

2013

Histology

تاريخ

Module 4
Alexmed 2012-2013



Soly-GFX

Development, Growth, Regeneration of Skeletal muscle (Lecture 2)

1 - Development (3 stages) :-

A - Myoblast

spindle shaped cell
oval central nucleus
lack myofibril

Fusion

B - Myotubes

Multinucleated
randomly scattered
Nuclei

Differentiation

C - Muscle fiber
Nuclei peripherally
situated.

Myofibril in center
of Muscle Fiber.

أسرة فكرة

2 - Growth :-

Can't increase in Number (hyperplasia) as it can't divide.
but it increase in Size (hypertrophy)
 in width
 in length.

in width
by synthesis of new
myofibril

in Length
by activated satellite
cells which transform into
myoblast fused with muscle
fiber so increase its length

Note

basal lamina



muscle fiber

Satellite cell (mononucleated cell between
Skeletal muscle fiber and basal lamina)

3. Regeneration :-

by ~~satellite~~ satellite cell

if injury ^{small}
necrotic area phagocytosed
by macrophages



satellite cells transform into
myoblast



fuse with injury and repair
the damage or forming
new myotubes

if injury wide
satellite cell can't
repair it



Muscular tissue
transformed into fibrous
tissue



loss its function.

4. Aging :-

* increase in type I fiber why??

→ Conversion of type II to type I

→ as compensatory mechanism result from atrophy of other
fibers why??



aging of the
muscles

limited physical
activity of older people.

الحياة .. فاكلا
كسالة

Fekra Team



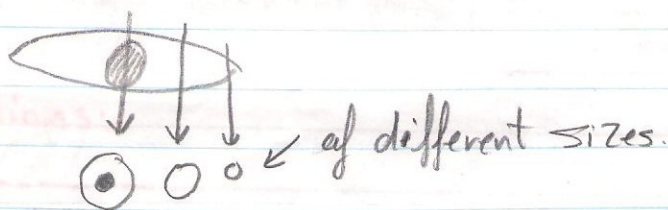
Smooth Muscles

1. unstriated and involuntary muscles.
2. Stimulated by nervous, hormonal and chemical mediators
3. Produce collagen, elastin and proteoglycan.

* Light Microscopic picture :-

Longitudinal section → elongated - spindle shaped cells.
pale oval centrally nucleus.
sarcoplasm eosinophilic

Cross section → unequal size as it cut at different levels.



* Electron Microscopic picture :-

cytoplasm divides into 2 zones :-

Firstly → surround poles of nucleus - contain organelles.

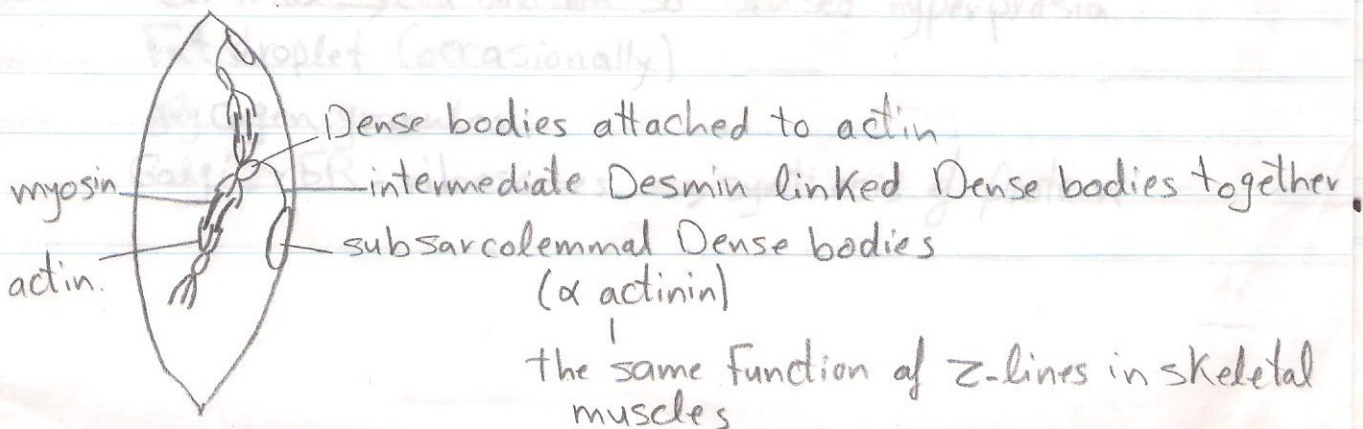
Secondly → occupies rest of cell - contain myofilaments.

[1] Myofilaments :-

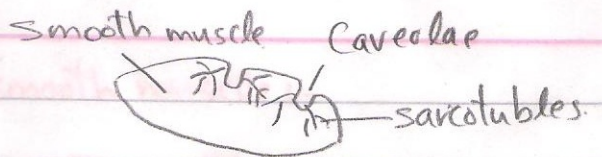
thin → actin, tropomyosin (No troponin complex).

thick → myosin.

→ Myofilaments aren't arranged in bundles like skeletal

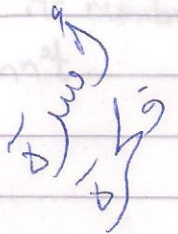


[2] Caveolae :-



Vesicular invagination of sarcolemma.

[3] Sarcoplasmic reticulum :-



Poorly developed - associated with caveolae.
So the nerve impulse transmit from sarcolemma to caveolae then sarcotubules so reach all fiber contents.

[4] Junctions :-

Gap junction between adjacent muscle fibers so that nerve impulse can transmit from fiber to another involuntary.

Note There is no gap junction between skeletal muscle fiber as it's voluntary muscle. Fiber stimulation

[5] Stituent: other organelles.

Mitochondria

Centriol → cell division so caused hyperplasia.

Fat droplet (occasionally)

glycogen granules.

Golgi - rER - ribosomes → synthesis of protein

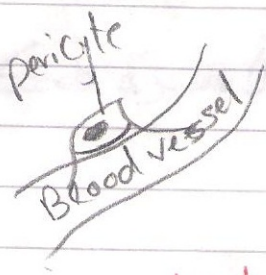
Growth and regeneration of smooth muscle :-

Smooth muscle fiber has capacity to increase its number as it can divide but skeletal or Cardiac can't.

regeneration :-

along blood vessel, There are pericytes on its wall

These cells can repair any damage occurred in the wall of vessel



Note

→ Sarcomere is functional unit of skeletal muscle but myofibril is structural building unit of skeletal muscles.

سليمان الله وبجوده
سليمان الله العظيم

أُسرّة فِكْرَة ... حلم لبكرة

Note

myotube cell (mononucleated cell between skeletal muscle fiber and basal lamina)