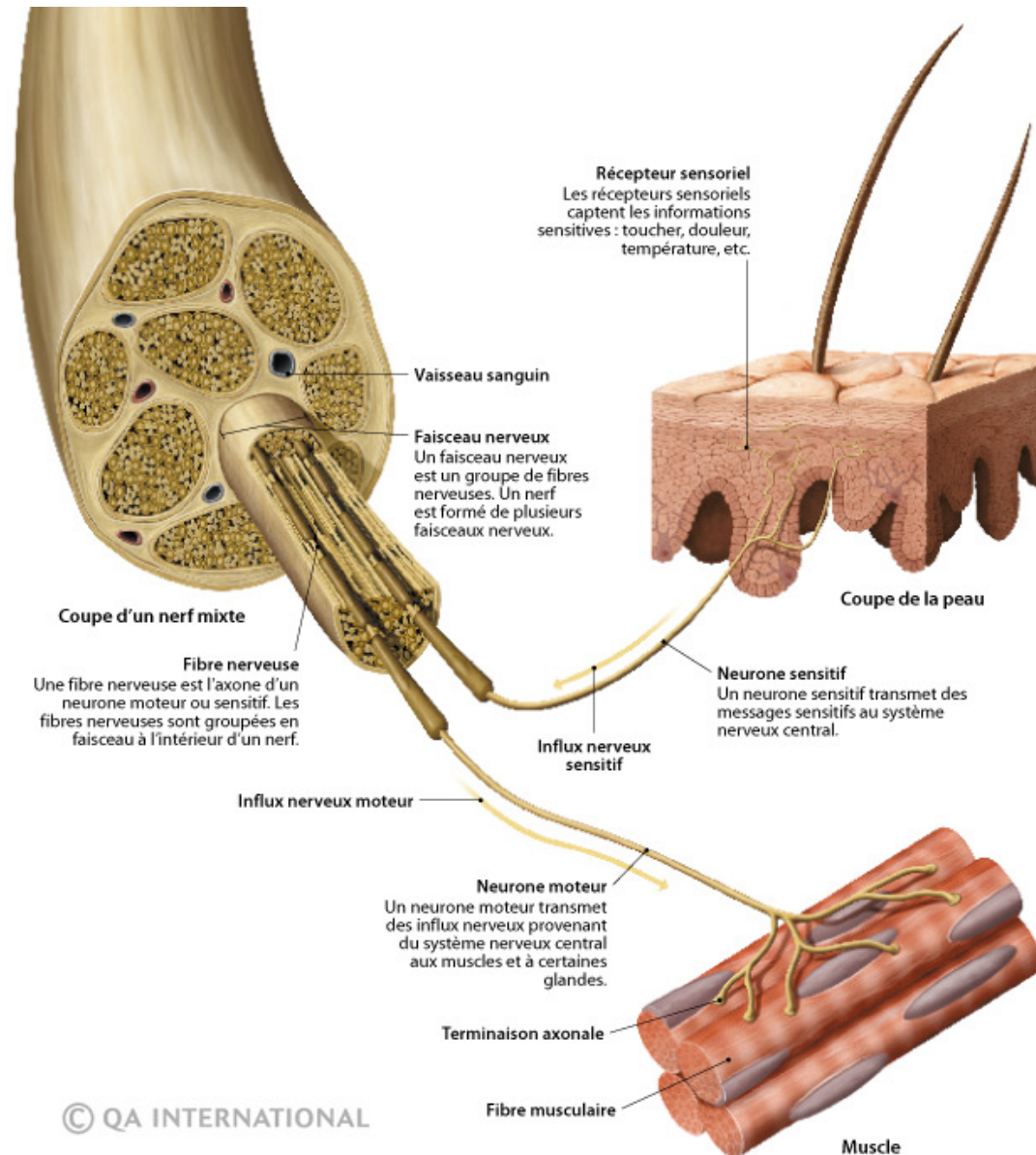


Un nerf mixte : moteur et sensitif



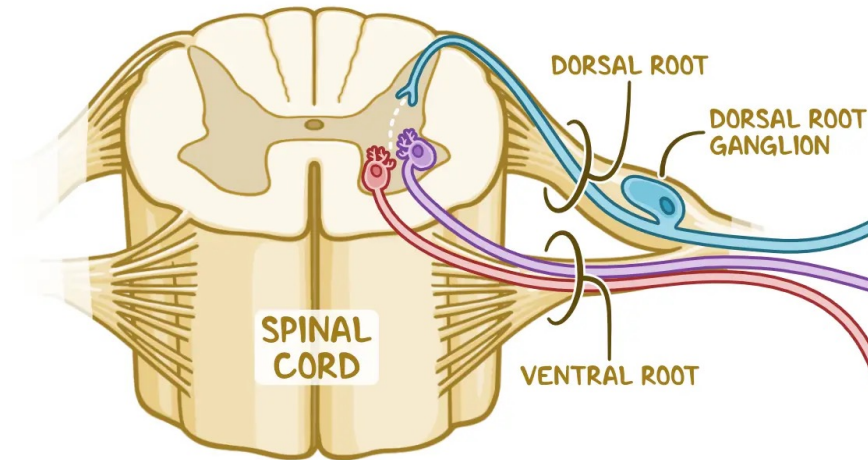
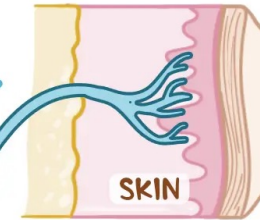
Influx nerveux **afférent**.

Efférence somatique

Influx nerveux **efférent**
vers un muscle strié
déclenche la contraction
des rhabdomyocytes.

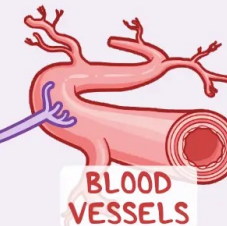
AFFERENT NEURONS

- * CARRY SENSORY INFO from RECEPTORS in SKIN/ OTHER ORGANS → CENTRAL NERVOUS SYSTEM
~ aka SENSORY NEURONS
- * CELL BODIES are LOCATED OUTSIDE of the SPINAL CORD



AUTONOMIC DIVISION

- * REGULATES INVOLUNTARY BODY RESPONSES



SOMATIC DIVISION

- * VOLUNTARY MOVEMENT by SKELETAL MUSCLES

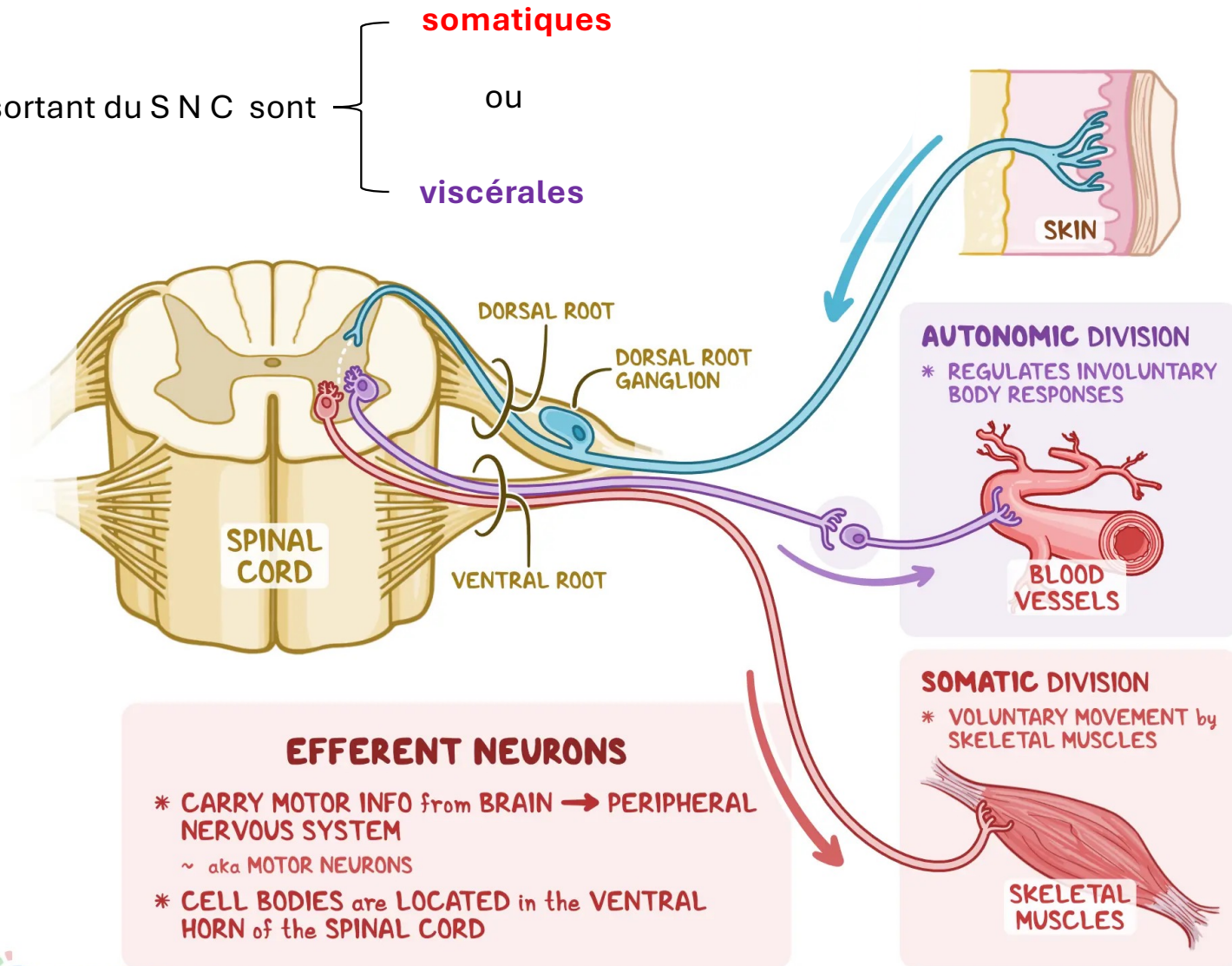


EFFERENT NEURONS

- * CARRY MOTOR INFO from BRAIN → PERIPHERAL NERVOUS SYSTEM
~ aka MOTOR NEURONS
- * CELL BODIES are LOCATED in the VENTRAL HORN of the SPINAL CORD

Les éférences sortant du S N C sont {
 somatiques
 ou
 viscérales

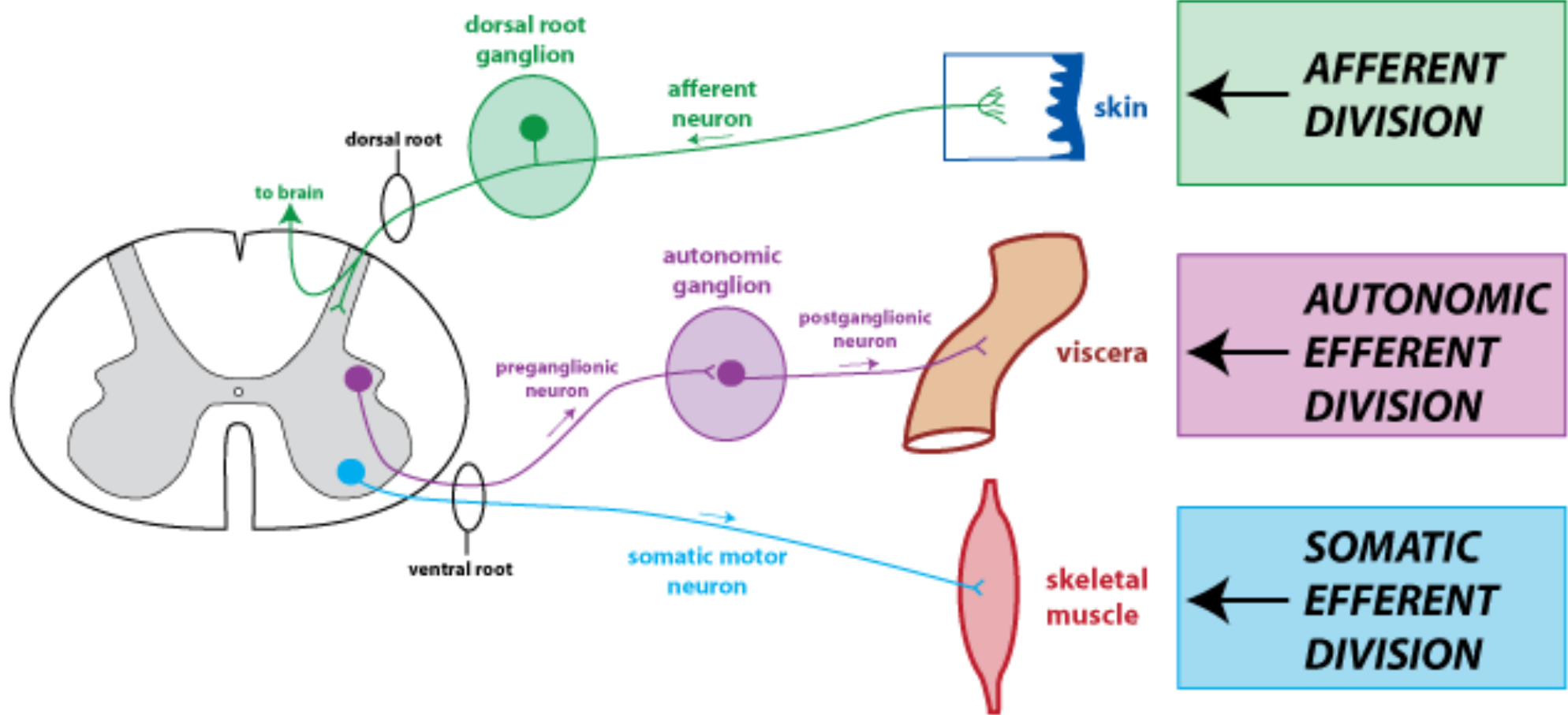
illustration pour
 les nerfs spinaux



muscle lisse

muscle strié

PERIPHERAL NERVOUS SYSTEM



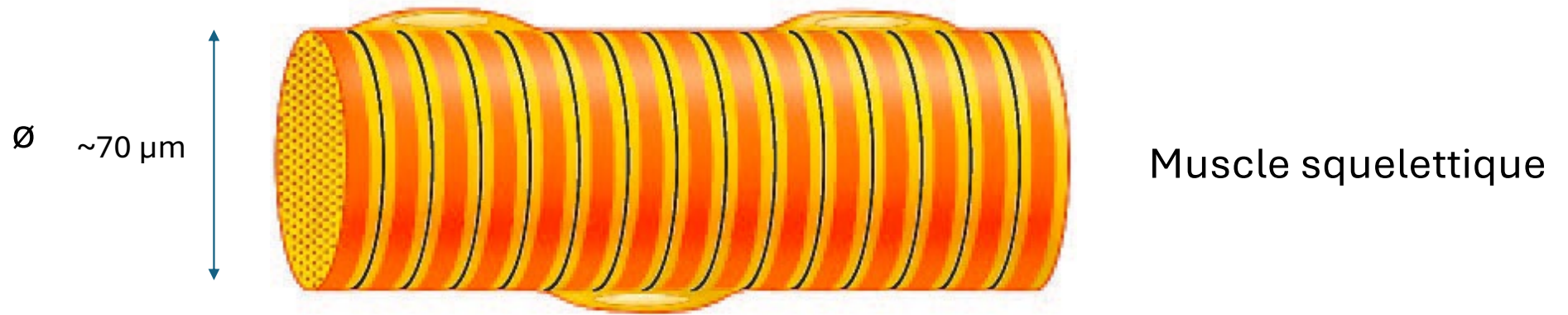
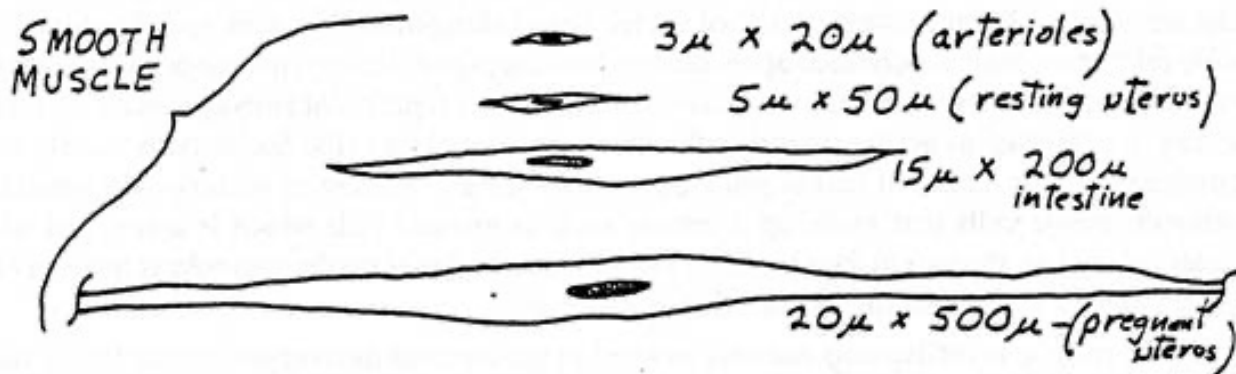


FIGURE 9-3

The three types of muscle fibers. Only a small portion of the skeletal muscle fiber is shown. (not drawn to scale)



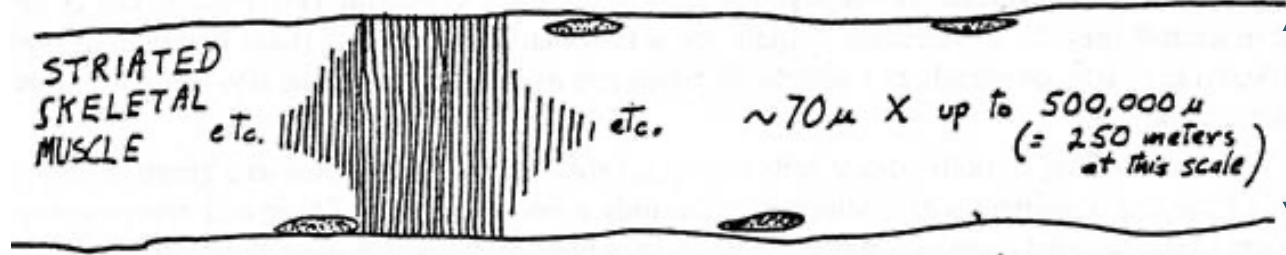
Muscle lisse



muscle lisse vasculaire

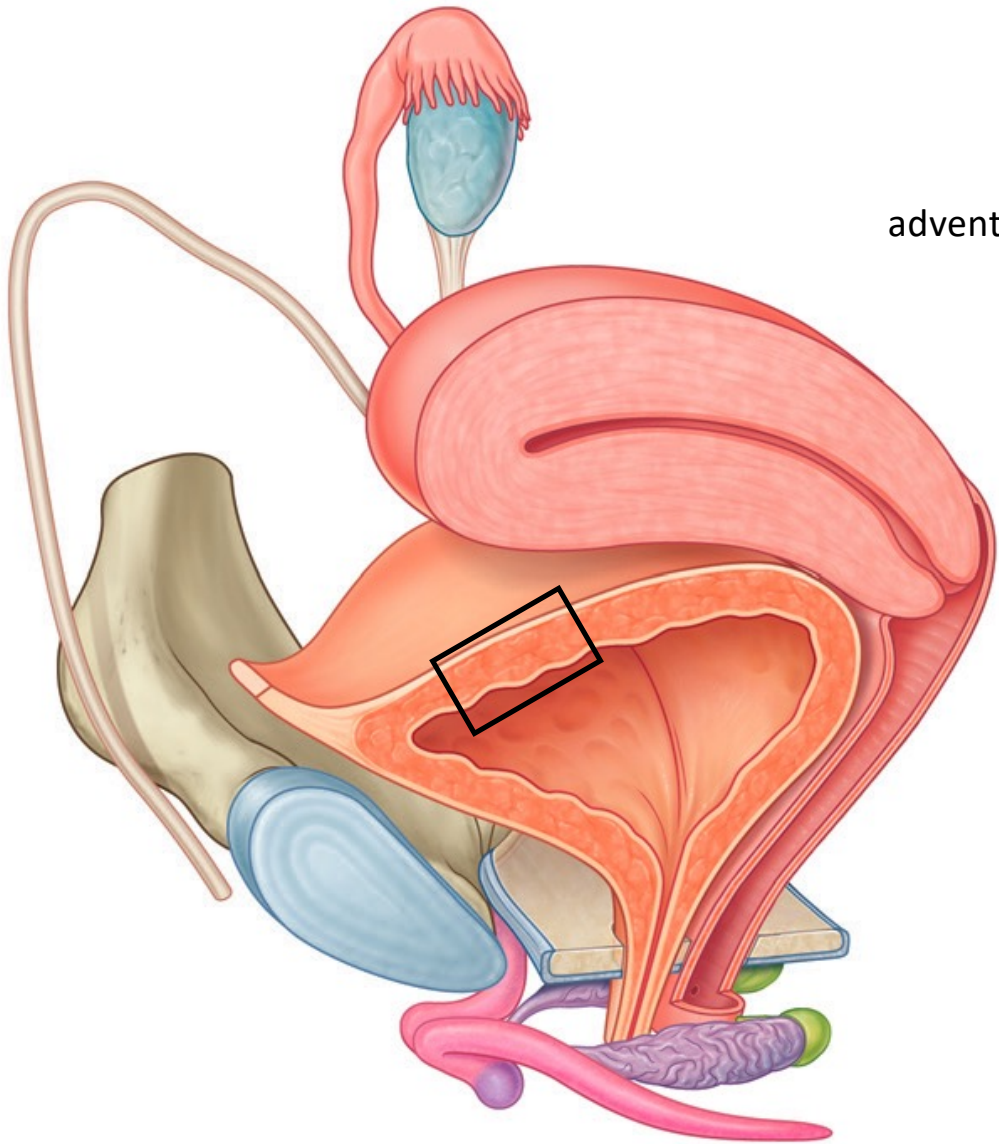
muscle lisse digestif

Muscle strié



Muscle cardiaque

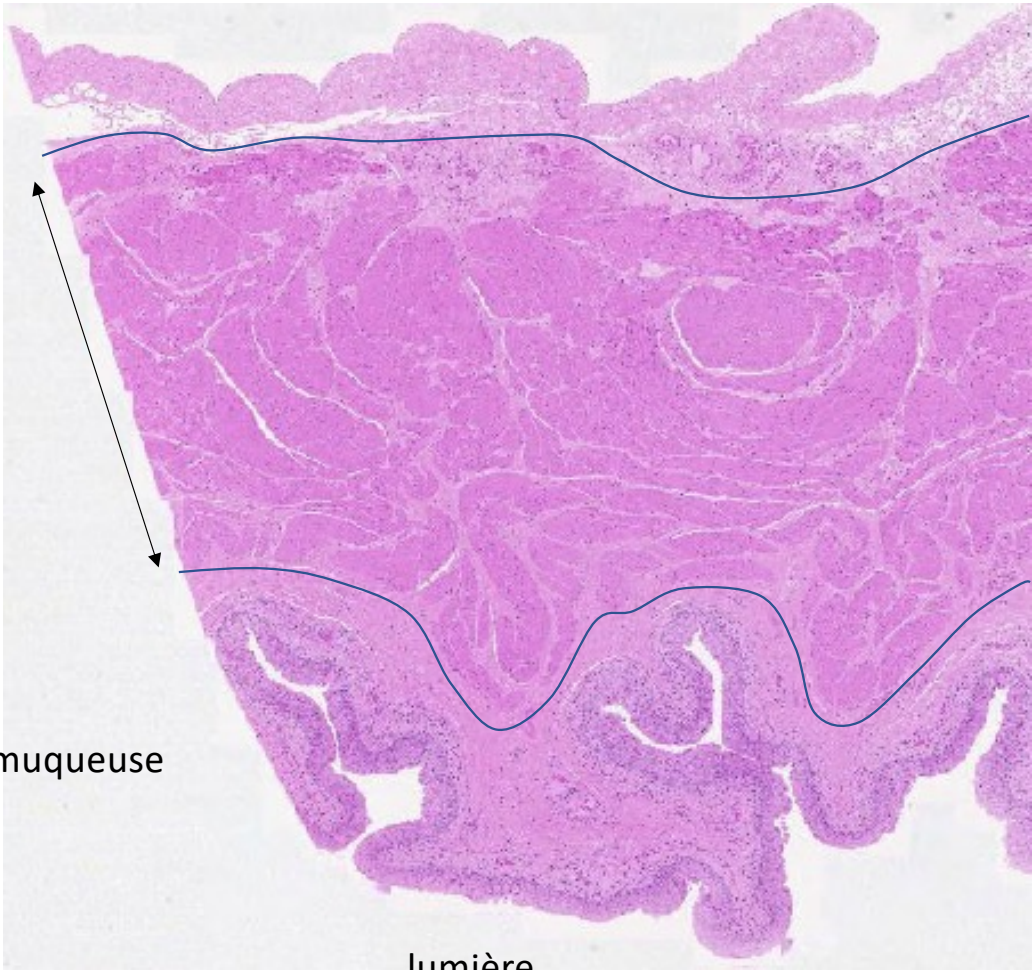




Muscle lisse

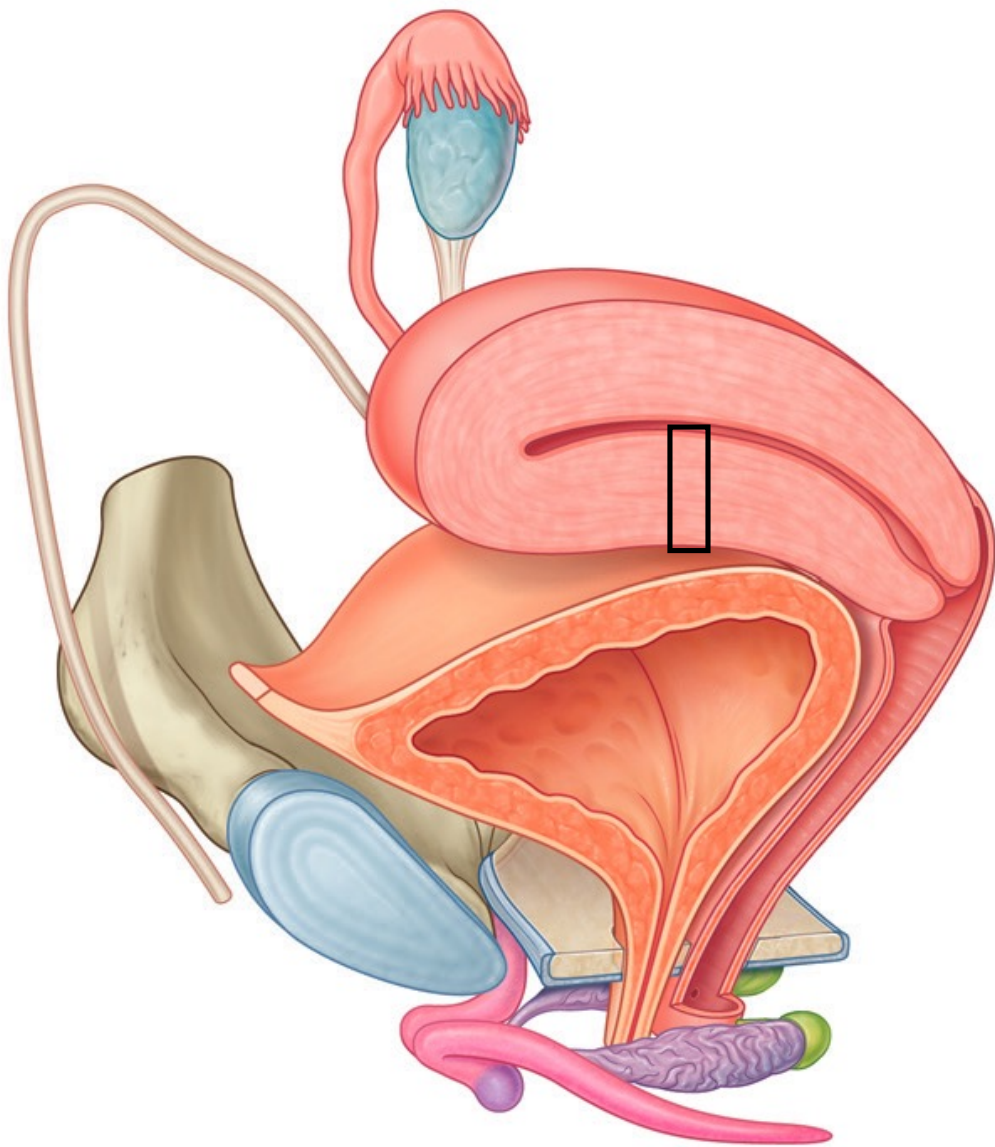
vessie

adventice



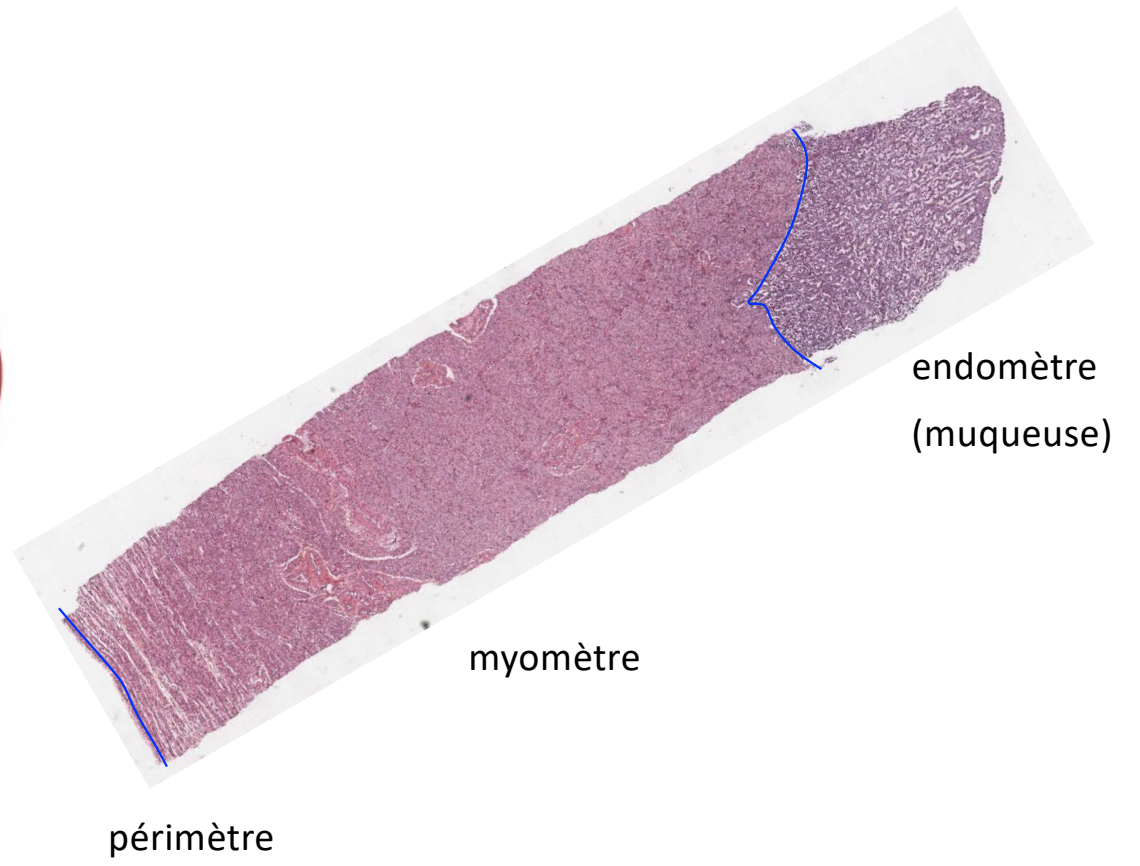
muqueuse

lumière



Muscle lisse

utérus



endomètre
(muqueuse)

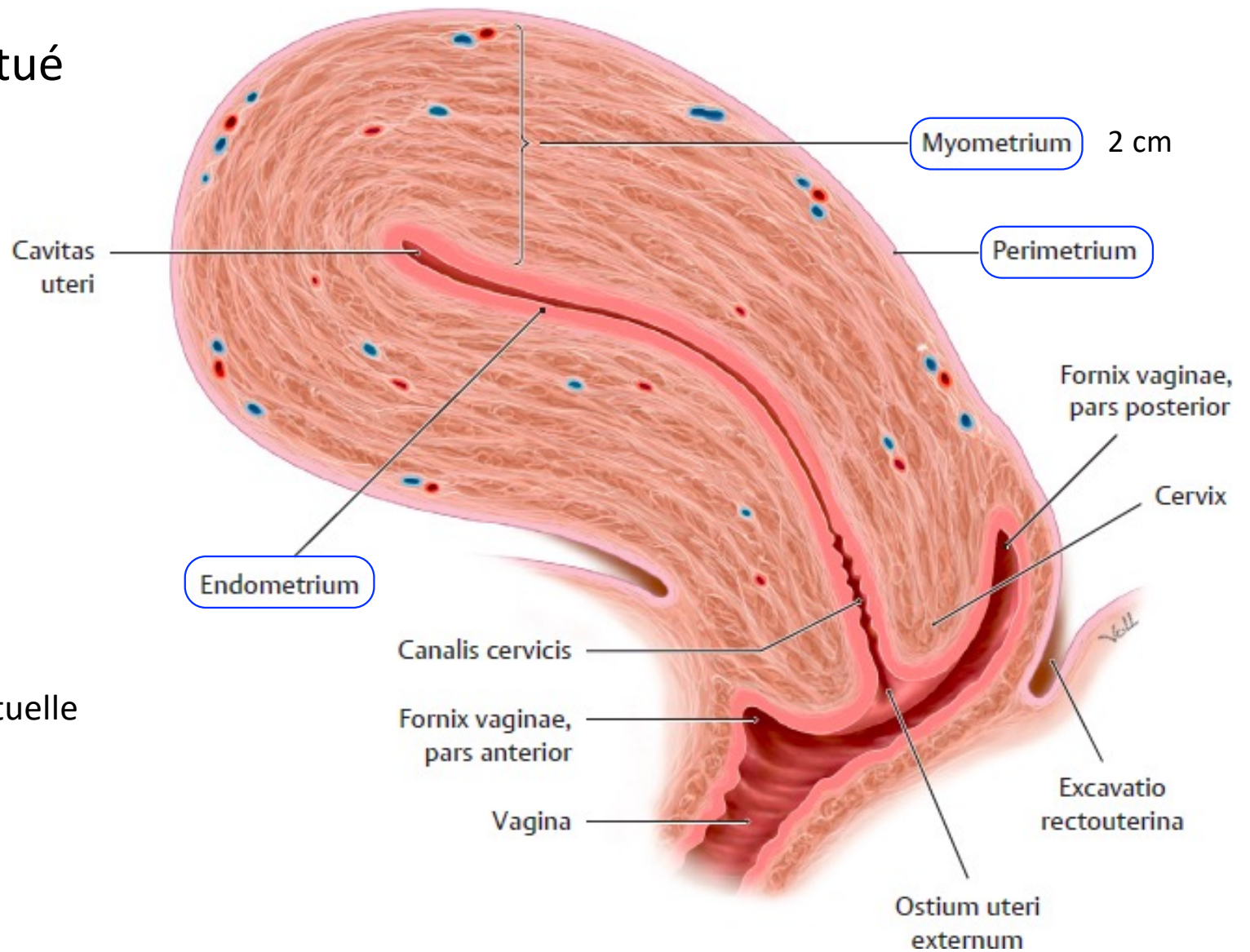
myomètre

périmètre

L'utérus est constitué
de 3 couches :

- **Endomètre**
épithélium
lamina propria
- **Myomètre**
- **Périmètre**

La cavité utérine est virtuelle



Muscle lisse

relâché

contracté

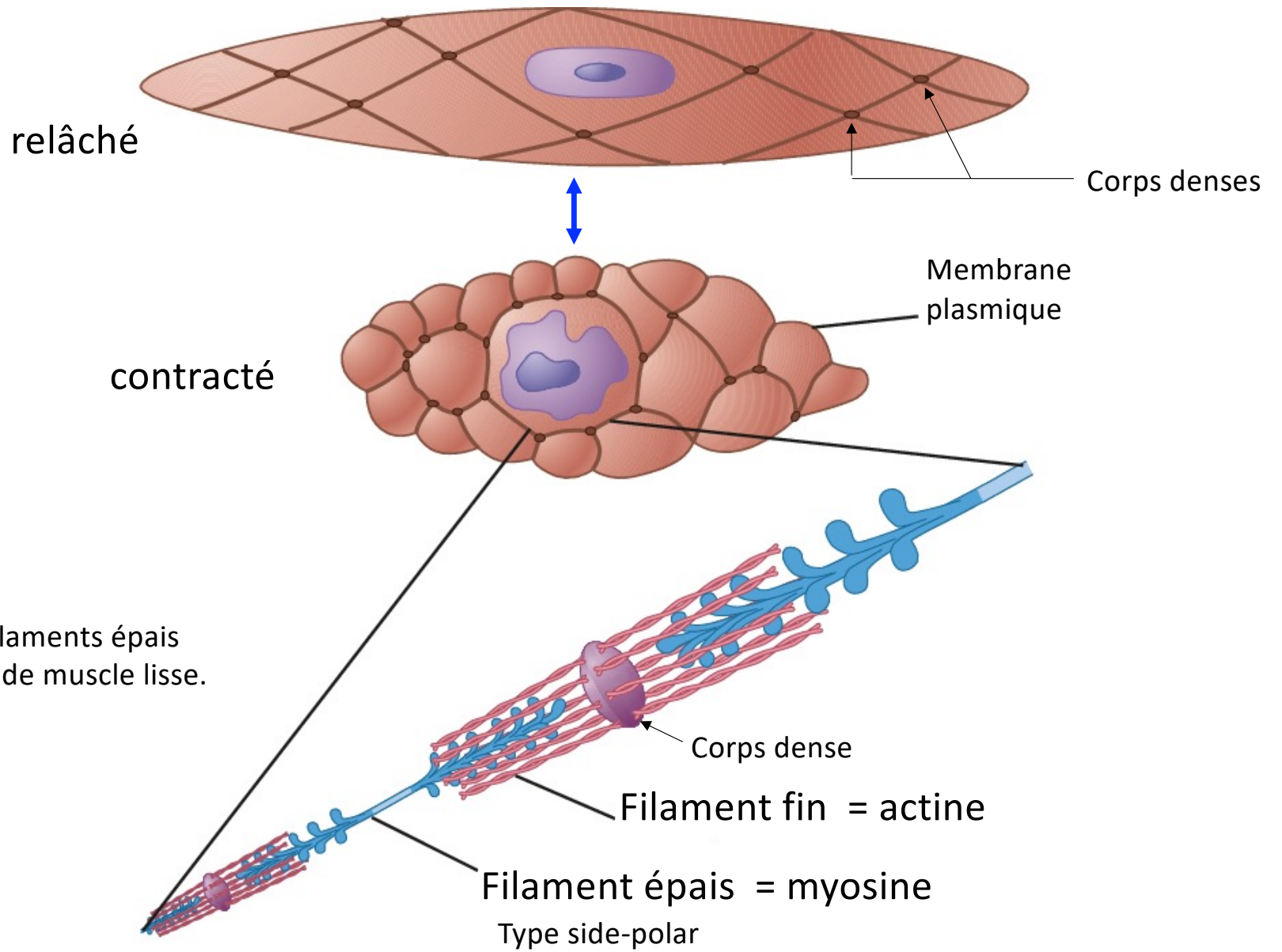


noyau en cigare

noyau en tire-bouchon

Figure 11.27

Muscle lisse

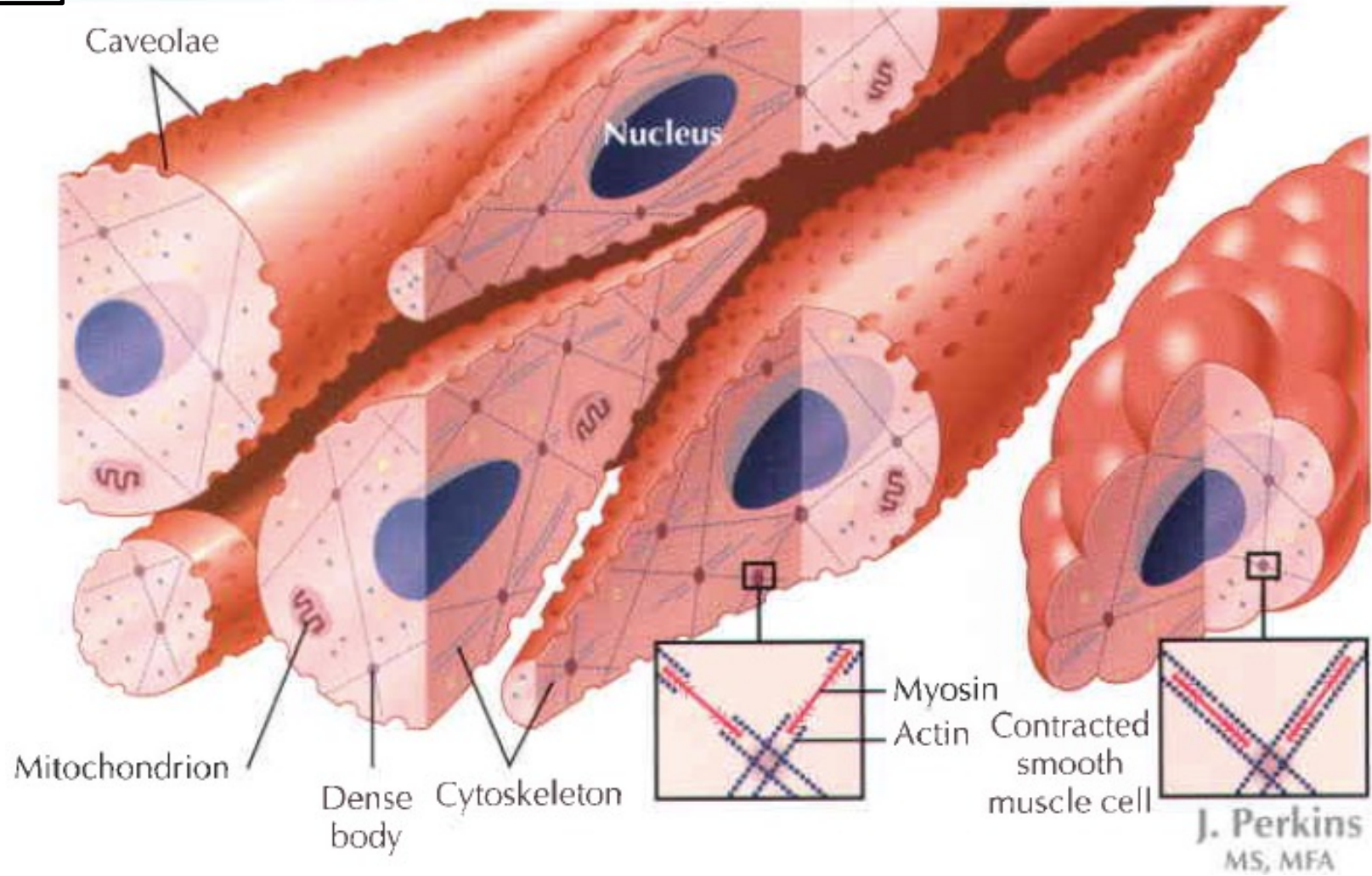


Notez l'erreur :
Le noyau se déforme
en tire-bouchon

Notez l'erreur :
L'artiste a représenté des filaments épais
bipolaires dans une cellule de muscle lisse.

Filament fin = actine
Filament épais = myosine
Type side-polar

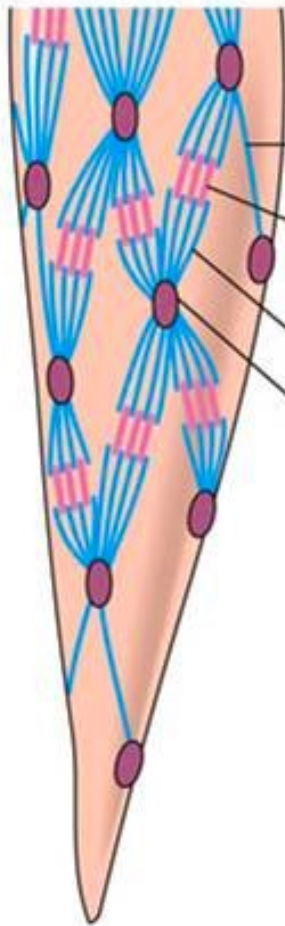
Muscle lisse



La contraction implique le glissement de la myosine par rapport à l'actine.



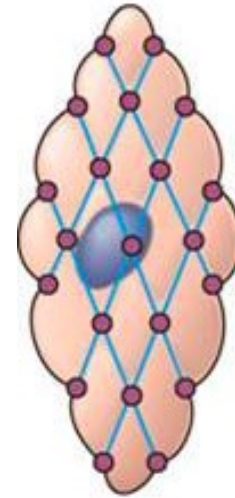
(a)
relâché



Intermediate filament
Thick filament
Thin filament
Dense body



Muscle lisse



(b)
© 2007 Thomson Higher Education

contracté

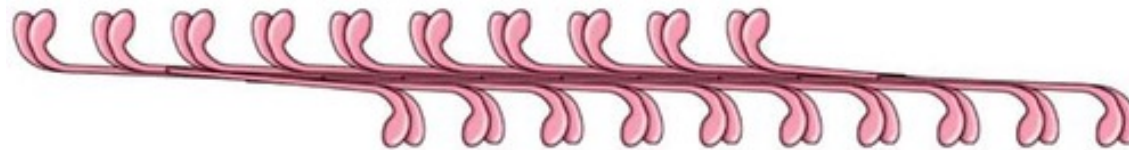
Assemblage des molécules de **Myosines** en filaments musculaires épais.

Muscle strié



bipolar thick filament

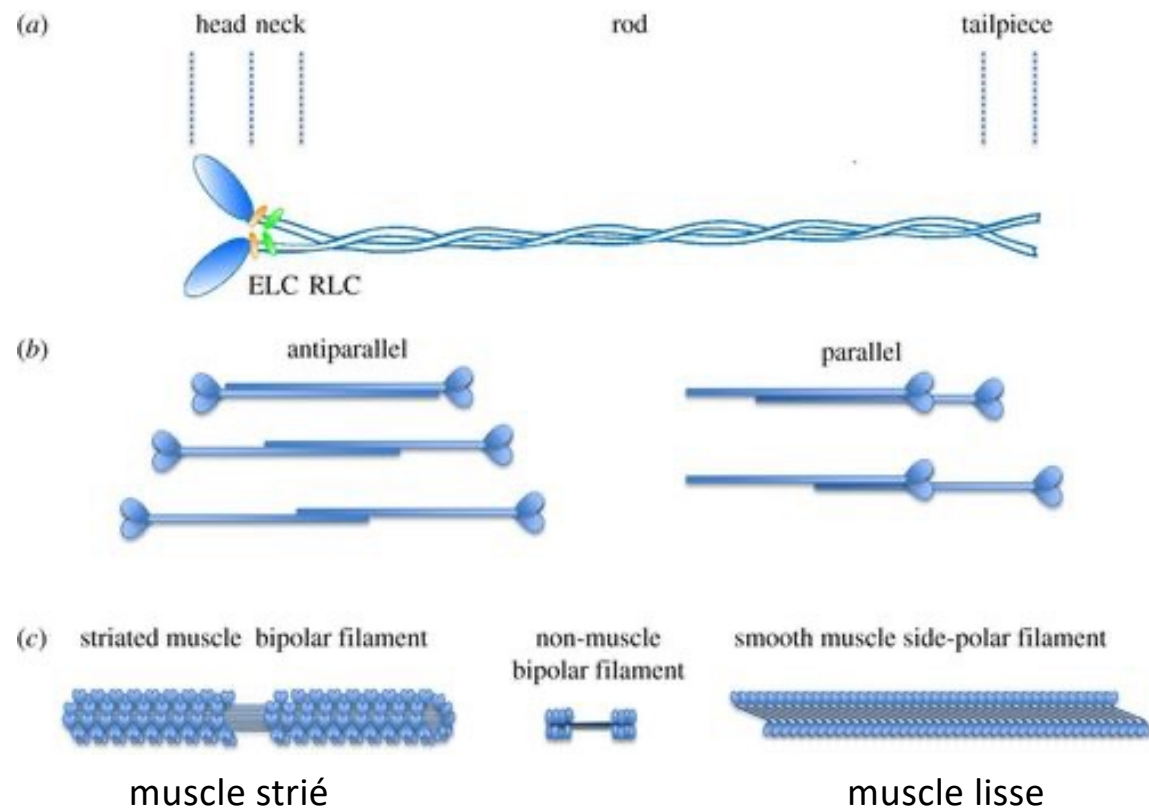
Muscle lisse



side-polar thick filament

Myosine II des muscles striés \neq myosine des muscles lisses \rightarrow assemblage différent

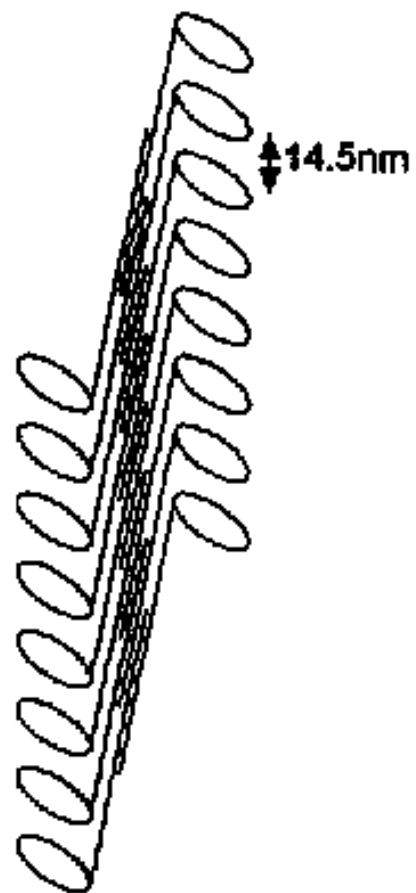
Essential Light Chain
Regulatory Light Chain



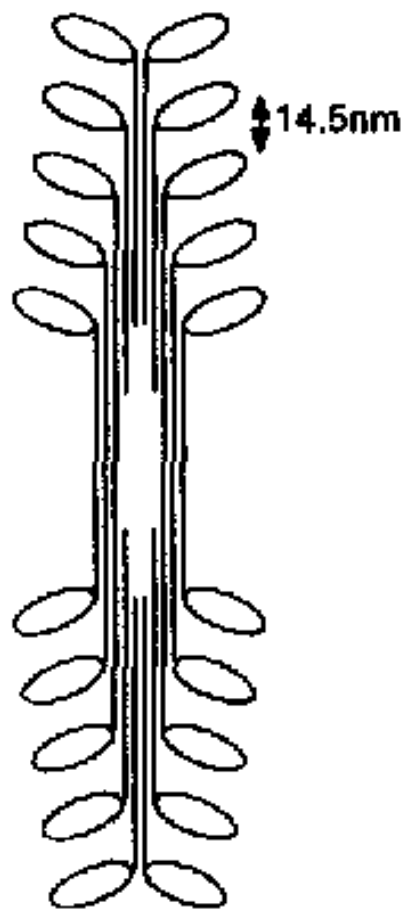
Ordering of myosin II filaments driven by mechanical forces: experiments and theory.

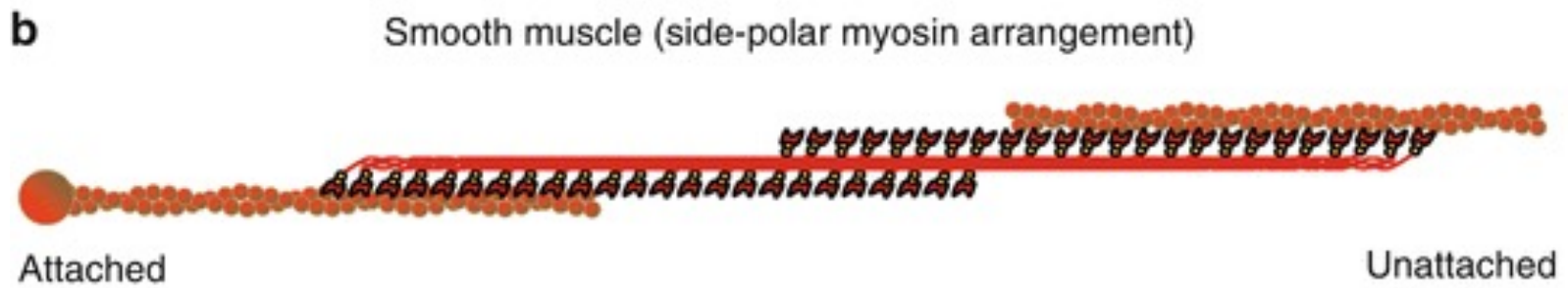
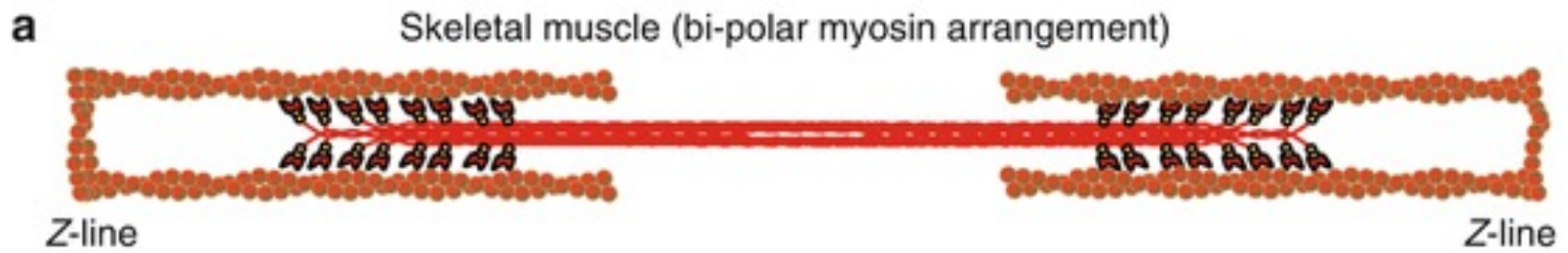
<https://royalsocietypublishing.org/doi/10.1098/rstb.2017.0114>

Side-polar



Bipolar



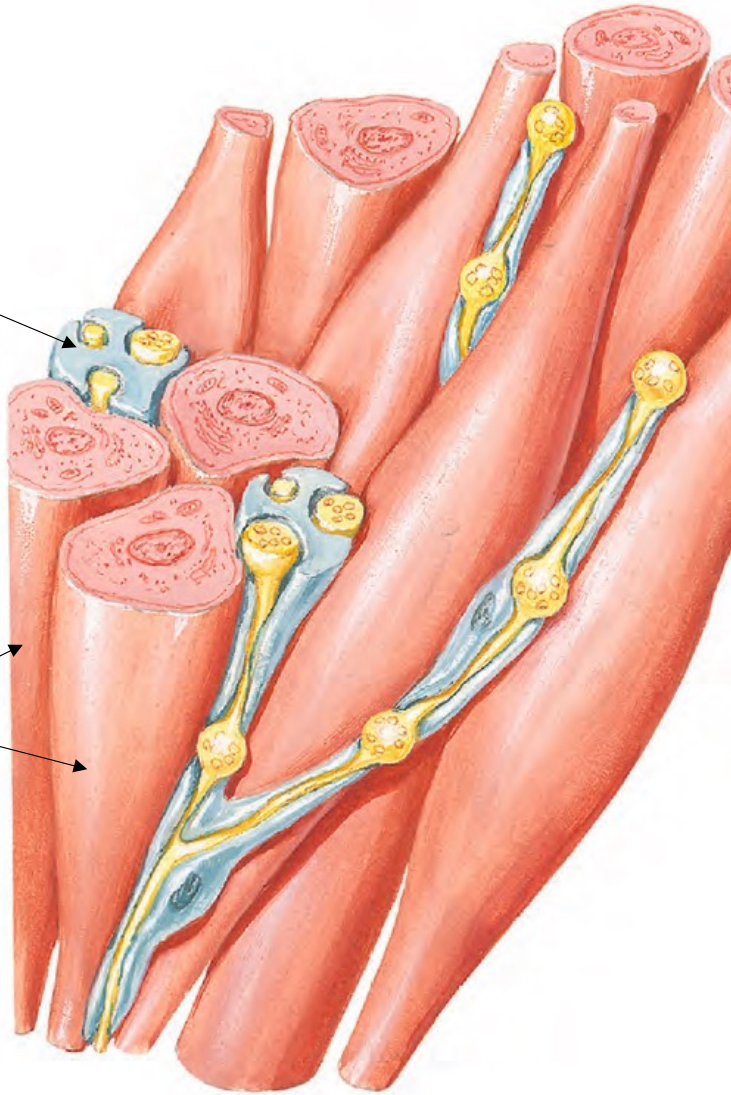


Muscle lisse

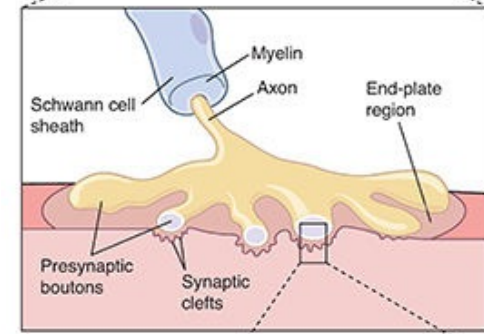
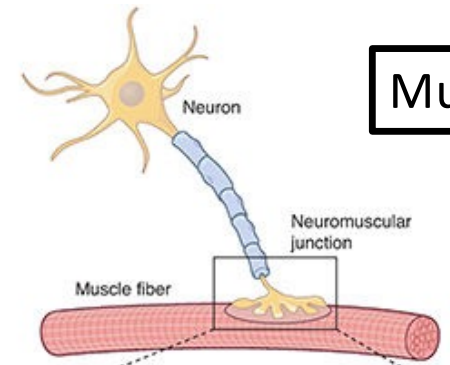
Cellule de Schwann

Myocytes fusiforme
noyau central

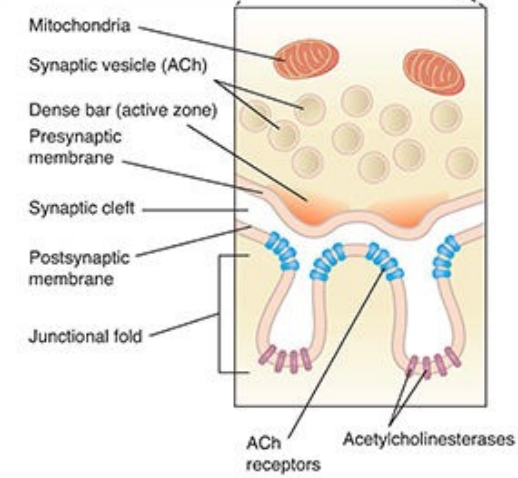
Innervation par le
S N autonome



Muscle strié



Jonction
neuro-musculaire



Nerve terminals in smooth muscle are observed only in the connective tissue adjacent to the muscle cells.

Nerve fibers pass through the connective tissue within the bundles of smooth muscle cells; enlargements in the passing nerve fiber, or **bouton en passant** (see page 362), occur adjacent to the muscle cells to be innervated. The enlargements contain synaptic vesicles with neuromuscular transmitters. However, the neuromuscular site is not comparable to the neuromuscular junction of striated muscle. Rather, a considerable distance, usually 10 to 20 μm (in some locations, up to 200 μm), may separate the nerve terminal and the smooth muscle. The neurotransmitter released by the nerve terminal must diffuse across this distance to reach the muscle.

Not all smooth muscle cells are exposed directly to the neurotransmitter, however. As discussed above, smooth muscle cells make contact with neighboring cells by **gap junctions**. As in cardiac muscle, contraction is propagated from cell to cell via gap junctions, thus producing coordinated activity within a smooth muscle bundle or layer. The gap junction between two smooth muscle cells was originally designated a **nexus**, a term still in use.

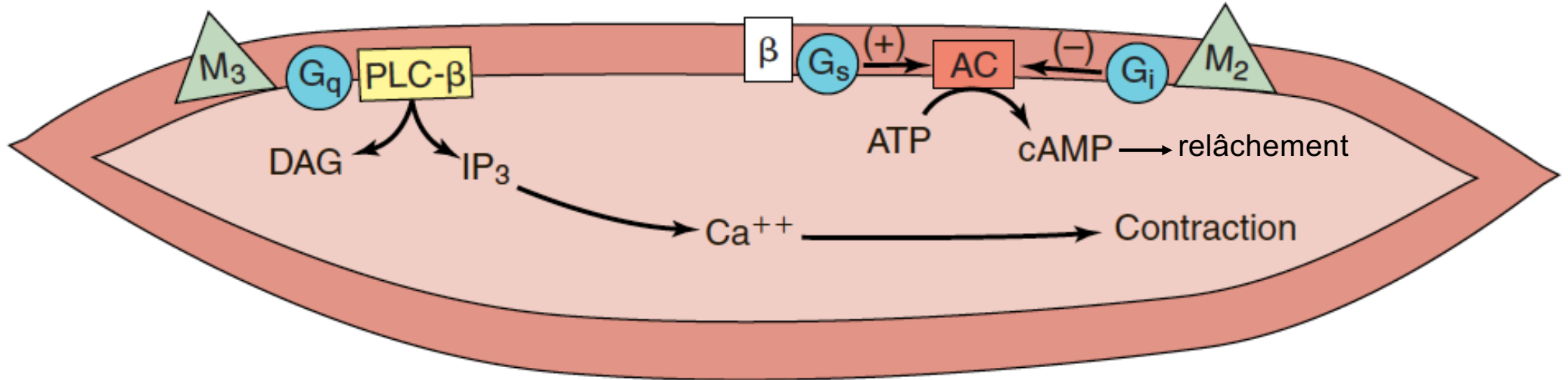
Cellule musculaire lisse

Smooth Muscle Cell

Activation leads to contraction

Activation leads to relaxation

Activation inhibits relaxation



Muscle lisse

Figure importante !!

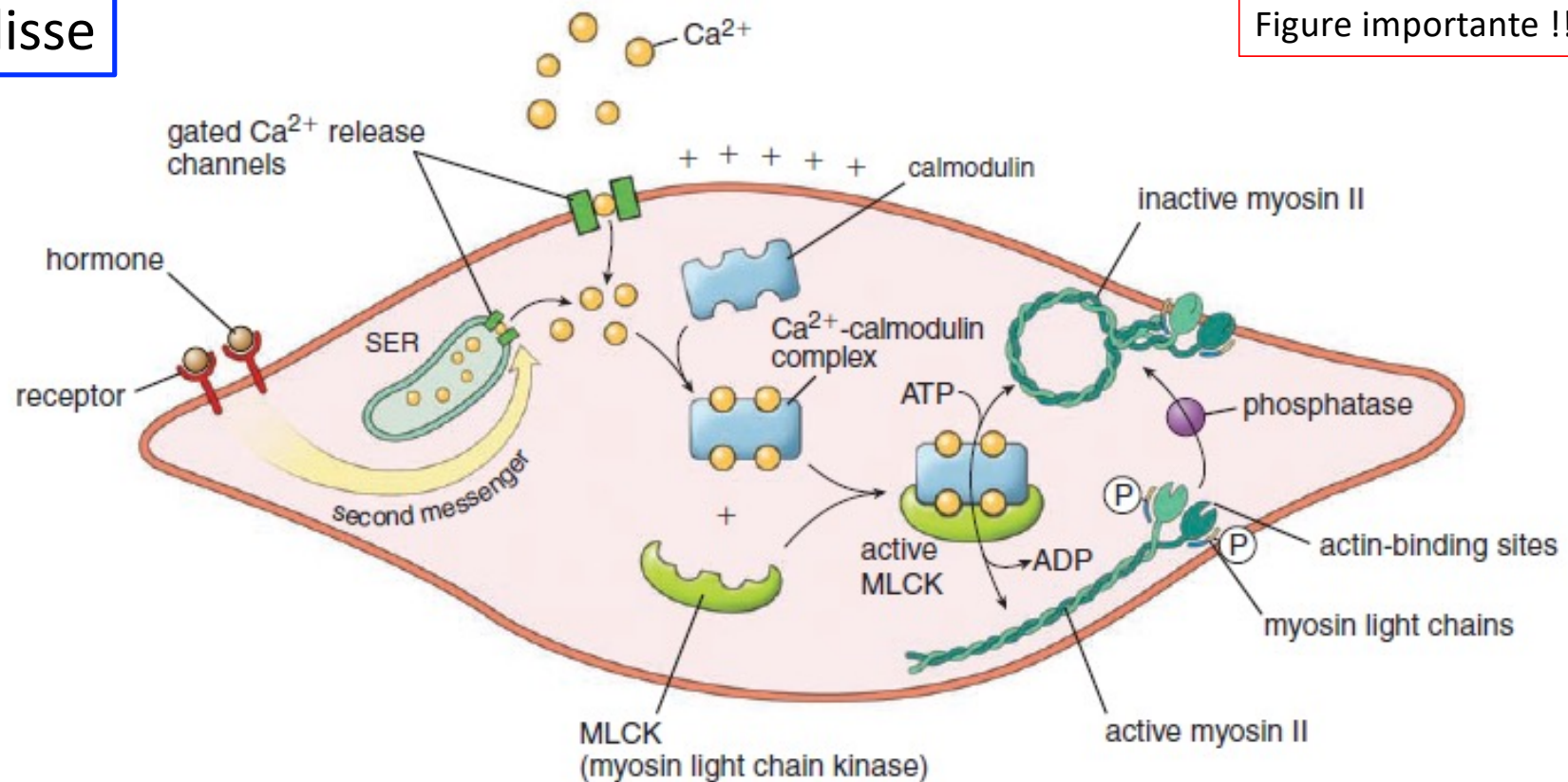


FIGURE 11.23 • Schematic diagram illustrating steps leading to initiation of smooth muscle contraction. An increase in the Ca²⁺ level concentration within the cytosol is necessary to initiate smooth muscle contraction. This increase is achieved either by initial depolarization of the cell membrane or hormonal stimulation of cell surface receptors. The intracellular Ca²⁺ binds to calmodulin (4 Ca²⁺ per 1 molecule of calmodulin) to form the Ca²⁺-calmodulin complex. This complex then binds to myosin light chain kinase (MLCK) to phosphorylate one of the two regulatory light chains of the myosin molecule. When phosphorylated, the myosin changes its conformation and the actin-binding site on the myosin head is activated, allowing it to attach to actin. In the presence of ATP, the myosin head bends, producing contraction. *sER*, smooth endoplasmic reticulum.

Muscle lisse

Gène pour la chaîne lourde : MYH 11

Messenger secondaire : Ca^{++}

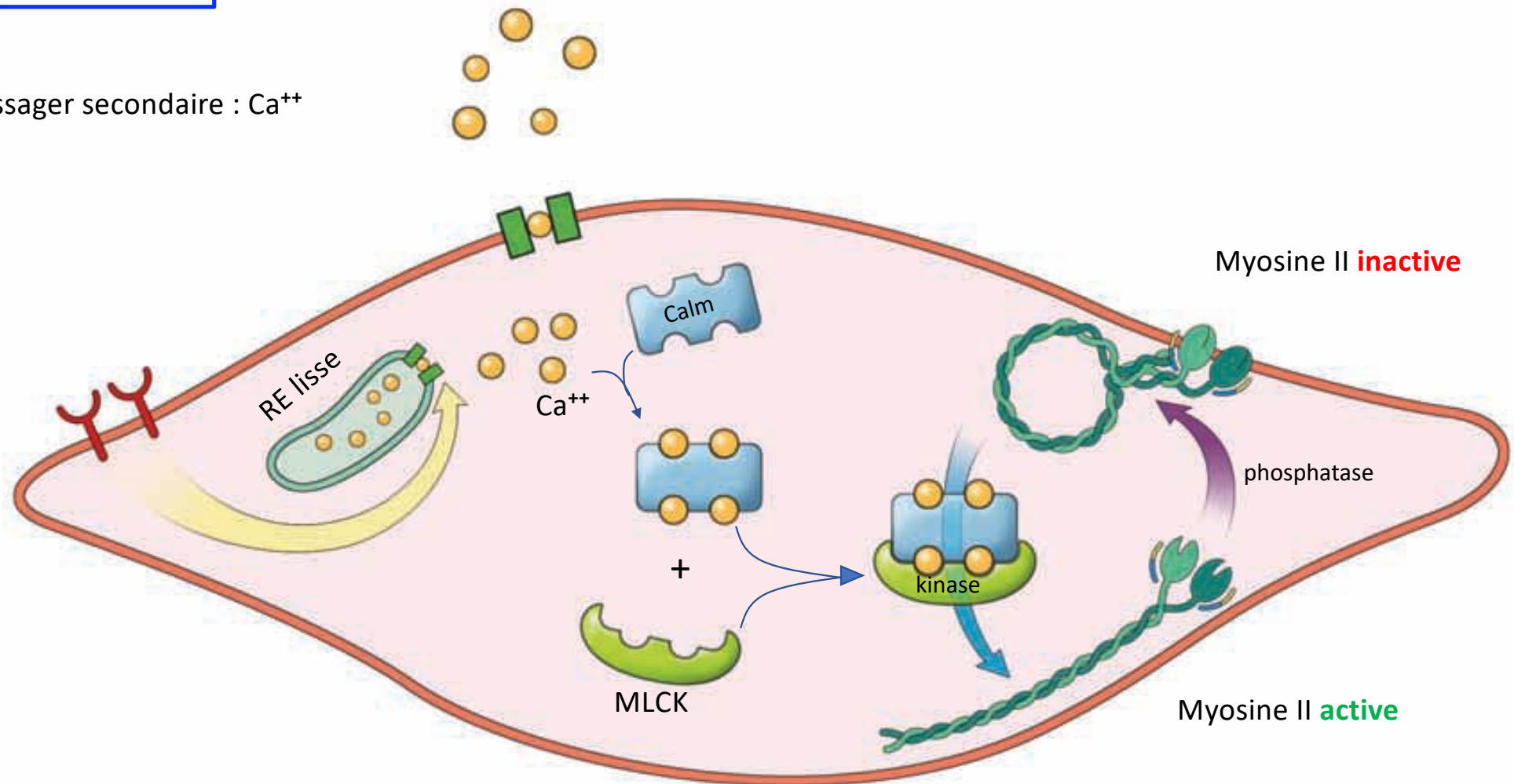


Figure 11.23

Muscle lisse

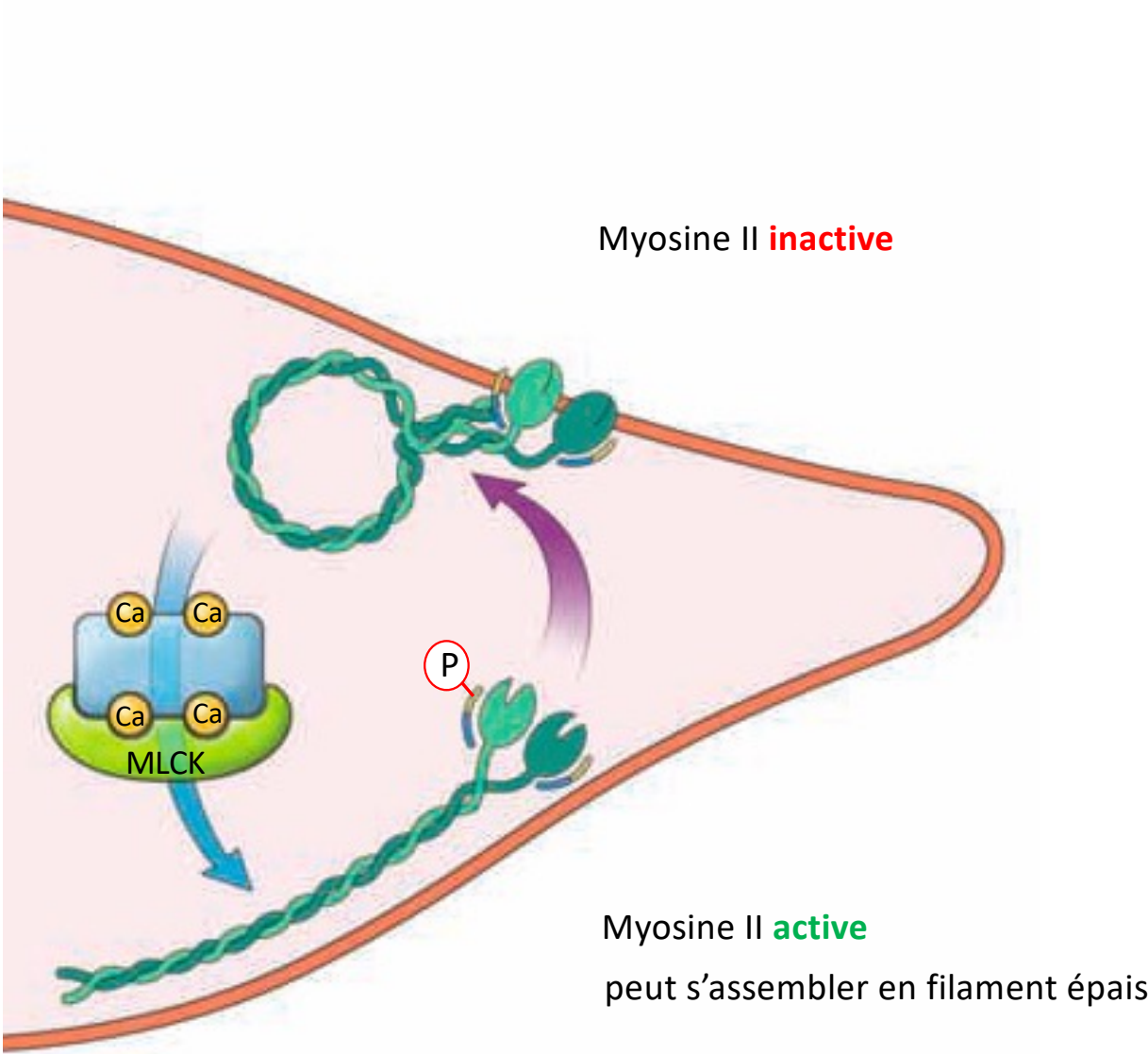
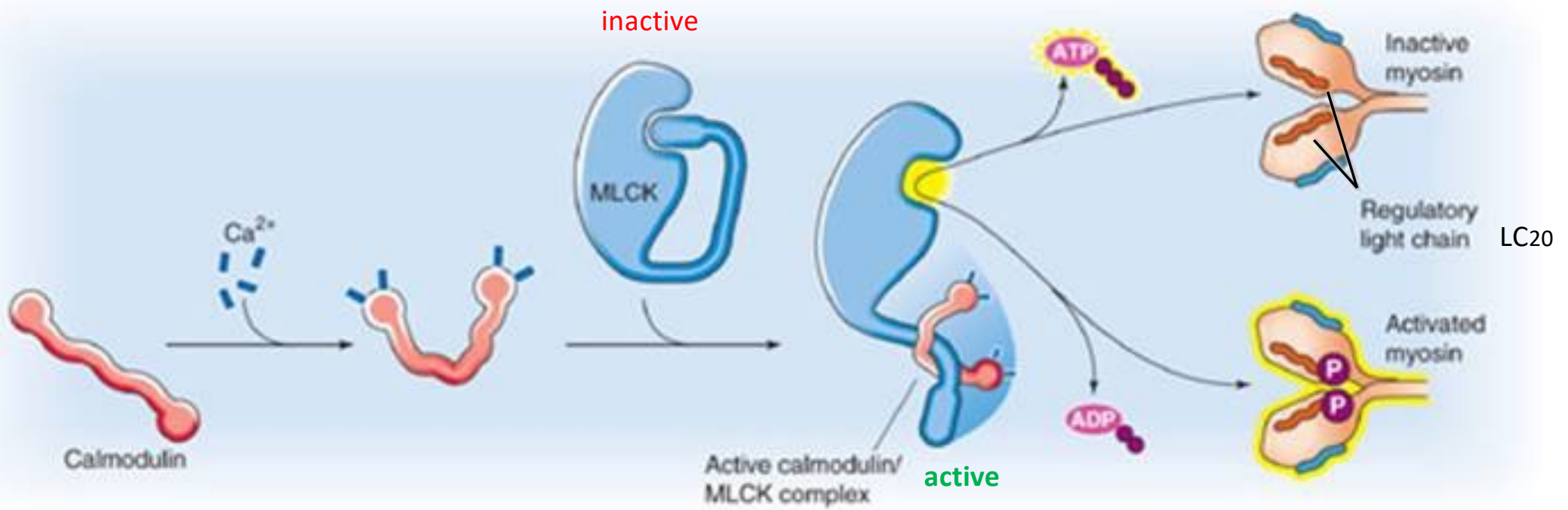


Figure 11.23

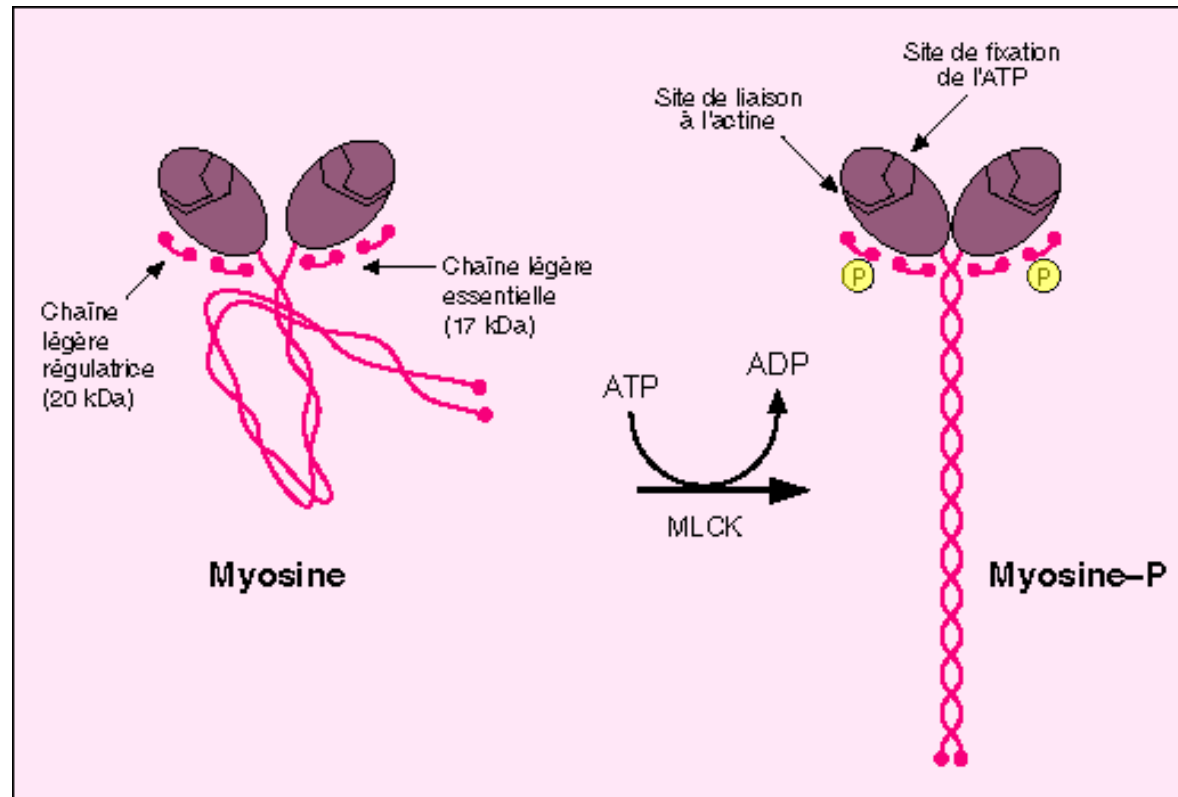


LC20

Myosin Light Chain Kinase

Myosine II dans le muscle lisse

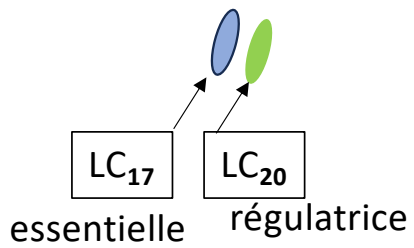
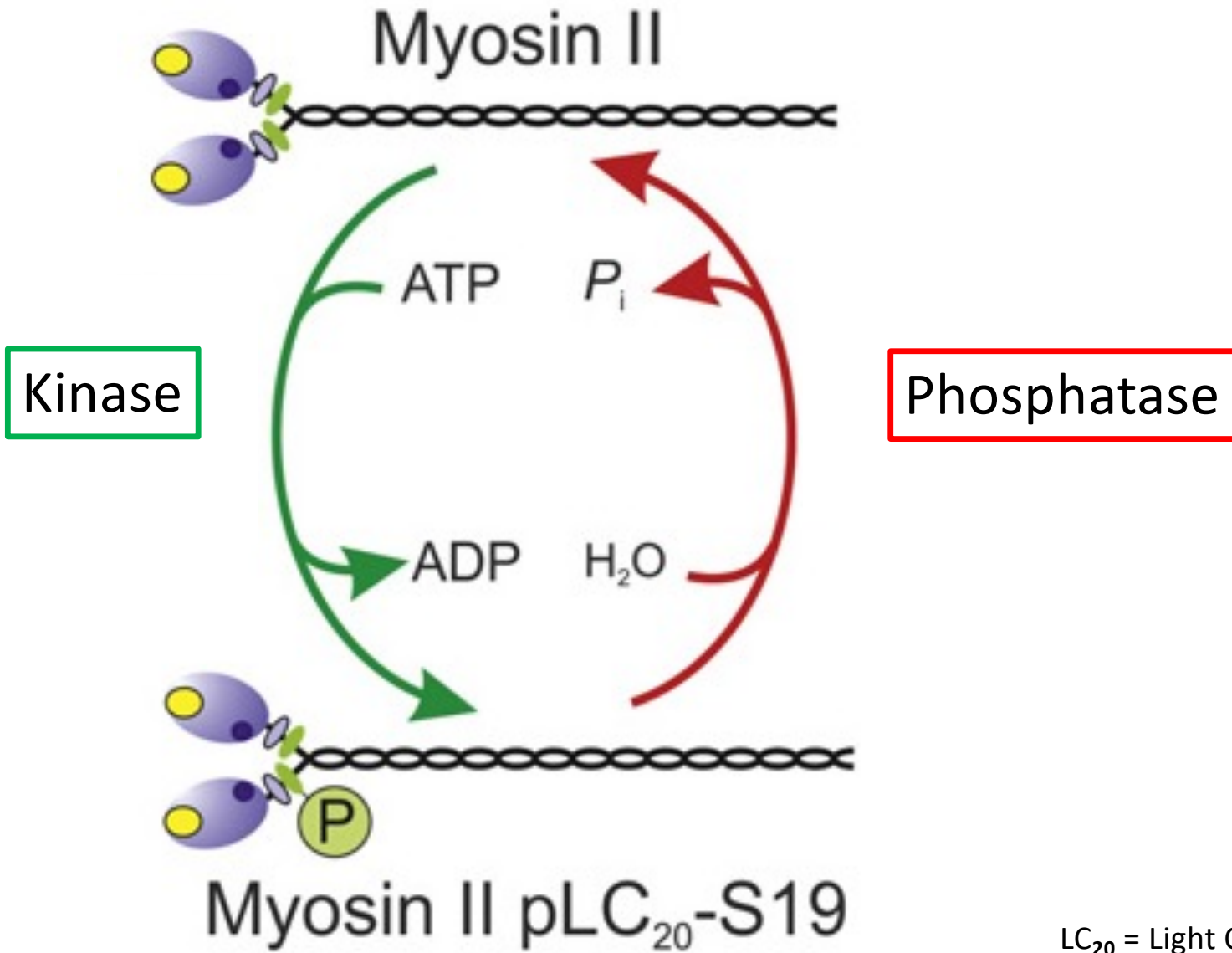
- 1 chaîne lourde
- 1 chaîne légère régulatrice
- 1 chaîne légère essentielle



Calcium cytoplasmique et contraction des cellules musculaires lisses intestinales

[Hervé M. BLOTTIERE](#), [Gervaise LOIRAND](#), [Pierre PACAUD](#)

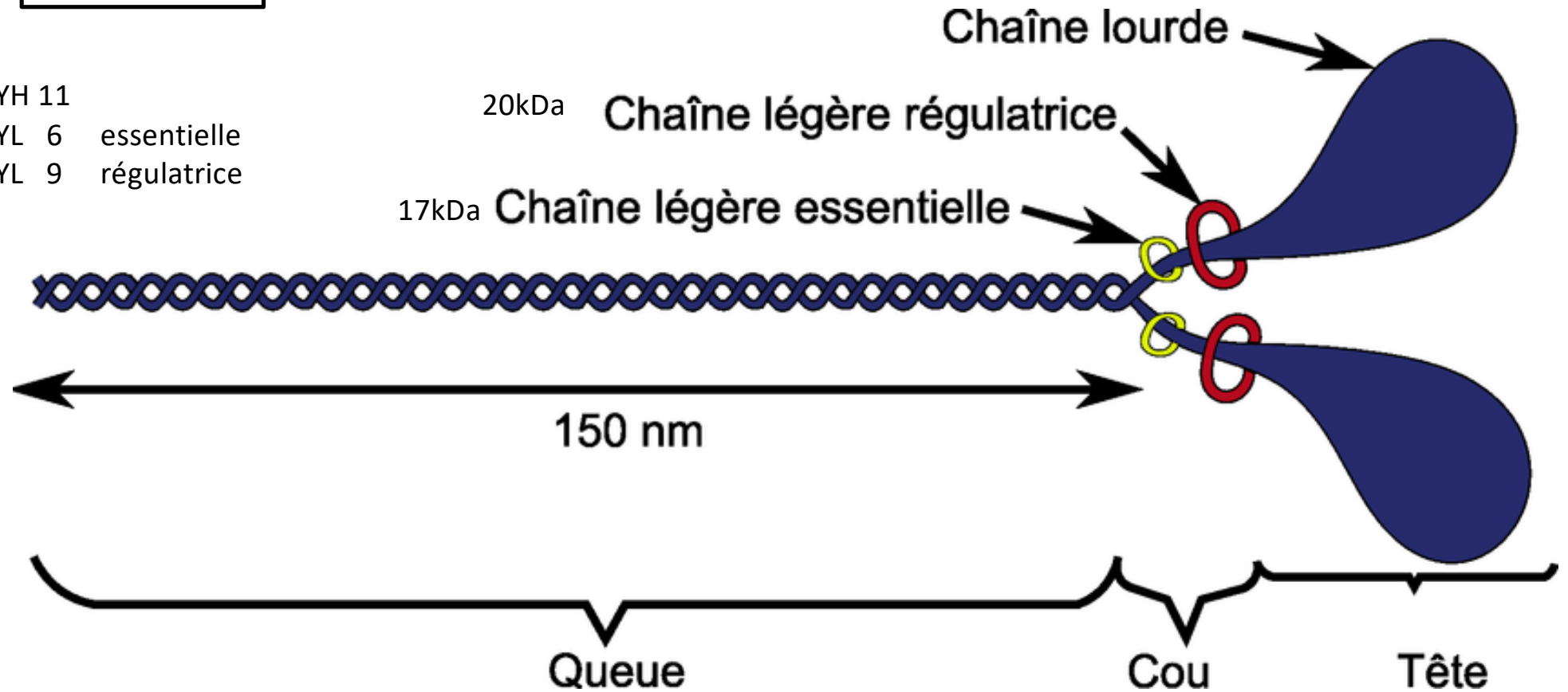
Muscle lisse

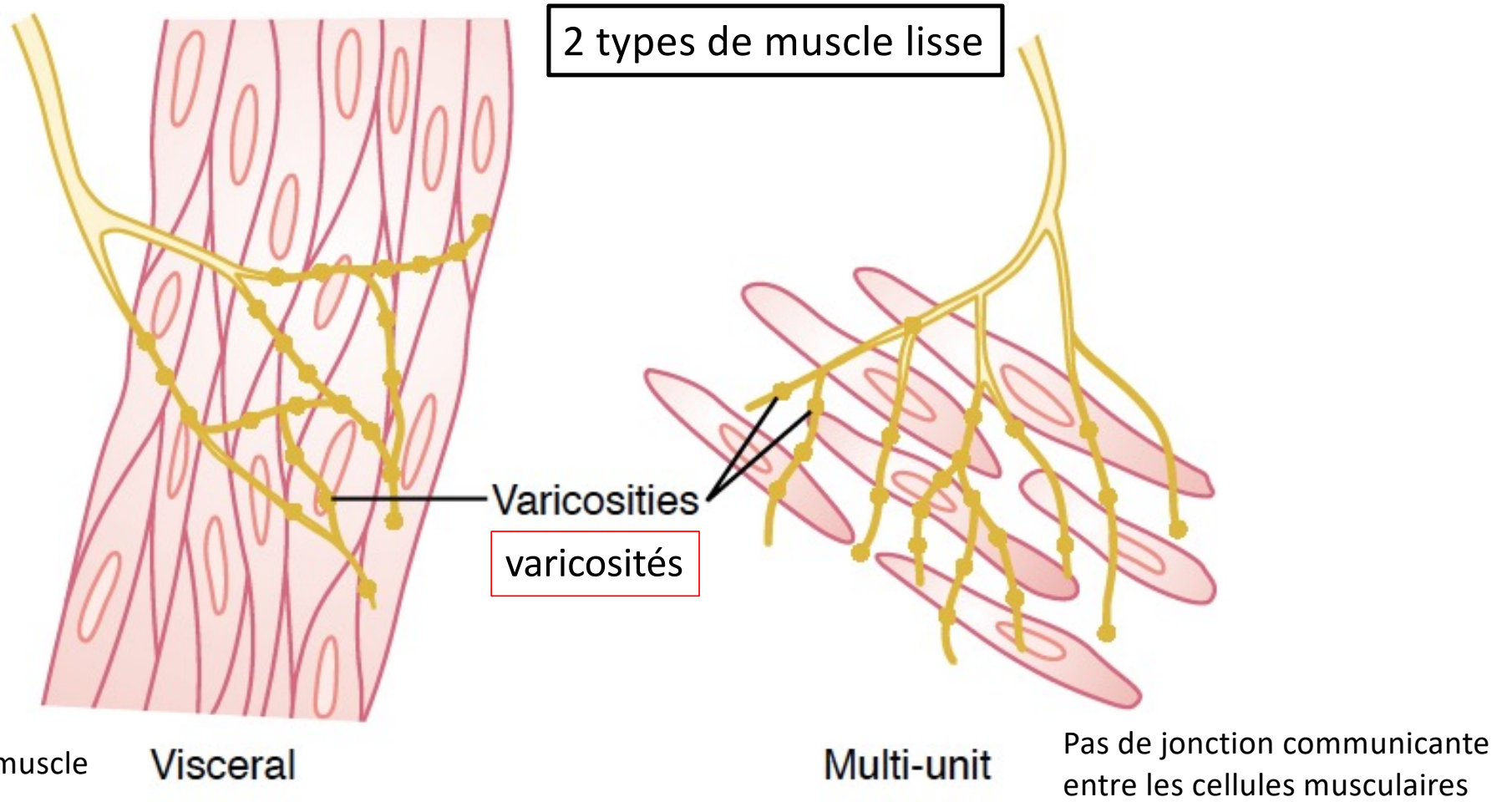


LC₂₀ = Light Chain 20kDa

Myosine II

MYH 11
MYL 6 essentielle
MYL 9 régulatrice





Muscle lisse **unitaire** (=viscéral)

Figure 8-3

Muscle lisse **multiunitaire**

Innervation of smooth muscle.

2 types de muscle lisse

Some examples of

multi-unit smooth muscle

are

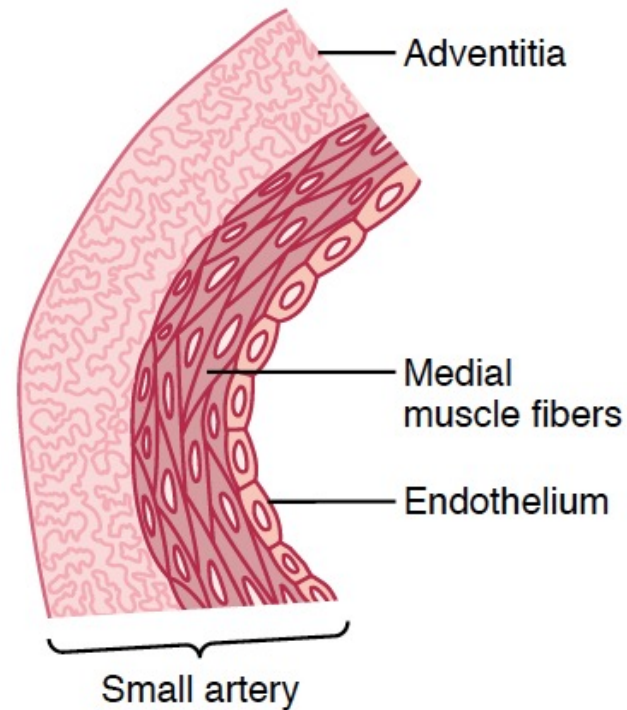
- the ciliary muscle of the eye,
- the iris muscle of the eye,
- the piloerector muscles that cause erection of the hairs when stimulated by the sympathetic nervous system.



Multi-unit smooth muscle

A

exemple : artère de petite taille



Unitary smooth muscle

B

Figure 8-1

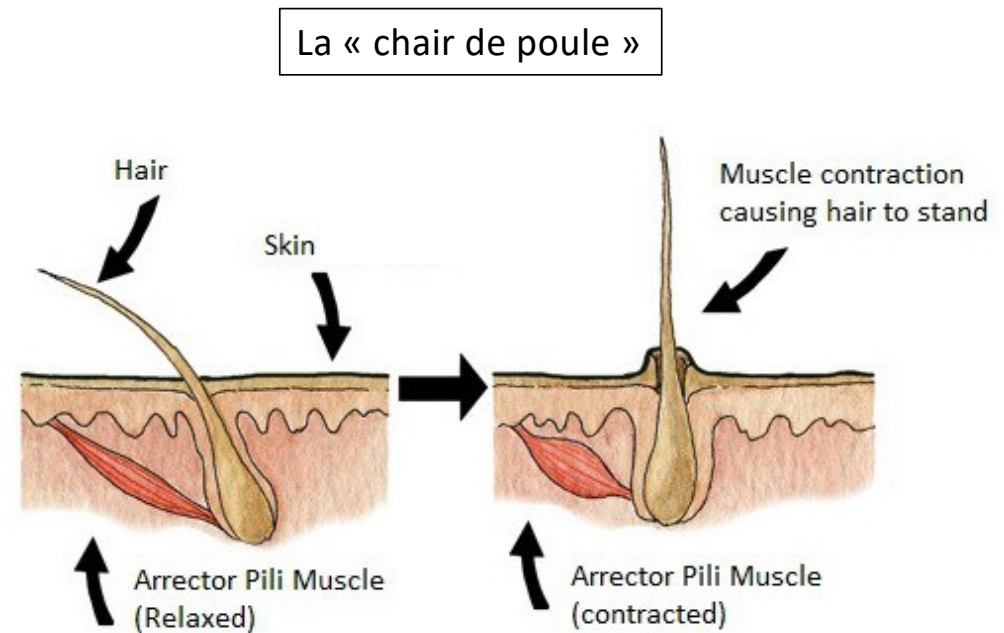
Multi-unit (A) and unitary (B) smooth muscle.

Multi Unit Smooth Muscle

The smooth muscles in the large **airways** to the lungs and in **large arteries**, the **arrector pili muscles** attached to hair follicles, and the **internal eye muscles** that adjust pupil size and allow the eye to focus visually are all examples of **multi unit smooth muscle**. In contrast to unitary muscle, gap junctions and spontaneous depolarizations are rare. Like skeletal muscle, multi unit smooth muscle:

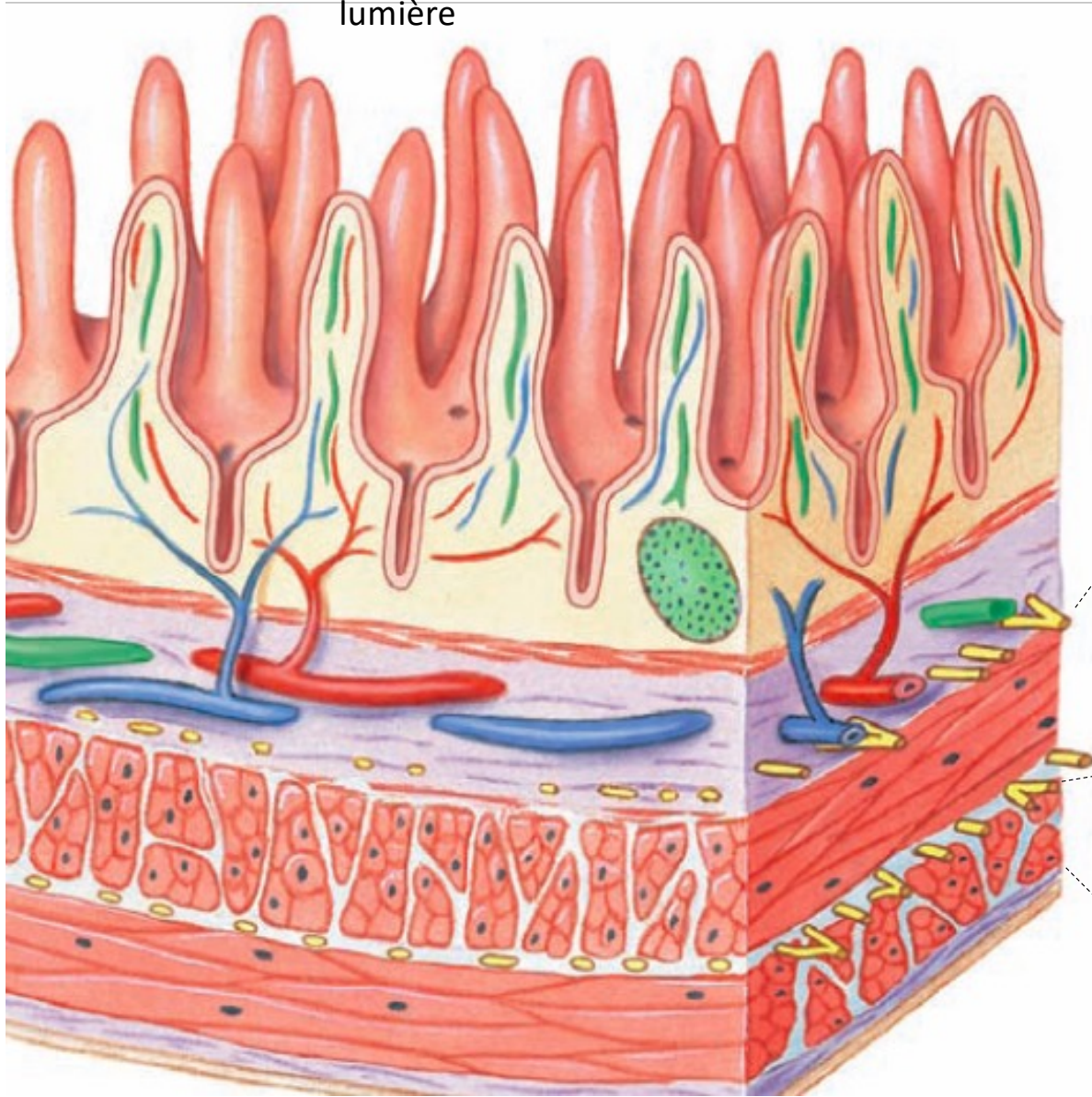
- Consists of muscle fibers that are structurally independent of one another
- Is richly supplied with nerve endings, each of which forms a motor unit with a number of muscle fibers
- Responds to neural stimulation with graded contractions that involve recruitment

However, skeletal muscle is served by the somatic (voluntary) division of the nervous system. Multi unit smooth muscle, like unitary smooth muscle, is innervated by the autonomic (involuntary) division and also responds to hormones.



Le muscle érecteur du poil
(muscle lisse)

lumière



Intestin grêle

Muscle lisse
(type unitaire)

