جامعة الملك سعود
King Saud University

MED439
KING SAUD UNIVERSITY

Lecture 3:
Connective tissues (C.T.)

- Colours index :
Red : important
Grey : doctors notes
Pink : Girls slides

Histology Team
MED 439

Objectives :

1. Enumerate the **general characteristics of C.T.**

2. **Classify C.T.** Into *C.T. Proper (C.T.P.)* and *special types of C.T.*

3. Describe **components of C.T.P.**

4. **Classify C.T.P.** and know the distribution and function of each type

Definition and components of C.T.

1.It is one of the 4 basic tissues.
2.it is Mesodermal* in origin.

Function of C.T

1. Supports, binds and connects other tissue and organs.
2. Provides structural (fix organ position) and metabolic support.

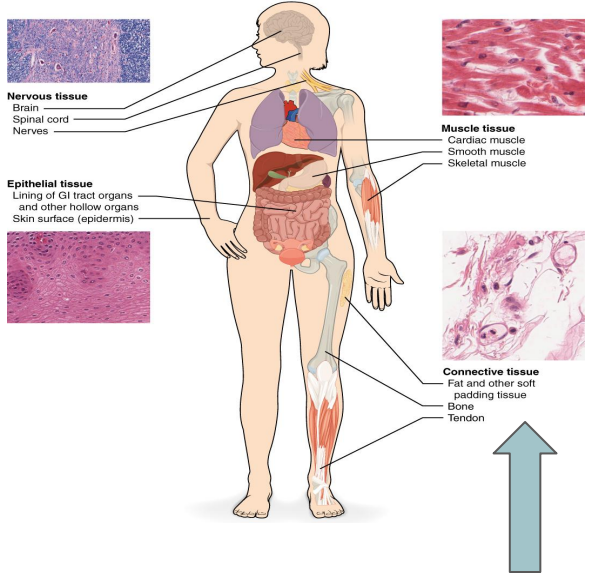
General characteristics of C.T :

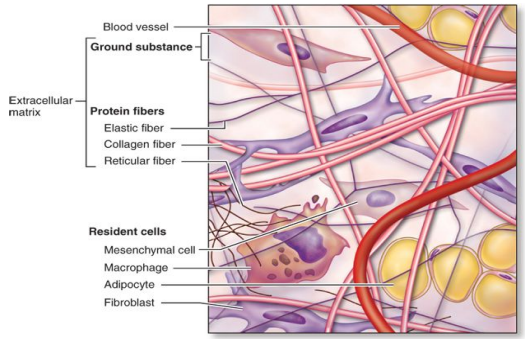
1. It is formed of widely separated, few cells with abundant extracellular matrix.
2. Most of C.T. Are vascular (have blood vessel).

Components of C.T :

1. **Cells:** different types.
2. **Fibers:** collagenous, elastic & reticular.
3. **Matrix:** the intercellular substance = extracellular matrix, where cells and fibers are embedded.

*Mesodermal: (the middle layer of an embryo in early development, between endoderm and ectoderm) “Referring to embryology” ;)





Types of C.T. (Depending on matrix)

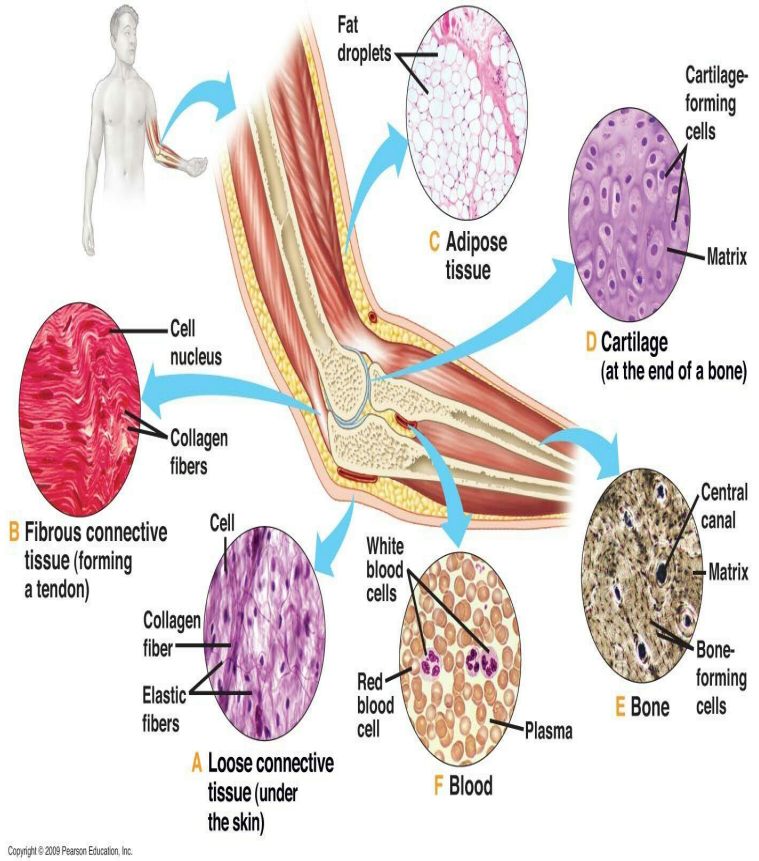
- Soft = **C.T. Proper**
- Rigid (firm,rubbery) = **Cartilage**
- Hard (solid) = **Bone**
- Fluid = **Blood**

Components of C.T. Proper

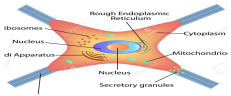
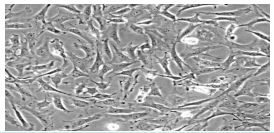
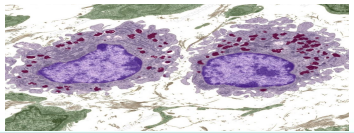
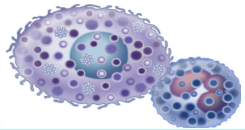
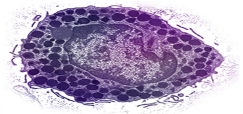
- **Cells**
- **Fibers**
- **Matrix**

Cells:

1. Fibroblasts
2. Macrophages
3. Mast cells
4. Plasma cells
5. Adipose cells
6. Leucocytes

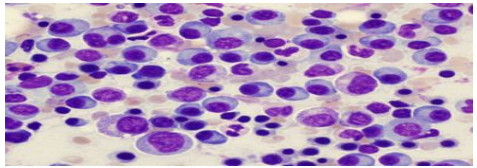
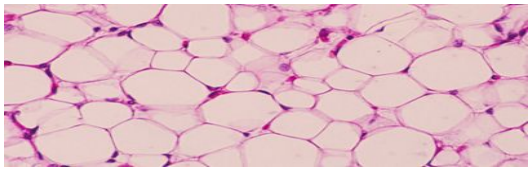
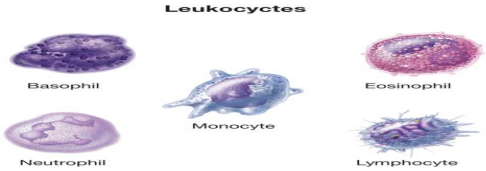


Cells: (connective tissue الخلايا المكونة للـ)

Fibroblast	Macrophages	Mast Cells
• It's the **most common cell,** found nearly in all types of C.T proper. • **L/M:** • flat branched cells (top view) **(spindle-shaped)** with basophilic cytoplasm. • They can divide. • Old fibroblasts are called fibrocytes. **Function:** 1. Formation of proteins of C.T fibers. 2.Formation of C.T matrix. 3.Healing of wounds.	**L/M:** • Basophilic cytoplasm, **rich in lysosomes.** • Irregular outline (Cell membrane). • They can divide. • They originate from blood monocytes. **Function:** Phagocytosis.	**L/M:** Cytoplasm contains numerous basophilic and cytoplasmic granules. **Function:** 1.Secrete: **heparin (anticoagulant).** 2.Secrete: **histamine (allergic reaction).**
 		 

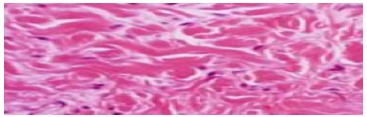
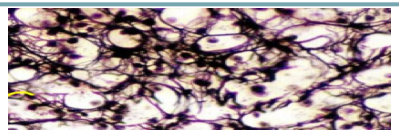
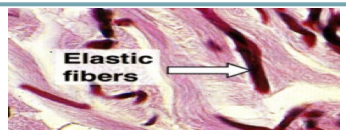
C.T= Connective tissue

❖ Cells:

Plasma cells	Adipose cells (Adipocytes, Fat cells)	Leukocytes (white blood cells)
L/M: Basophilic cytoplasm with a negative golgi image. ● Nucleus: spherical, eccentric with a clock-face appearance of chromatin. ● Derived from B-lymphocytes. **Function:** Secretion of antibodies (immunoglobulins).	**L/M:** of Unilocular Adipose Cells: ● large spherical, with a single large fat droplet. ● Thin rim of cytoplasm at the periphery. ● Nucleus: flattened , peripheral **Function:** Storage of fat.	● Appears Normal in C.T proper. ● Neutrophils increase in acute inflammation. ● Lymphocytes and monocytes increase in chronic inflammation. ● Eosinophils and basophils increase in allergic inflammation.
		

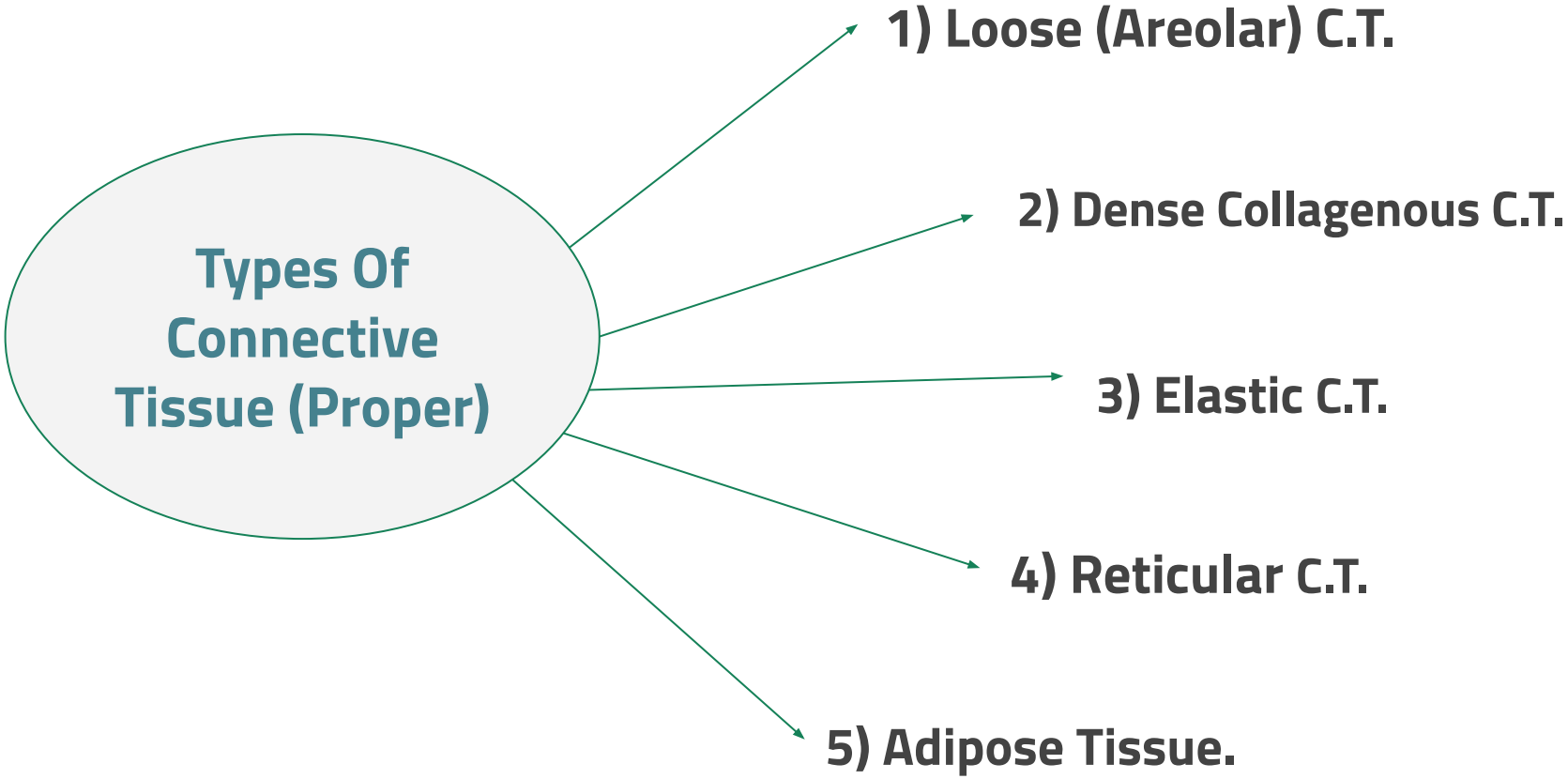
eccentric= متجهة للطرف

❖ Fibers:

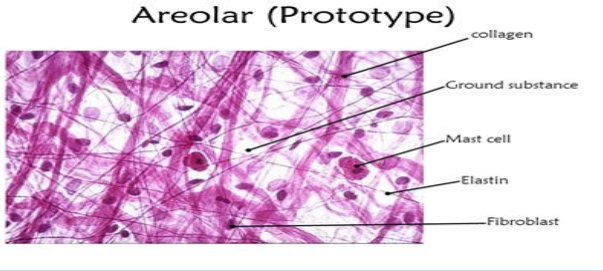
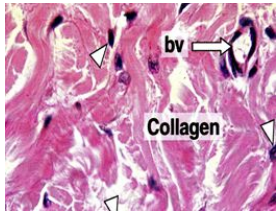
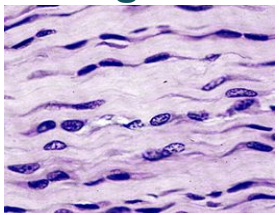
Collagen	Reticular Fibers	Elastic Fibers
Made of collagen type I.	Made of collagen Type III.	Made of elastin.
Non-branched fiber, arranged in bundles.	Branched and form a network.	Branched.
Acidophilic.	Stained black with silver.	Stained brown with orcein.
		

❖ Other types of collagen includes:

1. Collagen type II (cartilage).
2. Collagen type IV (basement membrane).

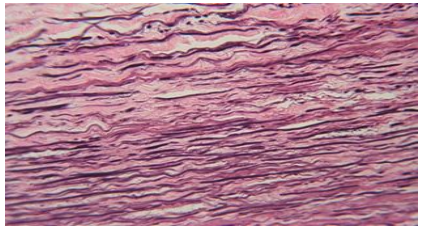
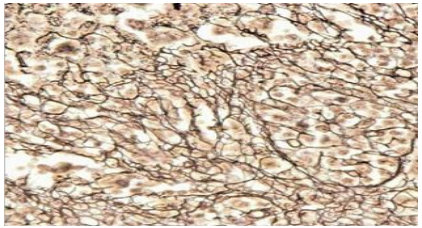
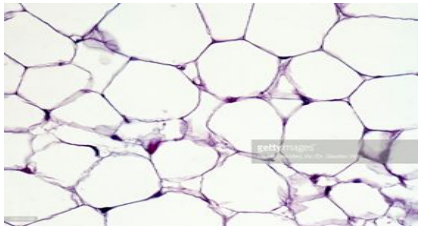

Types Of Connective Tissue (Proper)
1) Loose (Areolar) C.T.
2) Dense Collagenous C.T.
3) Elastic C.T.
4) Reticular C.T.
5) Adipose Tissue.

Types Of connective tissue proper

Type of C.T.P	1) Loose (Areolar) C.T	2) Dense Collagenous C.T
L/M	1) Contains all the main components of C.T.P. 2) Have all types of C.T. **(cells & fibers + abundant matrix)** with No predominant element.	Predominance of **collagen fibers + fibroblasts.**
Site	Subcutaneous tissue	**1- Dense irregular:** dermis of the skin, capsules. **2- Dense regular:** tendons, ligaments.
Function	-	tough tissue which resist stretching.
		Irregular  Regular 

*** Loose (Areolar) Connective tissue is the most common type of C.T.P.**

Types Of connective tissue proper

Type of C.T.P	3) Elastic Tissue	4) Reticular Tissue	5) Unilocular adipose tissue (white adipose tissue)
L/M	**Predominance** of **elastic fiber** + (sheets or membranes) fibroblasts.	**Predominance** of **reticular fibers** + reticular cells (specialized fibroblasts).	**Predominance** of **unilocular fat cells.**
Site	Wall of Large arteries, e.g. Aorta.	Stroma of organ: liver, lymph node, spleen.	1) Subcutaneous tissue, especially in: Buttocks, Abdominal wall, Female breast. 2) Around the kidney.
Function	elastic tissue which is stretchable.	structural support.	1) Synthesis, storage and release of fat. 2) Supports organs, e.g. kidney. 3) Heat insulation.
			

Functions of connective tissue proper

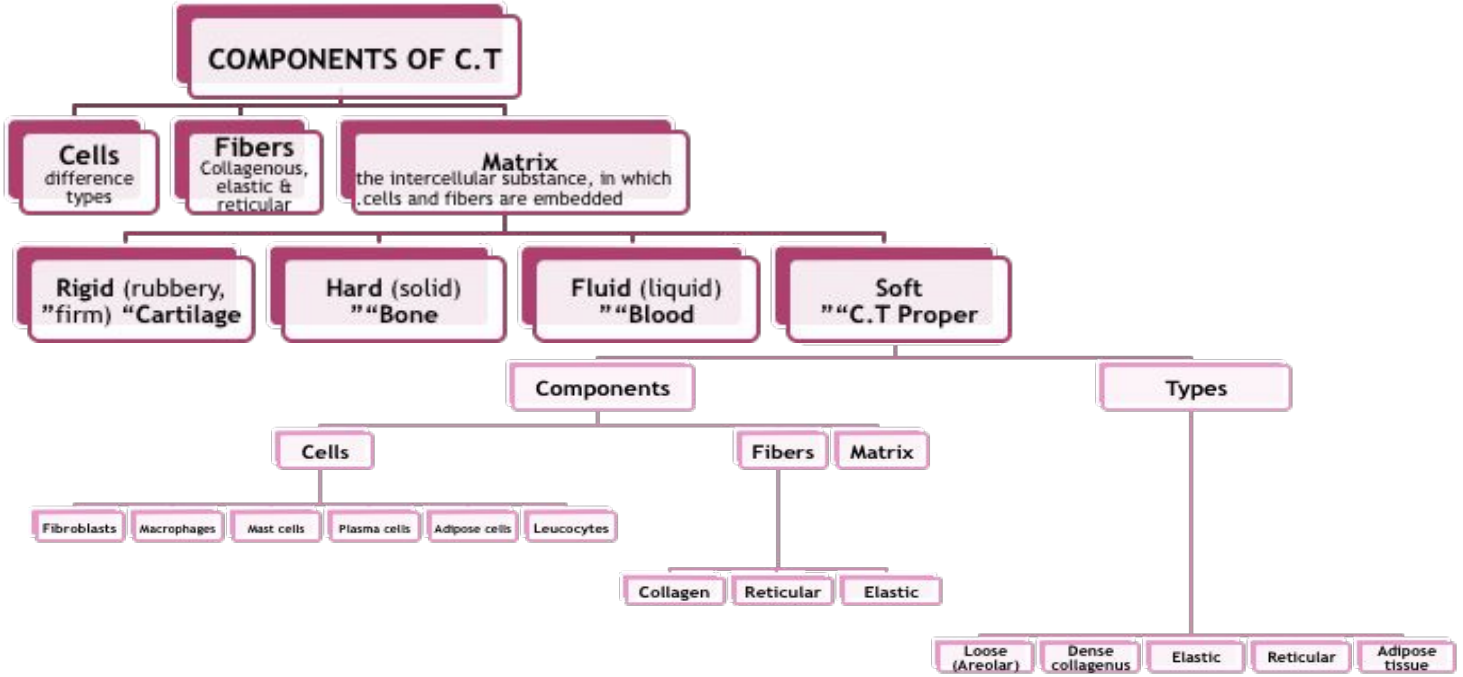
1) Supports, binds, and connects other tissues and organs.

2) Nourishes(يغذي) the surrounding structures, through its blood vessels.

3) Its Cells provide healing of injured tissues, produce heparin, histamine, antibodies, store fat, preserve body temperature and protect against microorganisms.

4) Its fibers provide rigidity or elasticity.

Summary


COMPONENTS OF C.T
Cells
difference types
Fibers
Collagenous, elastic & reticular
Matrix
the intercellular substance, in which .cells and fibers are embedded
Rigid (rubbery, ”firm) “Cartilage
Hard (solid) ””Bone
Fluid (liquid) ””Blood
Soft ””C.T Proper
Components
Types
Cells
Fibers
Matrix
Fibroblasts
Macrophages
Mast cells
Plasma cells
Adipose cells
Leucocytes
Collagen
Reticular
Elastic
Loose (Areolar)
Dense collagenus
Elastic
Reticular
Adipose tissue

MCQ :

Q1: What most common type of connective tissue proper?
A) Loose (Areolar) C.T B) Dense collagenous C.T C) Elastic tissue D) Reticular tissue

Q2: What sites of reticular tissue?
A) Around kidney B) Stroma of organs C) Neither A & B D) Both A & B

Q3: What tissue can be found in the Aorta?
A) Loose (Areolar) C.T B) Dense collagenous C.T C) Elastic tissue D) Reticular tissue

Q4: Reticular fibers is made of?
A) Collagen III B) Collagen II C) Collagen I D) Collagen IV

Q5: What is the function of elastic tissue?
A) Resistant to stretch B) Stretchable C) Structural support D) Support organs

1- A
2- B
3- C
4- A
5- B

MCQ :

Q6: What type of fiber is form a network?
A) Collagen fiber B) Elastic fiber C) Adipose fiber D) Reticular fiber

Q7: What type of cell rich in ribosomes?
A) Fibroblasts B) Macrophages C) Plasma cells D) Leukocytes

Q8: What type of cell rich in lysosomes?
A) Fibroblasts B) Macrophages C) Plasma cells D) Leukocytes

Q9: What is the function of Dense collagenous connective tissue?
A) Stretchable B) Resistant to stretch C) Structural support D) Support organs

Q10: What characters nucleus of plasma cell?
A) Flattened & clock-face appurtenance of chromatin B) Flattened & periphery
C) Spherical & clock-face appurtenance of chromatin D) Spherical & peripher

6- D
7- A
8- B
9- B
10- C

MCQ :

Q11: Most of connective tissue are?
A) Vascular B) Avascular C) Branched D) Non-branched

Q12: Which of these cells have basophilic cytoplasm?
A) Fibroblasts B) Macrophages C) Neither A & B D) Both A & B

Q13: What color do elastic fiber stain?
A) Brown with orcein B) Black with silver C) Brown with silver D) Black with orcein

Q14: Describe cytoplasm of adipose cell?
A) Basophilic cytoplasm with negative Golgi image B) Thin rim of cytoplasm at the peripheral
C) Contains A lot of basophilic cytoplasm granules D) Basophilic cytoplasm, rich in lysosomes

Q15: What tissue can be found in subcutaneous?
A) Loose (Areolar) C.T B) Adipose Tissue C) Neither A & B D) Both A & B

11- A
12- D
13- A
14- B
15- D

MCQ :

Q16: Which cell is responsible for structural support?

A) Adipose tissue B) Dense collagenous C.T C) Reticular tissue D) Elastic tissue

Q17: Which cell is responsible for heat insulations?

A) Elastic tissue B) Dense collagenous C.T C) Reticular tissue D) Adipose tissue

Q18: What type of cells that make matrix of cartilage?

A) Soft B) Rigid (firm, rubbery) C) Hard (solid) D) Fluid (liquid)

Q19: What function of mast cells?

A) Maintain temperature B) Connect organs C) Secrete antibodies D) Secrete heparin & histamine

16- C
17- D
18- B
19- D
20- C

Team members

- Afnan AlMohsen
- Nourah Alklaib
- Sarah Alobaid
- Sumo Abdulrahman
- Mariam Alruhaimi
- Joud Alarifi
- Yazeed Alomar
- Abdulmohsen Albesher
- Abdullah Alburikan
- Mohamed Albabtain
- Mohammed Benhjji
- Mohamed Alquhidan
- Nawaf Alshahrani

Team leaders

Albara Aldawoud
Fatimah Alhelal

Histology Team
MED 439

Contact us through :
Histologyteam439@gmail.com

Any future corrections will be in the editing file :Click Here