Subject : Tissues 14 / 10 / 2024

Tissue هي مجموعة من الخلايا لها أصل جنيني

4 Types of Tissues :

1. Epithelial Tissue
2. Connective Tissue
3. Muscular Tissue
4. Nervous Tissue

Tissue	Nervous	Epithelial	Muscular	Connective
cells	intertwining elongated	Aggregated polyhedral	elongated contractile	Several types of fixed and wandering cells
Amount of ECM	very small	small	moderate	Abundant
Main Fonction	Transmission of nerve impulse	Covering, Lining, Secretion	Movement	Support, protection

Epithelial Tissue :

1. Cover surfaces or line cavities تغطي الأسطح أو التجاويف
2. Rapid turn over, because its exposed to the external environment تتجدد بسرعة لأنها معرضة للبيئة الخارجية .
3. Formed of sheets of closely packed cells . تتكون من صفائح من الخلايا المتقاربة
4. The cells are polar " it has a multiple fonction"
5. Epithelium tissues lack blood vessels تفتقر الأنسجة الظهارية لذلك تحصل على غذائه من connective tissue

. The epithelium rests upon a sheet of ECM called the Basal Lamina it has a connective tissue layer under it

Epithelium = epidermis

Connective tissue = dermis

Subject :

Basement Membrane :-

1. Basal Lamina — الأقرب إلى ال epithelium
2. Reticular Lamina — الأقرب إلى ال connective

Function of Basement Membrane :

Supports the epithelium

Types of Epithelium :

- Lining or covering epithelium
- Glandular epithelium "secretion"
  - Unicellular cells
  - موجودة بالجهاز الهضمي والتنفسي

- Some Lining epithelial cells secrete : stomach
- Some glandular cells are present between Lining cells : "goblet cells" of small intestine أمعاء

Lining or Covering Epithelium

- **single layer**
- **Pseudo stratified epithelium**
- according to **number of Layers**
  - **Simple** (single layer)
    - according to **shape of cell**
      1. Squamous مفلطح
      2. Cuboidal مكعب
      3. Columnar عمودي
  - **Stratified** (multiple Layers)
    - according to **shape of cell in upper layer**
      1. Squamous
         - Keratinized
         - Non-Keratinized
      2. Cuboidal
      3. Columnar
      4. Transitional

Subject : ..... / /

	Simple Squamous	Simple Cuboidal	simple columnar
cells	flattened squamous	Cuboidal	tall columar
Location	• Line blood vessel • Line body Cavities	• Line renal tubules الأنابيب الكلوية • Cover ovaries مبايض	• Ciliated : Uterine tube قناة الرحم . عليها اهداب عندها اهداب لتحريك البويضة . • non ciliated : Stomach
fonction	• Easy passage of substances • Secretion	• Active transport • Cover organs	• Secretion • Absorption

	Stratified Squamous		stratified cuboidal	Stratified columnar
	Keratinized	non-Keratinized		
Top-most Layer	squamous cells covered by Keratin	Squamous cell not covered by Keratin	Cuboidal	Columner
Location	skin	Esophagus المريء	Large ducts قنوات of salivary glands الغدد اللعابية	ملتحمة العين Conjunctiva
Function	• Protection • prevent water loss	protection	• protection • Secretion	• protection • Secretion

Subject : / /

Transtitional epithelium "Urothelium" :-

زي القبة

- The topmost cells of this stratified epithelium are dome like called Umbrella cells لما تكون ملمومة تشكلها بشبه Dome ولما تمتلئ بيكون شكلها Transitional عشان هيئ بسماها Flattened

الثانة الحالب

Location :- Urinary bladder and ureters.

تحمي من التأثير الضار للبول.

function :- 1. protection against the adverse effects of Urine.
2. Allows the bladder to change size.

Pseudostratified columnar ciliated epithelium :

- the cells have different heights
- All cells rests on the same basal lamina but not all of them reach the surface.
- The nuclei occupy different levels giving the epithelium a false stratified

قصبة هوائية تجويف الأنف

Location : Trachea, bronchi, nasal cavity "Respiratory System"

الشعب الهوائية

function : 1. protection, secretion
2. ciliary movement removes particles from the airway passage.

Subject : Classification of glandular epithelium / /

According to number of cells :-

- Unicellular glands : formed of a single cell, like Goblet cells of digestive and respiratory tracts.
  الخلايا الوعائية والمعابية
- Multicellular glands : formed of clusters of cells, like salivary and sweat glands

According to presence of ducts :- عندها قنوات

- Exocrine glands :- possess ducts, secretion outside of body
  such as :- salivary glands
- Endocrine glands :- Lack ducts, secretion to blood
  such as :- Pancreatic Islets, Pituitary gland
  الغدة النخامية

Exocrine glands classified according to morphology of duct and secretory portion :-
تشكل القناة جزء الافراز

- Each exocrine gland has a :-
  1. Secretory portion "produces the secretion" → it could be branched and unbranched
  2. duct "carries this secretion"
- The secretory portion could → acinar "ball-shaped" secretory portion = Acinus
  → tubular أنبوبي
  → coiled ملفوفة
  Duct = conducting portion

Exocrine glands classified according to method of secretion :-

1. Merocrine : only product is secreted, salivary glands.
   serous : watery solution mucous : thick solution
2. Apocrine : product + apical, mammary gland
   جزء من الخلية
3. Holocrine : product + all cell, Sebaceous glands
   الغدد الدهنية

Subject :

Epithelial cells divided into 3 regions :-

1. Apical "Luminal" close to the Lumen of organ قريبة من تجويف العضو
2. Lateral adjacent to other cells
3. Basal lying on the basal lamina

روابط

Cellular Junctions :-

- cell-membrane structures
- located on the lateral and Basal surfaces

1. Hemidesmosomes : area of adhesion between cell b membrane and basal lamina "basal junction"

2. Lateral junction

1 Tight junction — 2 Desmosomes — 3 Adherent junction — Gap junction

الوظيفة : لتقوية الارتباط بين الخلايا
الرئيسية وفتحاته أكبر إلهم ترتيب حسب الأقوى !

ثقوب
Gap junction ↓ porous area in the cell membrane of two cells → allow passage of substances between them.

طيب !

شو الفرق بينهم إذا كلهم بيعملوا لنفس الهدف ؟

الحام
Tight : Fusion → سد/اغلاق seals the space between two cells

Desmosomes : stronger adhesion التصاق قوي

Adherent : adhesion التصاق

Subject : ..... / /

Apical Surface of the cell :-

1. Microvilli

- finger-like cytoplasmic projections — نتوءات سيتوبلازمية تشبه الأصابع
- present in absorptive epithelium — موجودة بالخلايا الطلائية الماصة
- most prominently in the small intestine — أكثر بروزاً في الأمعاء الدقيقة
- increase the surface area

2. Stereocilia

- Similar in structure to microvilli — يشبه
- longer and less motile — حركة
- act as mechanreceptors as in the inner ear hair cells — الأذن الداخلية

↓

مستقبلات ميكانيكية مثل تلك الموجودة في الأذن الداخلية.

3. Cilia

- thick projection, elongated, motile — متحركة — ممتد على طول السطح
- move in rhythmic fashion backwards and forwards — حركة إيقاعية أماماً وخلفاً
- removing fluids and debris ("waste") in a certain direction

4. Flagella

- similar to cilia in structure but are much longer
- Usually, only one flgellum is present on a cell.
- the movement of it is rotational — دائري
- In humans, only sperms possess a flagellum. — الحيوان المنوي

▸ Subject : ..... / /

Connective Tissue :-

Functions : 1. provide form of organs .
2. Support of different organs → fatty tissue
3. Connect and bind different structures → bone (عظم) , cartilage (غضروف)
4. provide a medium for diffusion of nutrients and waste products
→ connective tissue proper , blood .

The cells of the Connective Tissue : الخلايا المكونة للنسيج الرابط

1. Fibroblasts : most common type of cell in the connective tissue
function → Synthesizes fibers and produces components of ECM .
- Abundant irregularly branched cytoplasm .
- Large , pale-staining nucleus with a prominent nucleolus . النواة كبيرة وشاحبة على باض
- RER and Golgi apparatus لتصنيع البروتين .

Cell	Important feature	Function
Macrophages	Cell surface has indentations (تجاويف) and protrusions (نتوءات)	phagocytosis (بلعمة)
Mast cells	Cytoplasm filled with dark staining secretory granules (حبيبات)	Secretion of histamine (للتحسس) and heparin (مسؤول عن المنع)
plasma cells	Nucleus has alternating dark and light regions	production of antibodies .

"clock-face appearence"

Subject : ..... / /

Extracellular Matrix

* هي ال environment الخارجية

Formed of

1) Fibers
- Collagen → Strength
- Elastic → Elasticity (المرونة)
- Reticular → net that holding tissue together

2) Ground substances
- large molecules
- water

Connective Tissue

- Adult
  - Proper
    - Loose
      - Areolar
      - Adipose
      - Reticular
    - Dense
      - Elastic
      - Collagenous
        - regular
        - Irregular
  - Supportive
    - Bone
    - Cartilage
      - Hyaline
      - Fibrocartilage
      - Elastic
  - Fluid
    - Blood
    - Lymph
- embryonic

Lymph هو عبارة عن سائل يتجول بين الـ "Lymph node" العقد الليمفاوية بيفيدنا بموضوع ال "immunity"

Subject : / /

proper connective tissue : is the connective tissue is which the cell that form the ECM is the fibroblast or cell derived from fibroblasts.

Loose connective tissue :- the fibers are loosely arranged forming a network

يعني الألياف تكون مرتبة بشكل غير مترابط يعني ابعاد عن بعض

عشان هيك هي اللي بتشكلها شبكة.

Dense connective tissue : the fibers are numerous and densely packed

هون الألياف عددها كبير جداً ومتراصة.

found:- 1. Under epethelia
2. Around glands
3. In the spaces between muscle and nerve fibers.
4. Around blood and lymphatic vessels.
5. packing material of our body. « fills ↑spaces »

small

A very common type of CT

Loose Areolar

features :-

- Contain all three types of fibers arranged loosely.
- fibroblasts and macrophges
- All these components are embedded in an semi-fluid ground substance.
- It's highly vascular.

function :-

1. gives organs their shape
2. It is a medium for the diffusion of gases and nutrients and waste product
3. It is usually the first tissue where microorganisms and foregin particles enter the body. It's an important site for immune and inflammatory responses.

« ضد الدفاع الأول » يعني راح تكون أول طبقة تواجه الجسم الغريب وتمنع دخوله "packing" بما أنها مسؤولة عن ال

Subject : ..... / /

Adipose Tissue : is a type of loose connective tissue charcterized by the abundance of a specific type of cells " adipocytes"

	White Adipose Tissue	Brown Adipose Tissue
Type of adipocyte	White	Brown
Gross color	White to yellow "due to presence of fat"	Brown "due to abundant of blood vessels"
Main function	storage of energy	production of heat
Location	• present throughout life • All over the body	Abundant in infants, Decrease with age, In adults found in few areas.

بكل الدواخل الحرارية وبكل انحاء الجسم

موجود عند الاطفال ويقل مع تقدم العمر وموجودة بأماكن محددة عند البالغين

	White Adipocyte	Brown Adipocyte
Shape	Spherical كروي	Polygonal متعدد الاضلاع
Size	Larger	Smaller
Fat droplet	Single "Unilocular"	Multiple "multilocular"
Nucleus	Peripheral	Central
Mitochondria	Numerous	Numerous

عامل الإشباع

• White adipocytes secrete the hormon Leptin, which is satiety factor

SIGMA NOTEBOOK

Subject : .....

Dense

Type	Elastic	Collagenous	
		Irregular	regular
Fibers	Elastic	Collagen, passing in all direction	Collagen, passing in one direction
Function	provides elasticity	Resists forces from all directions	Resists traction forces
Location	Aorta, Vocal cords	Dermis of skin	Tendons, ligaments

Loose "Reticular"

Type — Reticular

Fibers — Reticular

Function — Holds parts of organs together

Location — Lymph node, spleen.