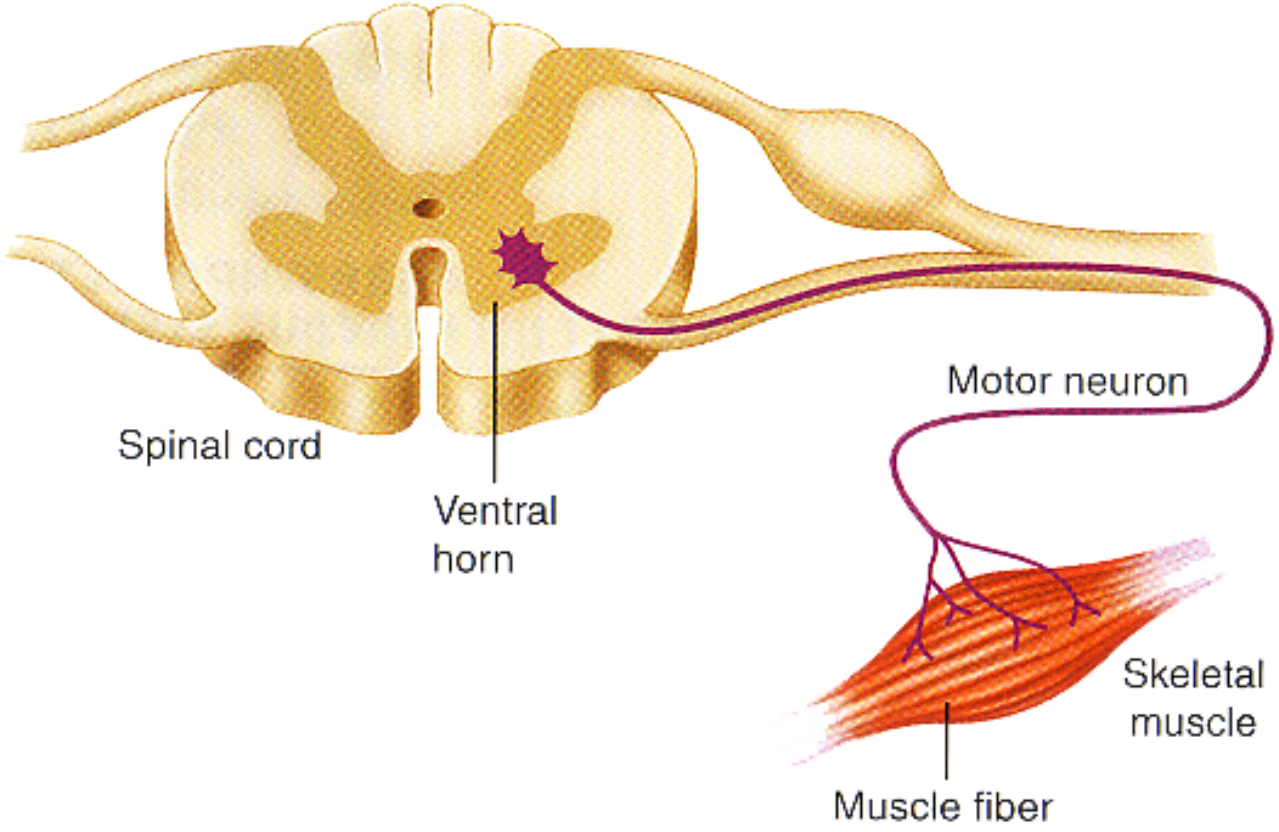
Il ruolo della corteccia premotoria nell' ideazione del piano motorio

FIGURA 40-15
A seguito della lesione unilaterale dell'area motrice supplementare si hanno deficit della coordinazione bimanuale. Una scimmia normale spinge il cibo attraverso il foro con una mano e lo afferra con l'altra. L'animale lesionato utilizza gli indici di entrambe le mani per spingere il cibo dall'alto e dal basso. (Modificata, da Brinkman, 1984).



La localizzazione dell'α-motoneurone

FIGURE 10.13 Anatomy of somatic nervous system pathways.
The somatic nervous system consists of motor neurons, which originate in the ventral horns of the spinal cord and terminate on skeletal muscle fibers throughout the body.



L'organizzazione anatomo-funzionale del tessuto muscolare scheletrico

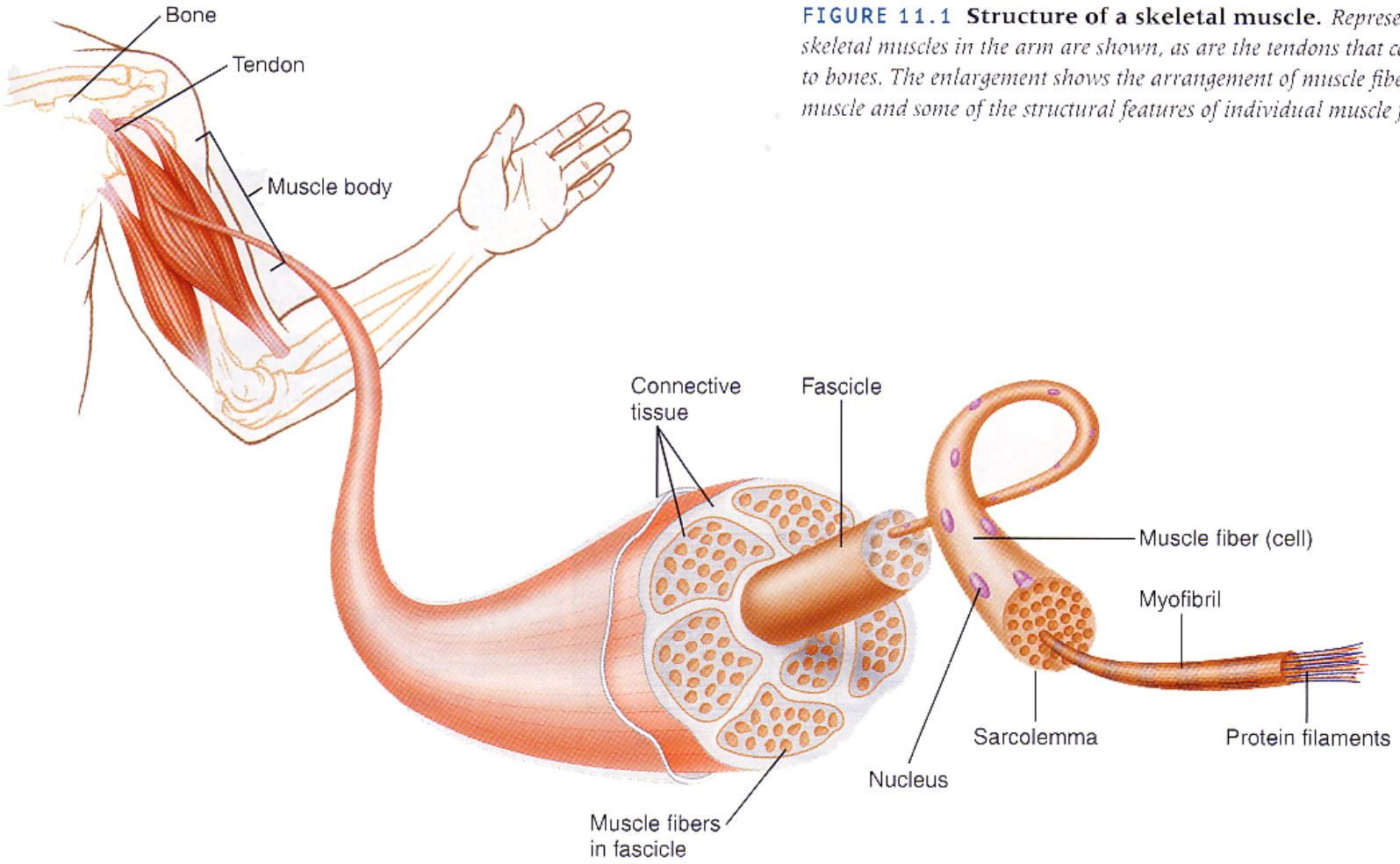


FIGURE 11.1 Structure of a skeletal muscle. *Representative skeletal muscles in the arm are shown, as are the tendons that connect them to bones. The enlargement shows the arrangement of muscle fibers within a muscle and some of the structural features of individual muscle fibers.*

Il sarcomero è l'unità funzionale della fibra muscolare scheletrica

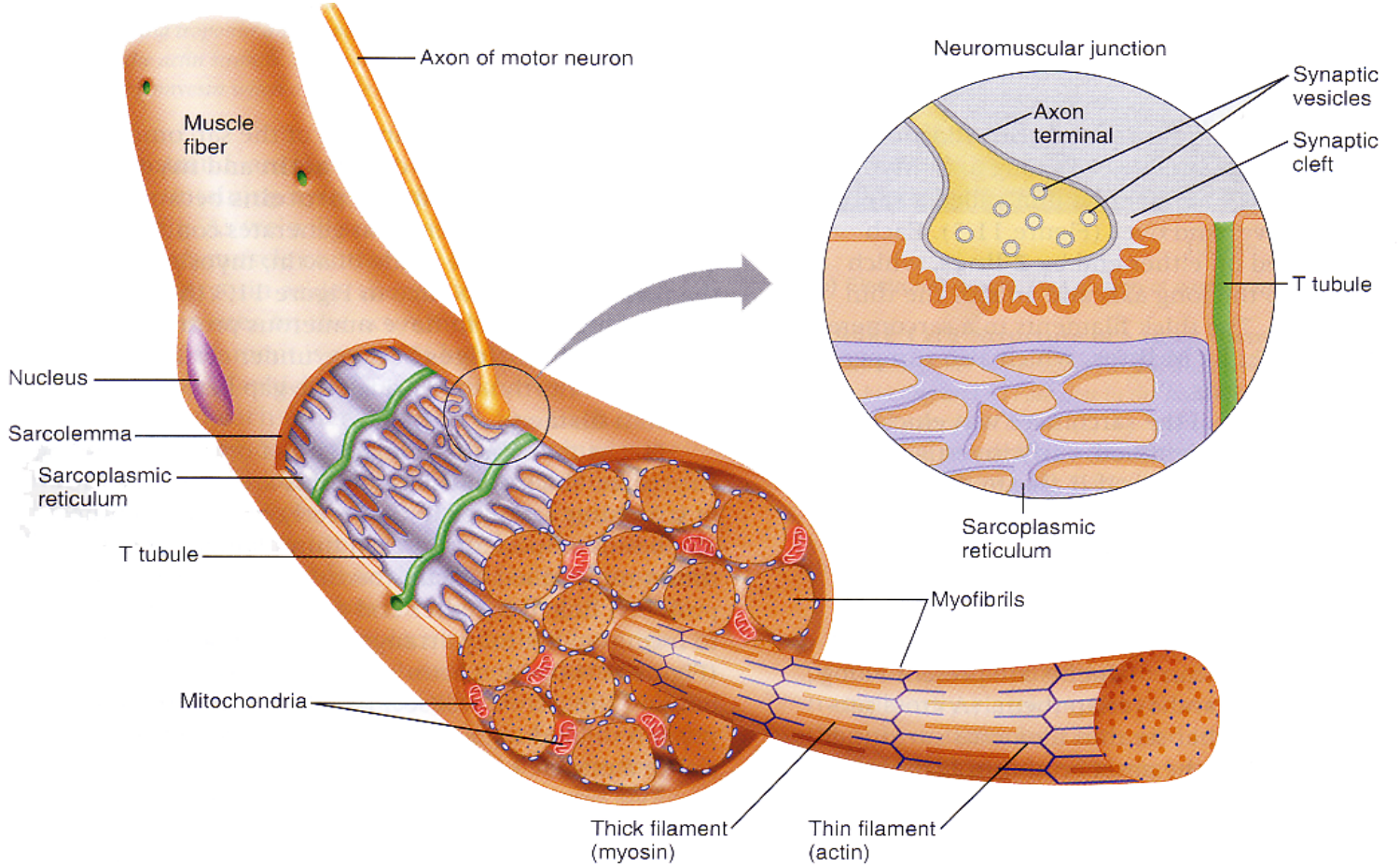
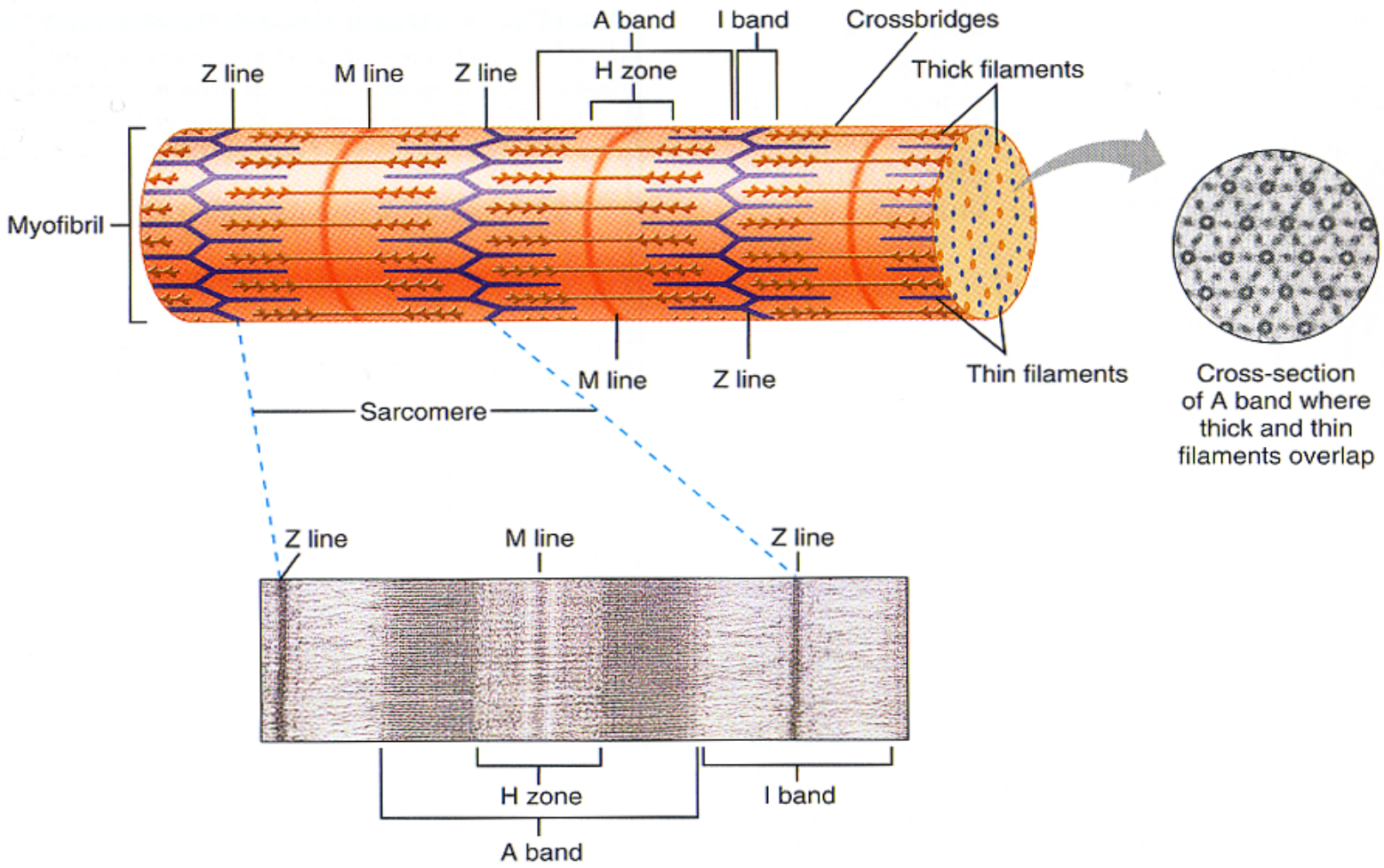
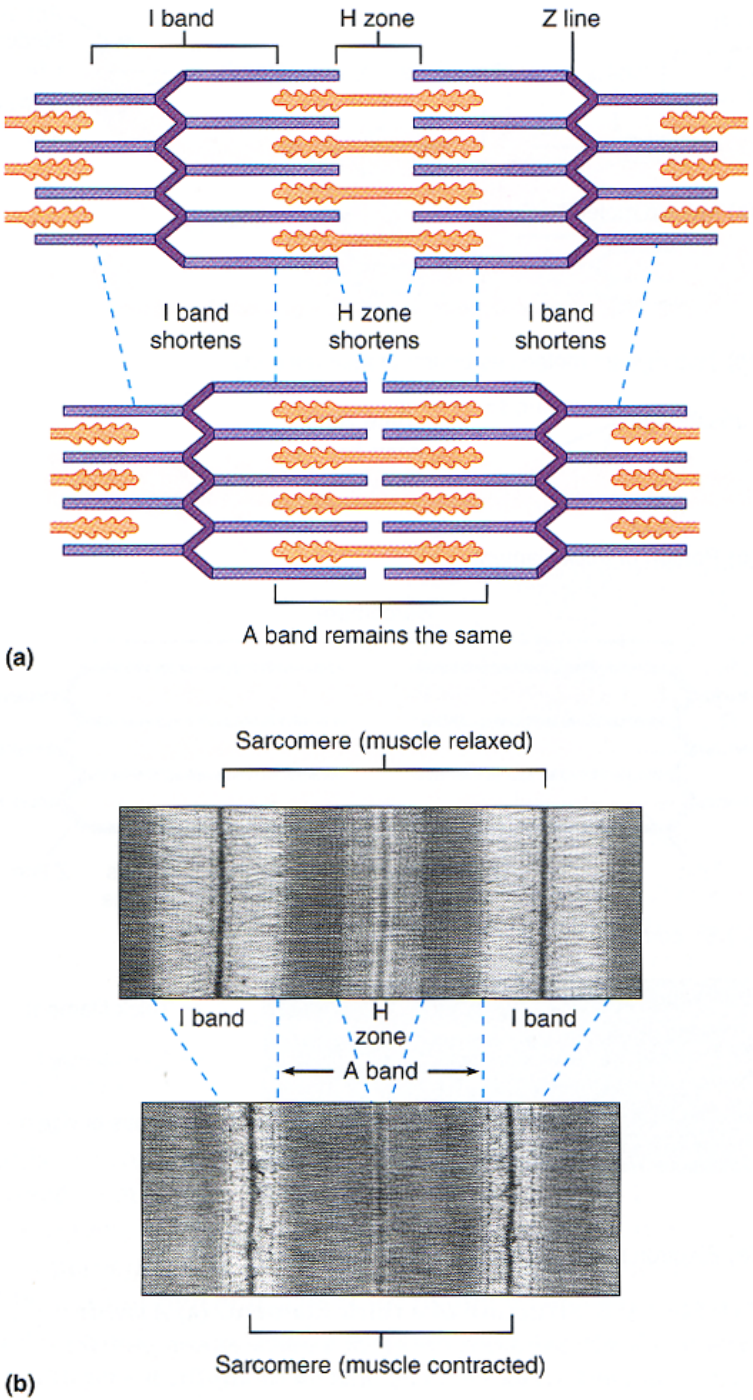


FIGURE 11.2 **Structure of a skeletal muscle fiber.** *Major internal components of a muscle fiber are shown. A single myofibril in the muscle fiber has been extended and slightly enlarged to reveal the arrangement of thick and thin filaments within it. The enlarged view shows a magnified image of a neuromuscular junction.*

L'arrangiamento geometrico dei filamenti contrattili

FIGURE 11.3 Sarcomere structure. *A drawing of a myofibril, showing the regular arrangement of protein filaments within sarcomeres. The lower photomicrograph shows the banding pattern typical of striated muscle; the photomicrograph at right shows a cross section through the A band of a myofibril, in which the three-dimensional arrangement of thick and thin filaments can be clearly seen.*





I filamenti contrattili del sarcomero:

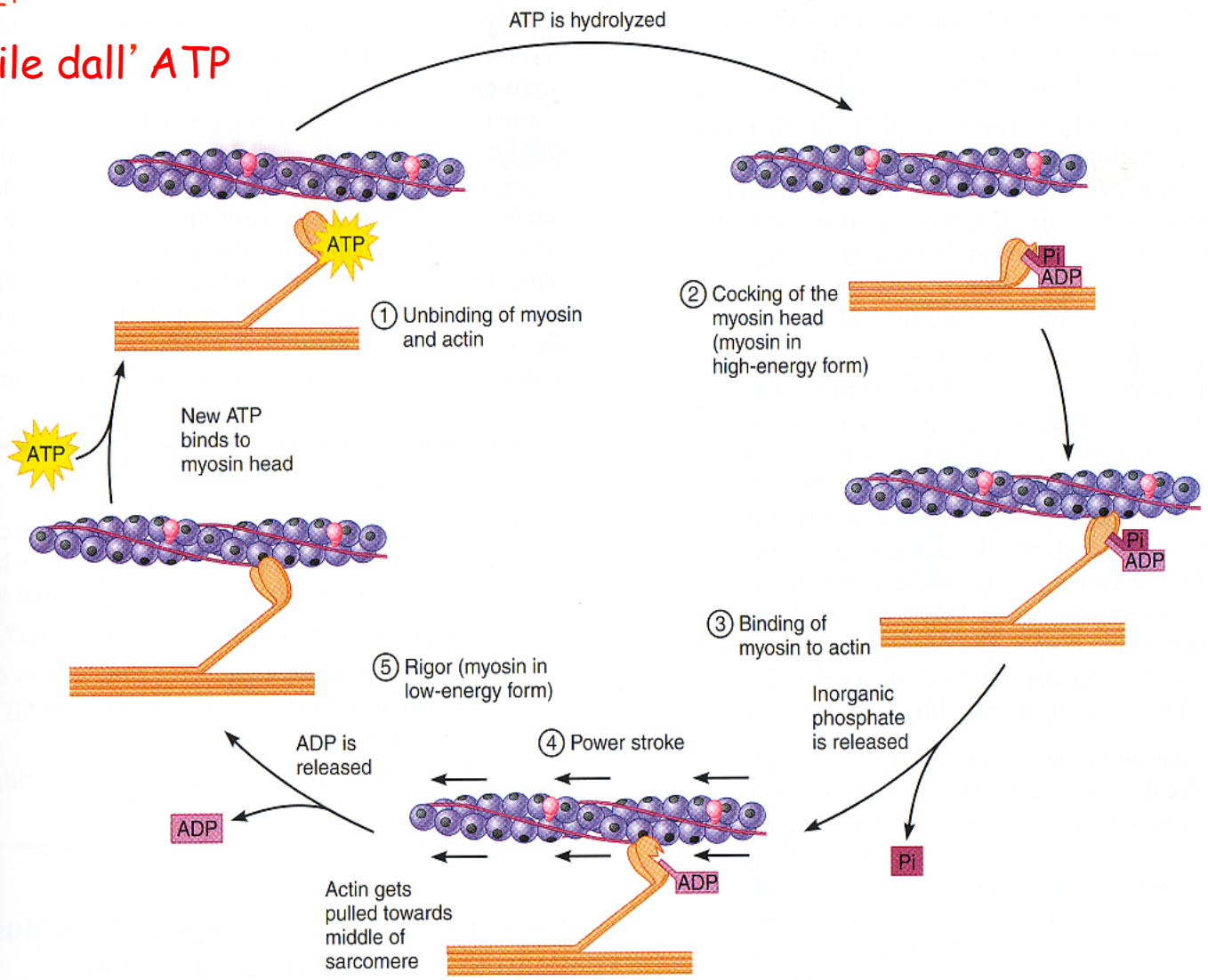
- l' actina (filamenti sottili)
- la miosina (filamenti spessi)

(proteine accessorie)

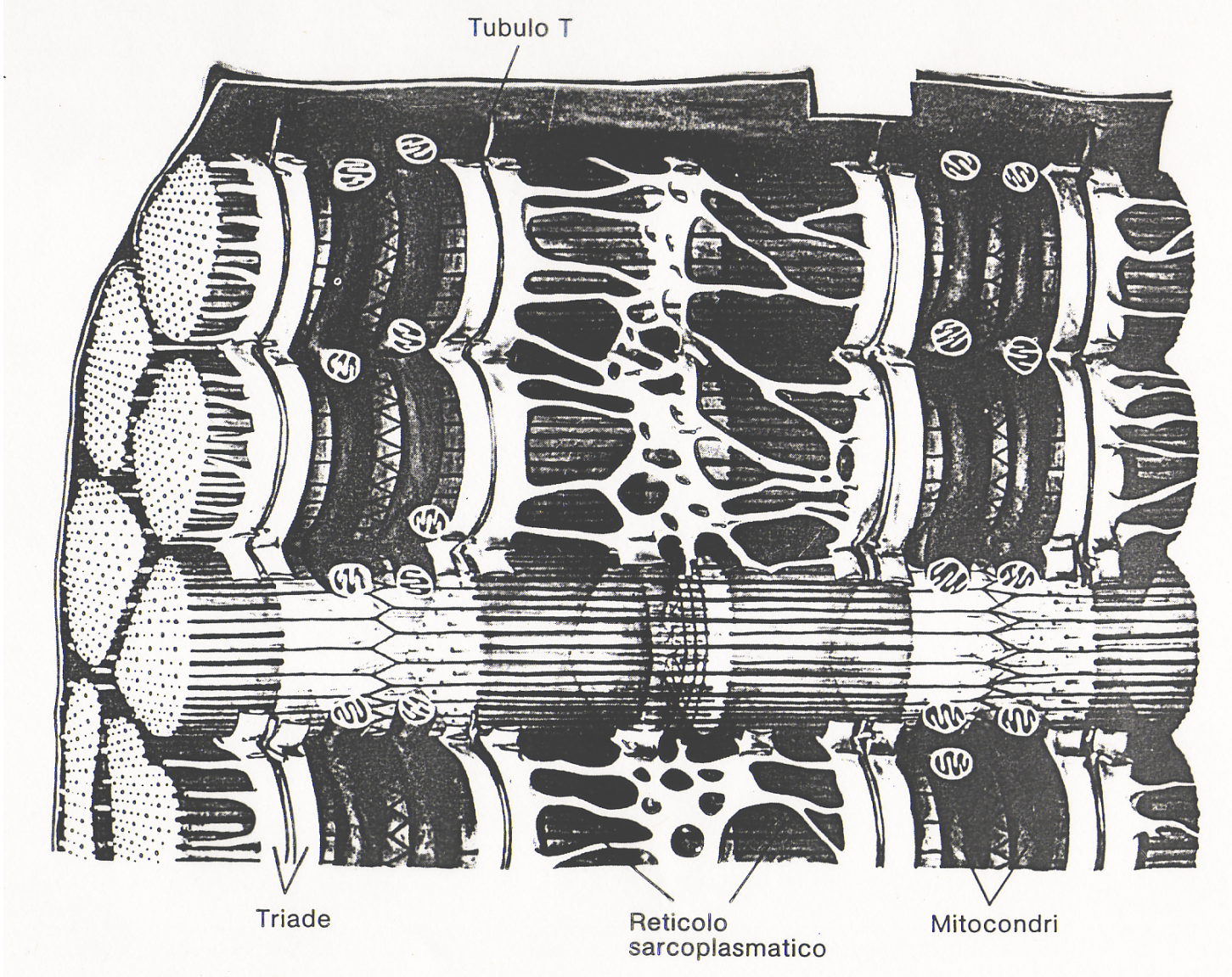
FIGURE 11.6 **How changes in striation pattern are explained by the sliding-filament model of muscle contraction.** *A schematic drawing* **(a)** *and photomicrographs* **(b)** *showing the relative positions of the thick and thin filaments in sarcomeres in relaxed muscle (top) and contracted muscle (bottom).*

La formazione del ponte acto-miosinico

- necessita di Ca^{2+}
- è reso reversibile dall' ATP



Il deposito intracellulare di Ca^{2+}: il reticolo sarcoplasmatico



Il meccanismo di accoppiamento eccitazione-contrazione

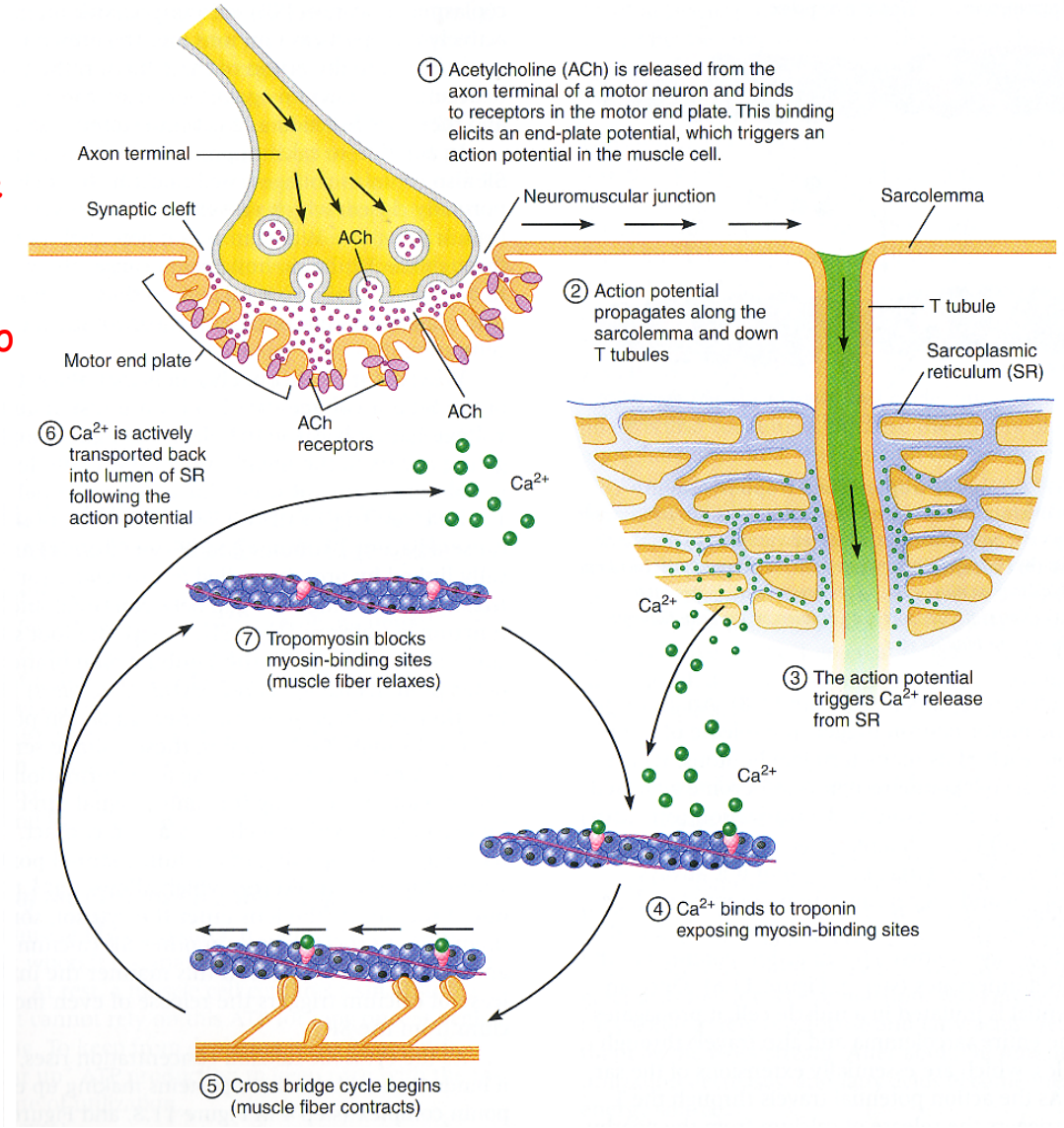
1) Rilascio di acetilcolina

2) Potenziale d' azione muscolare

3) Liberazione di Ca^{2+} dal reticolo

5) Interazione actina-miosina

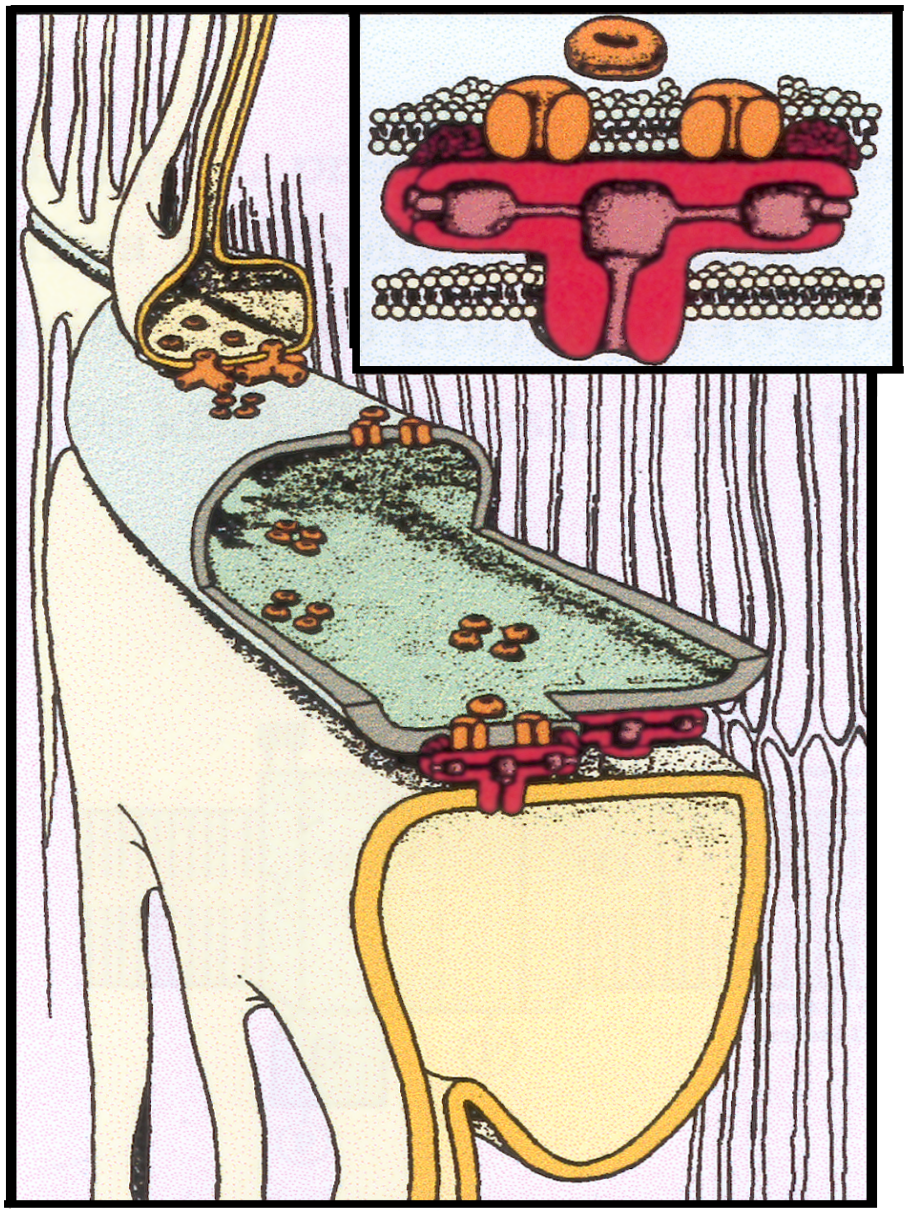
6) Contrazione



La triade ed i canali ionici:

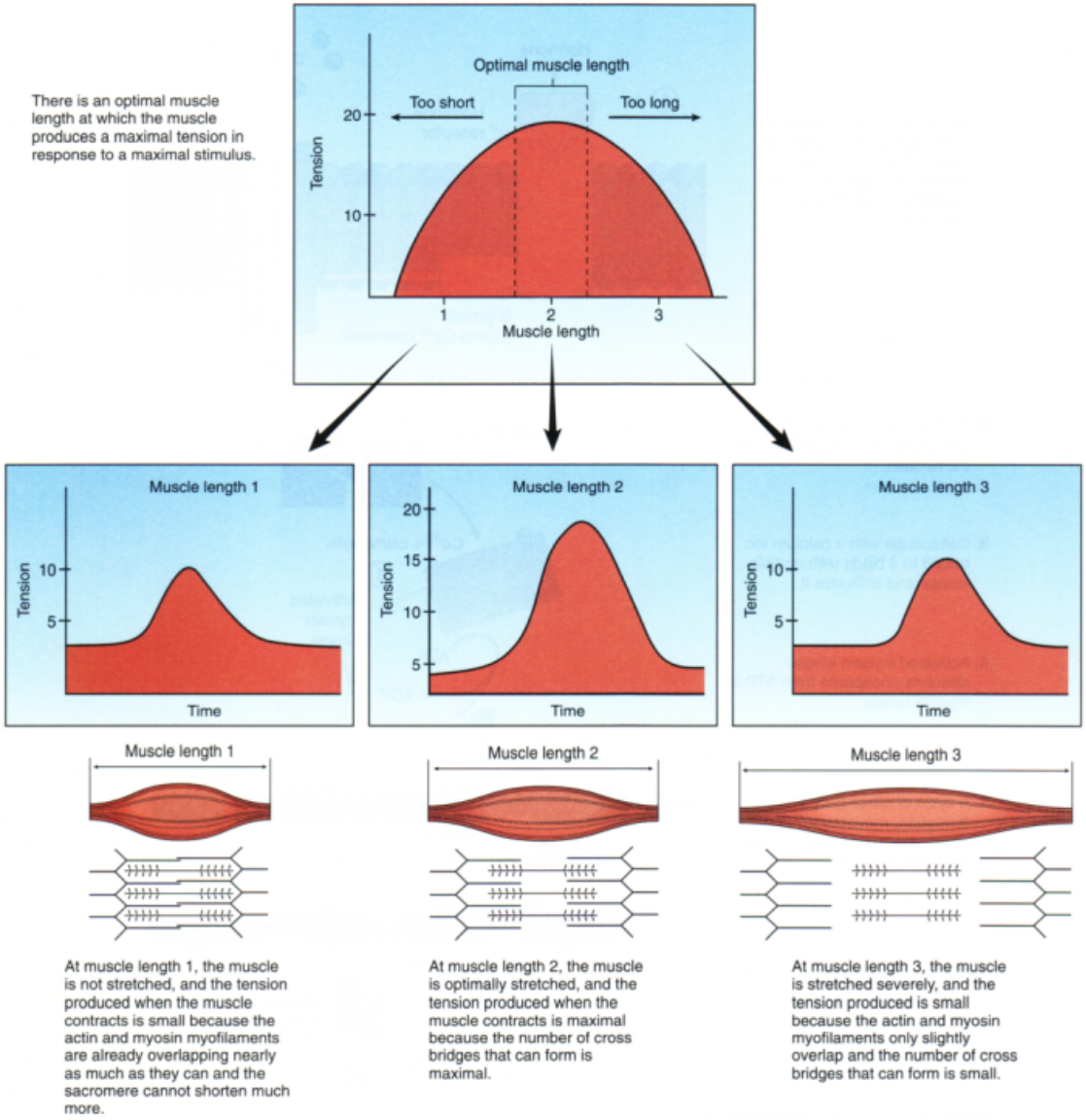
- canali voltaggio-dipendenti per il Ca^{2+} (DHPR)

- canali per il Ca^{2+} rianodina-sensibili o canali caffeina-sensibili (RyR)



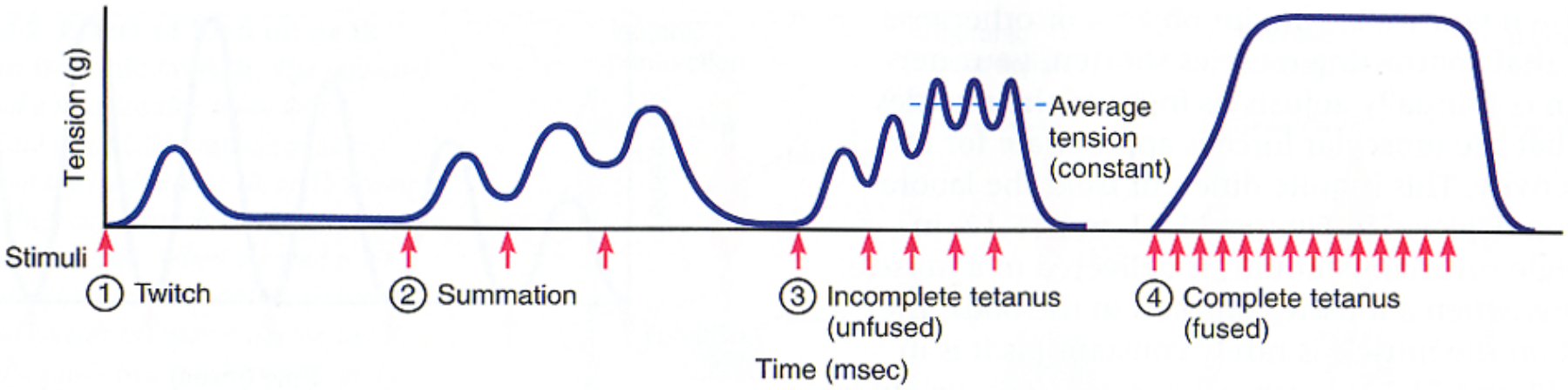
(modificata da Ríos and Pizarro, 1991)

La modulazione della forza sviluppata dal muscolo: il ruolo della lunghezza del sarcomero



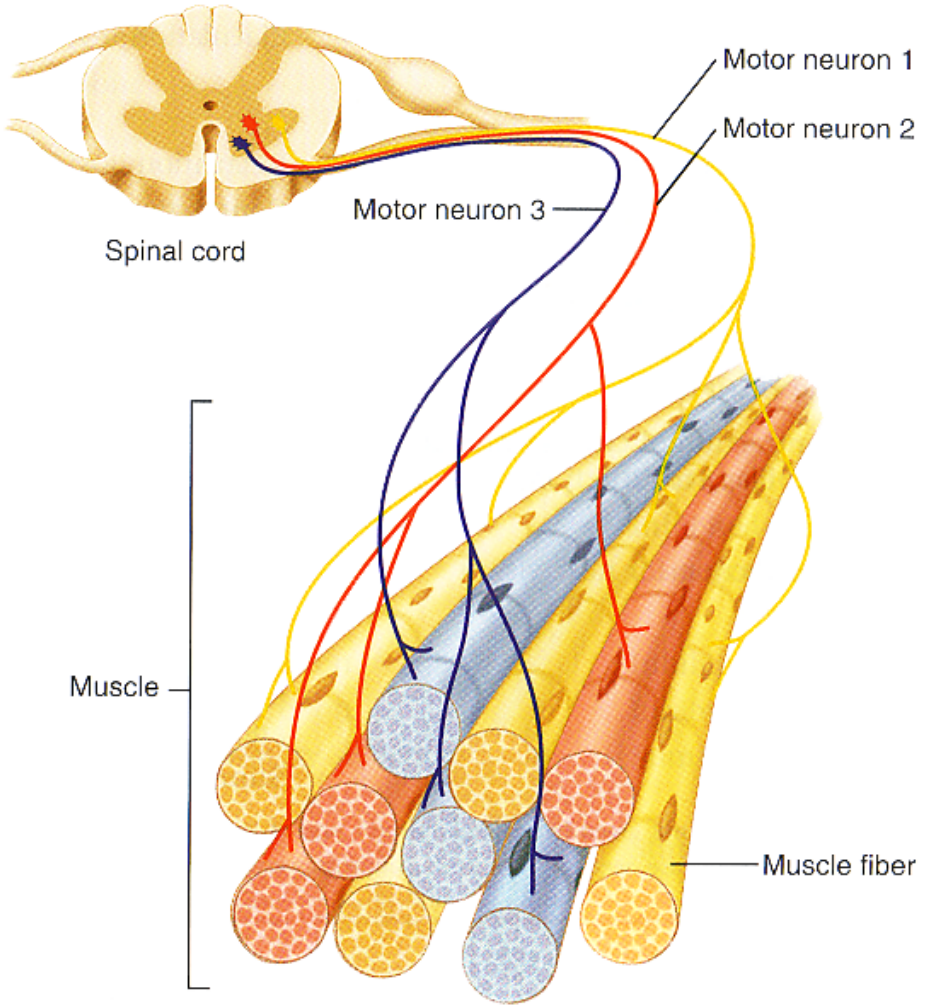
La modulazione della forza sviluppata dal muscolo: la sommazione dei transienti di Ca^{2+}

FIGURE 11.15 Effects of high stimulus frequency: summation and tetanus.
In response to repetitive stimuli (arrows) delivered close together in time, muscle twitches superimpose in summation. A train of more frequent stimuli causes tension to rise with each twitch until the muscle reaches incomplete tetanus, characterized by a plateau composed of individually distinguishable twitches. Still greater stimulus frequency produces complete tetanus, in which force increases swiftly and smoothly to a plateau in which individual twitches are no longer distinguishable.



Ogni muscolo è un insieme di unità motorie

FIGURE 10.14 Motor units. *A motor unit consists of a motor neuron and all the muscle fibers it innervates. Whereas a single neuron innervates many muscle fibers, a given muscle fiber is innervated by one motor neuron only. Note that the muscle fibers within a given motor unit are scattered throughout the muscle.*



La modulazione della forza sviluppata dal muscolo: il reclutamento delle unità motorie

FIGURE 11.18 Increases in force generation with recruitment of motor units. **(a)** *A hypothetical motor unit consisting of a motor neuron and a single muscle fiber.* **(b)** *Motor units X and Y, which possess five fibers and seven fibers, respectively.* **(c)** *Tension developed by the single fiber, by motor unit X, by motor unit Y, and by motor units X and Y together.*