





MSK-II Module(LGIS) MUSCLES



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Vision; The Dream/Tomorrow

Motto



- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

Professor Umar Model of Integrated Lecture



Learning Objectives

At the end of lecture 1st year students should be able to

- Classify the muscular tissue
- Discuss the ultra structure of smooth and cardiac muscles
- Describe the different types of proteins present in smooth and cardiac muscles
- Discuss the mechanism of contraction
- Describe the muscle regeneration
- Correlate clinical aspects
- To understand bio-physiological aspect of muscles
- Read a research article

Interactive Session

Leiomyoma and Leiomyosarcoma

- A 35-year-old woman presents to the clinic with complaints of heavy PV bleeding and pelvic pain that has been worsening over the past six months. She also mentions that she has been feeling a sense of pressure in her lower abdomen.
- History: She has no significant past medical history and her family history is unremarkable. She denies any recent weight loss, changes in appetite, or bowel habits.
- Examination: On physical examination, her abdomen is soft, non-tender but there is a palpable mass in the lower abdomen. Pelvic examination reveals an enlarged, irregular uterus.





Cardiac Muscle



Cardiac Muscle



Cardiac Muscle



Difference b/w skeletal and cardiac muscles

Skeletal muscles	Cardiac muscles
multinucleated	Uni nucleated
Peripheral nuclei	central
No branching	Single muscle fiber branch
No interclated discs	Interclated disc are present
Contains triads	Contains <u>diads</u>
 Mitochondria constitutes 2% of cytoplasmic volume 	Forms 40% of cytoplasmic volume
Triads at I-A junctions	Diads at Z lines
T tubles are smaller	Larger T tubules
Sarcoplasmic reticulum well developed	Sarcoplasmic reticulum under developed
Glycogen is main component for energy production	Lipid droplets are deposited

Smooth Muscle





Smooth Muscle

Thick filaments -Thin filaments -

Dense body

-Adjacent cells physically coupled at dense bodies

-Nucleus





Smooth Muscle



Contains calmodulin instead of troponin





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Contraction



Contraction



Regeneration of Muscle Tissue



Hyperplasia AND Hypertrophy

- Tissue growth by an increase in the number of cells is termed hyperplasia (hyper + Gr. plasis, molding), which takes place most readily in smooth muscle, whose cells have not lost the capacity to divide by mitosis.
- The increase in muscle thus obtained is caused by formation of new myofibrils and a pronounced growth in the diameter of individual muscle fibers. This process, characterized by increased of cell volume, is called hypertrophy (Gr. hyper, above, + trophe, nourishment).

Vertical Integration

Leiomyoma and Leiomyosarcoma

• Leiomyosarcoma, or LMS, is a type of rare cancer that grows in the smooth muscles. The smooth muscles are in the hollow organs of the body, including the intestines, stomach, bladder, and blood vessels

Core Concept

Spiral Integration

- Examination: On physical examination, her abdomen is soft, non-tender but there is a palpable mass in the lower abdomen. Pelvic examination reveals an enlarged, irregular uterus.
- Investigations: An ultrasound of the pelvis is ordered, which shows a welldefined, round mass arising from the uterine wall, suggestive of a leiomyoma (uterine fibroid).
- Management: The patient is counselled about the nature of her condition, and treatment options are discussed, including watchful waiting, medication, and surgical interventions such as myomectomy or hysterectomy, depending on her symptoms, the size of the fibroids, and her desire for future fertility

Spiral Integration

Counselling Of Patient with leiomyoma

- •Explain the Condition
- Discuss Symptoms
- Explore Treatment Options
 - Watchful Waiting
 - Medication
 - Surgical Interventions
- •Address Concerns and Answer Questions
- Provide Reassurance

Research article

TITLE:

Repairing skeletal muscle: regenerative potential of skeletal muscle stem cells:

Skeletal muscle damaged by injury or by degenerative diseases such as muscular dystrophy is able to regenerate new muscle fibers. Regeneration mainly depends upon satellite cells, myogenic progenitors localized between the basal lamina and the muscle fiber membrane. However, other cell types outside the basal lamina, such as pericytes, also have myogenic potency.

https://pubmed.ncbi.nlm.nih.gov/?term=Tedesco%20FS%5BAuthor%5D

Learning Resources

- Junqueira's Basic Histology 12th Edition, Chapter 10
- Histology , A text and Atlas by Michael H.Ross 6th Edition, Chapter 11
- Google scholar

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