

# 核心課程解剖學 2026



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錢宗良教授

Chung-Liang Chien, Ph.D.

國立臺灣大學醫學院

解剖學暨細胞生物學研究所

聯絡電話:(02)23123456分機 288193

E-mail address: [chien@ntu.edu.tw](mailto:chien@ntu.edu.tw)

# 114 學年度核心課程解剖學進度表

(甲班) 物治系、職治系、護理系 教室：基301

| 日期               | 時間                | 主題                                       | 教師          |
|------------------|-------------------|------------------------------------------|-------------|
| 9/9 (W)          | 9:10-10:00        | Introduction of Anatomy                  | 錢宗良         |
|                  | 10:10-12:10       | Tissues (General Histology)              | 錢宗良         |
| 9/16 (W)         | 9:10-12:10        | Skeletal System I                        | 王淑慧         |
| 9/23 (W)         | 9:10-12:10        | Skeletal System II                       | 王淑慧         |
| 9/30 (W)         | 9:10-12:10        | Muscular System                          | 王淑慧         |
| 10/7 (W)         | 9:10-12:10        | Cardiovascular System                    | 黃敏銓         |
| 10/14 (W)        | 9:10-12:10        | Digestive System                         | 李立仁         |
| <b>10/21 (W)</b> | <b>9:10-12:10</b> | <b>Lab. I</b>                            | <b>全體教師</b> |
| <b>10/28 (W)</b> | <b>9:10-12:10</b> | <b>Midterm Exam &amp; Lab. test I</b>    | <b>全體教師</b> |
| 11/4 (W)         | 9:10-12:10        | Nervous System I                         | 錢宗良         |
| 11/11 (W)        | 9:10-12:10        | Nervous System II                        | 錢宗良         |
| 11/18 (W)        | 9:10-12:10        | Somatic and Special Sense                | 廖孟琳         |
| 11/25 (W)        | 9:10-12:10        | Endocrine and Female Reproductive System | 龔秀妮         |
| 12/2 (W)         | 9:10-12:10        | Urinary and Male Reproductive System     | 張銘峰         |
| 12/9 (W)         | 9:10-12:10        | Lymphatic and Respiratory System         | 林能裕         |
| <b>12/16 (W)</b> | <b>9:10-12:10</b> | <b>Lab. II</b>                           | <b>全體教師</b> |
| <b>12/23 (W)</b> | <b>9:10-12:10</b> | <b>Final Exam &amp; Lab. test II</b>     | <b>全體教師</b> |

## Textbook:

(1) **Human Anatomy.** MARIEB et al. 9<sup>th</sup> ed. (2019) Pearson Edu., Inc.

(2) **Principles of Human Anatomy.**

G. J. Tortora and M.T. Nielsen 15th ed. (2020) John Wiley & Sons, Inc.

**Midterm Exam 範圍: 10/21(含)以前課程**

**Final Exam 範圍: 11/04(含)以後課程，地點由教務分處統一分配**

**Lab. test I: 範圍: 10/21 Lab I. 實習課程內容，**

**時間為 Midterm Exam 筆試完後同地點考幻燈片(實體與模型)**

**Lab. test II: 範圍: 12/16 Lab II. 實習課程內容，**

**時間為 12/23 Final Exam 筆試完後同地點考幻燈片(實體與模型)**

**平時成績 (10%): 實習課程及考試準時出席**

**考試主要題型：選擇、是非、配合**

**負責助教：楊耀華 (分機 62212)**

**請選修課程同學請至乙班上課**

# Anatomy

- **Gross anatomy**

- ① **Systemic anatomy**

- ② **Regional anatomy**

- ③ **Surface anatomy**

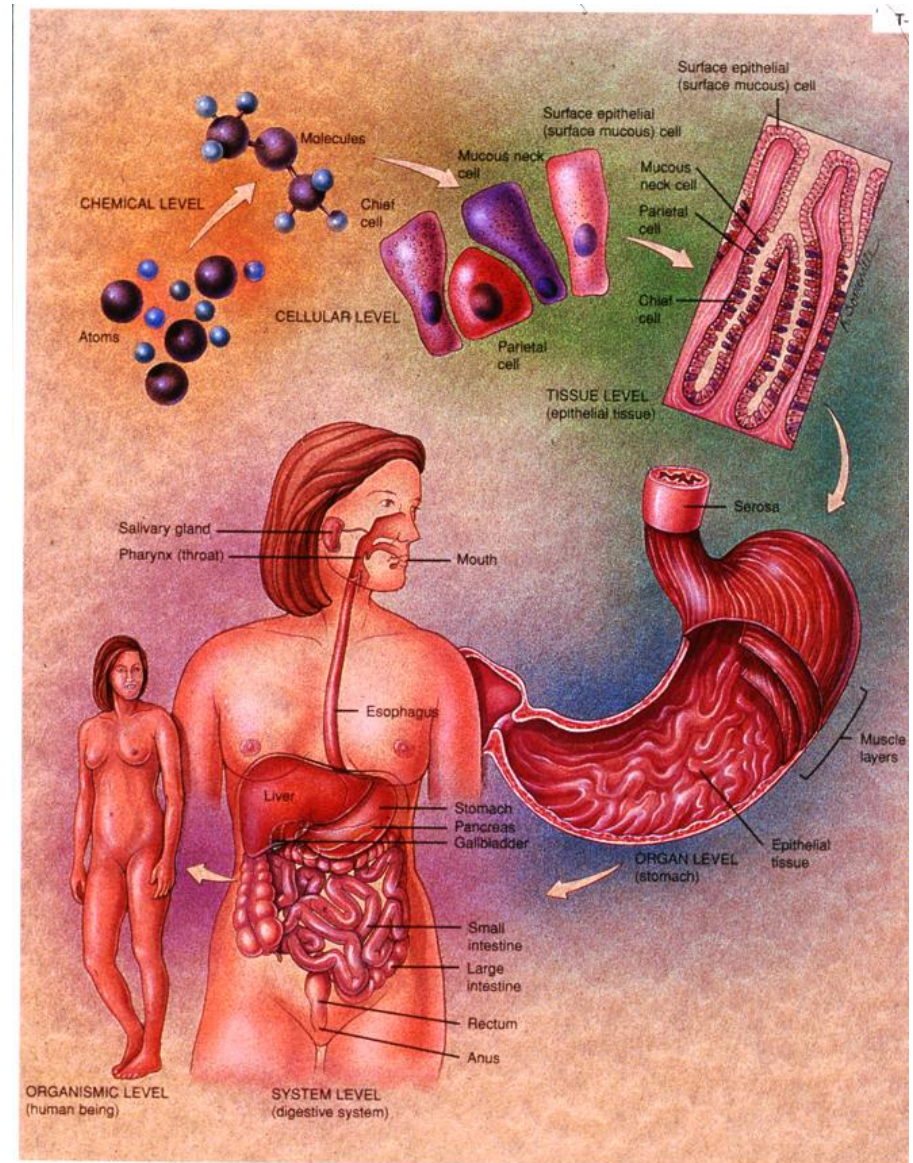
- **Microscopic anatomy** –  
Histology

- **Development anatomy** –  
Embryology

- **Pathological anatomy** –  
Pathology

- **Radiographic anatomy**

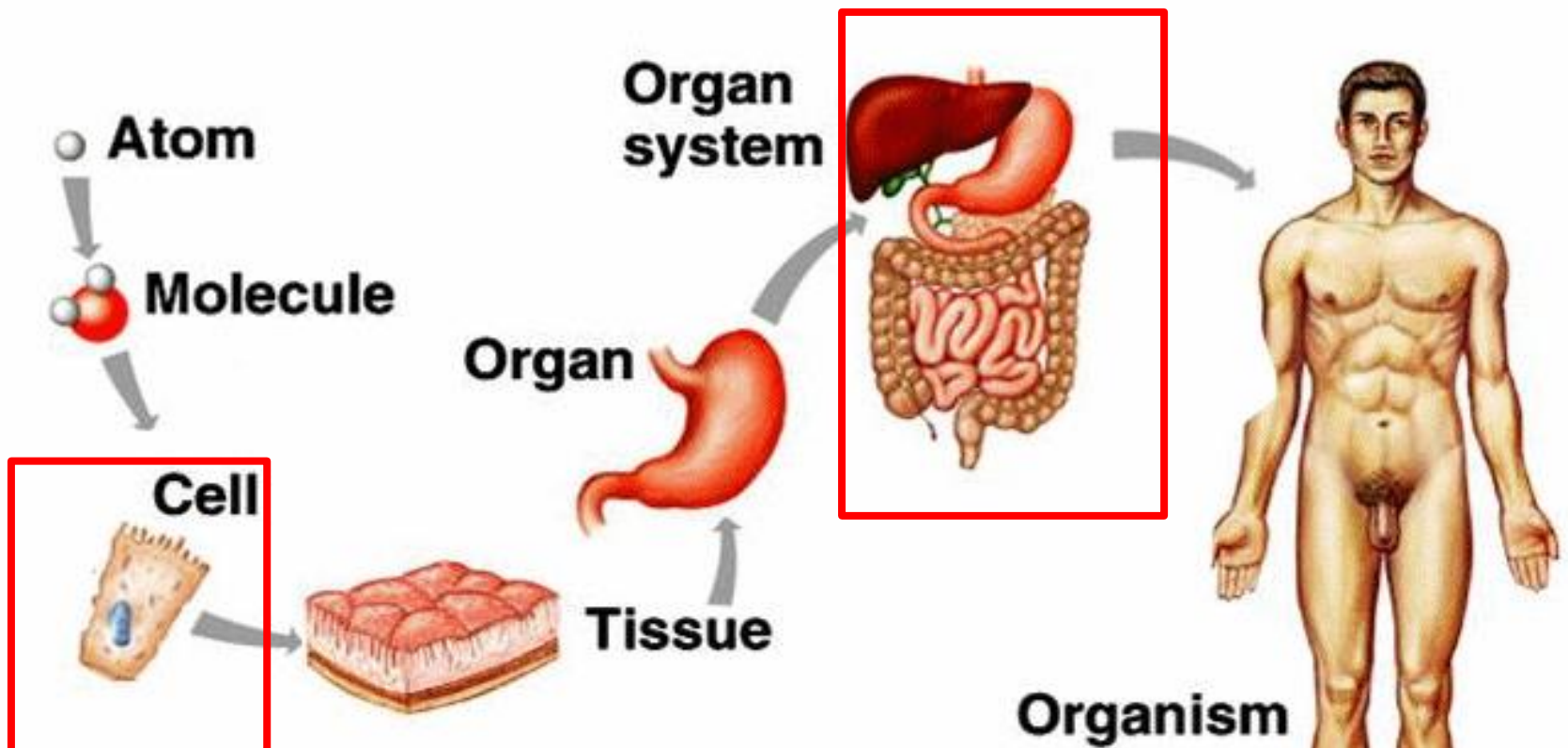
- **Surgical anatomy**



Levels of Structural organization that compose the human body, Fig# 1.1

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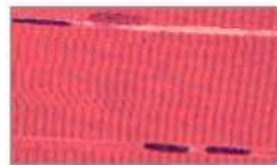
Four types of tissue



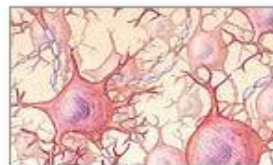
Connective tissue



Epithelial tissue



Muscle tissue



Nervous tissue



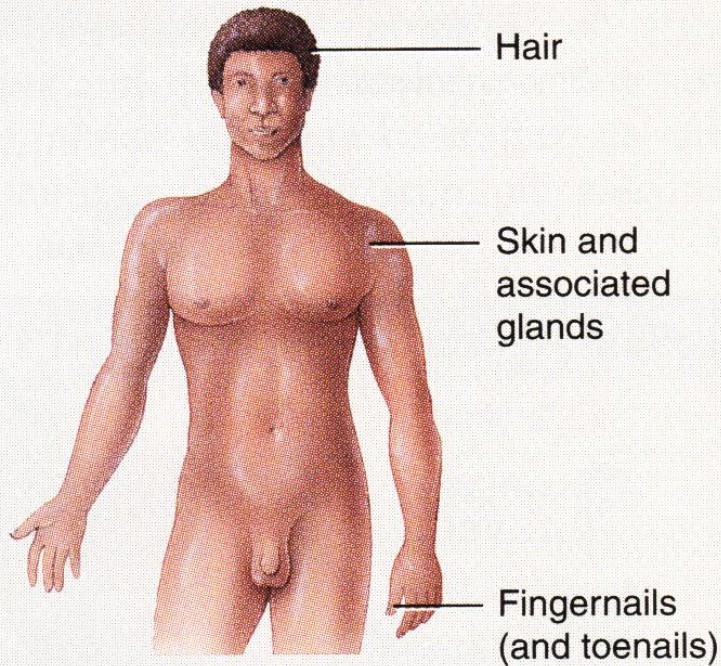
# Body Systems:

## Integumentary system (皮膚系統)

### Integumentary System

**Components** The skin and structures derived from it, such as hair, nails, and sweat and oil glands.

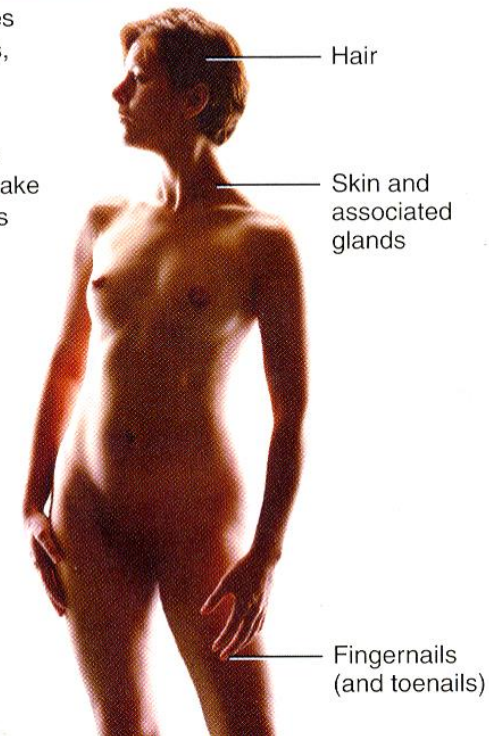
**Functions** Helps regulate body temperature; protects the body; eliminates some wastes; helps produce vitamin D; and detects sensations, such as pain, touch, hot, and cold.



### INTEGUMENTARY SYSTEM

**Components** Skin, and structures derived from it, such as hair, nails, sweat glands, and oil glands.

**Functions** Protects the body; helps regulate body temperature; eliminates some wastes; helps make vitamin D; and detects sensations such as touch, pain, warmth, and cold.



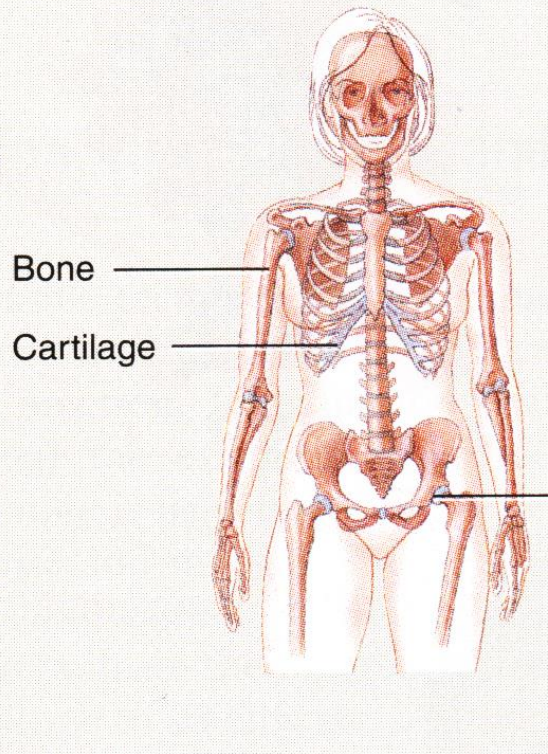


# Skeletal system (骨骼系統)

## Skeletal System

**Components** All the bones and joints of the body and their associated cartilages.

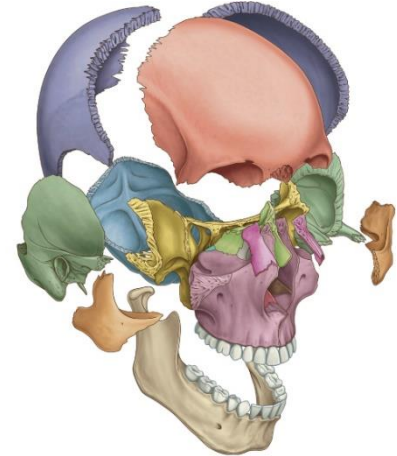
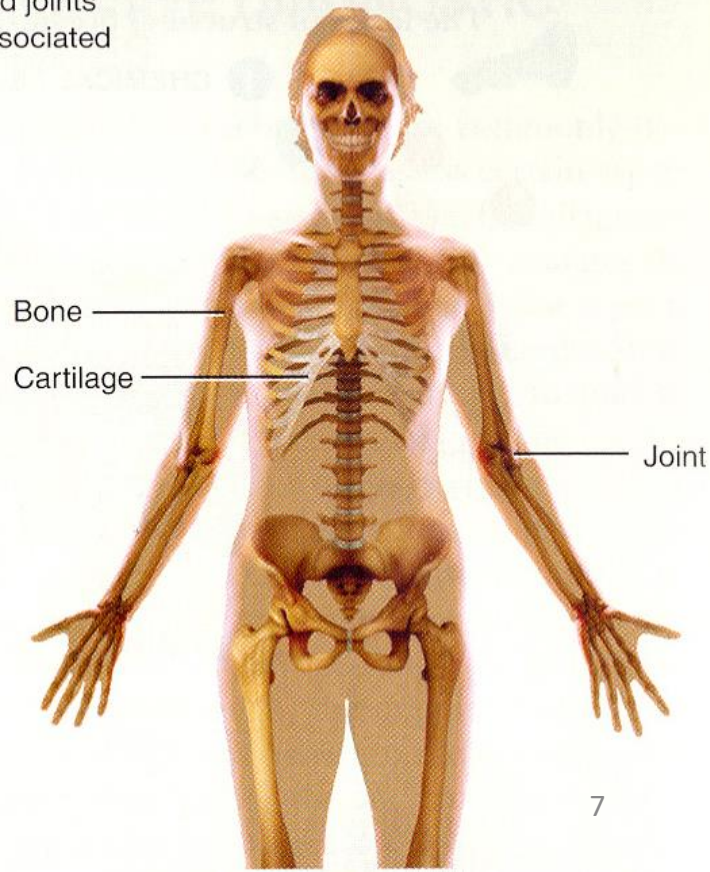
**Functions** Supports and protects the body; assists in body movements; houses cells that give rise to blood cells; and stores minerals and lipids (fats).



## SKELETAL SYSTEM

**Components** Bones and joints of the body and their associated cartilages.

**Functions** Supports and protects the body; provides a surface area for muscle attachment; aids body movements; houses cells that produce blood cells; stores minerals and lipids (fats).



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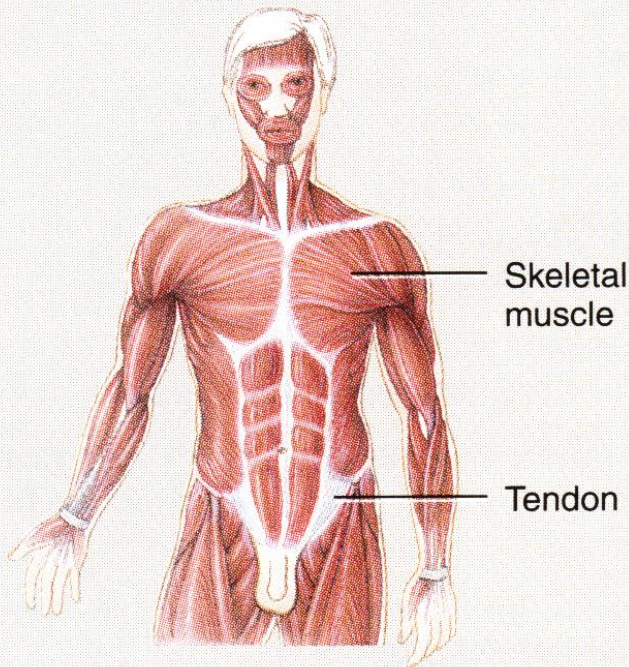


# Muscular system (肌肉系統)

## Muscular System

**Components** Refers specifically to skeletal muscle tissue, which is muscle usually attached to bones. Other muscle tissue types are smooth and cardiac.

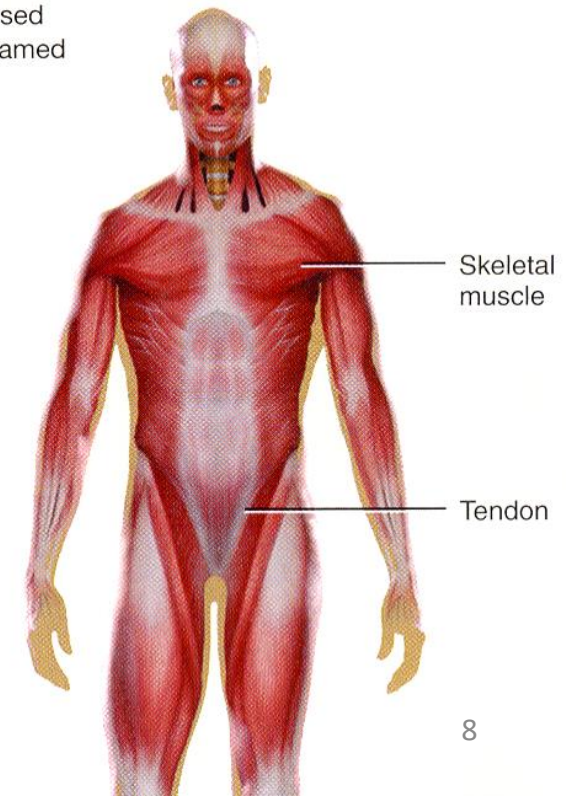
**Functions** Powers movements of the body, such as walking and throwing a ball; stabilizes body positions (posture); and generates heat.



## MUSCULAR SYSTEM

**Components** Muscles composed of skeletal muscle tissue, so-named because it is usually attached to bones.

**Functions** Produces body movements, such as walking; stabilizes body position (posture); generates heat.



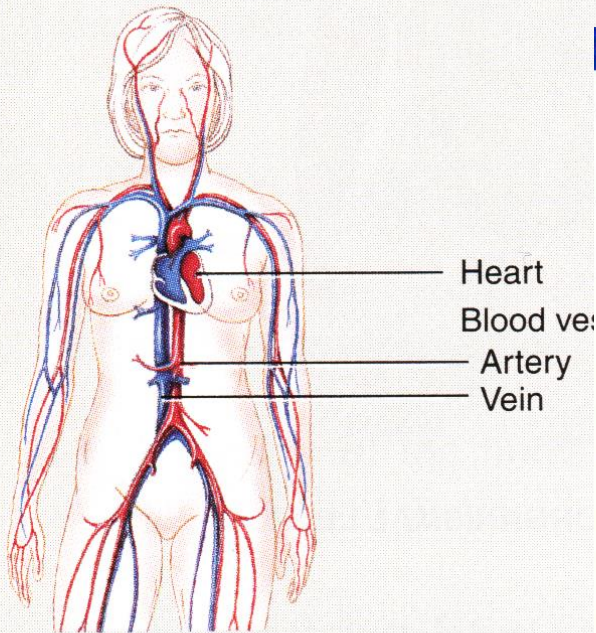


# Cardiovascular system (心血管系統)

## Cardiovascular System

**Components** Blood, heart, and blood vessels.

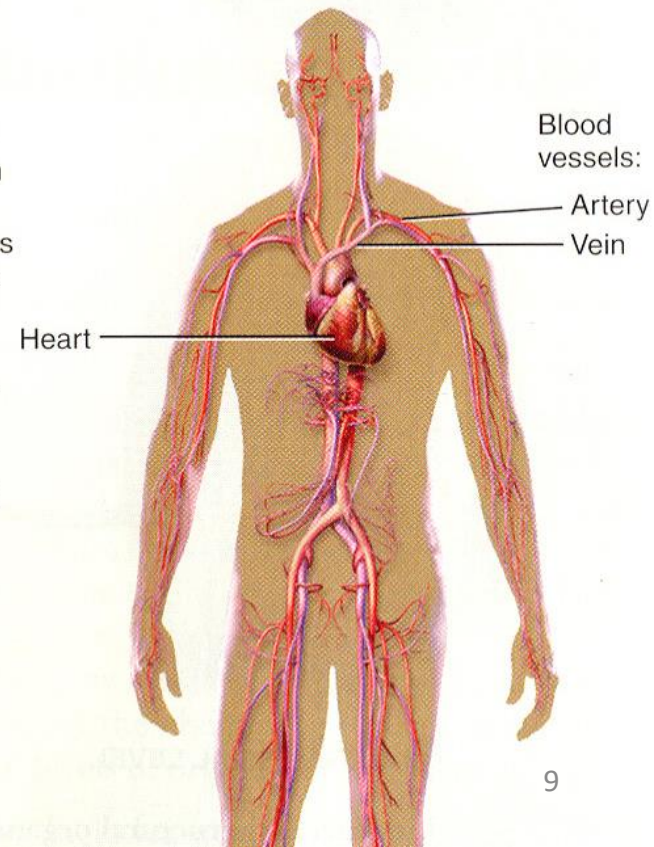
**Functions** Heart pumps blood through blood vessels; blood carries oxygen and nutrients to cells and carbon dioxide and wastes away from cells and helps regulate acid–base balance, temperature, and water content of body fluids; blood components help defend against disease and mend damaged blood vessels.



## CARDIOVASCULAR SYSTEM

**Components** Blood, heart, and blood vessels.

**Functions** Heart pumps blood through blood vessels; blood carries oxygen and nutrients to cells and carbon dioxide and wastes away from cells and helps regulate acid–base balance, temperature, and water content of body fluids; blood components help defend against disease and mend damaged blood vessels.



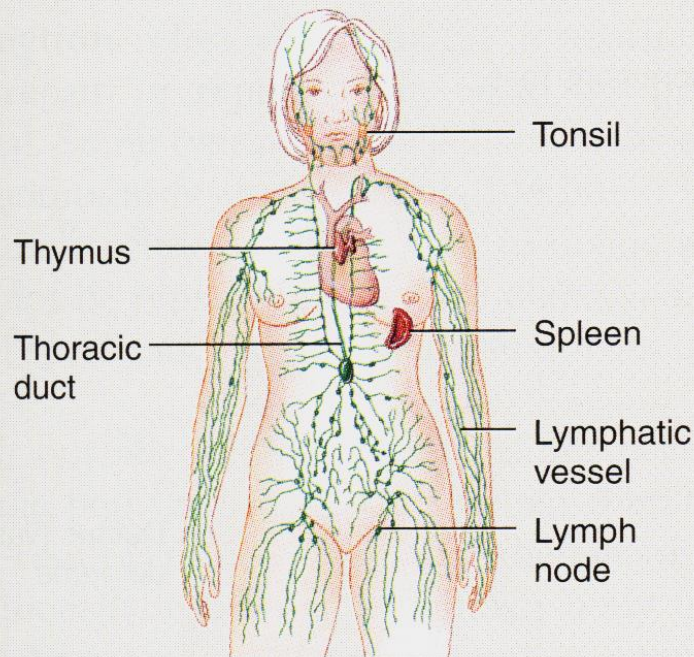


# Lymphatic system (淋巴系統)

## Lymphatic and Immune Systems

**Components** Lymph, lymphatic vessels, and structures or organs containing lymphatic tissue such as the spleen, thymus, lymph nodes, and tonsils. Lymphatic tissues contain large numbers of white blood cells called lymphocytes.

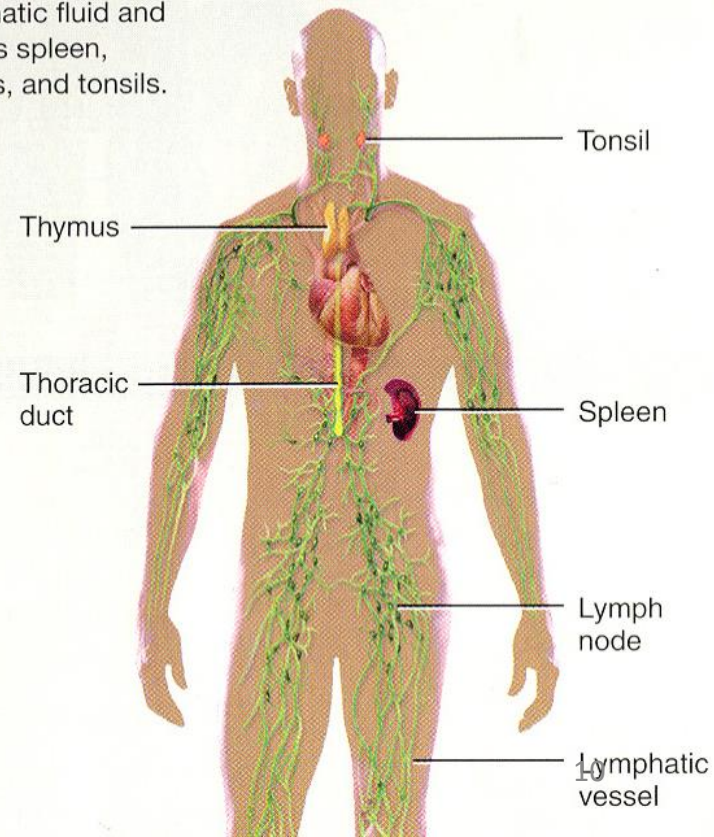
**Functions** Returns proteins and plasma (liquid portion of blood) to the cardiovascular system; transports triglycerides (fats) from the gastrointestinal tract to the cardiovascular system; serves as a site of maturation and proliferation of certain white blood cells; and helps protect against disease through the production of proteins called antibodies, as well as other responses.



## LYMPHATIC AND IMMUNE SYSTEM

**Components** Lymphatic fluid and vessels; also includes spleen, thymus, lymph nodes, and tonsils.

**Functions** Returns proteins and fluid to blood; carries lipids from gastrointestinal tract to blood; includes structures where lymphocytes that protect against disease-causing organisms mature and proliferate.





# Nervous system

## (神經系統)

### Nervous System

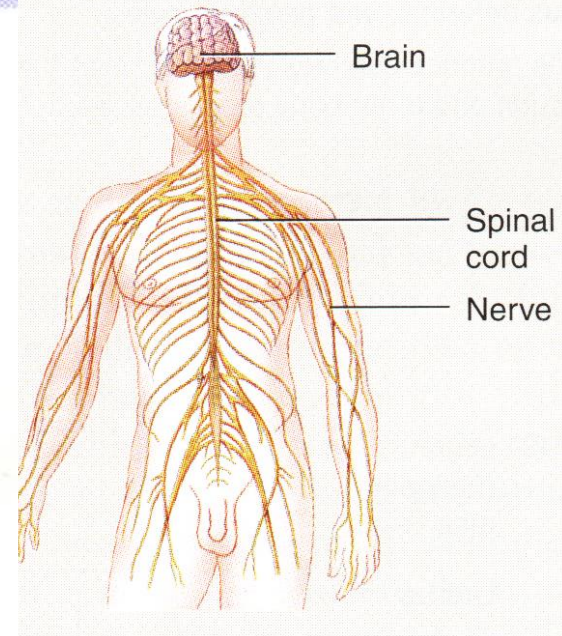
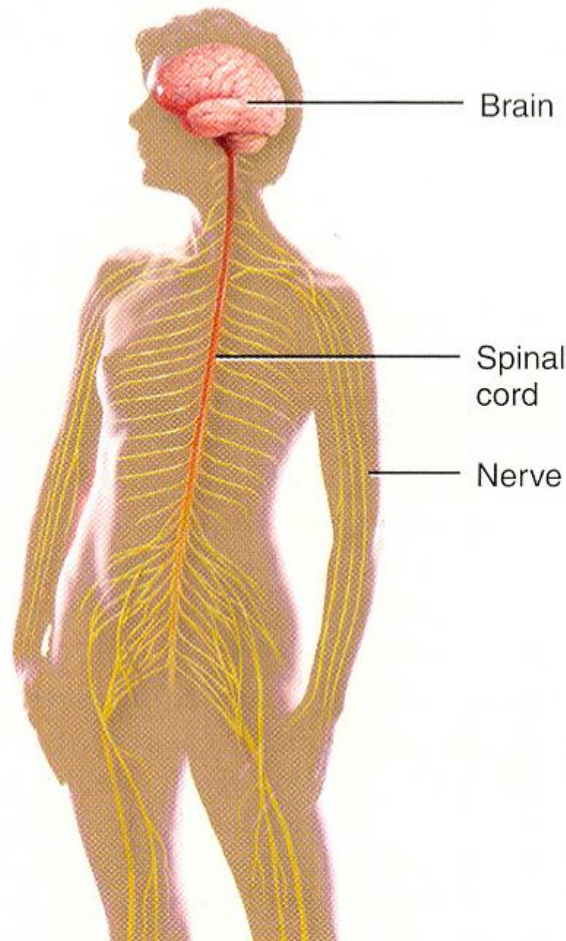
**Components** Brain, spinal cord, nerves, and special sense organs, such as the eyes and ears.

**Functions** Regulates body activities through action potentials (nerve impulses) stimulated by changes in the internal and external environments, interprets the changes, and responds to the changes by inducing muscular contractions or glandular secretions.

### NERVOUS SYSTEM

**Components** Brain, spinal cord, nerves, and special sense organs, such as the eye and ear.

**Functions** Generates action potentials (nerve impulses) to regulate body activities; detects changes in the body's internal and external environment, interprets the changes, and responds by causing muscular contractions or glandular secretions.



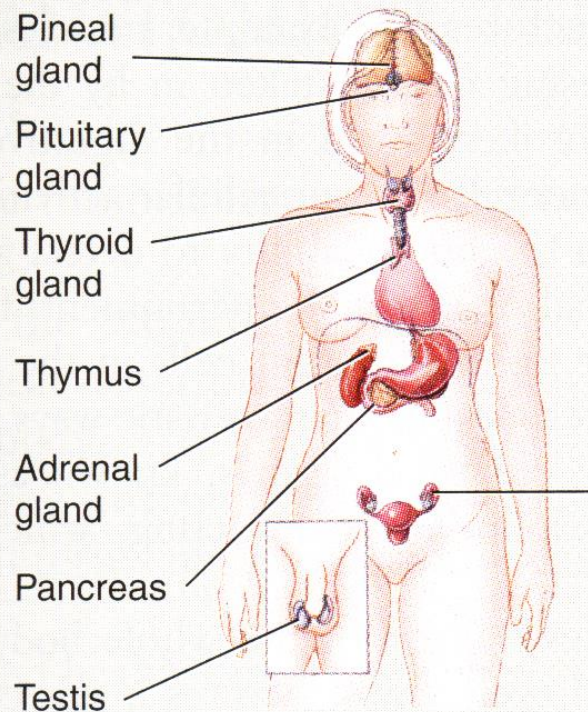


# Endocrine system (內分泌系統)

## Endocrine System

**Components** All hormone-producing cells and glands such as the pituitary and thyroid glands and pancreas.

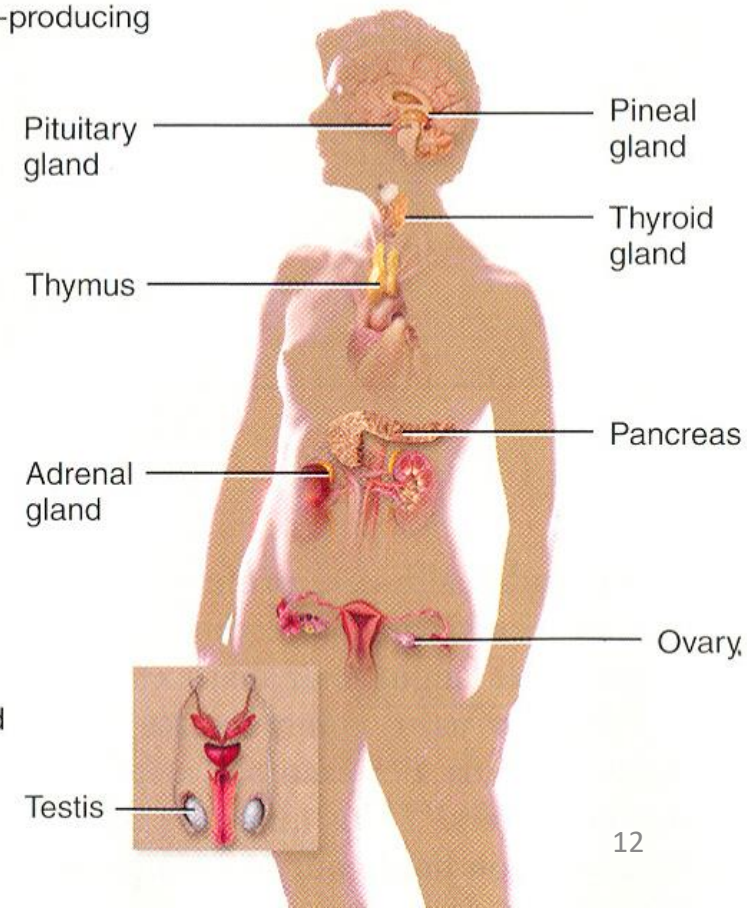
**Functions** Regulates body activities through hormones, chemicals transported in the blood to various target organs of the body.



## ENDOCRINE SYSTEM

**Components** Hormone-producing glands (pineal gland, hypothalamus, pituitary gland, thymus, thyroid gland, parathyroid glands, adrenal glands, pancreas, ovaries, and testes) and hormone-producing cells in several other organs.

**Functions** Regulates body activities by releasing hormones, which are chemical messengers transported in blood from an endocrine gland to a target organ.





# Respiratory system

## (呼吸系統)

### Respiratory System

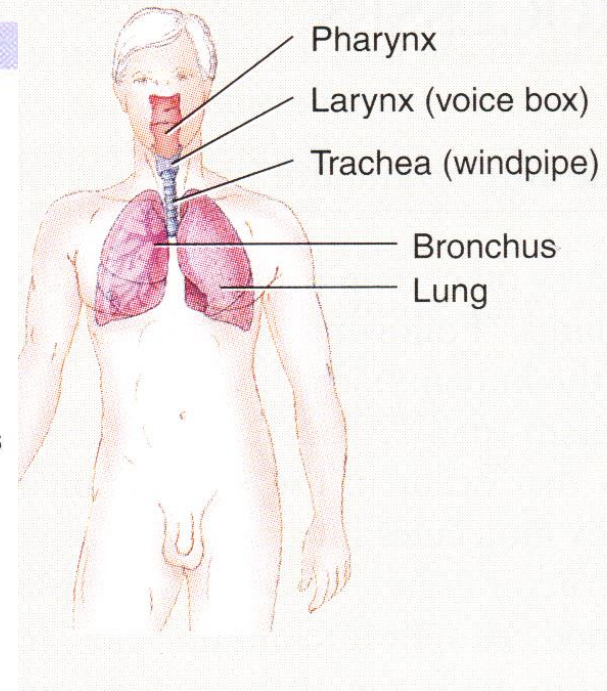
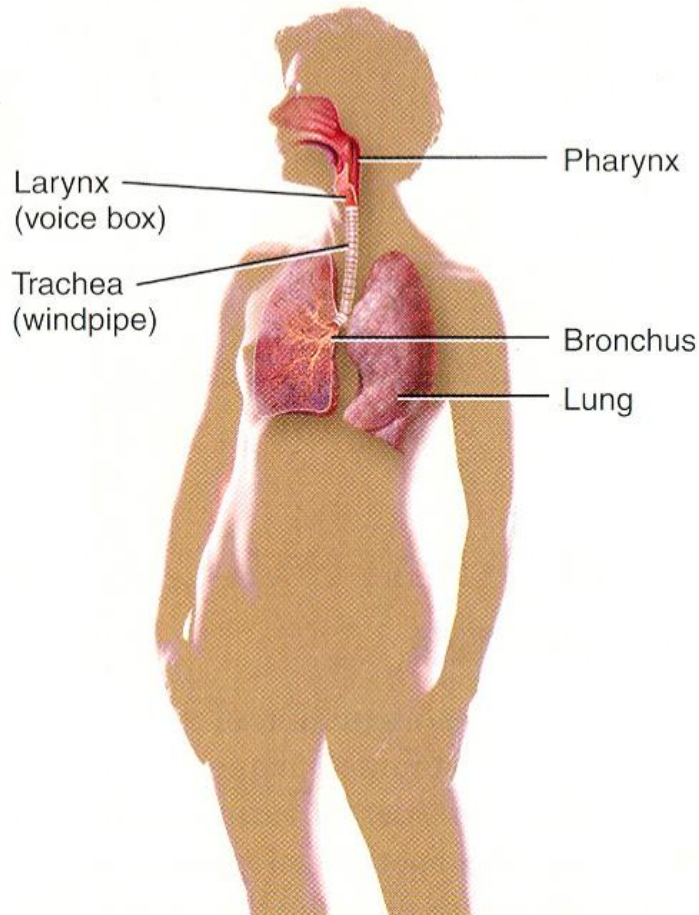
**Components** Lungs and the airways leading into and out of them.

**Functions** Transfers oxygen from inhaled air to blood and carbon dioxide from blood to exhaled air; helps regulate acid–base balance of body fluids; air flowing out of lungs through vocal cords produces sounds.

### RESPIRATORY SYSTEM

**Components** Lungs and air passageways such as the pharynx (throat), larynx (voice box), trachea (windpipe), and bronchial tubes leading into and out of them.

**Functions** Transfers oxygen from inhaled air to blood and carbon dioxide from blood to exhaled air; helps regulate acid–base balance of body fluids; air flowing out of lungs through vocal cords produces sounds.



(continues)

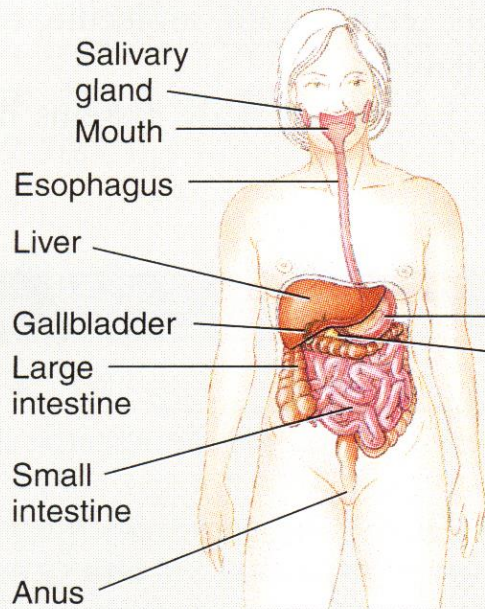


# Digestive system (消化系統)

## Digestive System

**Components** Organs of gastrointestinal tract, a long tube that includes the mouth, esophagus, stomach, intestines, and anus; also includes accessory organs that assist in digestive processes, such as the salivary glands, liver, gallbladder, and pancreas.

**Functions** Achieves physical and chemical breakdown of food; absorbs nutrients; eliminates solid wastes.

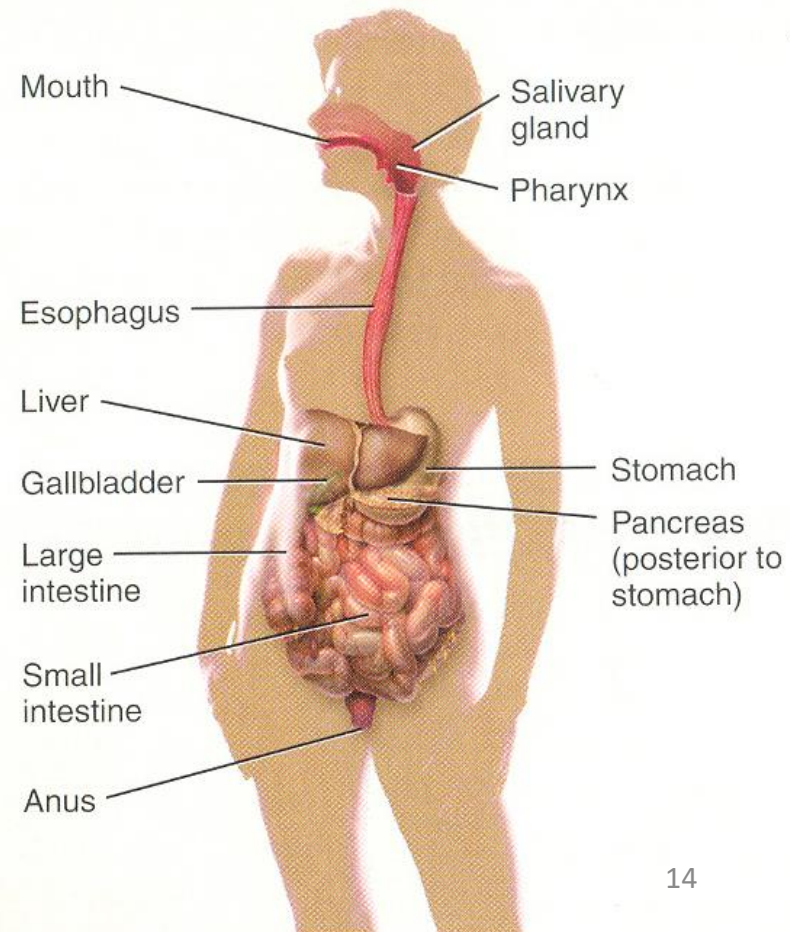


## DIGESTIVE SYSTEM

### Components

Organs of gastrointestinal tract, a long tube that includes the mouth, pharynx, esophagus, stomach, small and large intestines, and anus; also includes accessory organs that assist in digestive processes, such as the salivary glands, liver, gallbladder, and pancreas.

**Functions** Achieves physical and chemical breakdown of food; absorbs nutrients; eliminates solid wastes.





# Urinary system (泌尿系統)

## Urinary System

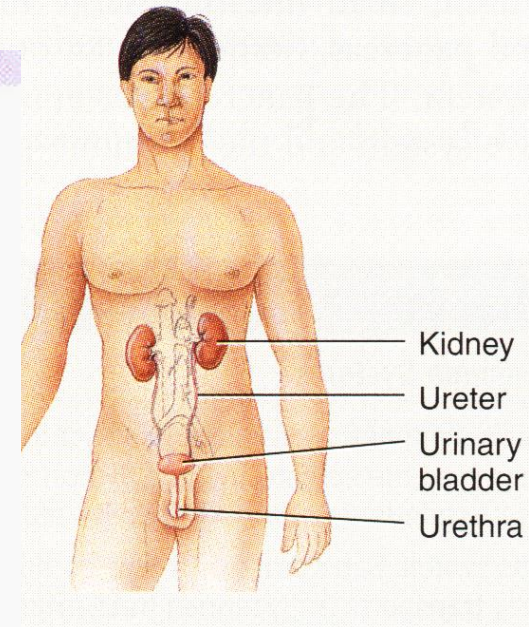
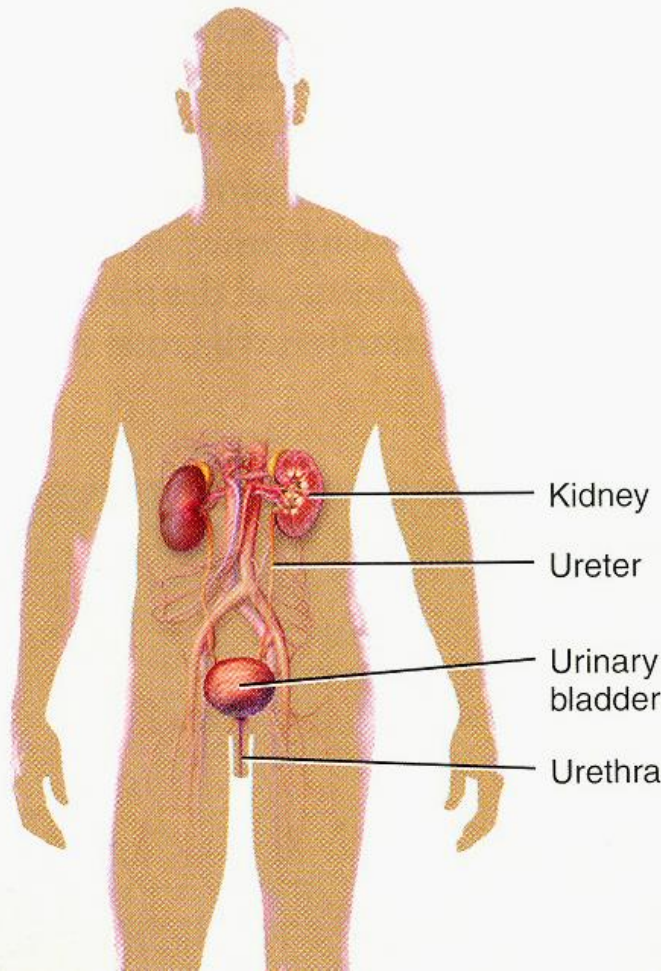
**Components** Kidneys, ureters, urinary bladder, and urethra that together produce, store, and eliminate urine.

**Functions** Regulates the volume and chemical composition of blood; eliminates metabolic wastes; regulates fluid and electrolyte balance; helps maintain the acid–base balance of body fluids and calcium balance of the body; and secretes a hormone that regulates red blood cell production.

## URINARY SYSTEM

**Components** Kidneys, ureters, urinary bladder, and urethra.

**Functions** Produces, stores, and eliminates urine; eliminates wastes and regulates volume and chemical composition of blood; helps maintain the acid–base balance of body fluids; maintains body's mineral balance; helps regulate production of red blood cells.



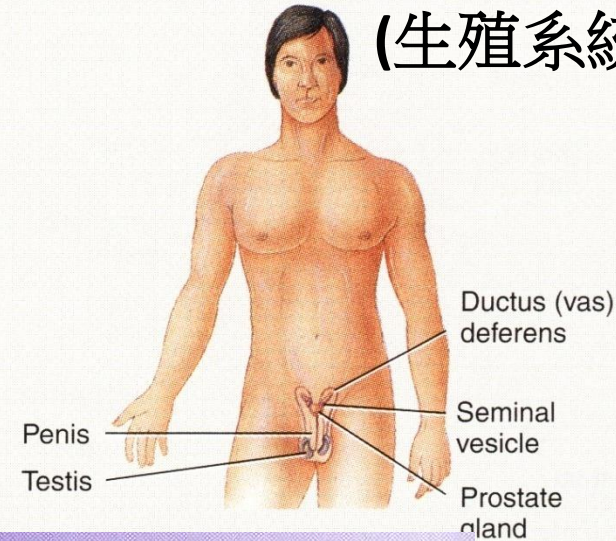
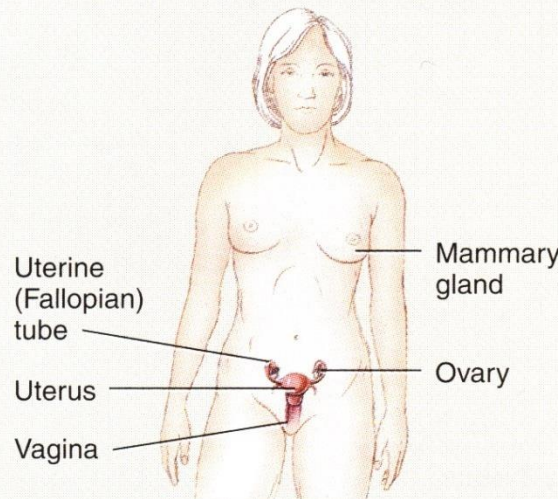


Reproductive Systems

**Components** Gonads (testes or ovaries) and associated organs: uterinetubes, uterus, and vagina in females and epididymis, ductus deferens, and penis in males.

**Functions** Gonads produce gametes (sperm or ova) that unite to form a new organism and release hormones that regulate reproduction and other body processes; associated organs transport and store gametes.

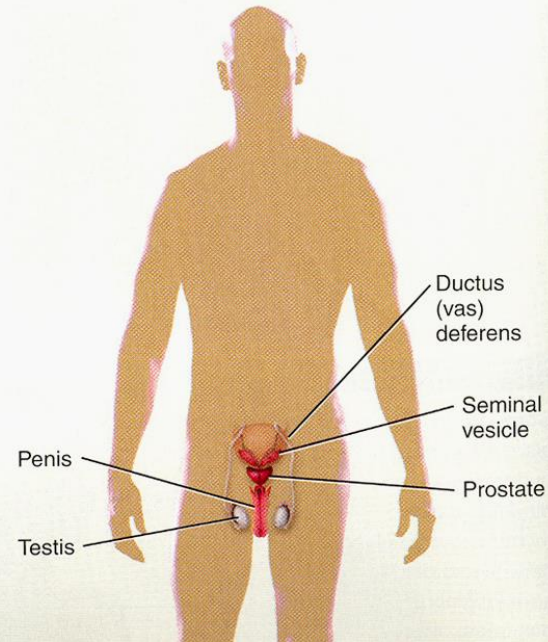
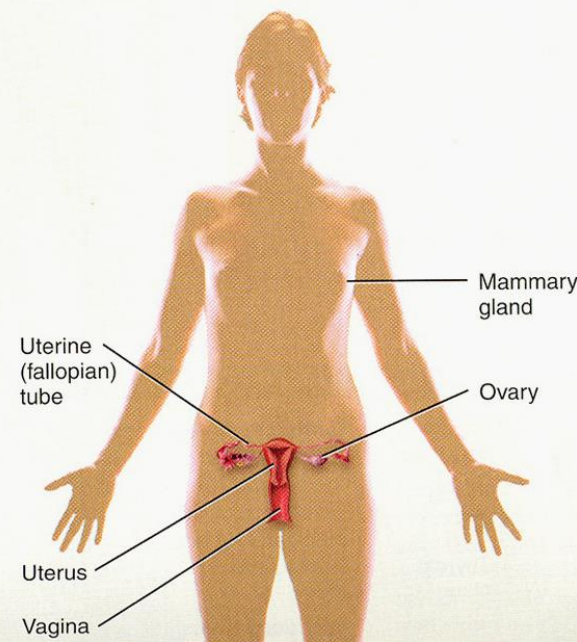
Reproductive system (生殖系統)



REPRODUCTIVE SYSTEM

**Components** Gonads (testes in males and ovaries in females) and associated organs (uterine tubes, uterus, and vagina in females and epididymis, ductus deferens, and penis in males).

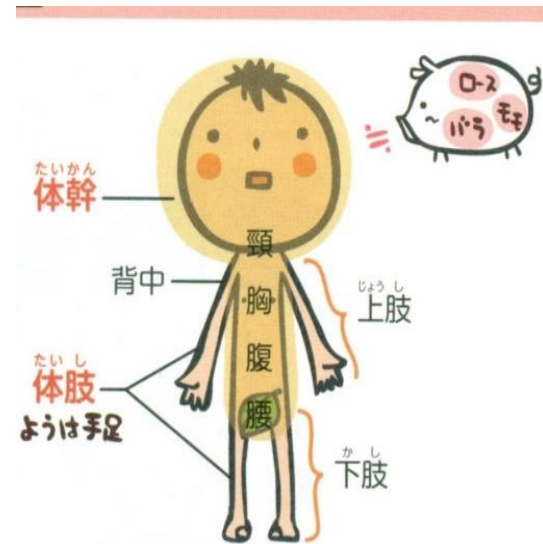
**Functions** Gonads produce gametes (sperm or oocytes) that unite to form a new organism; gonads also release hormones that regulate reproduction and other body processes; associated organs transport and store gametes.



Male



# Gross Anatomy



## Axial region

### Cephalic (head)

Frontal

Orbital

Nasal

Oral

Mental

### Cervical (neck)

### Thoracic

Axillary

Sternal

Mammary

### Abdominal

Umbilical

### Pelvic

Inguinal (groin)

### Pubic (genital)

Thorax

Abdomen

Back (Dorsum)

## Appendicular region

### Upper limb

Acromial

Brachial (arm)

Antecubital

Antebrachial (forearm)

Carpal (wrist)

### Manus (hand)

Pollex

Palmar

Digital

### Lower limb

Coxal (hip)

Femoral (thigh)

Patellar

Crural (leg)

Fibular or peroneal

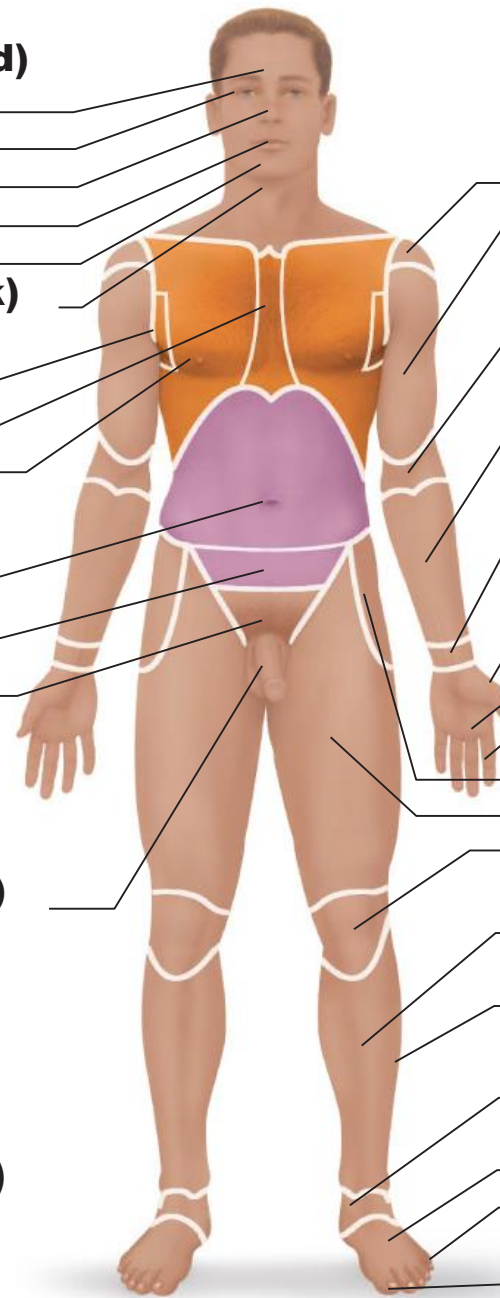
### Pedal (foot)

Tarsal (ankle)

Metatarsal

Digital

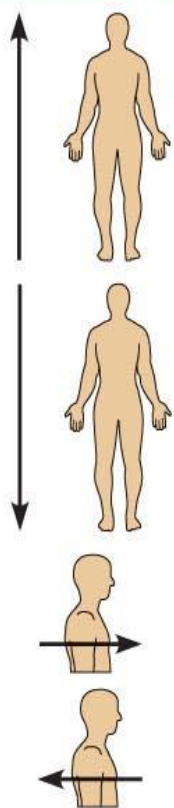
Hallux



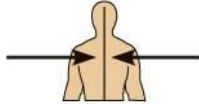
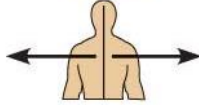
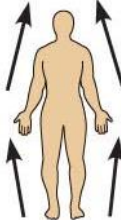
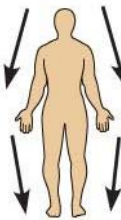
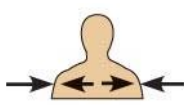
(a) Anterior/Ventral



# Orientation

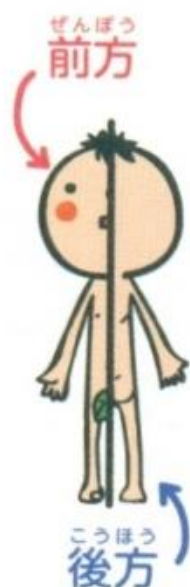
| Term                          | Definition                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                  | Example                                   |
|-------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Superior (cranial)<br>上 (頭顱)  | Toward the head end or upper part of a structure or the body; above               |  <p>The diagrams show a human figure from the back with a vertical double-headed arrow indicating superior (up) and inferior (down) directions. Below this, a human head and neck are shown in profile with a horizontal double-headed arrow indicating anterior (front) and posterior (back) directions.</p> | The head is superior to the abdomen.      |
| Inferior (caudal)<br>下 (尾部)   | Away from the head end or toward the lower part of a structure or the body; below |                                                                                                                                                                                                                                                                                                                                                                                                  | The navel is inferior to the chin.        |
| Anterior (ventral)*<br>前 (腹部) | Toward or at the front of the body; in front of                                   |                                                                                                                                                                                                                                                                                                                                                                                                  | The breastbone is anterior to the spine.  |
| Posterior (dorsal)*<br>後 (背部) | Toward or at the back of the body; behind                                         |                                                                                                                                                                                                                                                                                                                                                                                                  | The heart is posterior to the breastbone. |



| Term                      | Definition                                                                                    |                                                                                      | Example                                          |
|---------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------|
| Medial 内側                 | Toward or at the midline of the body; on the inner side of                                    |    | The heart is medial to the arm.                  |
| Lateral 外側                | Away from the midline of the body; on the outer side of                                       |   | The arms are lateral to the chest.               |
| Proximal 近端               | Closer to the origin of the body part or the point of attachment of a limb to the body trunk  |   | The elbow is proximal to the wrist.              |
| Distal 遠端                 | Farther from the origin of a body part or the point of attachment of a limb to the body trunk |   | The knee is distal to the thigh.                 |
| Superficial (external) 表淺 | Toward or at the body surface                                                                 |    | The skin is superficial to the skeletal muscles. |
| Deep (internal) 深層        | Away from the body surface; more internal                                                     |    | The lungs are deep to the skin.                  |
| Ipsilateral 同側            | On the same side                                                                              |   | The right hand and right foot are ipsilateral.   |
| Contralateral 對側          | On opposite sides                                                                             |  | The right hand and left foot are contralateral.  |



# 人体の方向



# Body Planes:

Transverse plane (水平切面)

Frontal or Coronal plane (冠狀切面)

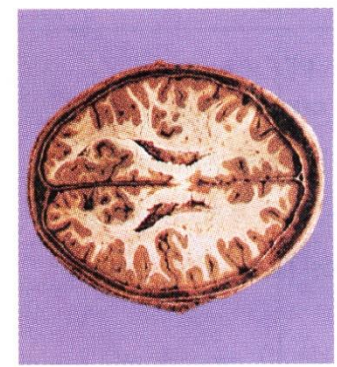
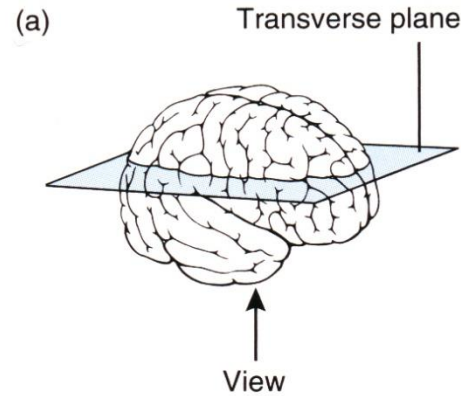
Sagittal plane (矢狀切面)

Midsagittal plane (正中矢狀切面)

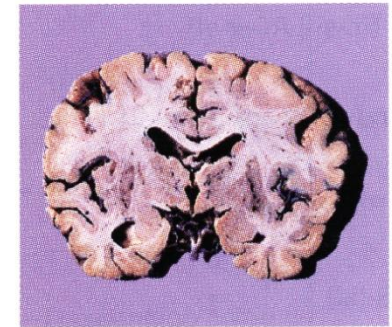
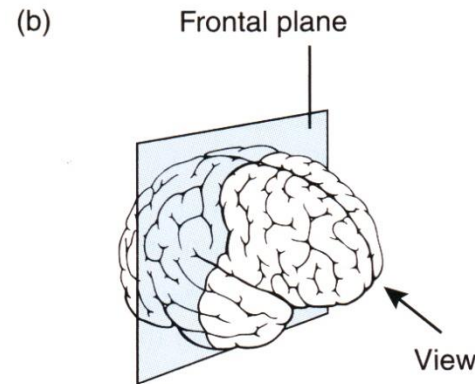
Cross plane (橫狀切面)

Oblique plane (斜切面)

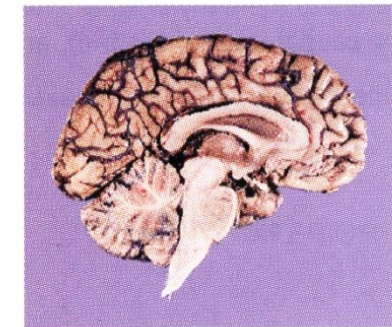
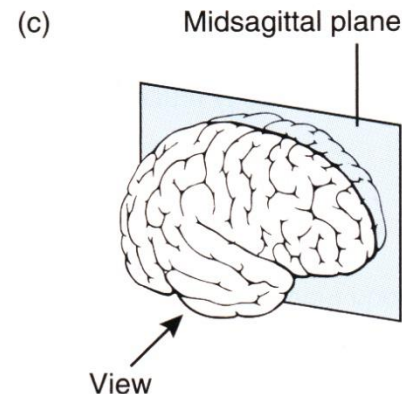
Longitudinal plane (縱切面)



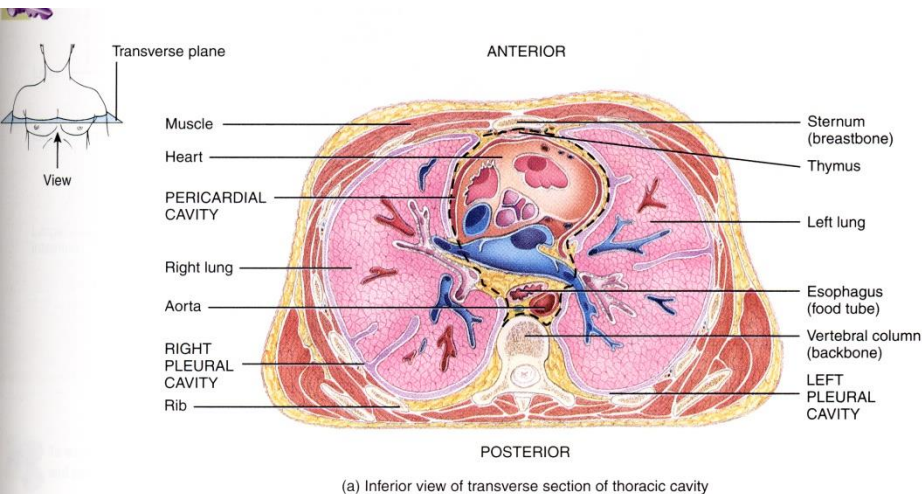
Transverse section



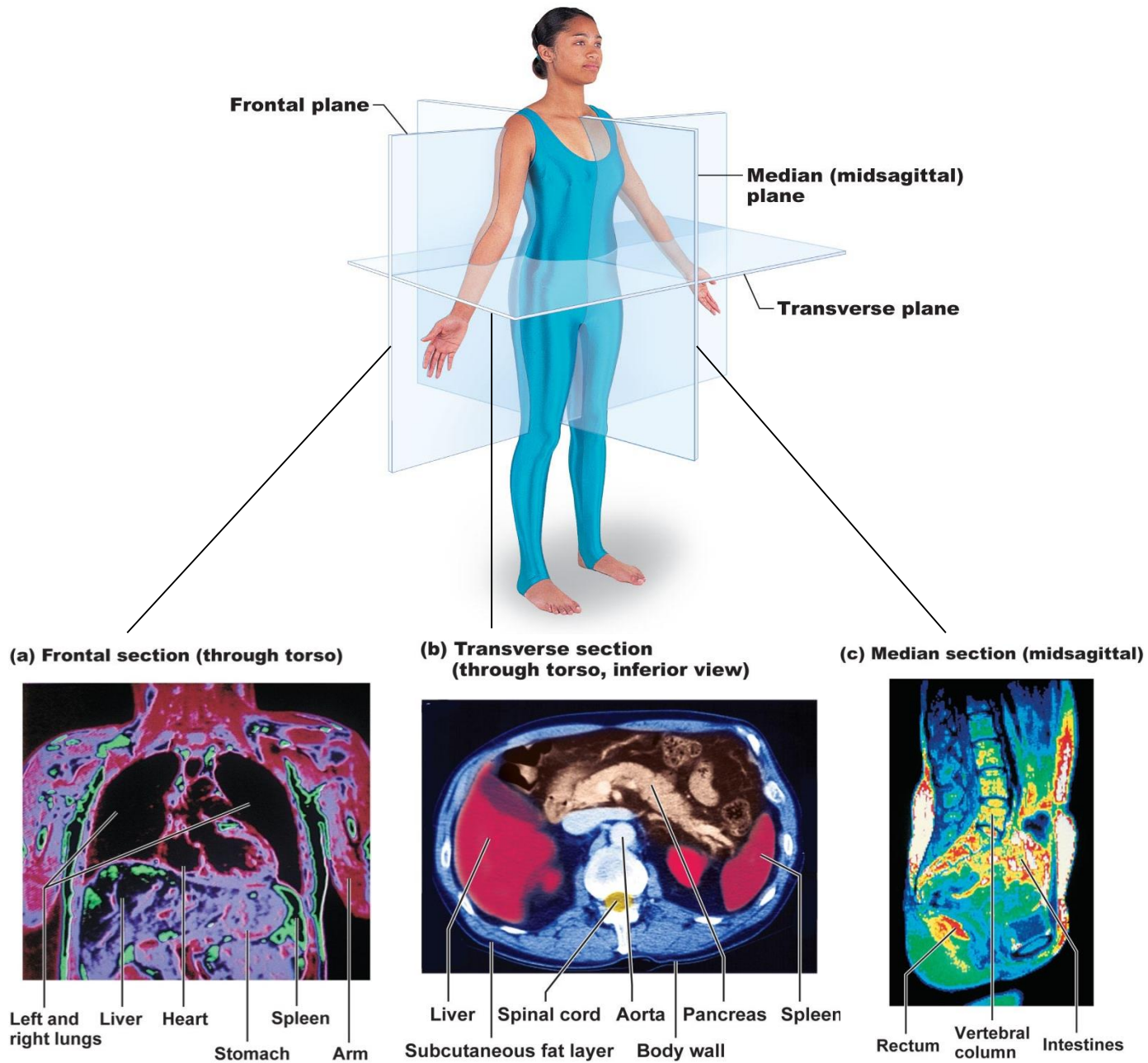
Frontal section



Midsagittal section

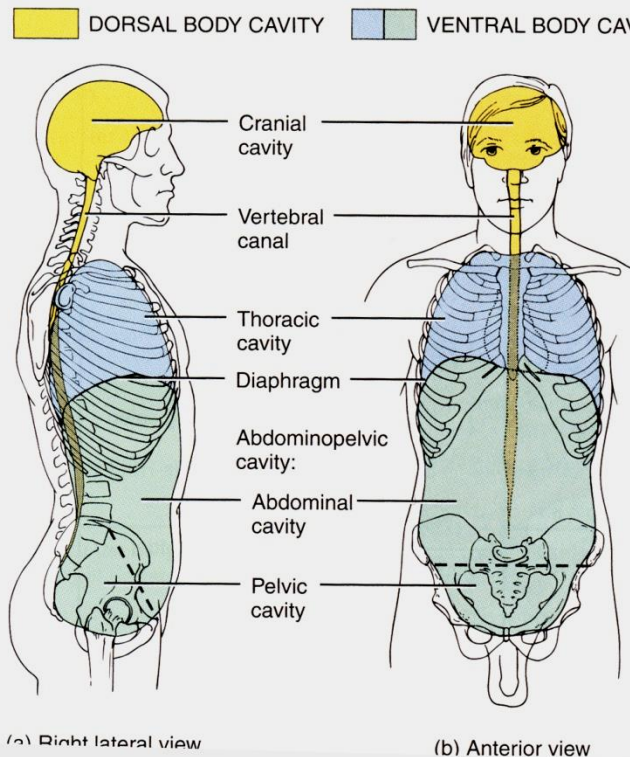








# V. Body Cavities:



| CAVITY                       | COMMENTS                                                                                                                                                                                                |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DORSAL CAVITY</b>         |                                                                                                                                                                                                         |
| <b>Cranial cavity</b>        | Formed by cranial bones and contains brain.                                                                                                                                                             |
| <b>Vertebral cavity</b>      | Formed by vertebral column and contains spinal cord and the beginnings of spinal nerves.                                                                                                                |
| <b>VENTRAL CAVITY*</b>       |                                                                                                                                                                                                         |
| <b>Thoracic cavity</b>       | Chest cavity; superior portion of ventral body cavity; contains pleural and pericardial cavities and mediastinum.                                                                                       |
| <i>Pleural cavity</i>        | Each surrounds a lung; the serous membrane of the pleural cavities is the pleura.                                                                                                                       |
| <i>Pericardial cavity</i>    | Surrounds the heart; the serous membrane of the pericardial cavity is the pericardium.                                                                                                                  |
| <i>Mediastinum</i>           | Central portion of thoracic cavity between the lungs; extends from sternum to vertebral column and from neck to diaphragm; contains heart, thymus, esophagus, trachea, and several large blood vessels. |
| <b>Abdominopelvic cavity</b> | Inferior portion of ventral body cavity; subdivided into abdominal and pelvic cavities.                                                                                                                 |
| <i>Abdominal cavity</i>      | Contains stomach, spleen, liver, gallbladder, small intestine, and most of large intestine; the serous membrane of the abdominal cavity is the peritoneum.                                              |
| <i>Pelvic cavity</i>         | Contains urinary bladder, portions of large intestine, and internal organs of reproduction.                                                                                                             |



# V. Body Cavities:

## Dorsal body cavity:

Cranial cavity 顱腔

Spinal (vertebral) canal

脊髓(脊椎)管

## Ventral body cavity:

Thoracic cavity 胸腔

Abdominal cavity 腹腔

Pelvic cavity 骨盆腔

**Dorsal body cavity**

**Cranial cavity**  
(contains brain)

**Vertebral cavity**  
(contains spinal cord)

**Thoracic cavity**  
(contains heart and lungs)

Diaphragm

**Abdominal cavity**  
(contains digestive viscera)

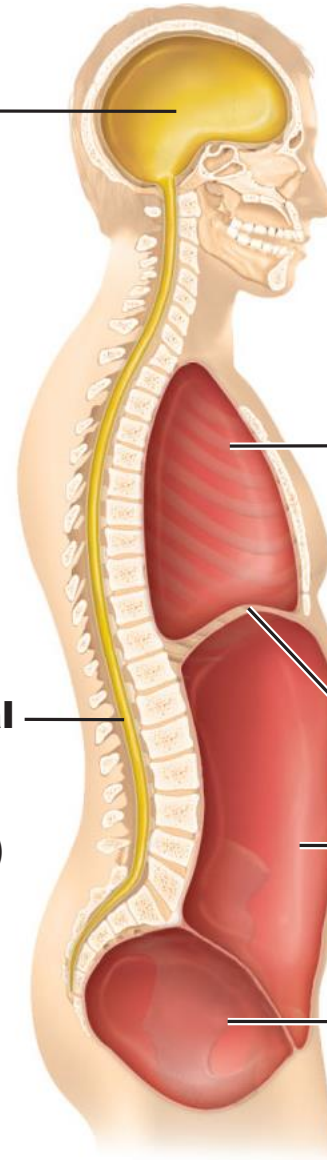
**Pelvic cavity**  
(contains urinary bladder, reproductive organs, and rectum)



Dorsal body cavity

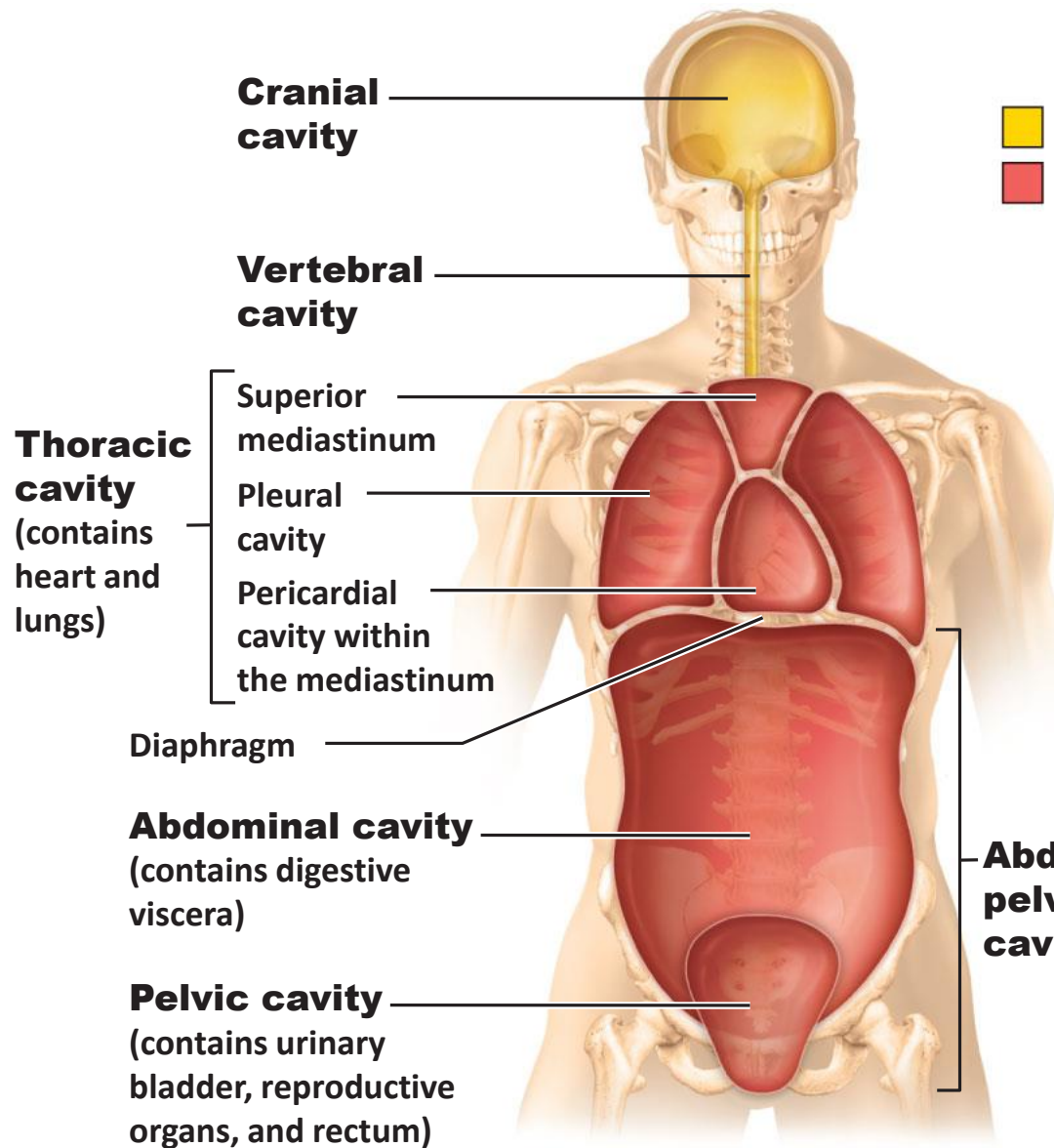


Ventral body cavity

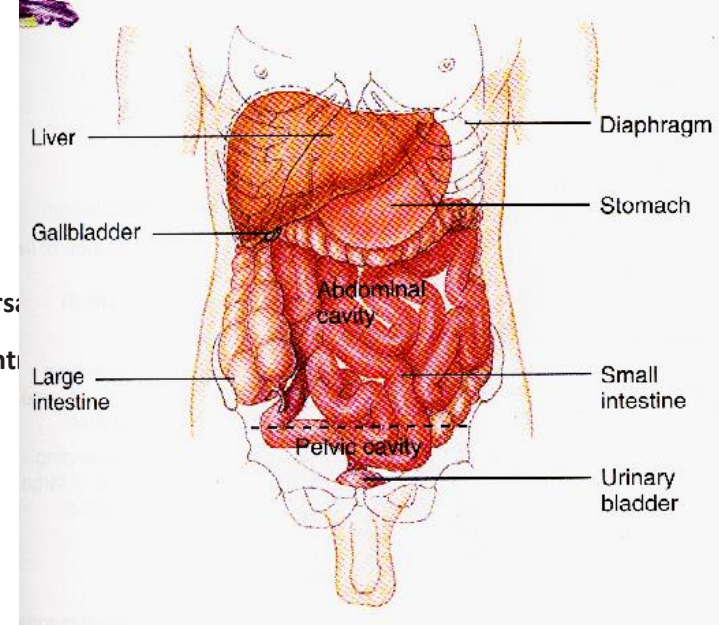


**(a) Lateral view**

# V. Body Cavities:



**(b) Anterior view**



**Ventral body cavity**  
(thoracic and abdominopelvic cavities)



# Thoracic cavity

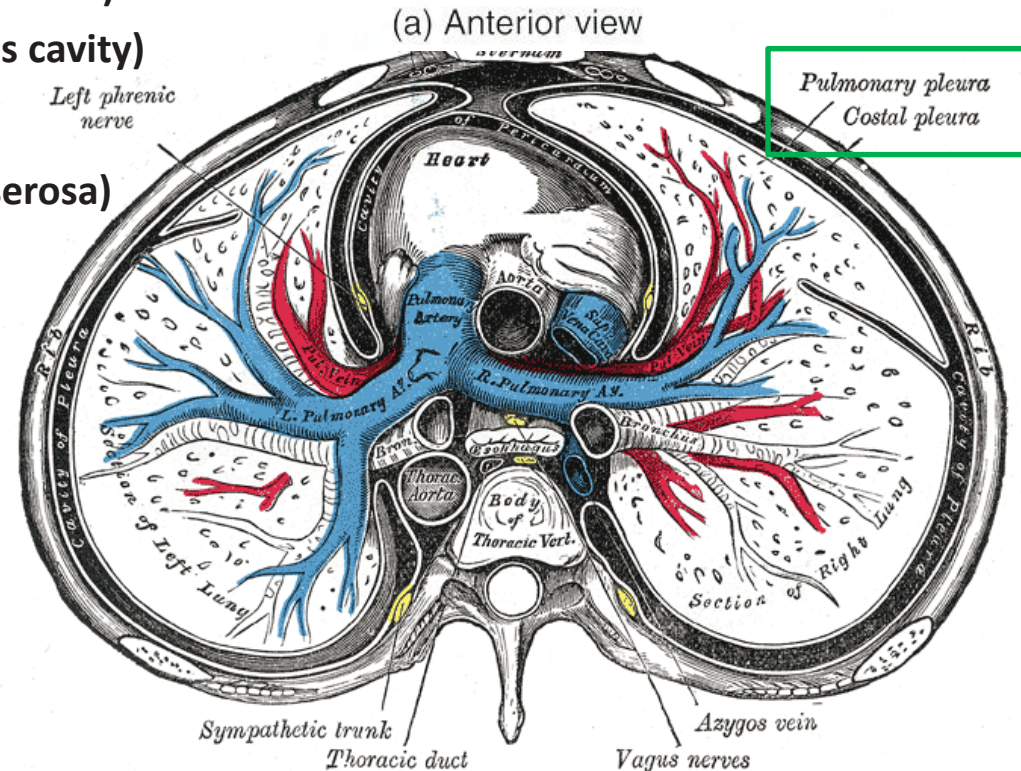
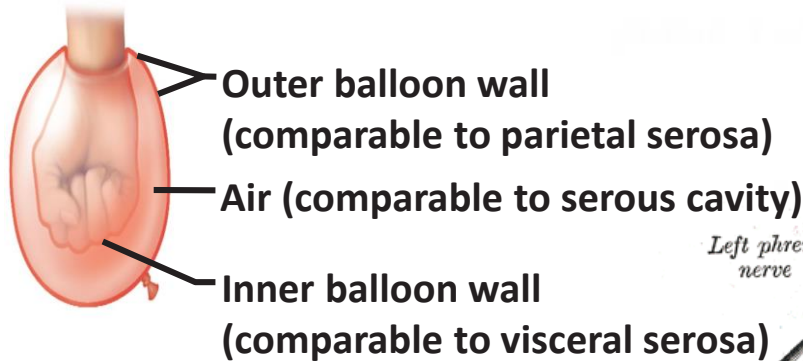
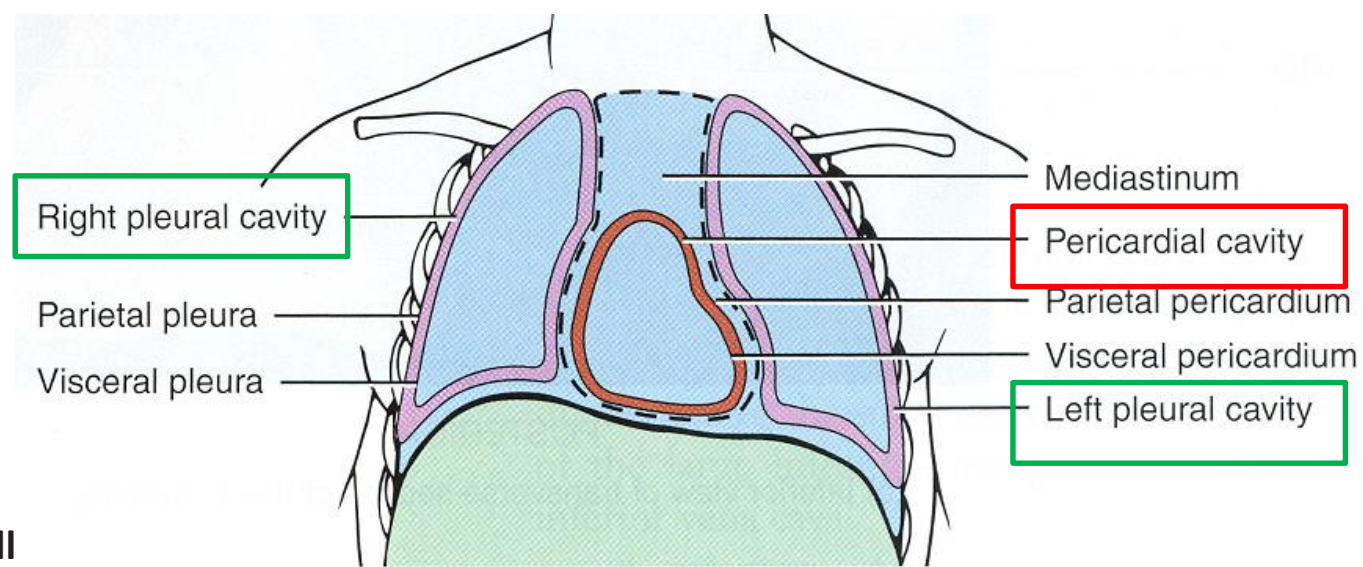
## 胸腔

Mediastinum 縱膈

Pericardial cavity

心包腔

Pleural cavity 胸膜腔

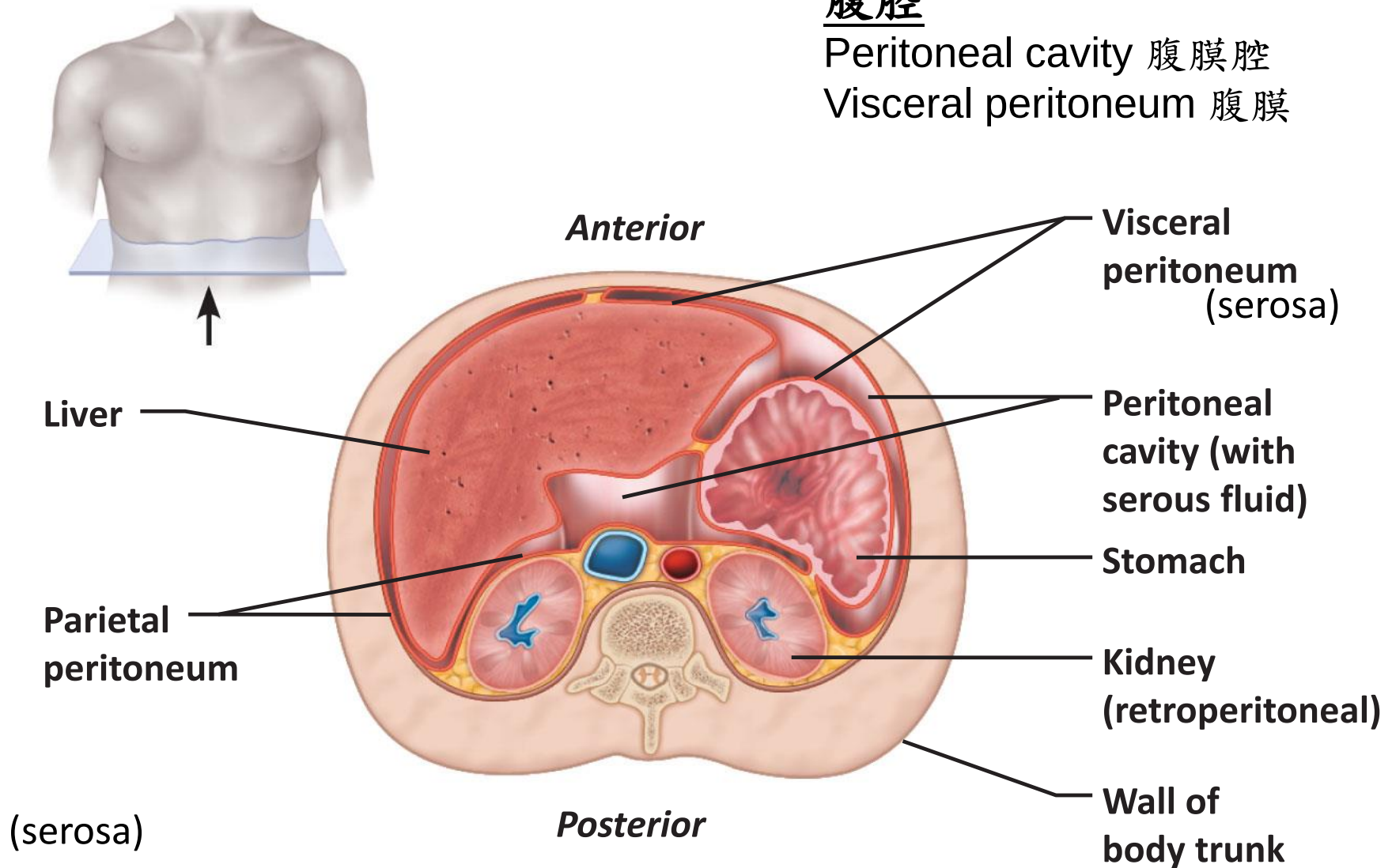


# Abdominal cavity

## 腹腔

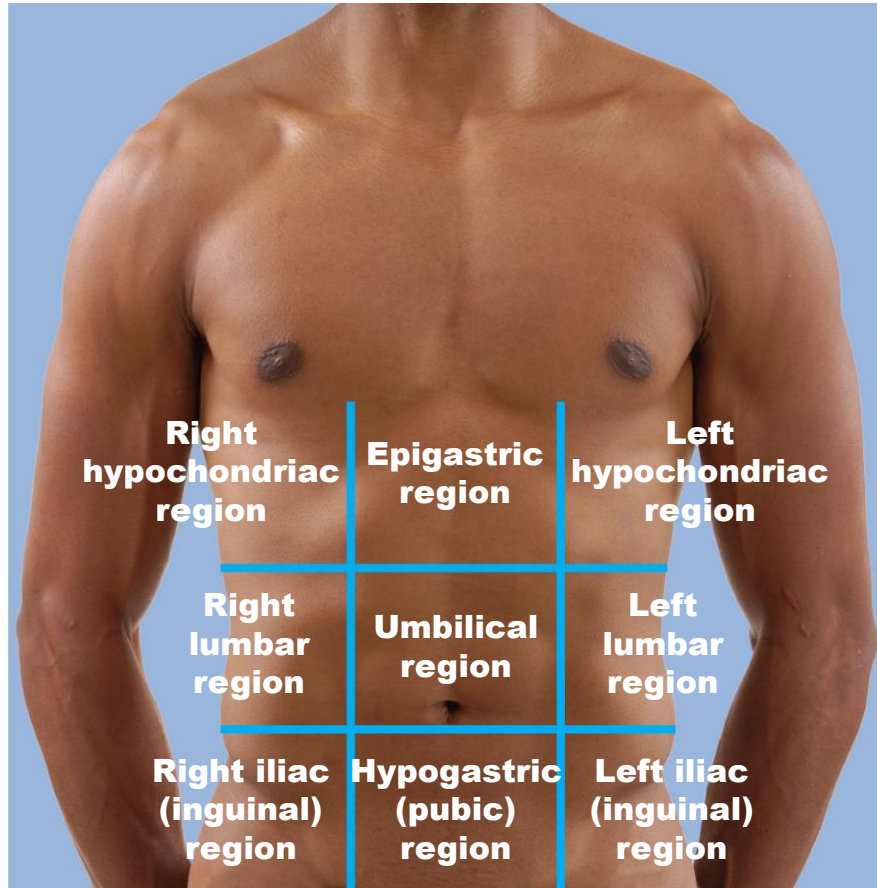
Peritoneal cavity 腹膜腔

Visceral peritoneum 腹膜

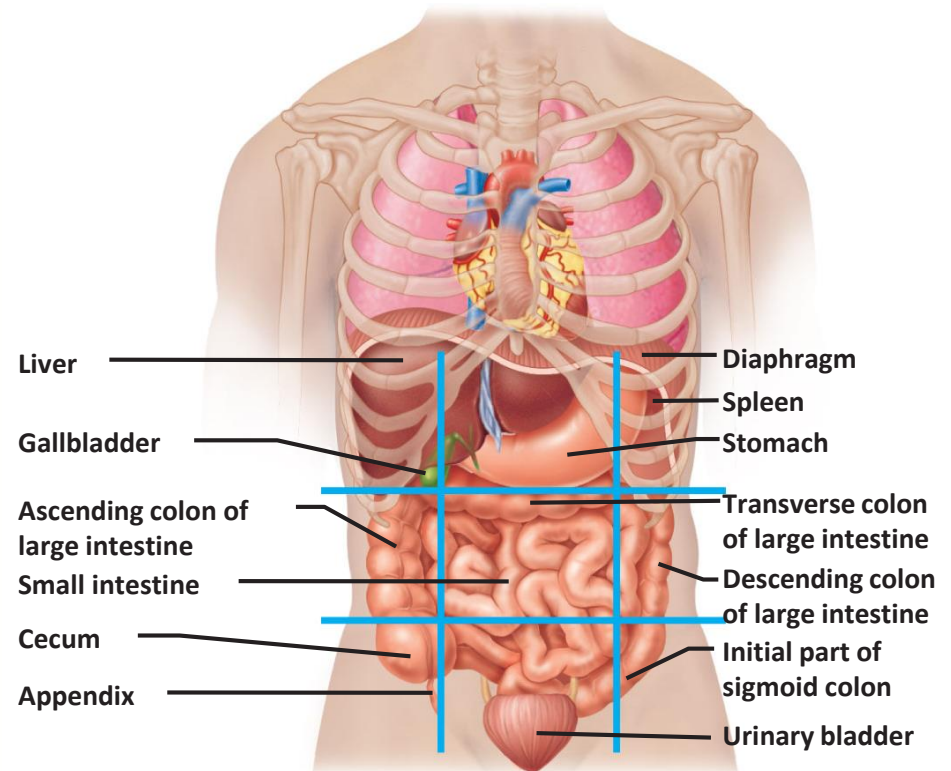




# Abdominal cavity 腹腔區間



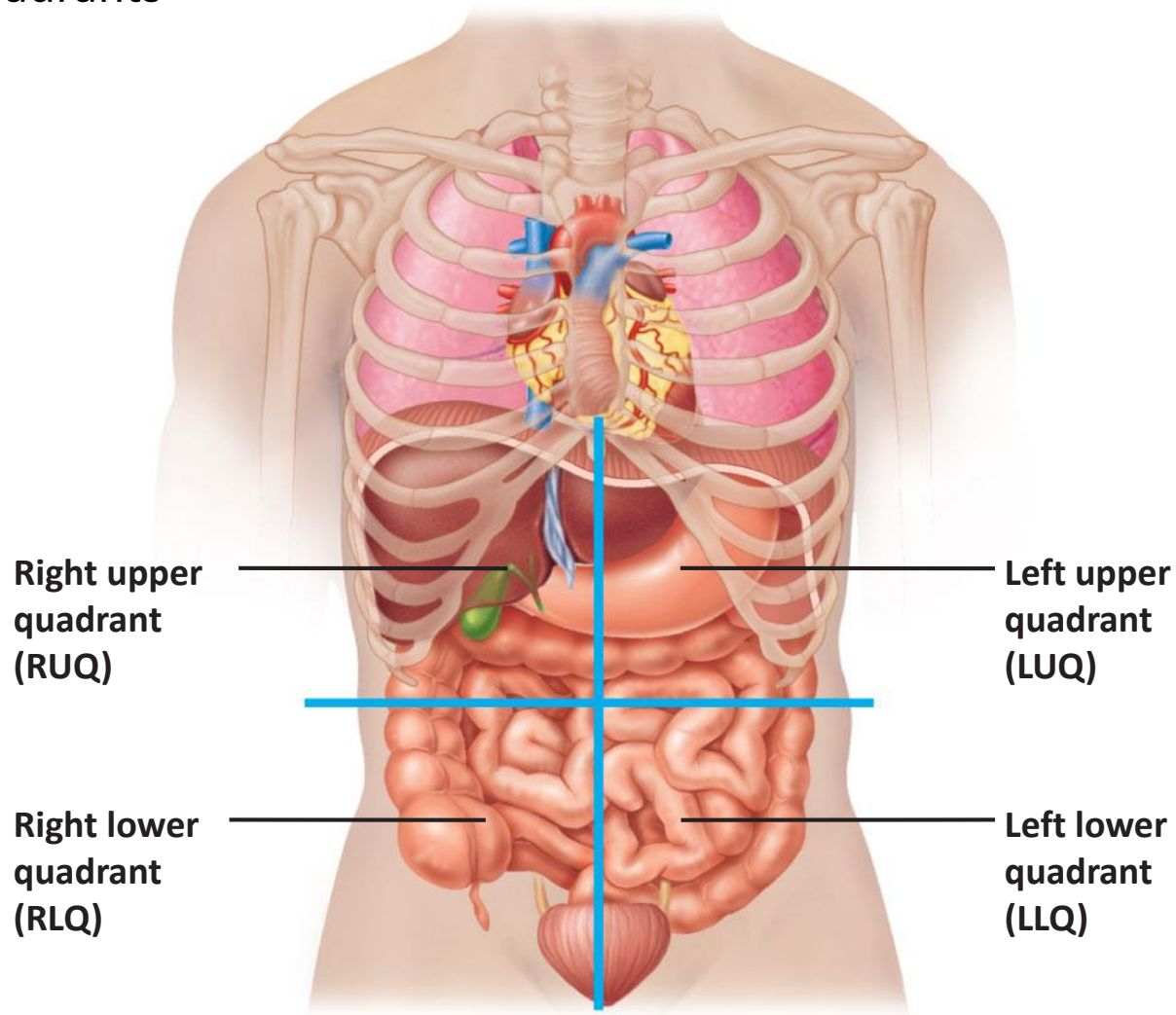
**(a) Nine regions delineated by four planes**



**(b) Anterior view of the nine regions showing the superficial organs**

# Abdominal cavity 腹腔區間

## Abdominal Quadrants



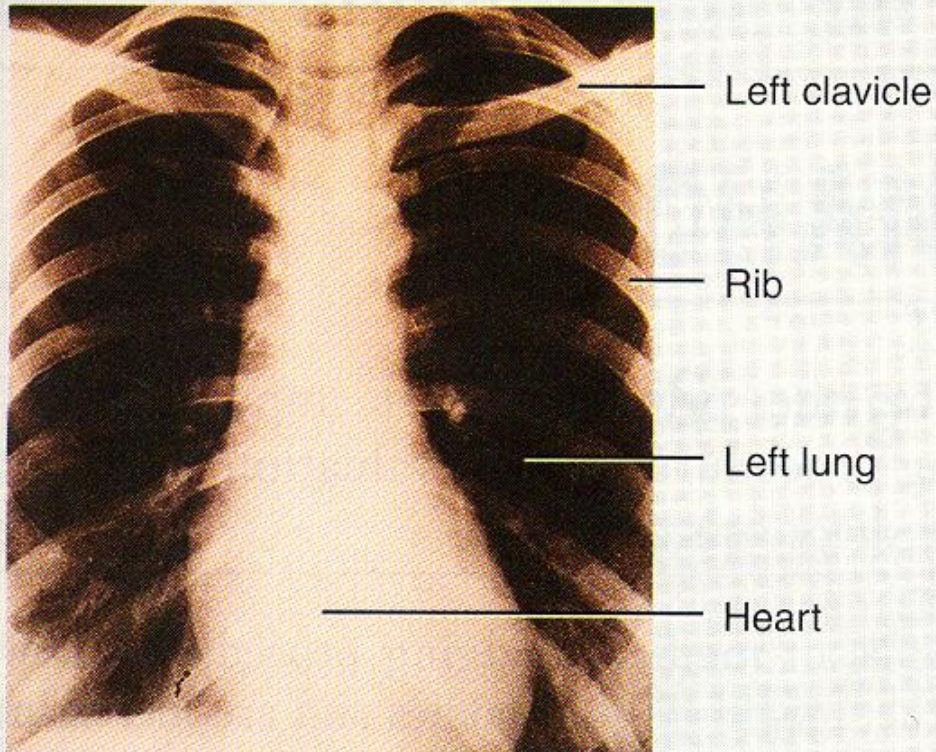


# Medical Imaging: Radiography

## Radiography

**Procedure:** A single barrage of x-rays passes through the body, producing an image of interior structures on x-ray-sensitive film. The resulting two-dimensional image is a *radiograph* (RĀ-dē-ō-graf'), commonly called an *x-ray*.

**Comments:** Produces clear images of bony or dense structures, which appear bright, but poor images of soft tissues or organs, which appear hazy or dark.



Anterior view of thorax





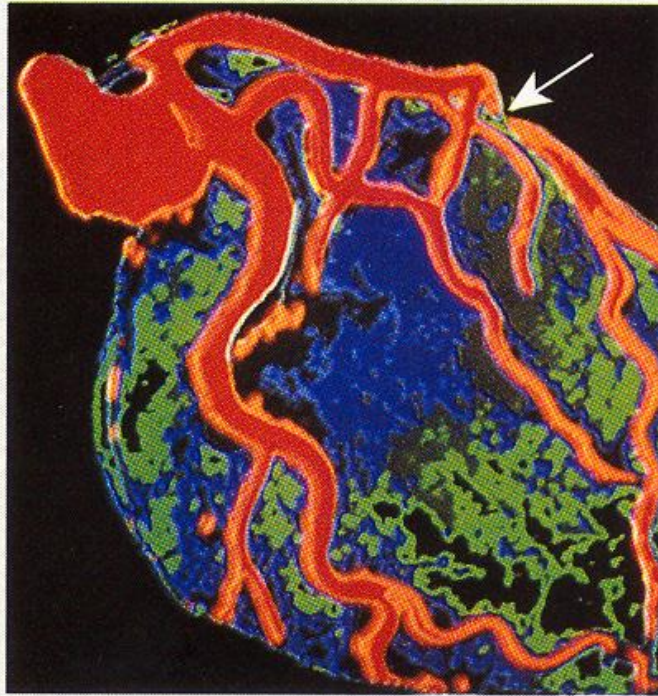
# Medical Imaging: Digital subtraction angiography (DSA)

## 數位減影血管攝影

### Digital Subtraction Angiography (DSA)

**Procedure:** A computer compares radiographs of a body region before and after a dye is injected into blood vessels. Tissues around the blood vessels are erased (digitally subtracted) from the second image. The result, shown on a monitor, is an unobstructed view of the blood vessels.

**Comments:** Used primarily to study blood vessels in the brain and heart.



Blood vessels (red) surrounding heart  
(arrow indicates narrowed vessel)





# Medical Imaging: Computed tomography (CT) 電腦斷層掃描

## Computed Tomography (CT)

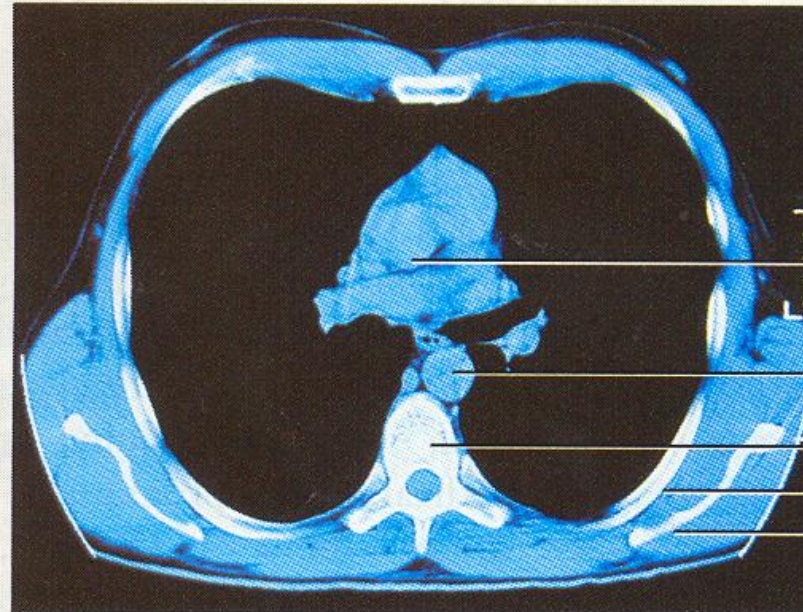
[formerly called computerized axial tomography (CAT) scanning]

**Procedure:** Computer-assisted radiography in which an x-ray beam traces an arc at multiple angles around a section of the body. The resulting transverse section of the body, called a *CT scan*, is reproduced on a video monitor.

**Comments:** Visualizes soft tissues and organs with much more detail than conventional radiographs. Differing tissue densities show up as various shades of gray. Multiple scans can be assembled to build three-dimensional views of structures.



ANTERIOR



POSTERIOR



# Medical Imaging: Sonography (超音波)

## Sonography

**Procedure:** High-frequency sound waves produced by a handheld wand reflect off body tissues and are detected by the same instrument. The image, which may be still or moving, is called a *sonogram* (SŌ-nō-gram) and is reproduced on a video monitor.

**Comments:** Safe, noninvasive, painless, and uses no dyes. Most commonly used to visualize the fetus during pregnancy. Also used to observe the size, location, and actions of organs and blood flow through blood vessels.



Forehead

Eye

Hand

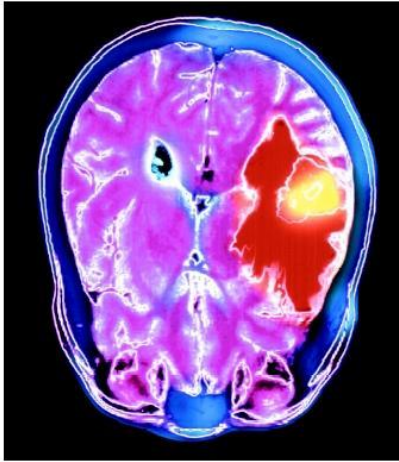


Courtesy of Andrew Joseph Tortora  
and Damaris Soler



# Medical Imaging: Magnetic resonance imaging (MRI)

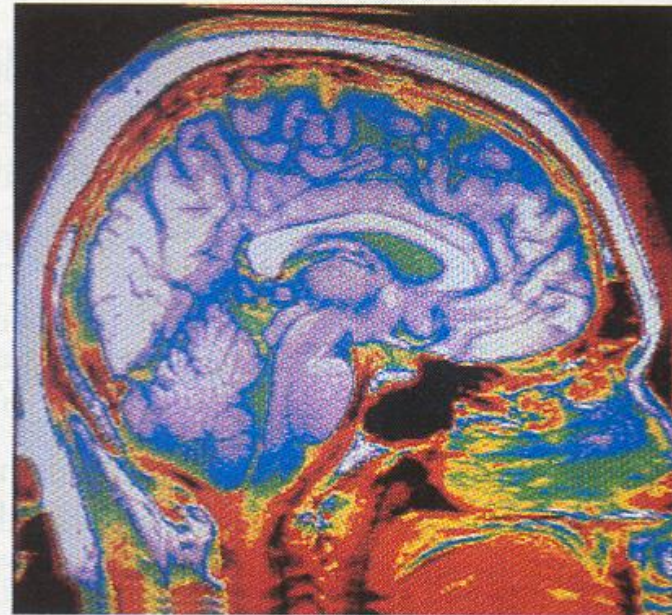
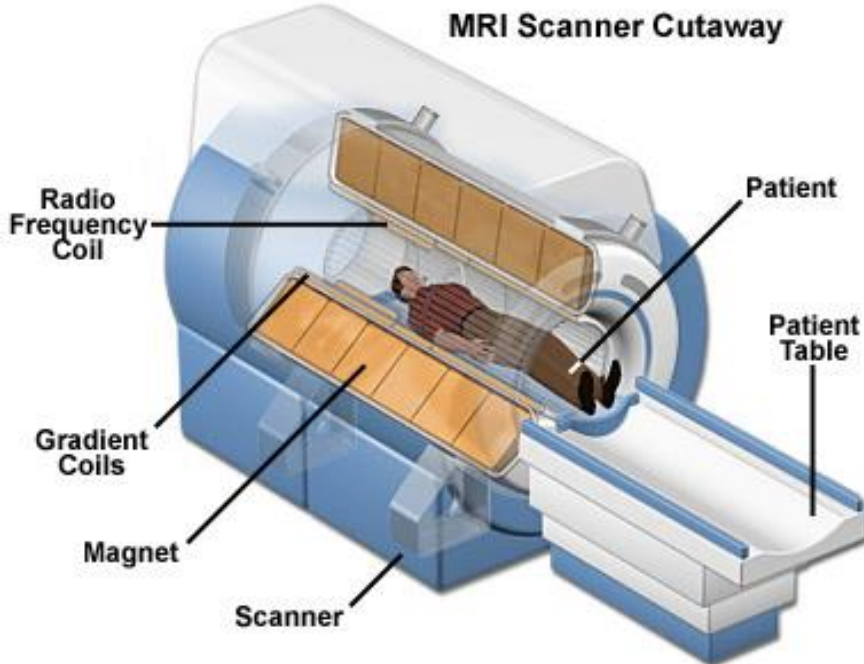
## 核磁共振攝影 (磁振造影)



### Magnetic Resonance Imaging (MRI)

**Procedure** The body is exposed to a high-energy magnetic field, which causes protons (small positive particles within atoms, such as hydrogen) in body fluids and tissues to arrange themselves in relation to the field. Then a pulse of radiowaves “reads” these ion patterns, and a color-coded image is assembled on a video monitor. The resulting image is a two- or three-dimensional blueprint of cellular chemistry.

**Comments** Relatively safe, but can't be used on patients with metal in their bodies. Shows fine details for soft tissues but not for bones. Most useful for differentiating between normal and abnormal tissues. Used to detect tumors and artery-clogging fatty plaques, reveal brain abnormalities, and measure blood flow.



Sagittal section of brain



# Medical Imaging:

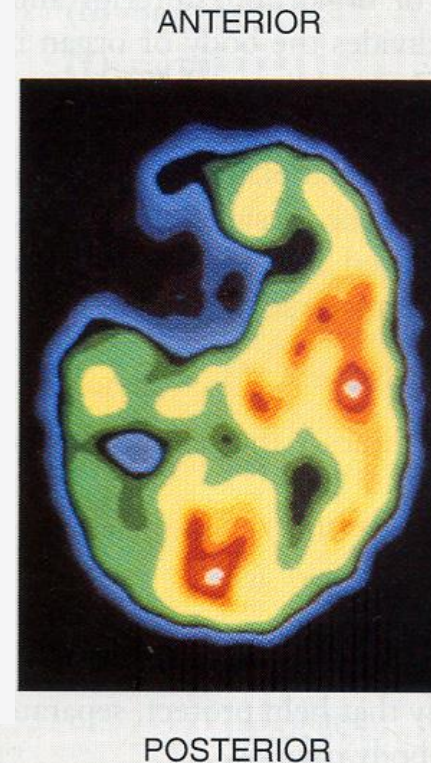
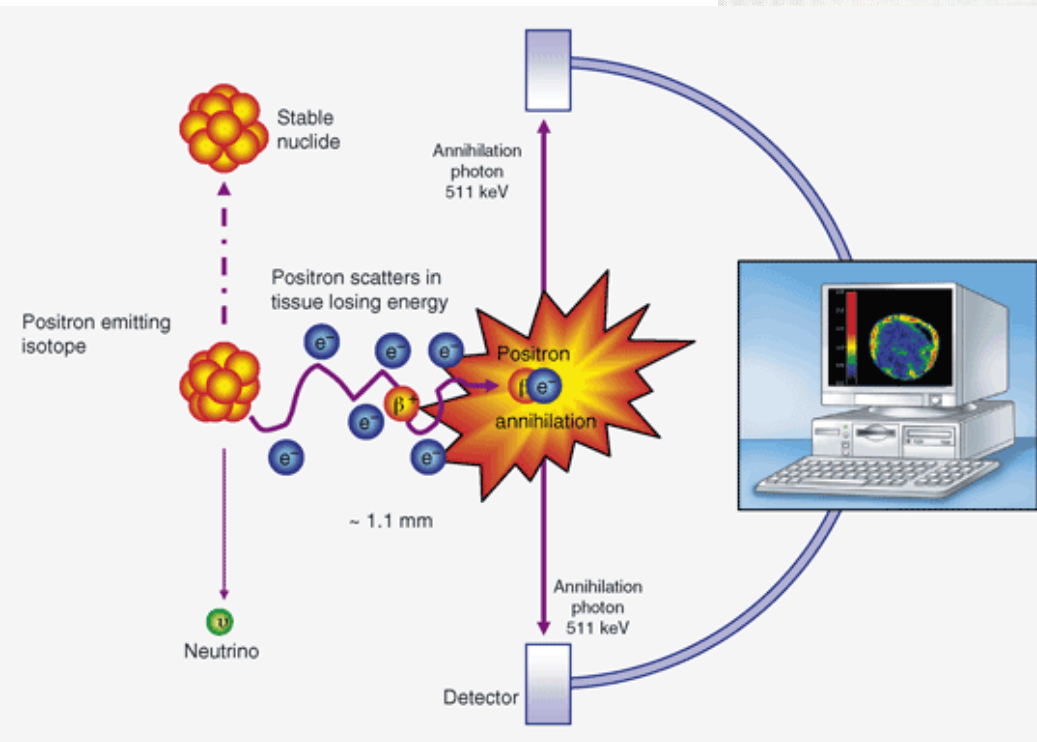
## Positron emission tomography (PET)

### 正子斷層掃描

#### Positron Emission Tomography (PET)

**Procedure** A substance that emits positrons (positively charged particles) is injected into the body, where it is taken up by tissues. The collision of positrons with negatively charged electrons in body tissues produces gamma rays (similar to x-rays) that are detected by gamma cameras positioned around the subject. A computer receives signals from the gamma cameras and constructs a *PET scan* image, displayed in color on a video monitor. The PET scan shows where the injected substance is being used in the body.

**Comments** Used to study the physiology of body structures, such as metabolism in the brain or heart.



Transverse section showing blood flow through brain (darkened area at upper left indicates where a stroke has occurred)



# General Histology

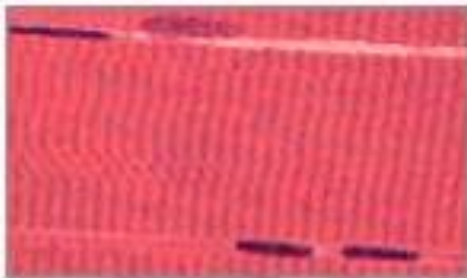
- **Epithelial tissue** 上皮組織—covering
- **Connective tissue** 結締組織—support
- **Muscle tissue** 肌肉組織—movement
- **Nervous tissue** 神經組織—control



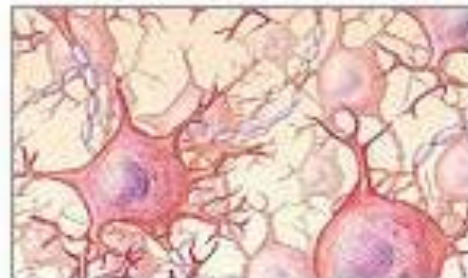
Connective tissue



Epithelial tissue

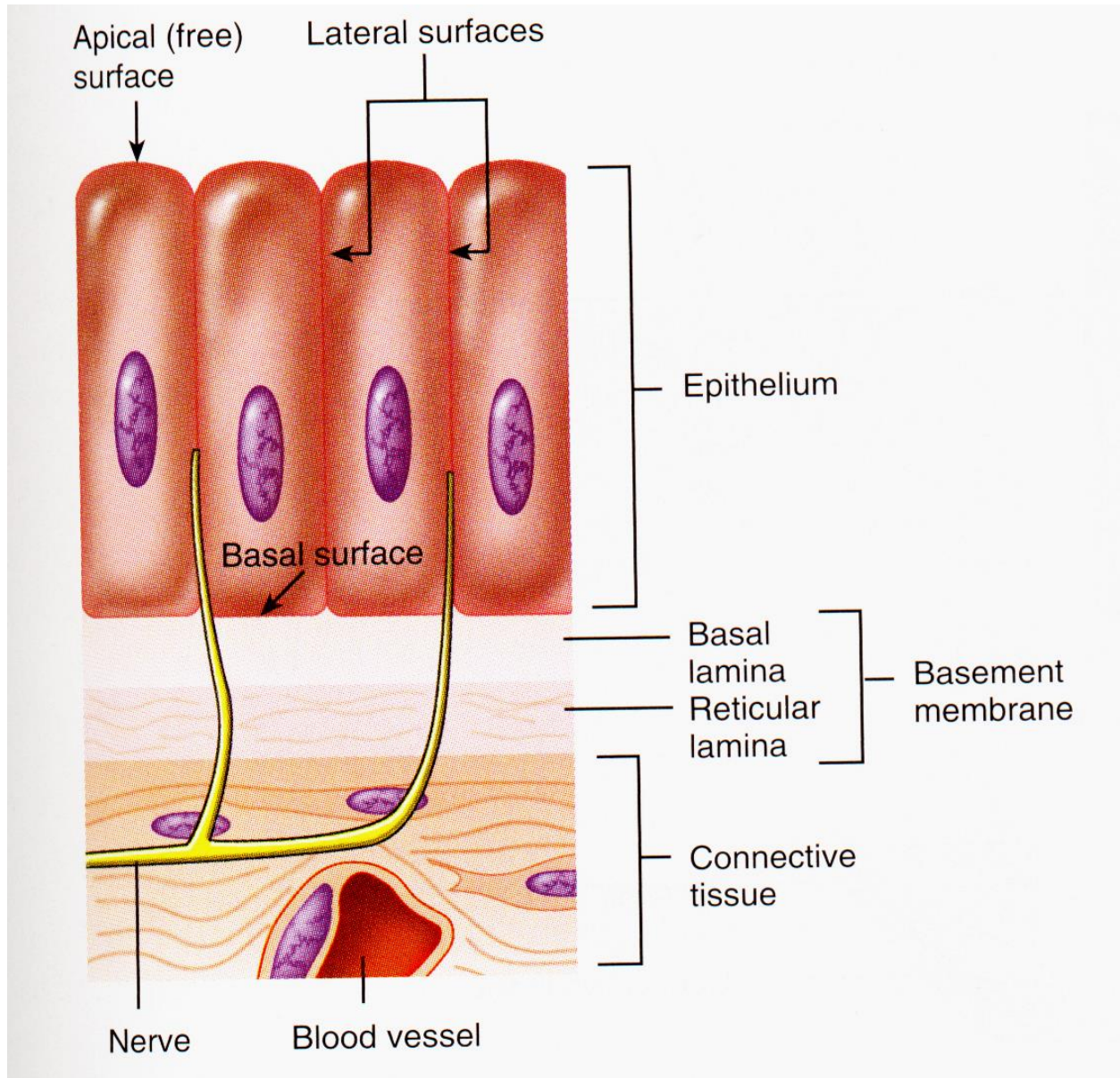


Muscle tissue



Nervous tissue

# Epithelial tissues 上皮組織





# Cell Junctions 細胞接合

a. Tight junction

緊密接合

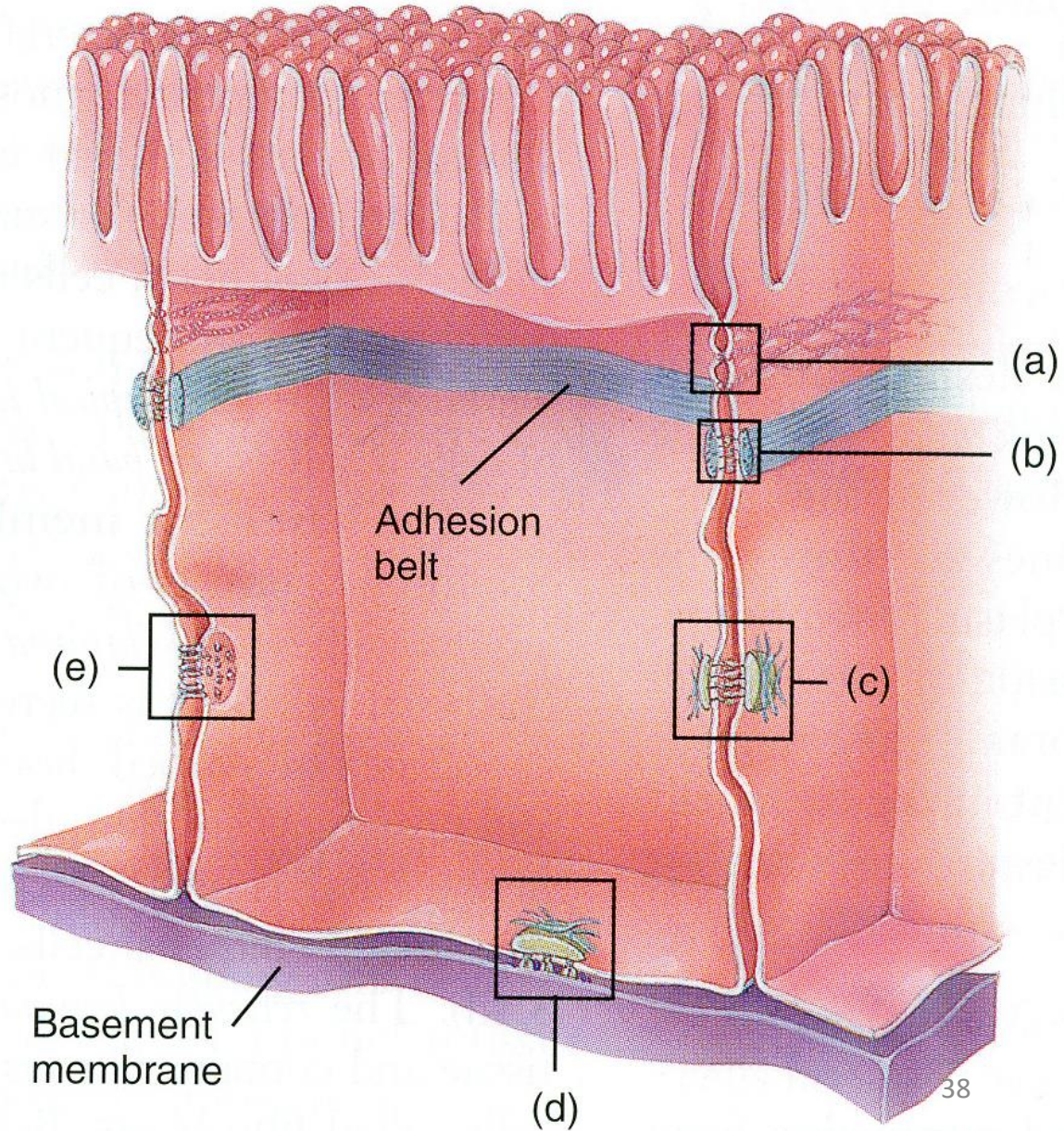
b. Adherens junction

黏連接合

c. Desmosome 鍵結體

e. Gap junction 溝通接合

d. Hemidesmosome 半鍵結體





# Cell Junctions

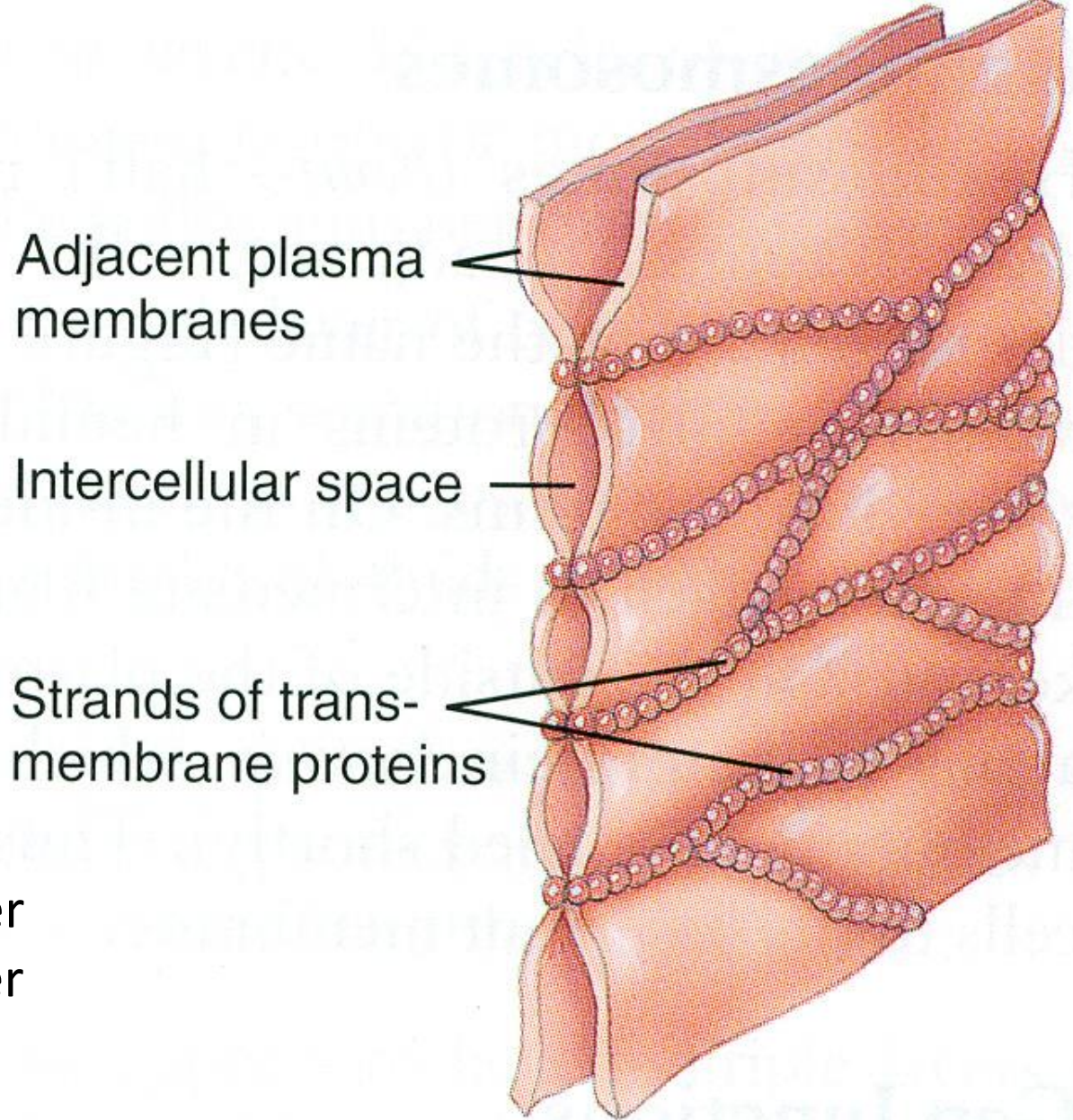
細胞接合

## a. Tight junction

緊密接合

BBB : blood brain barrier

BTB : blood testis barrier

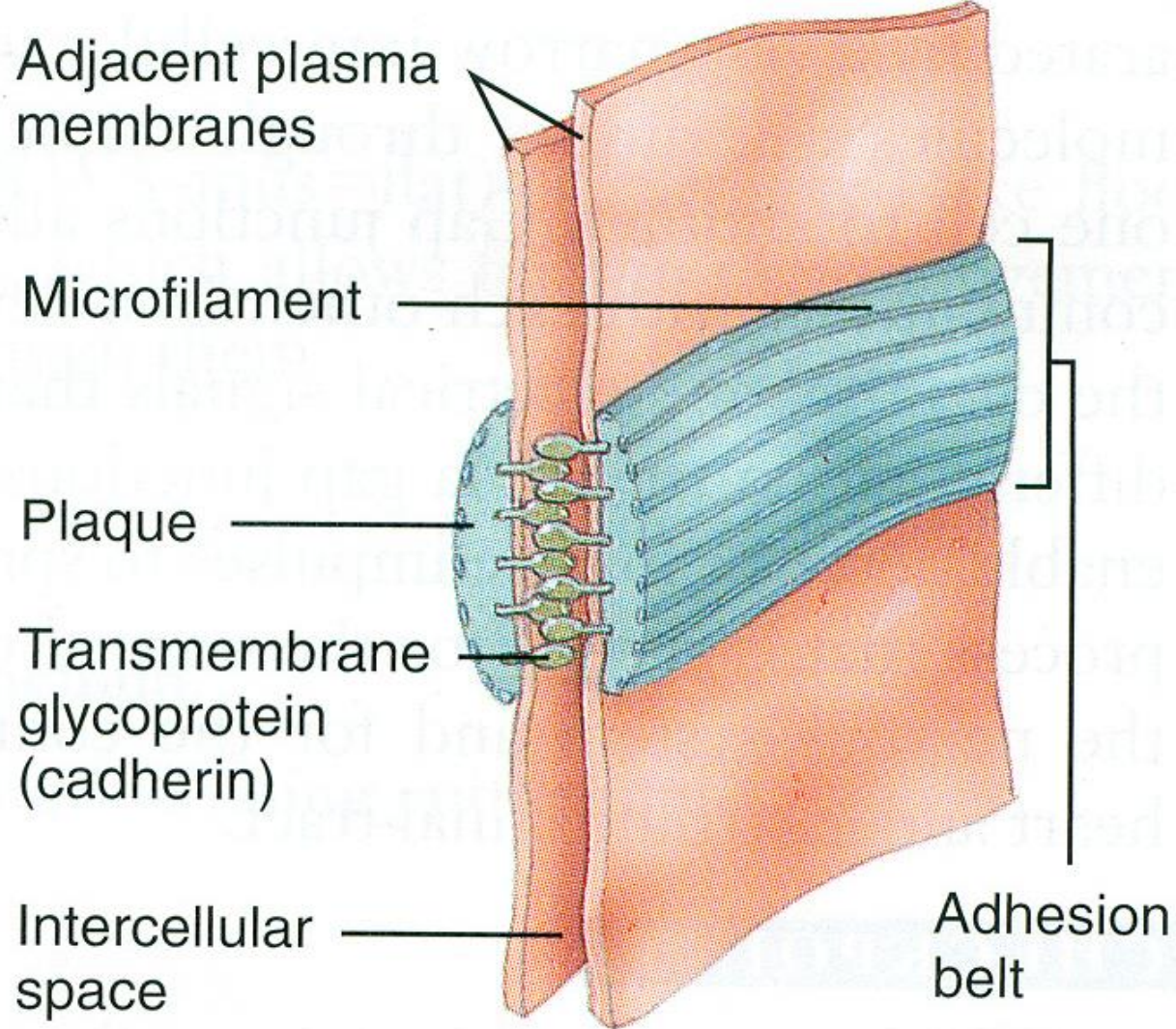


(a) Tight junction



# Cell Junctions 細胞接合

## b. Adherens junction 黏連接合

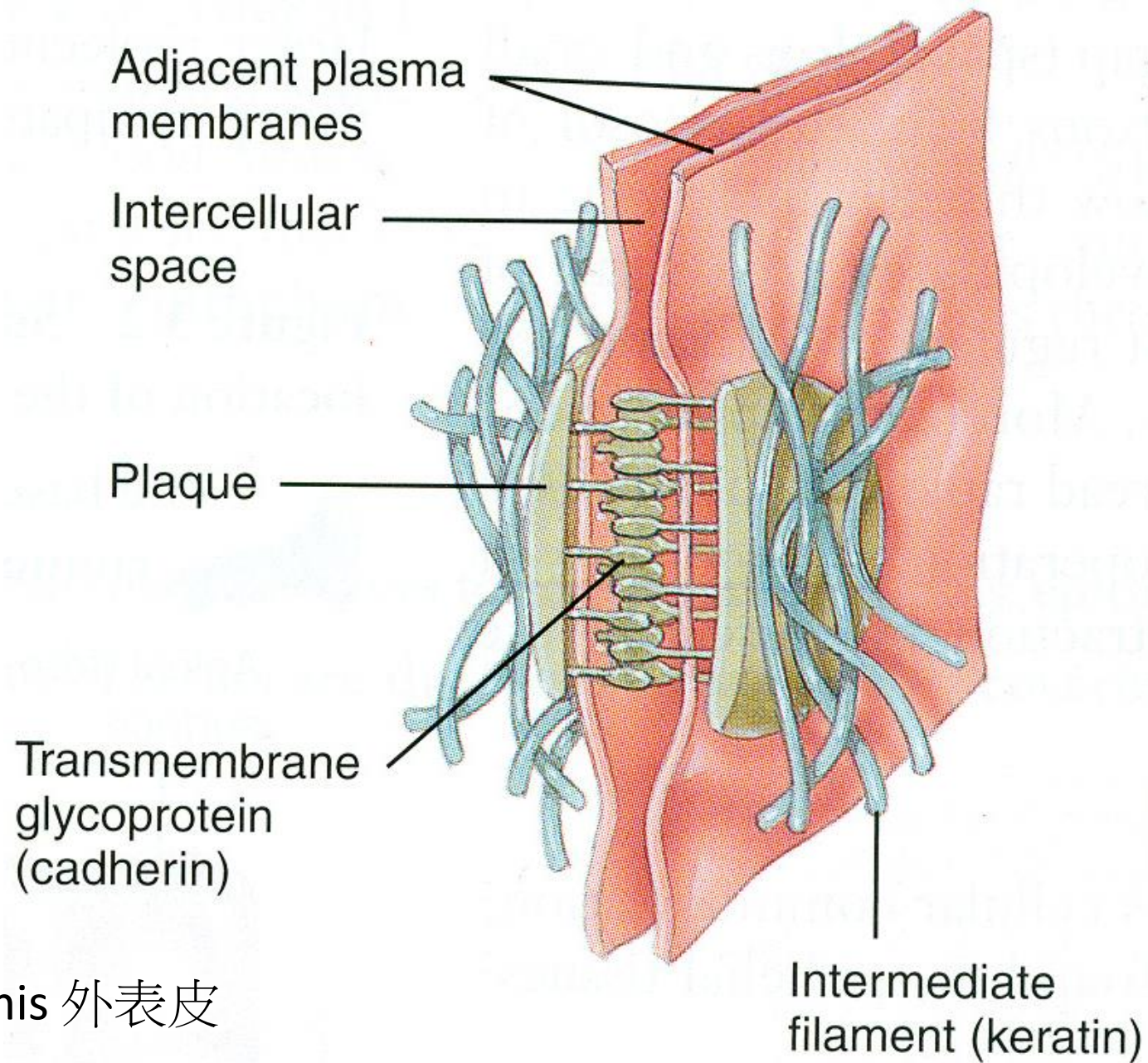


Cardiomyocyte 心肌細胞

(b) Adherens junction

# Cell Junctions 細胞接合

## c. Desmosome 鍵結體



Skin: epidermis 外表皮

(c) Desmosome



# Cell Junctions

細胞接合

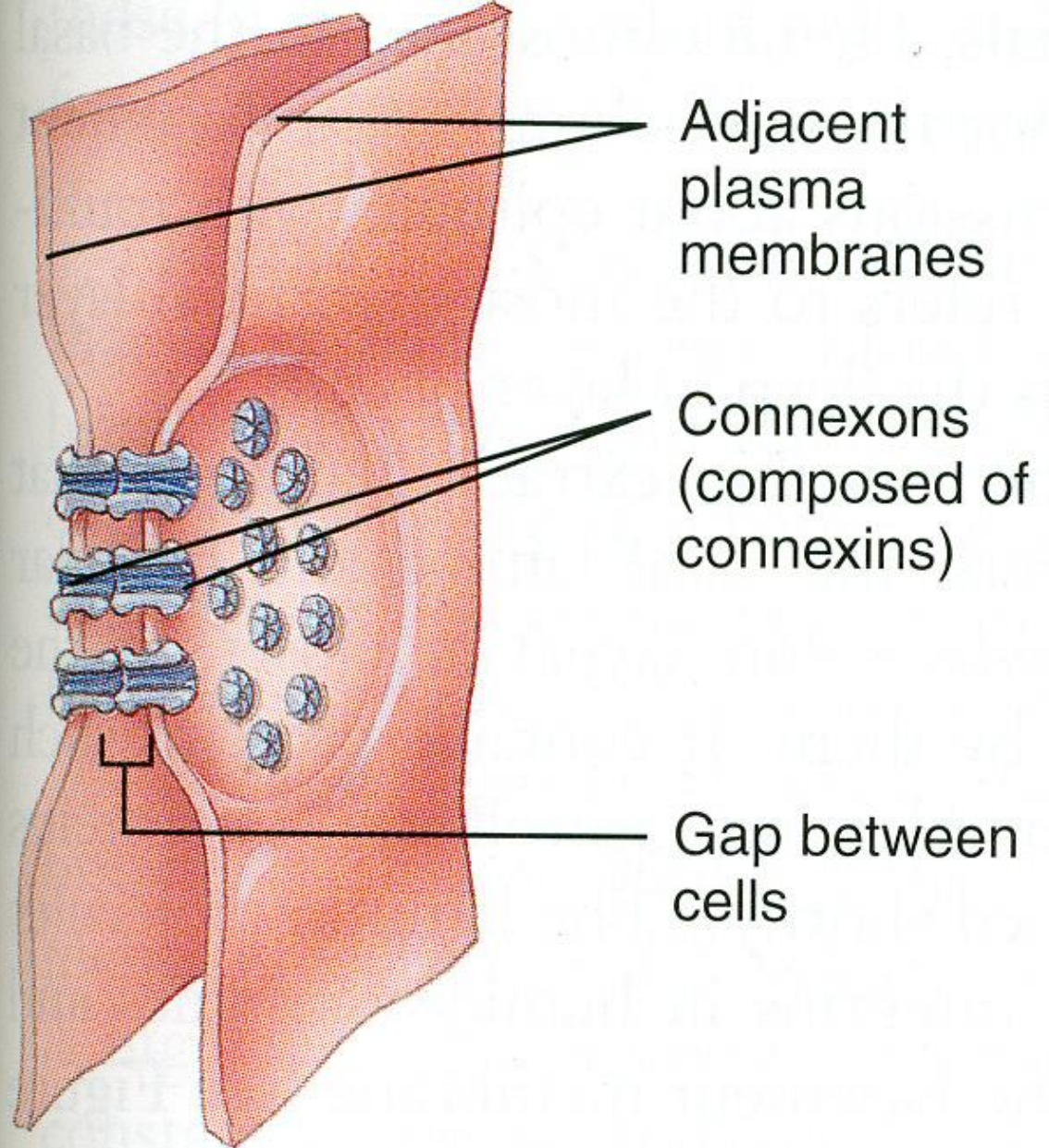
## e. Gap junction

溝通接合

細胞訊息傳遞：  
鈣離子  $\text{Ca}^{++}$

Cardiomyocyte

心肌細胞



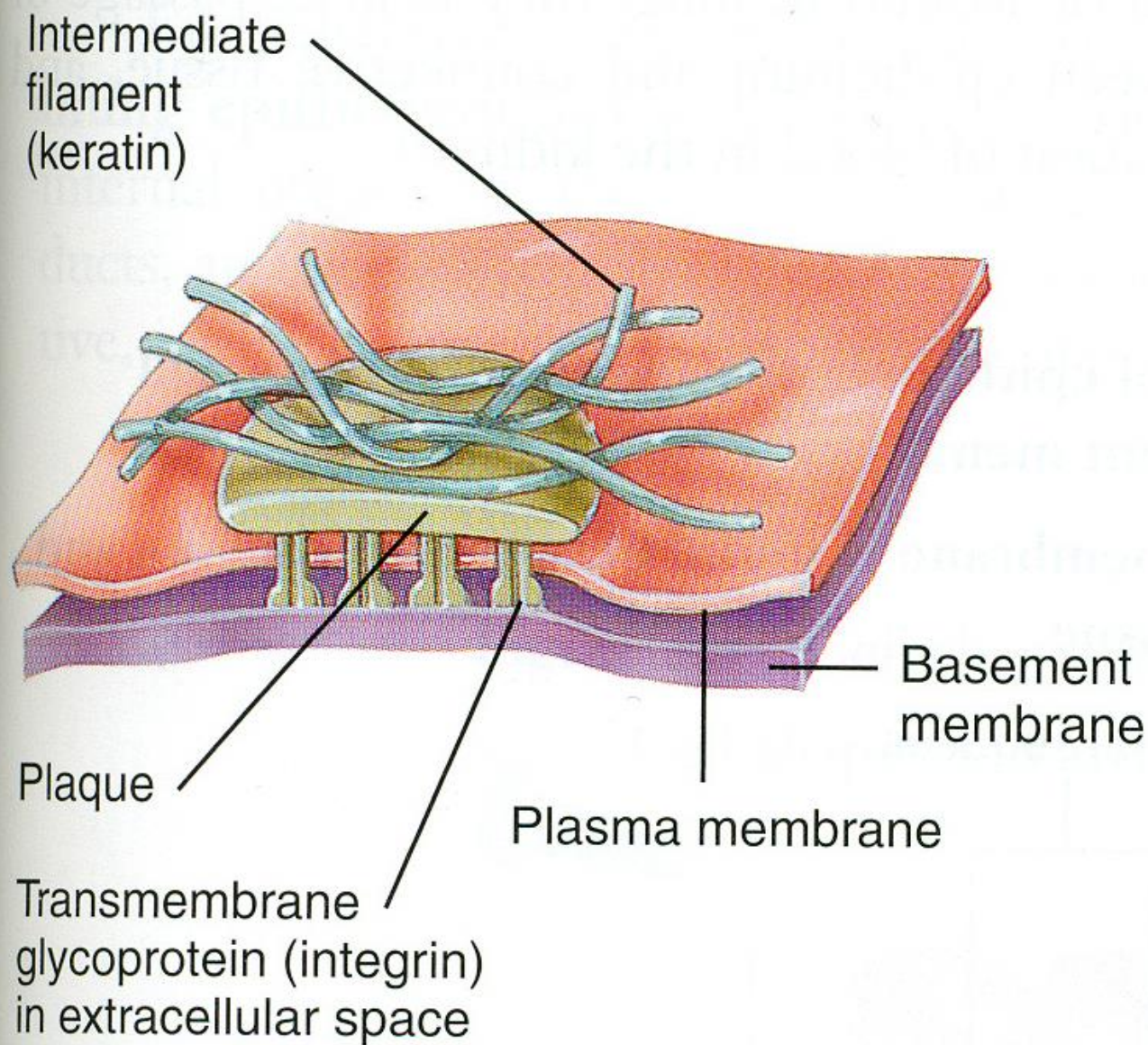
(e) Gap junction

# Cell Junctions

細胞接合

## d. Hemidesmosome

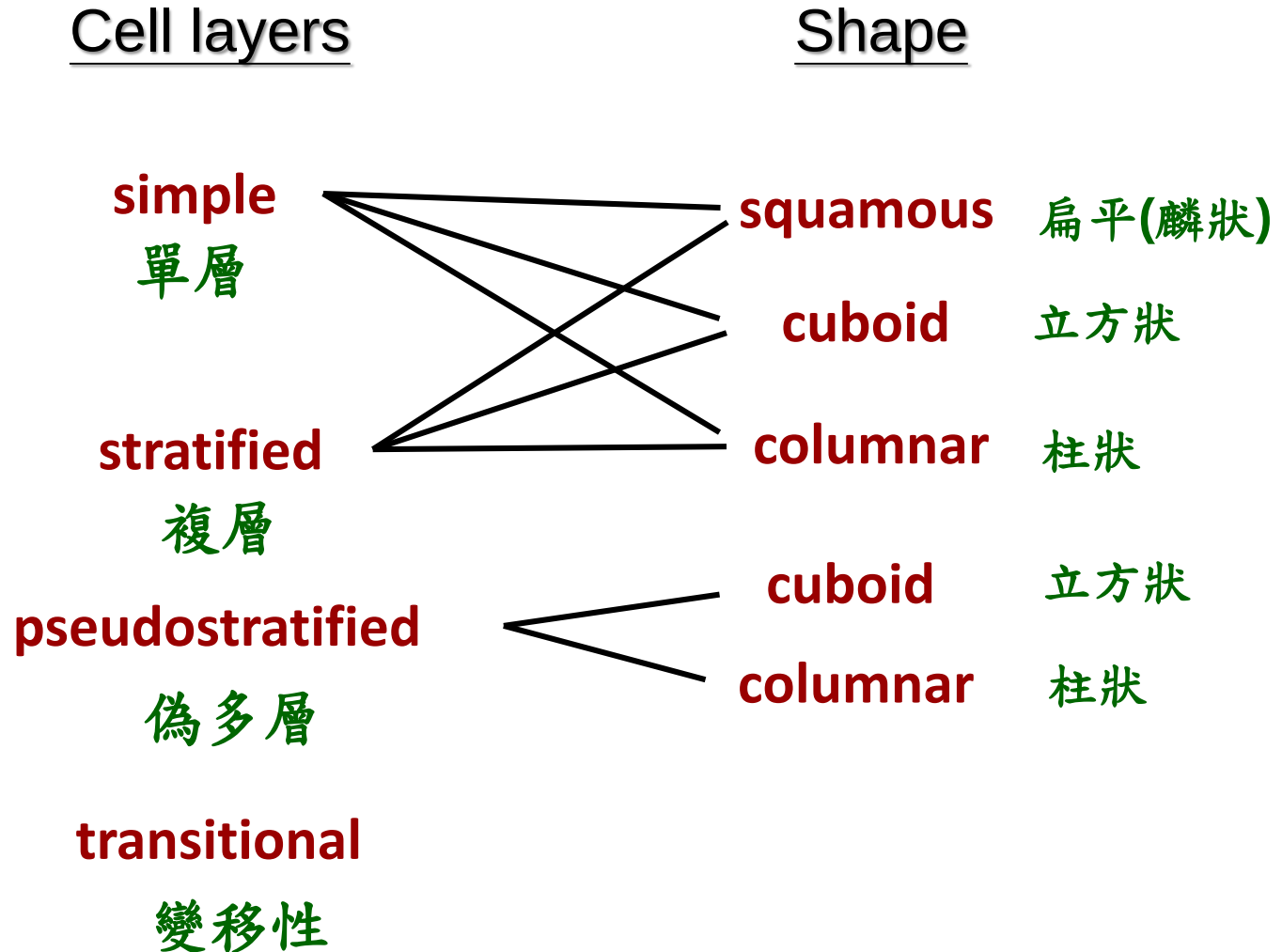
半鍵結體



(d) Hemidesmosome



# Classification of epithelial tissue (I)



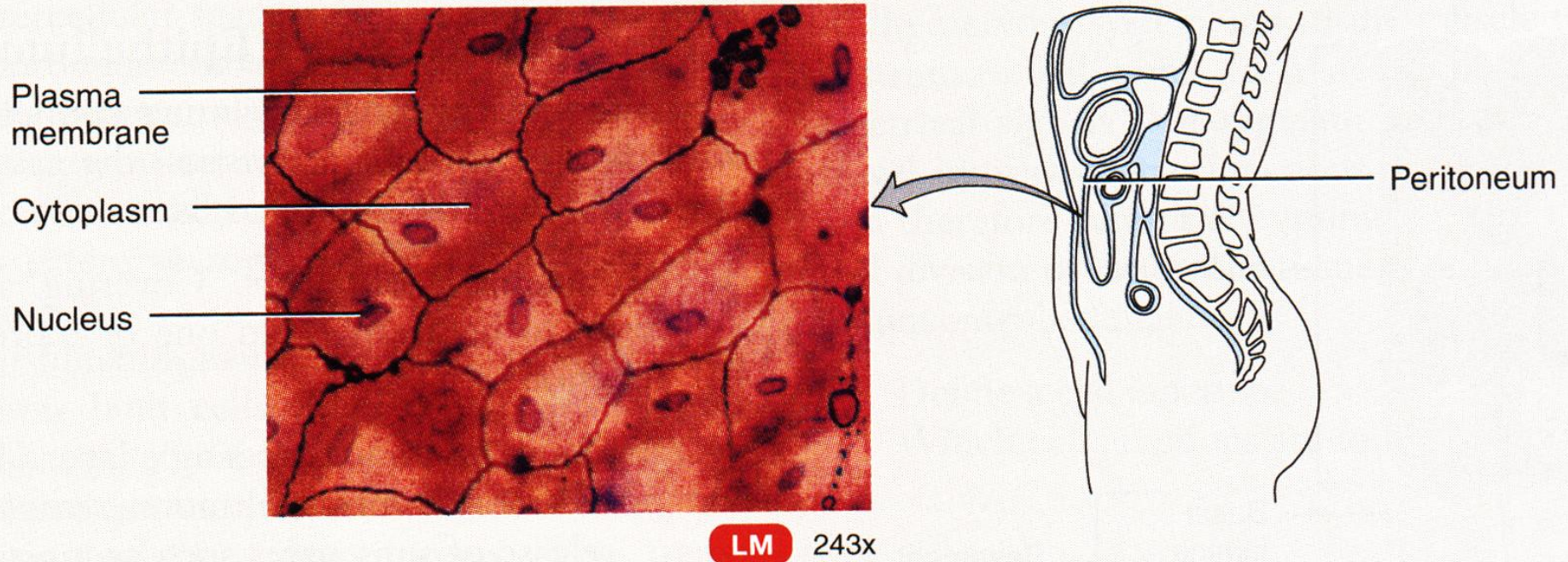
# Classification of epithelial tissue (II)

- Presence of apical surface modifications:  
**cornified (keratinized)** 角質化 or non-cornified
- ◆ Cilia : **ciliated** 纖毛化 or non-ciliated
- ◆ Microvilli 微絨毛: Striated border - intestine  
Brush border - kidney (proximal tubule)
- ◆ Stereocilia 靜纖毛: long microvilli – epididymis 副睪  
(ductus deferens 輸精管)

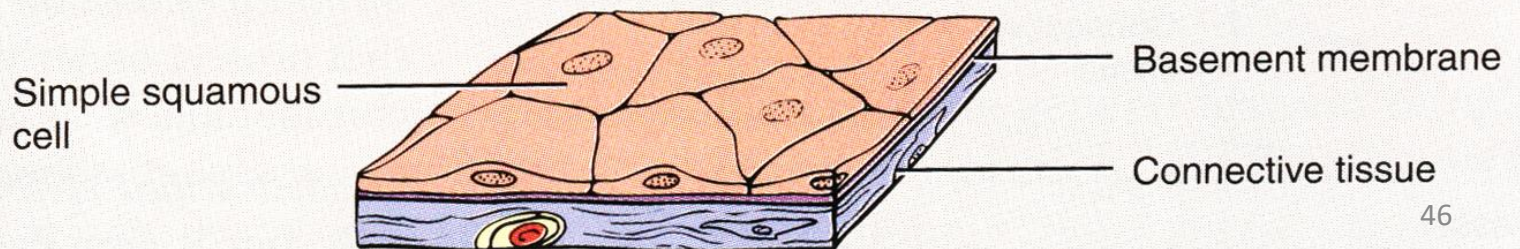


# Simple squamous epithelium 單層扁平(鱗狀)上皮:

Endothelium 血管內皮, mesothelium 腹膜中皮



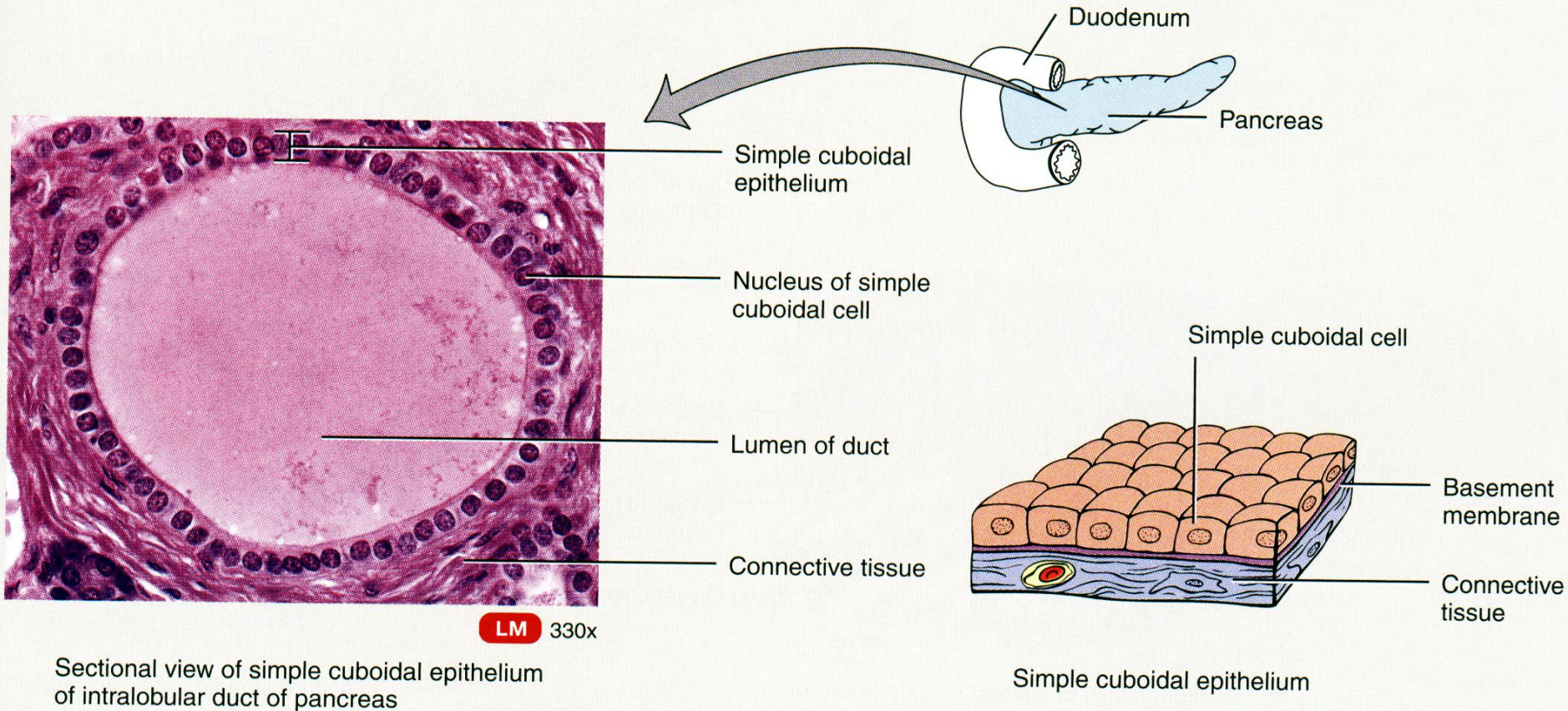
Surface view of simple squamous epithelium of mesothelial lining of peritoneum





# Simple cuboidal epithelium 單層立方狀上皮

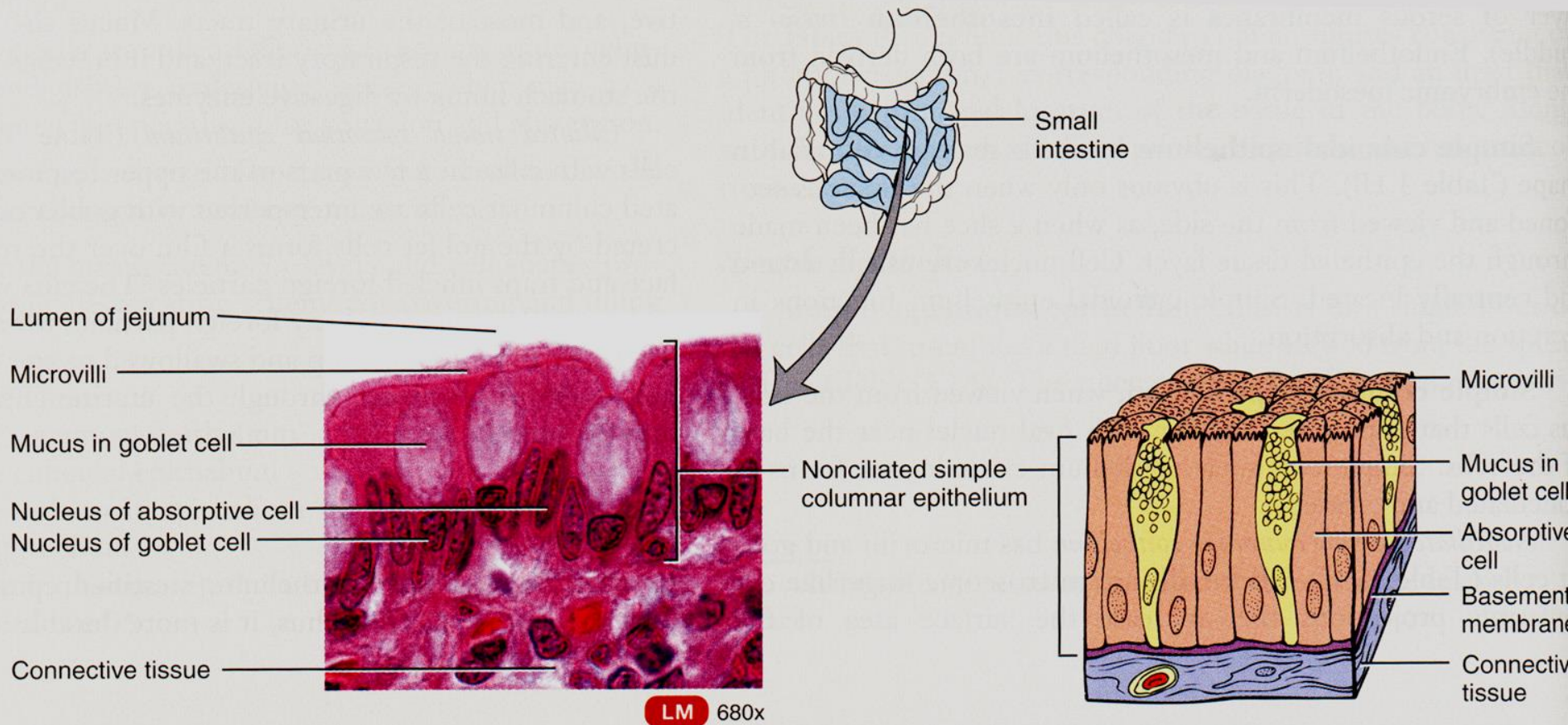
## Intralobular duct of Pancreas 胰臟葉內小管





# Nonciliated simple columnar epithelium 非纖毛柱狀上皮

## Intestinal villi 小腸絨毛上皮

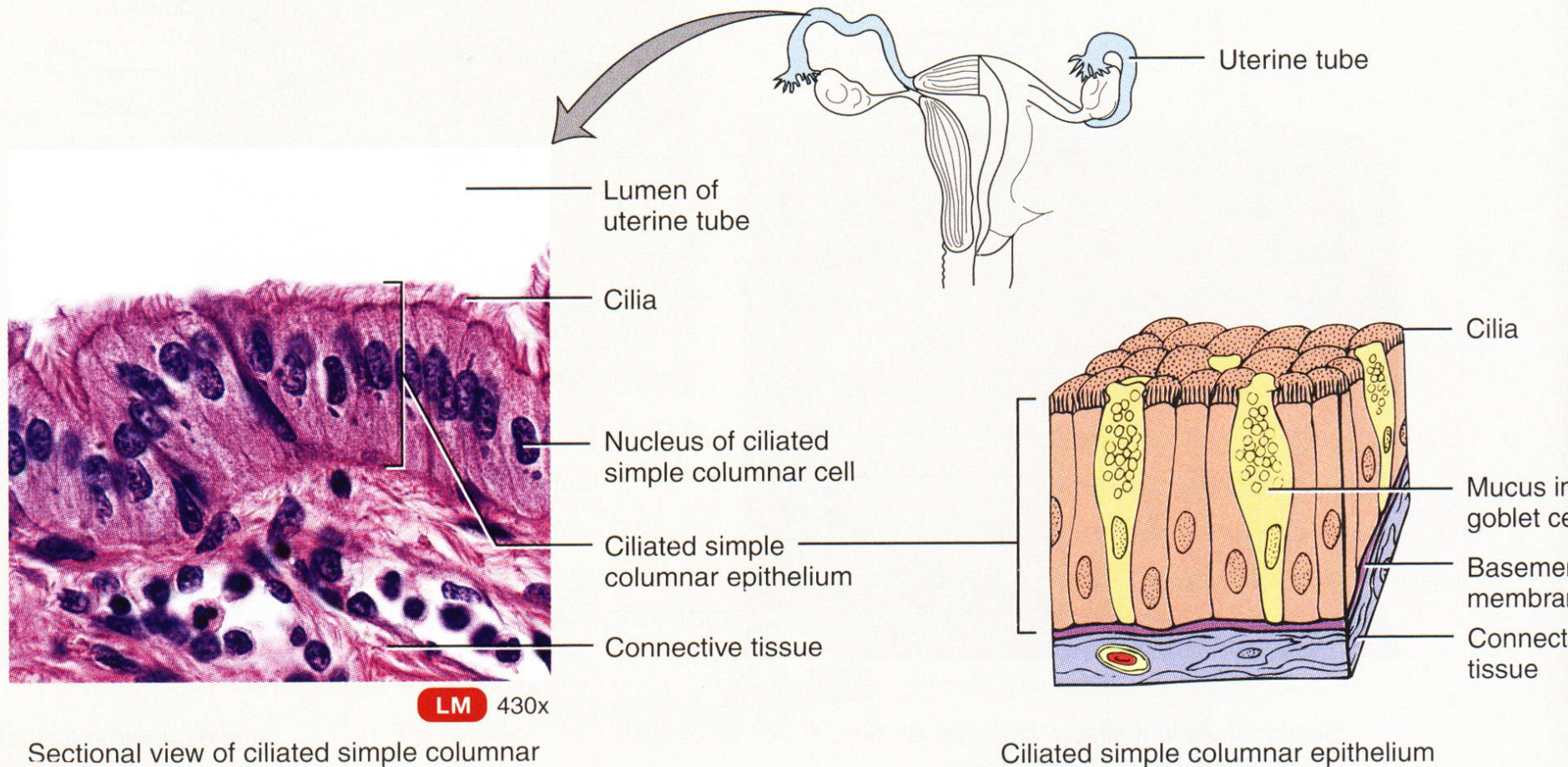


Sectional view of nonciliated simple columnar epithelium of lining of jejunum of small intestine

Nonciliated simple columnar epithelium

# Ciliated simple columnar epithelium 纖毛柱狀上皮

## Uterine tube (Oviduct) 輸卵管上皮



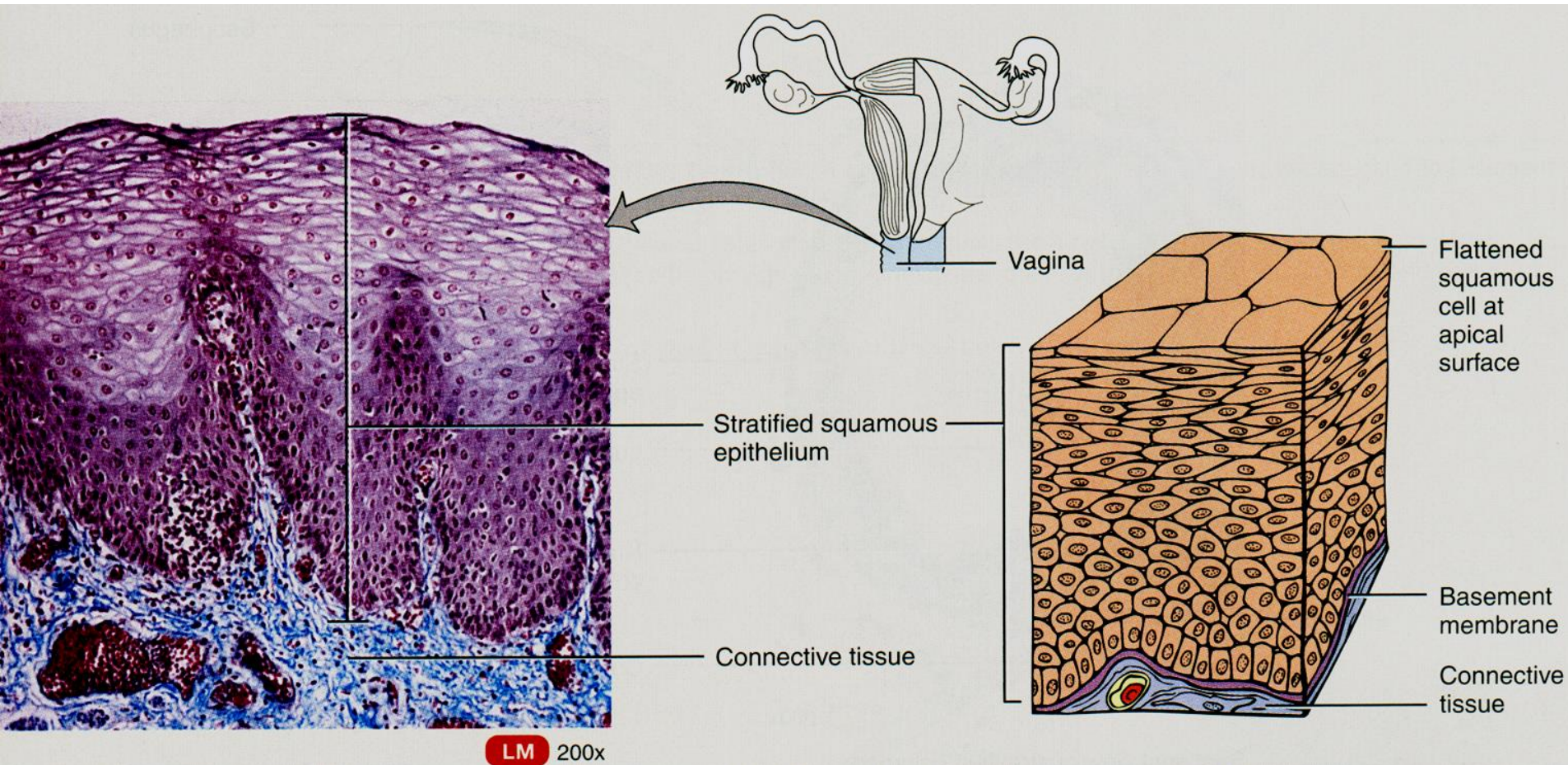
Sectional view of ciliated simple columnar

Ciliated simple columnar epithelium



# Stratified squamous epithelium 複層扁平上皮

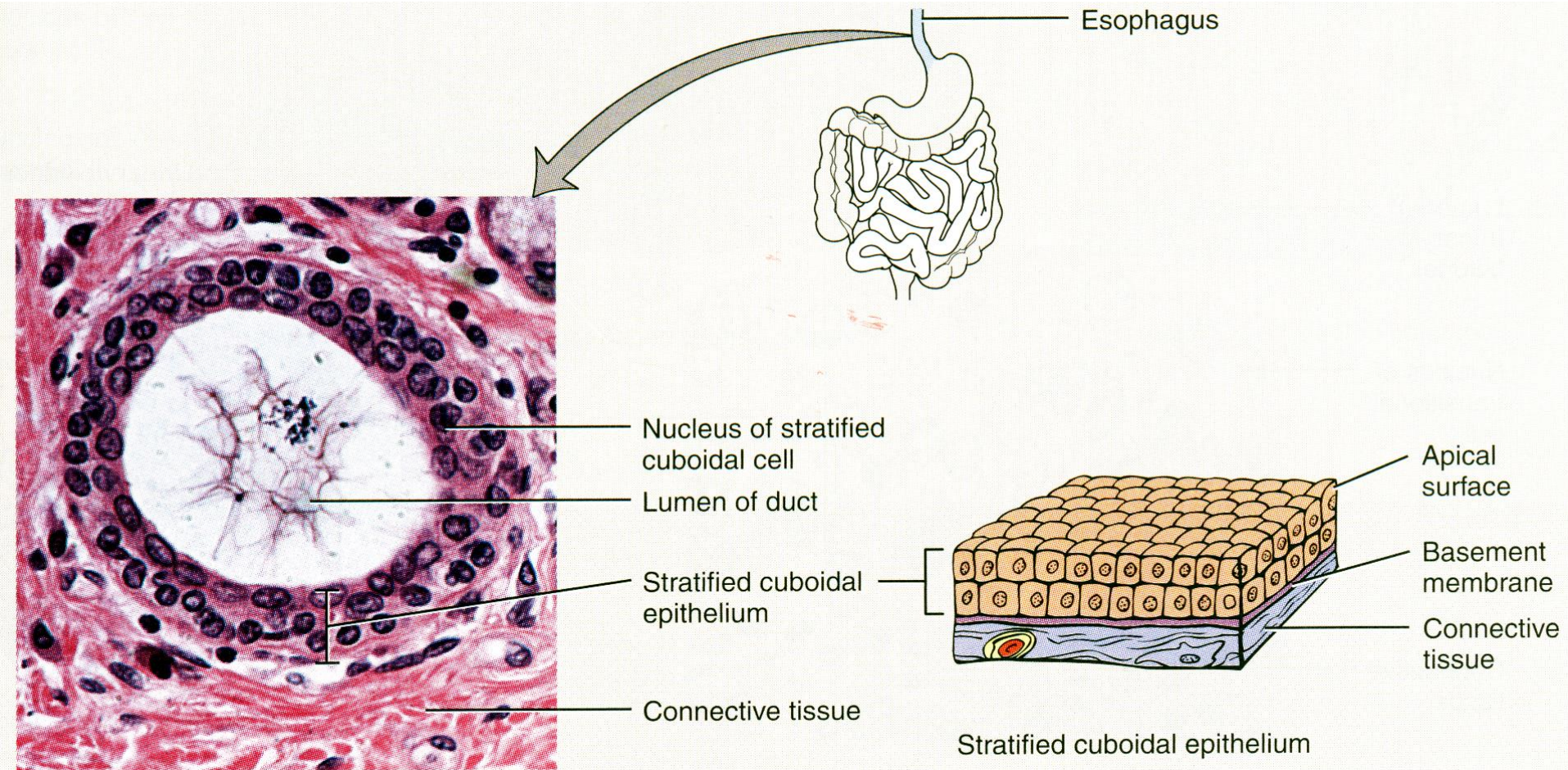
Skin epidermis 皮膚表皮; 食道、陰道上皮    Cornified / non-cornified





# Stratified cuboidal epithelium 複層立方上皮

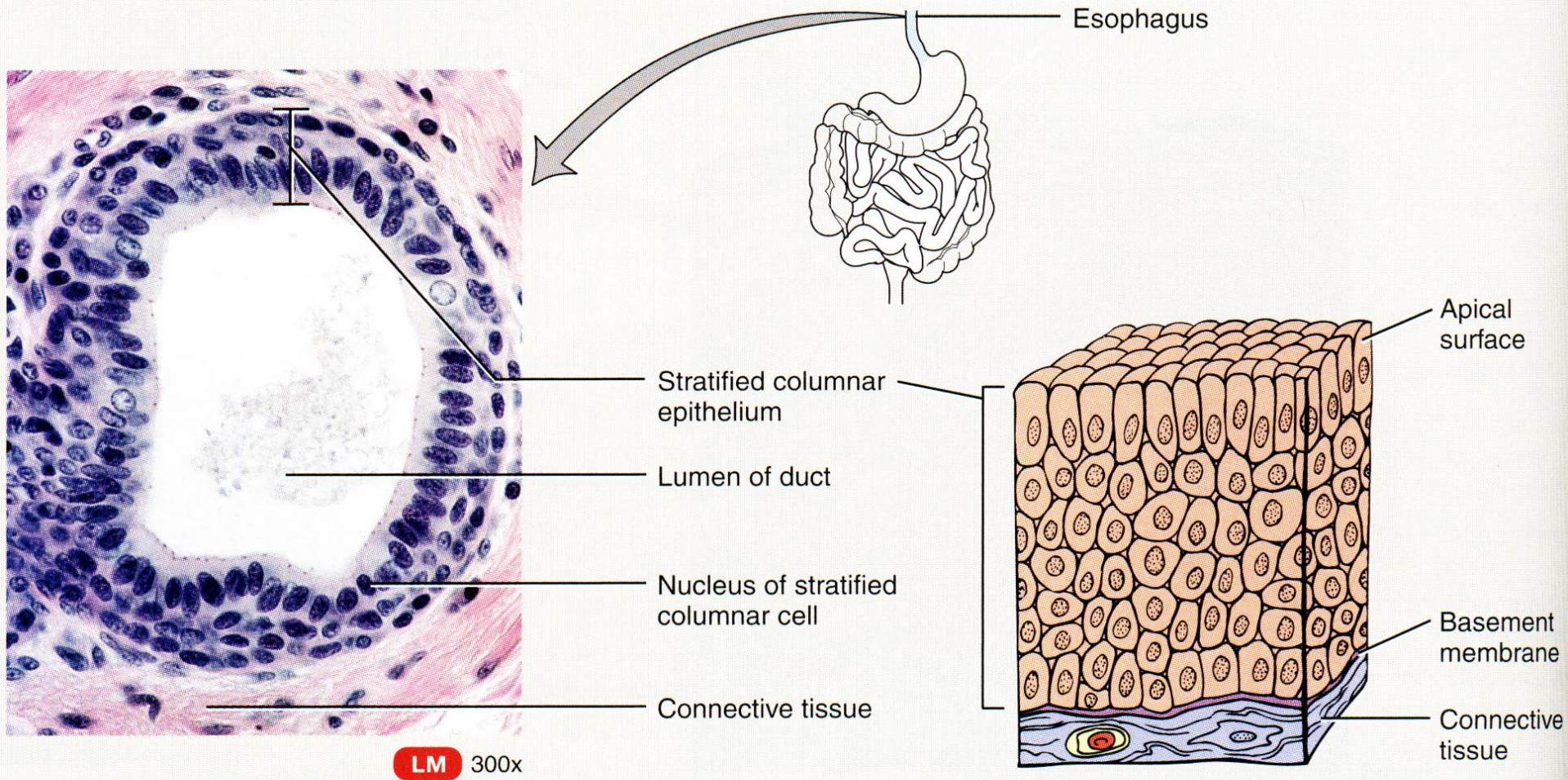
## Ducts of Esophageal gland 食道腺管道上皮





# Stratified columnar epithelium 複層柱狀上皮

## Ducts of Esophageal gland 食道腺管道上皮



Sectional view of stratified columnar epithelium of the duct of esophageal gland

Stratified columnar epithelium



# Transitional epithelium 變移性上皮

Urinary bladder 膀胱,  
Ureter 輸尿管上皮

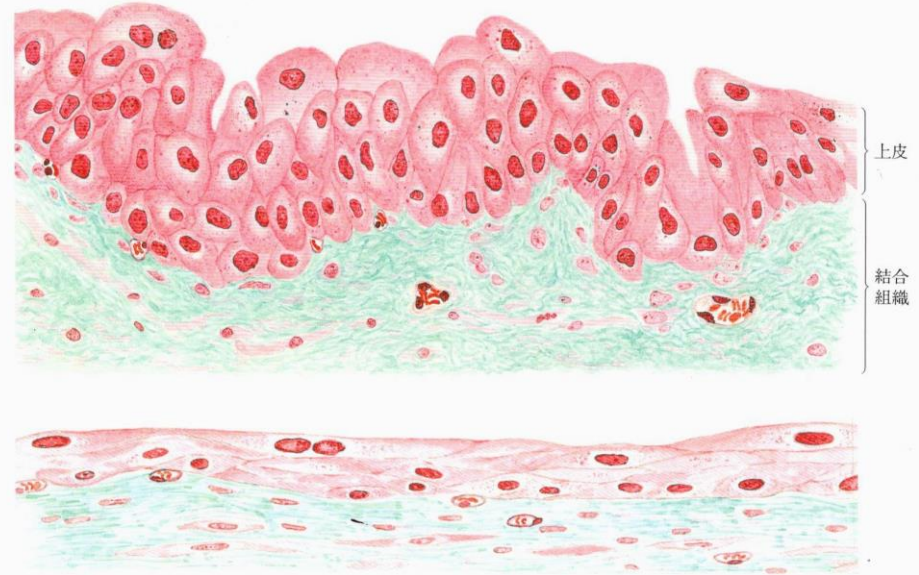


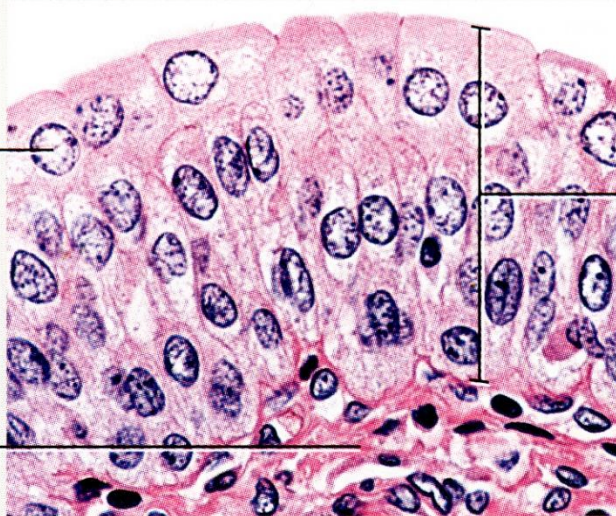
図 IV-6 移行上皮

上は膀胱の収縮時，下は伸展時。モルモット，Masson-Goldner 染色

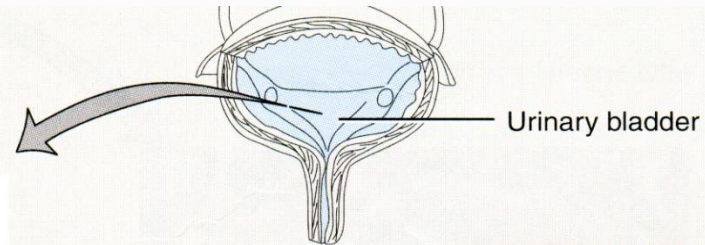
Lumen of  
urinary  
bladder

Nucleus of  
transitional  
cell

Connective  
tissue

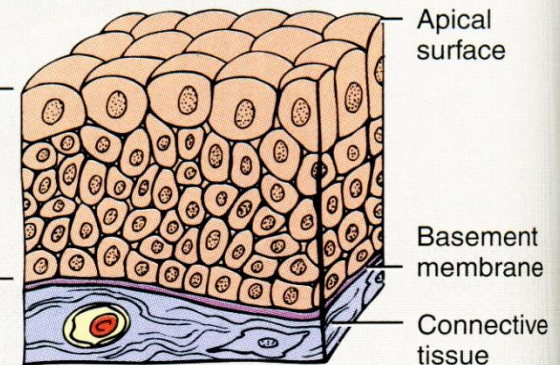


LM 500x



Urinary bladder

Transitional  
epithelium

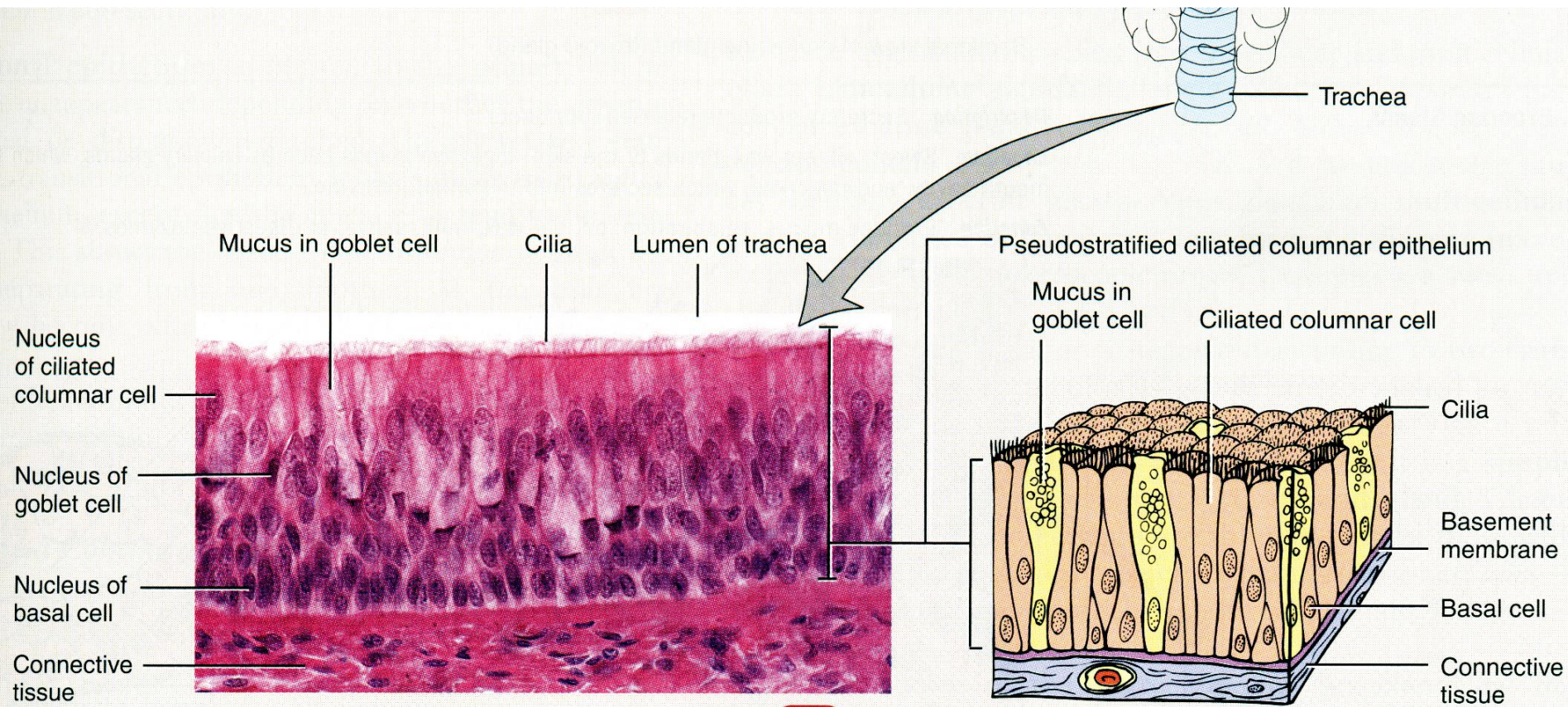


Relaxed transitional epithelium



# Pseudostratified columnar epithelium 偽多層柱狀上皮

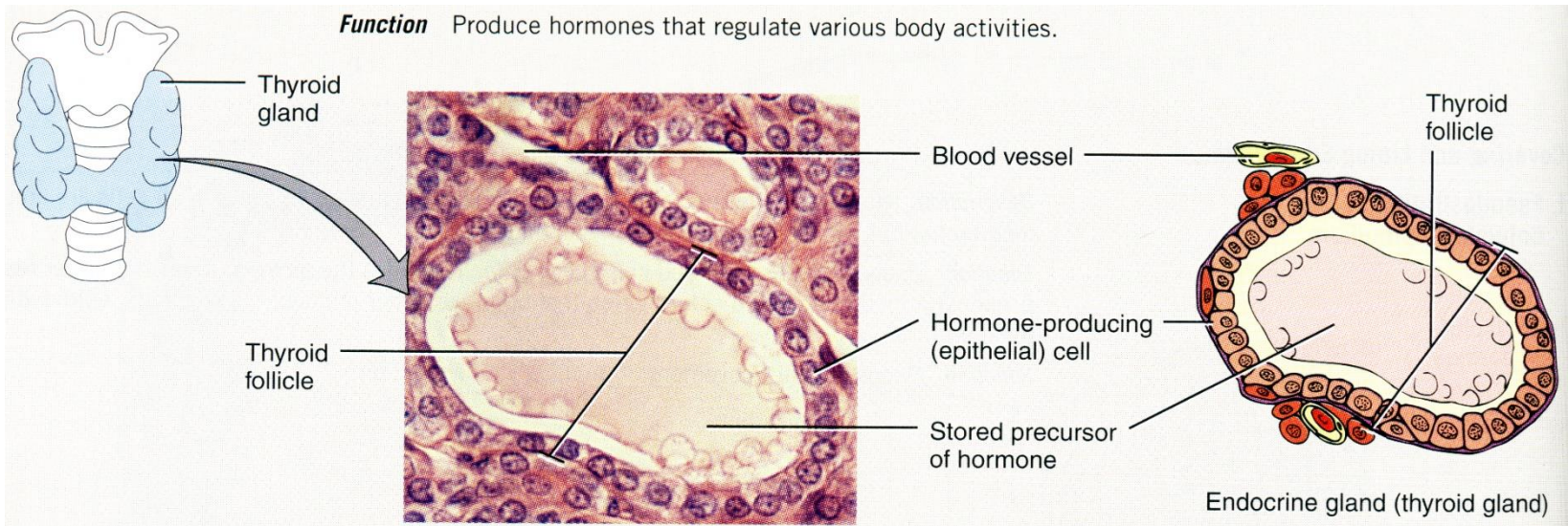
## Trachea 氣管上皮



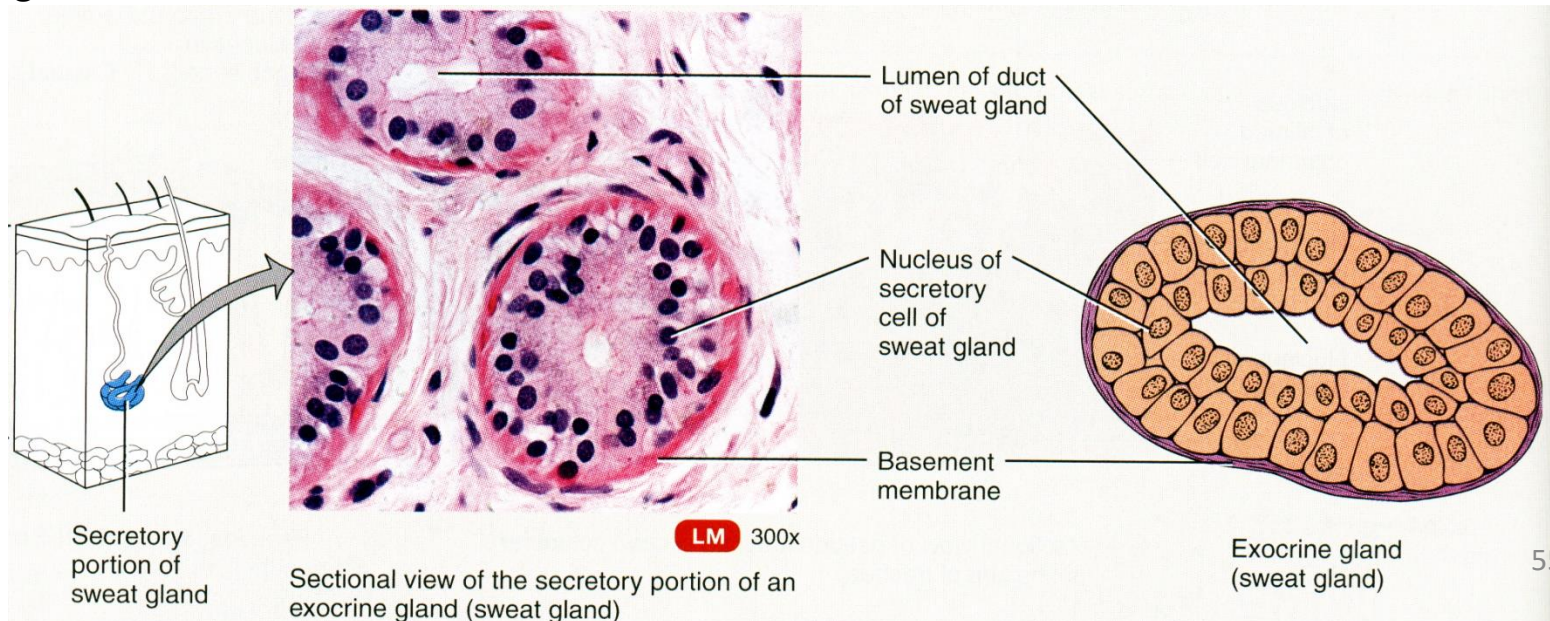


# Glandular epithelium 腺體上皮

endocrine glands 內分泌腺：甲狀腺、腎上腺



exocrine gland 外分泌腺：汗腺、消化腺





## II. Connective tissues

### 結締組織

ECM: extracellular matrix

細胞外基質

Cells:

Fibroblast 纖維母細胞

Macrophage 巨噬細胞

Plasma cell 漿細胞

Mast cell 肥大細胞

Adipocyte 脂肪細胞

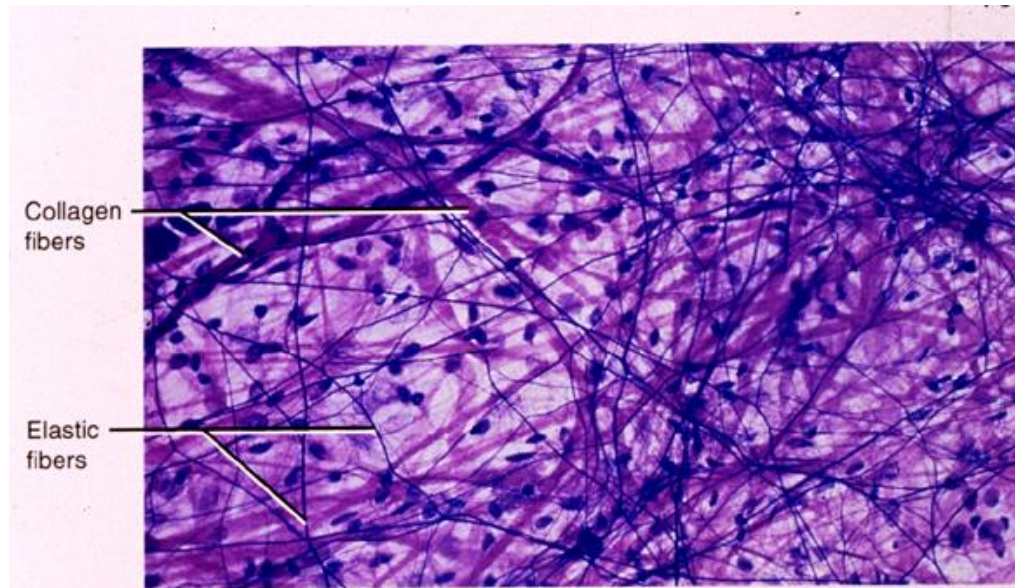
Lymphocyte 淋巴細胞

Fibers:

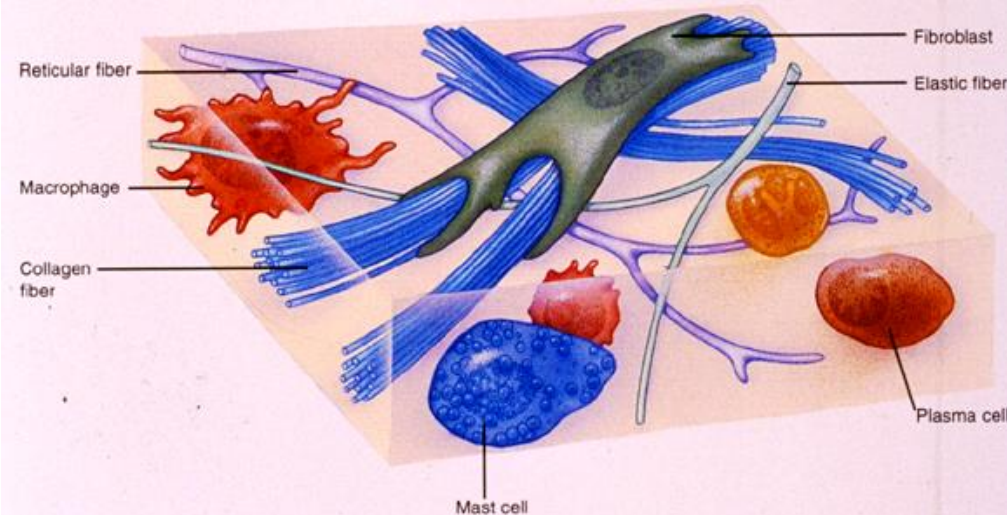
Collagen fiber 膠原纖維

Elastic fiber 彈性纖維

Reticular fiber 網狀纖維

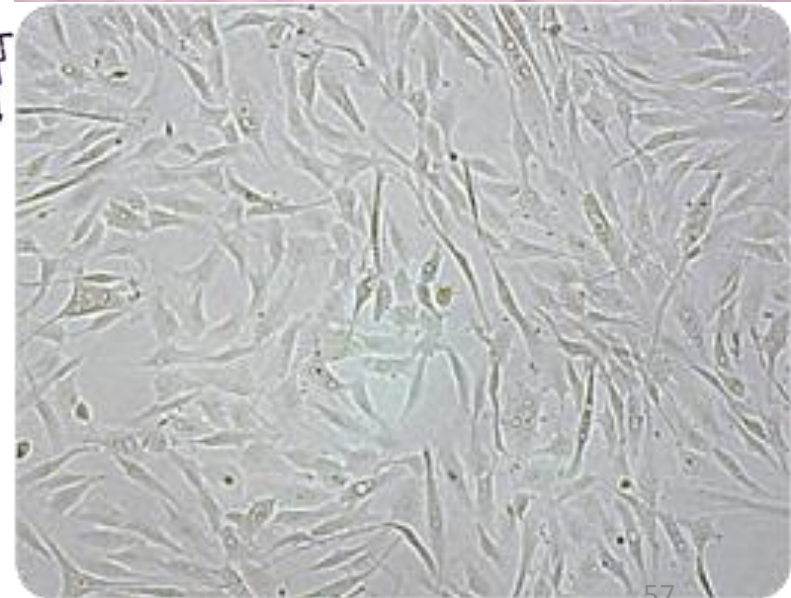
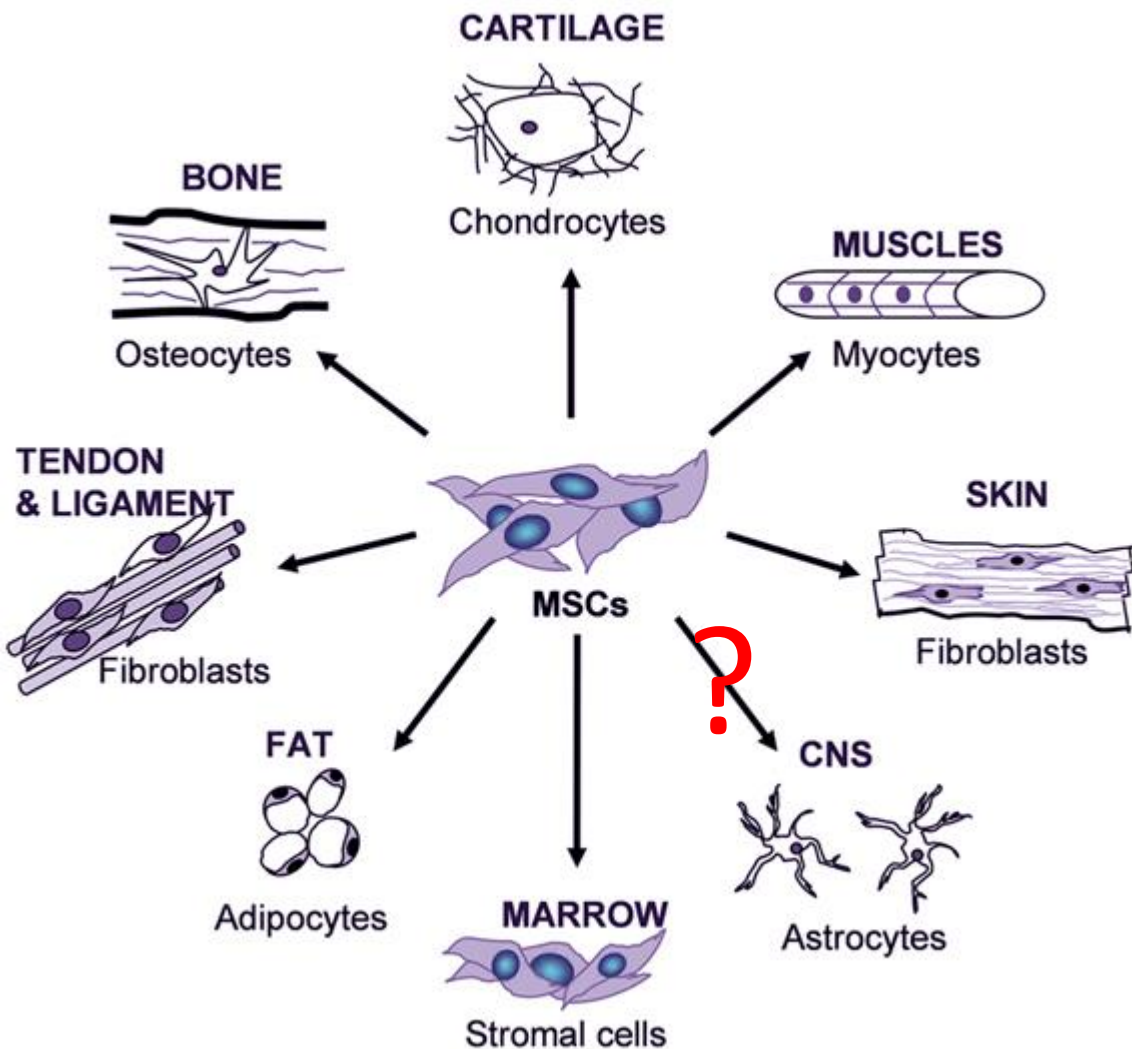


Sectional view of subcutaneous tissue



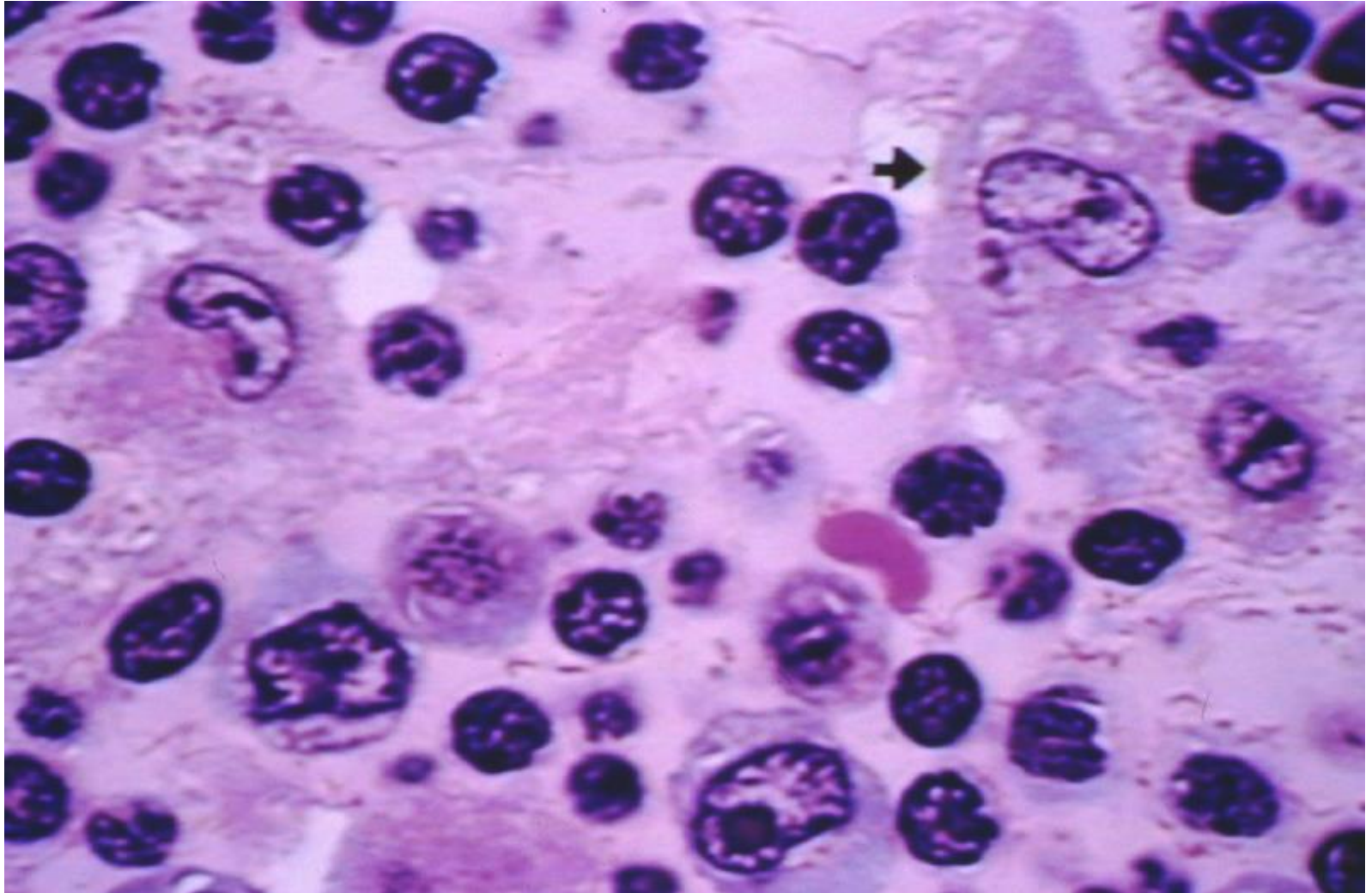
# Mesenchymal stem cells 間葉幹細胞

Fibroblast 纖維母細胞: 製造組織纖維 (Collagen fiber; Elastic fiber ; Reticular fiber)



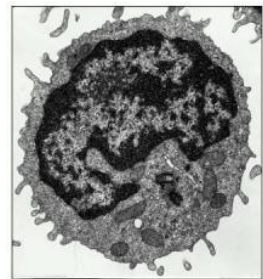
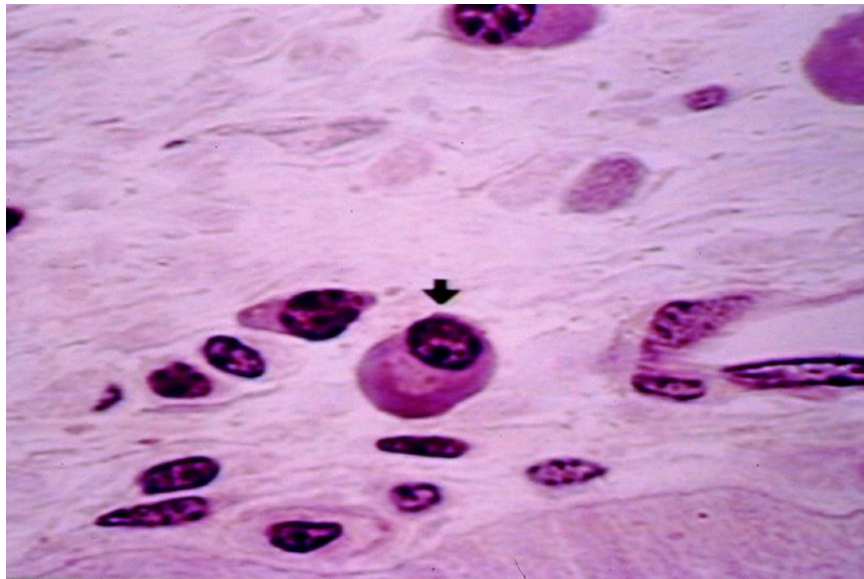


Macrophage 巨噬細胞：具吞噬作用清理壞死細胞或外來物

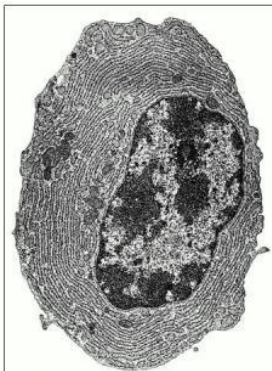


# Plasma cell 漿細胞：來自B 淋巴球(B lymphocyte)

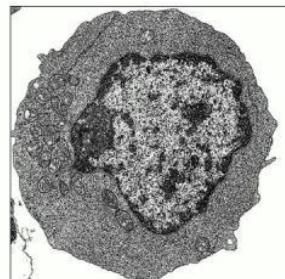
## Making antibodies!! 製造抗體



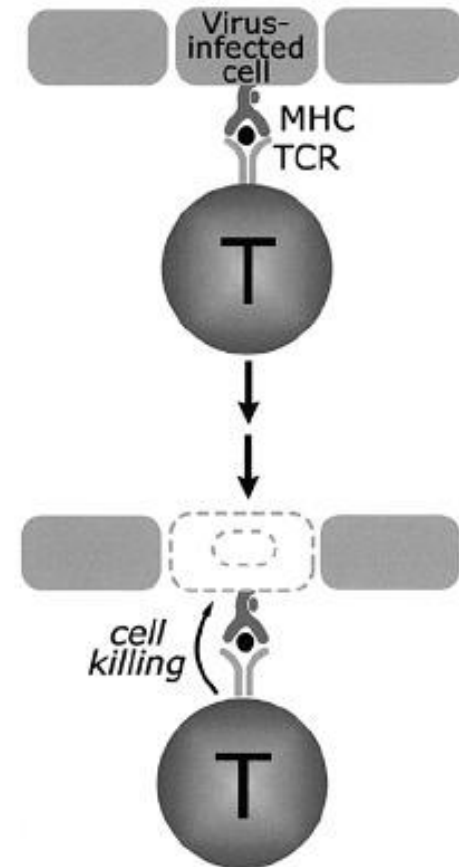
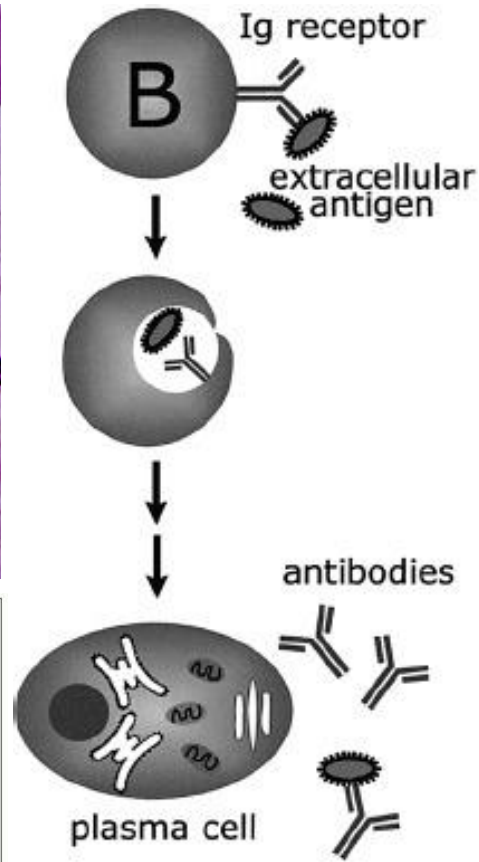
(A) resting T or B cell



(B) effector B cell (plasma cell)



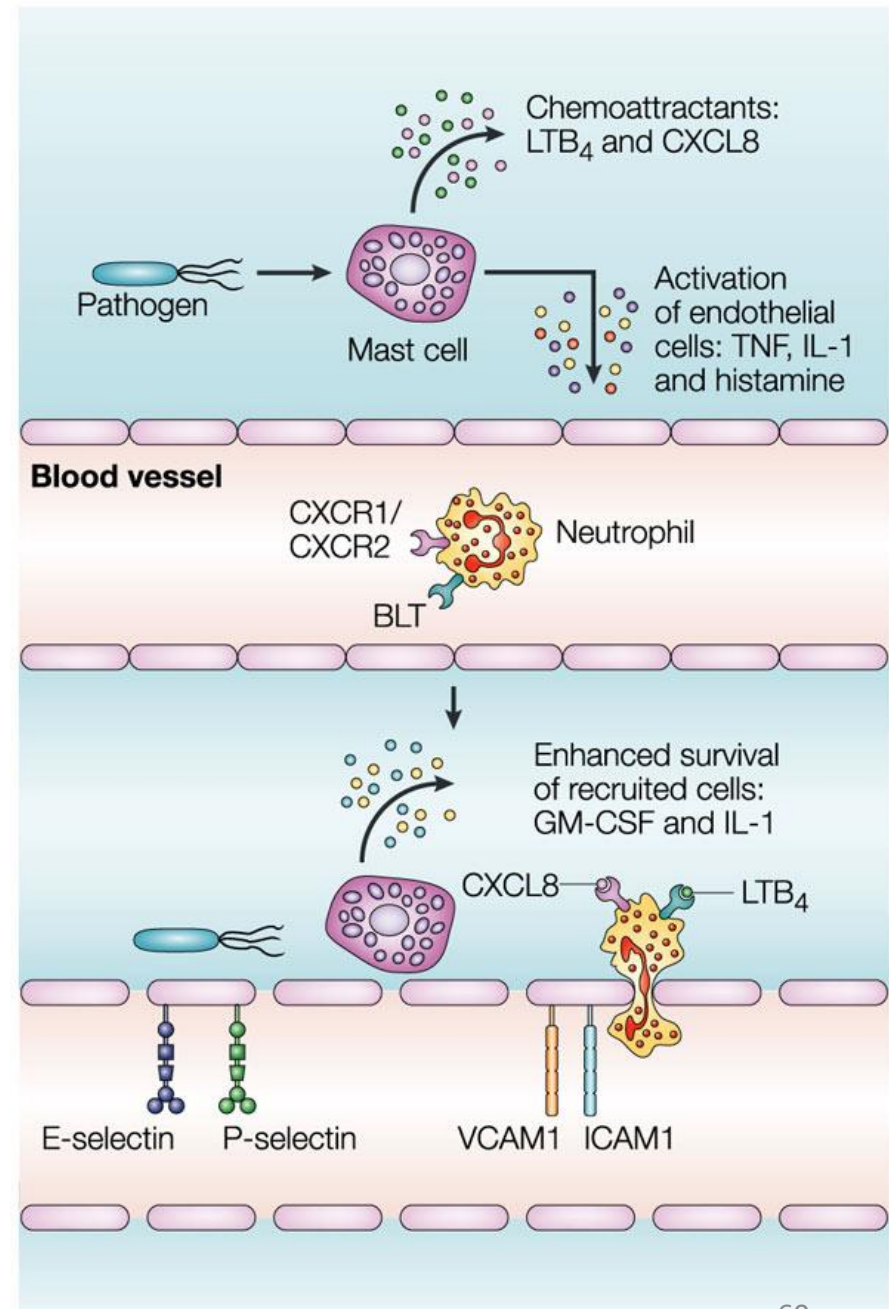
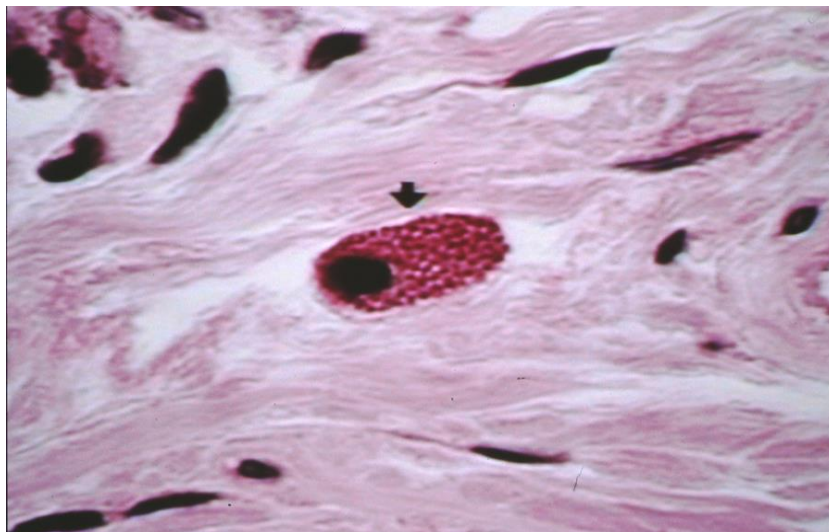
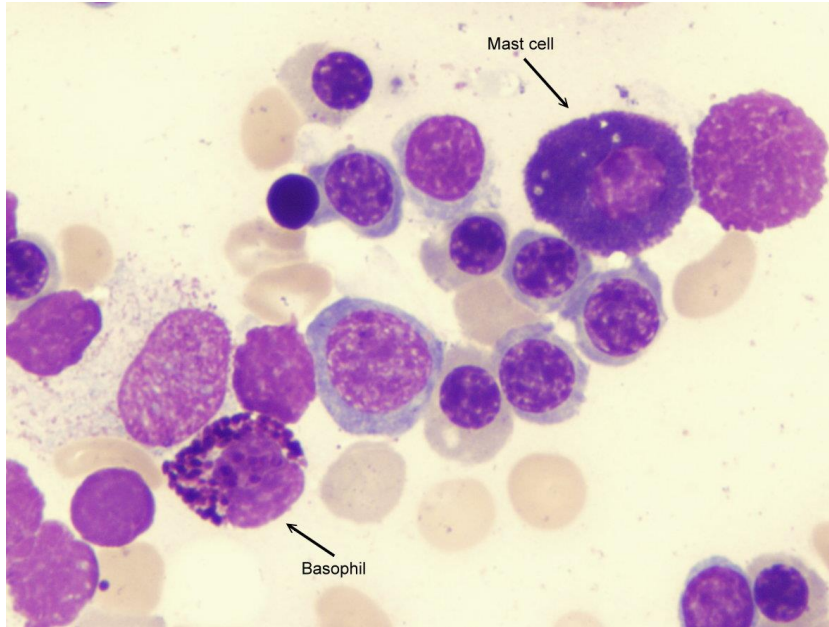
(C) effector T cell



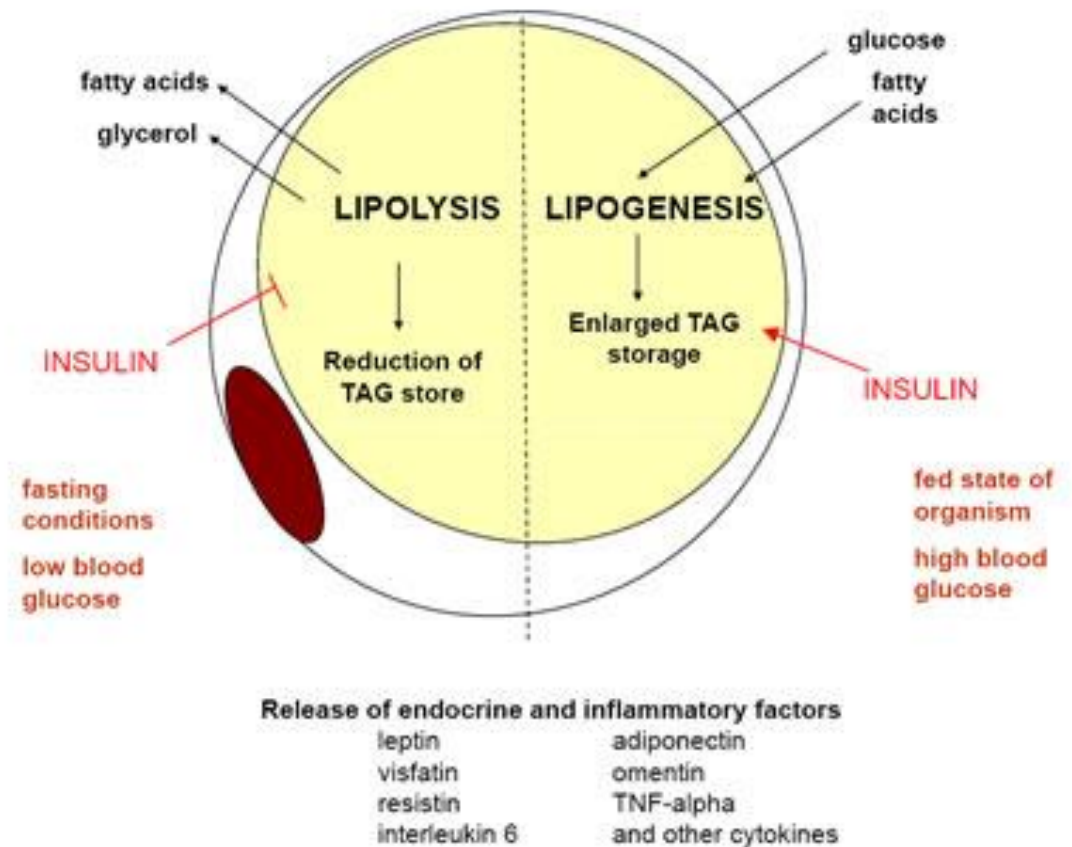
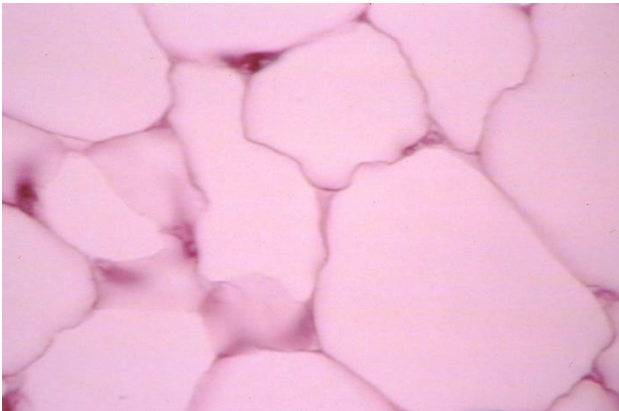
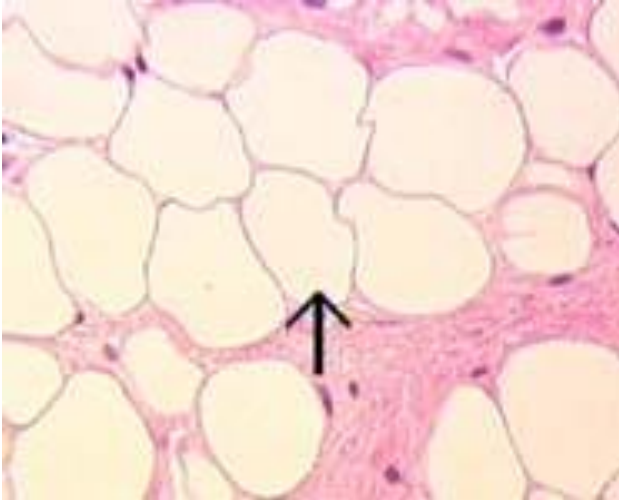


# Mast cell 巨大細胞

分泌Histamine; Cytokines

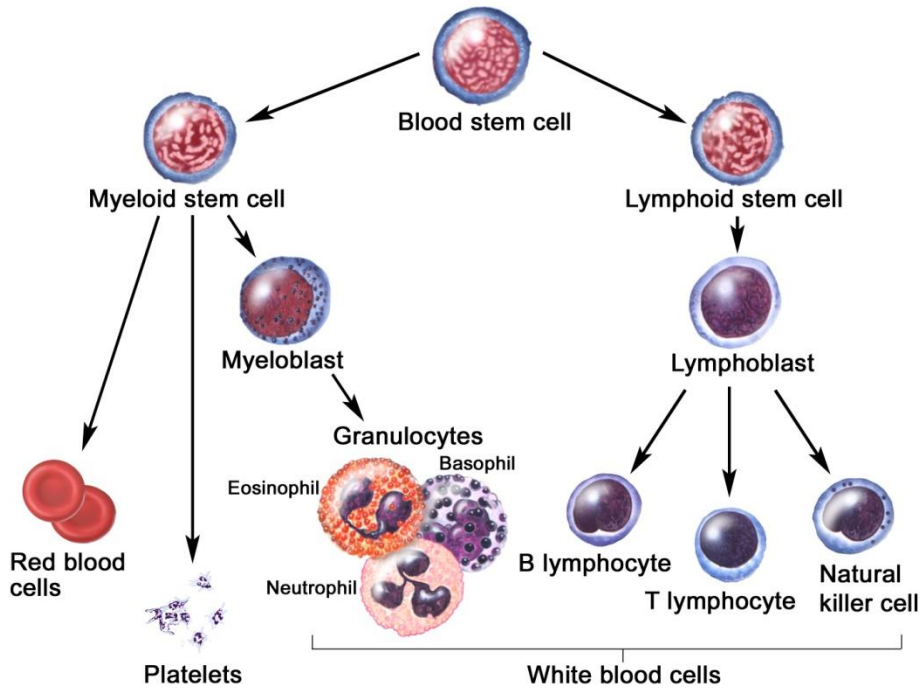


# Adipocyte 脂肪細胞

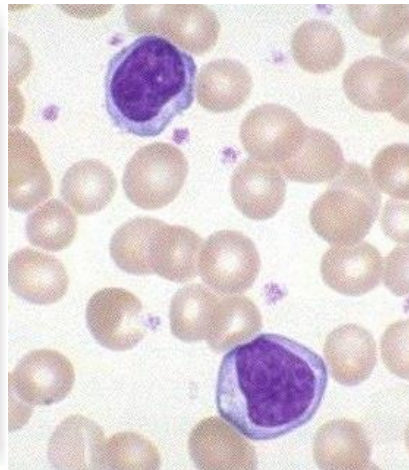
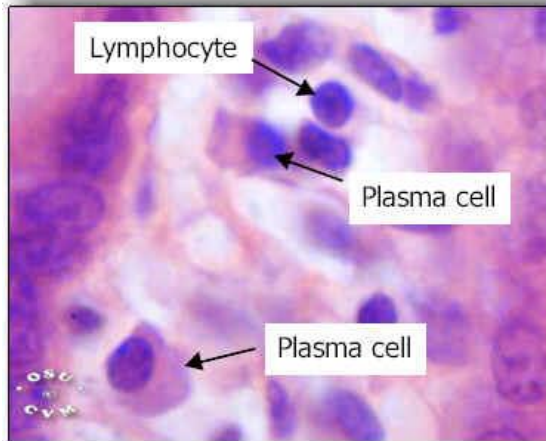
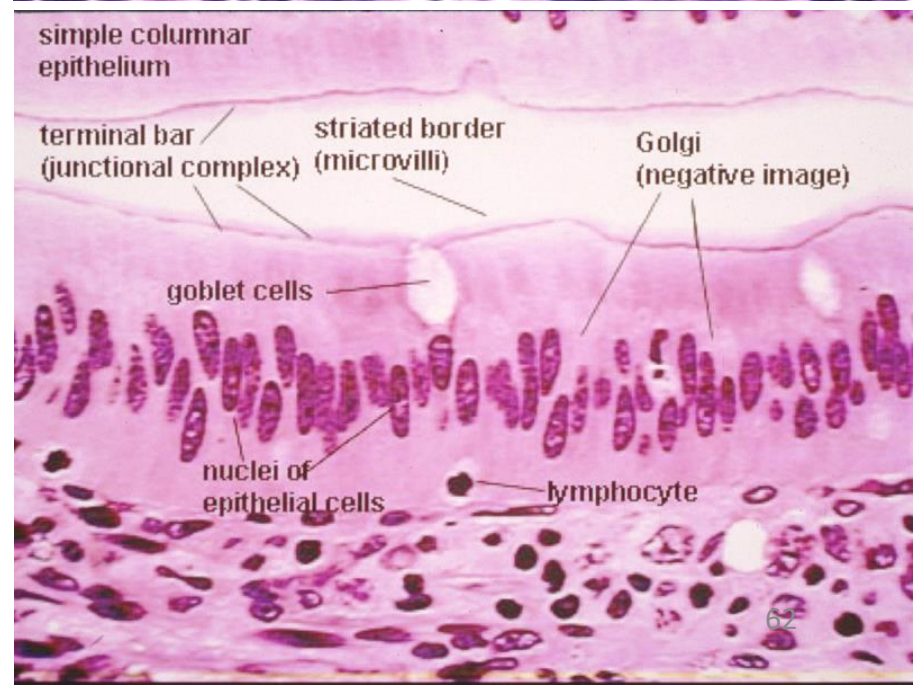
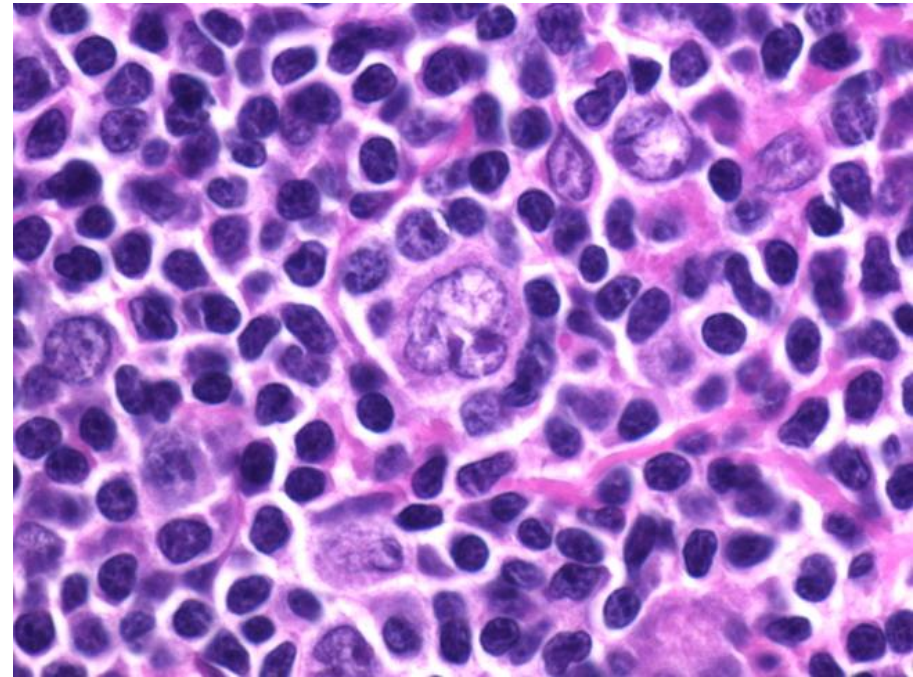




# Lymphocyte 淋巴細胞



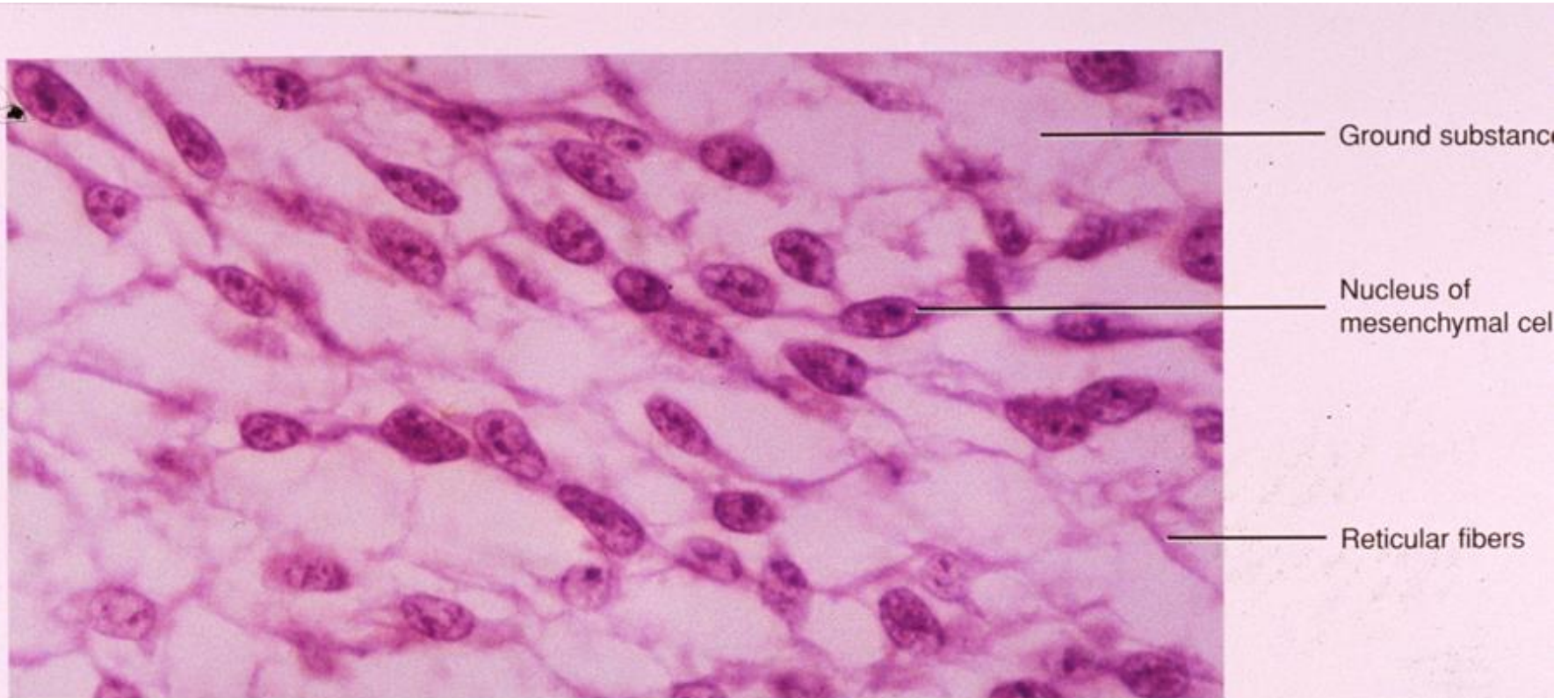
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Tissues:

Embryonic connective tissue 胚胎結締組織 (臍帶)

Mesenchyme 間葉 fibroblast 纖維母細胞



Sectional view of mesenchyme from a developing fetus

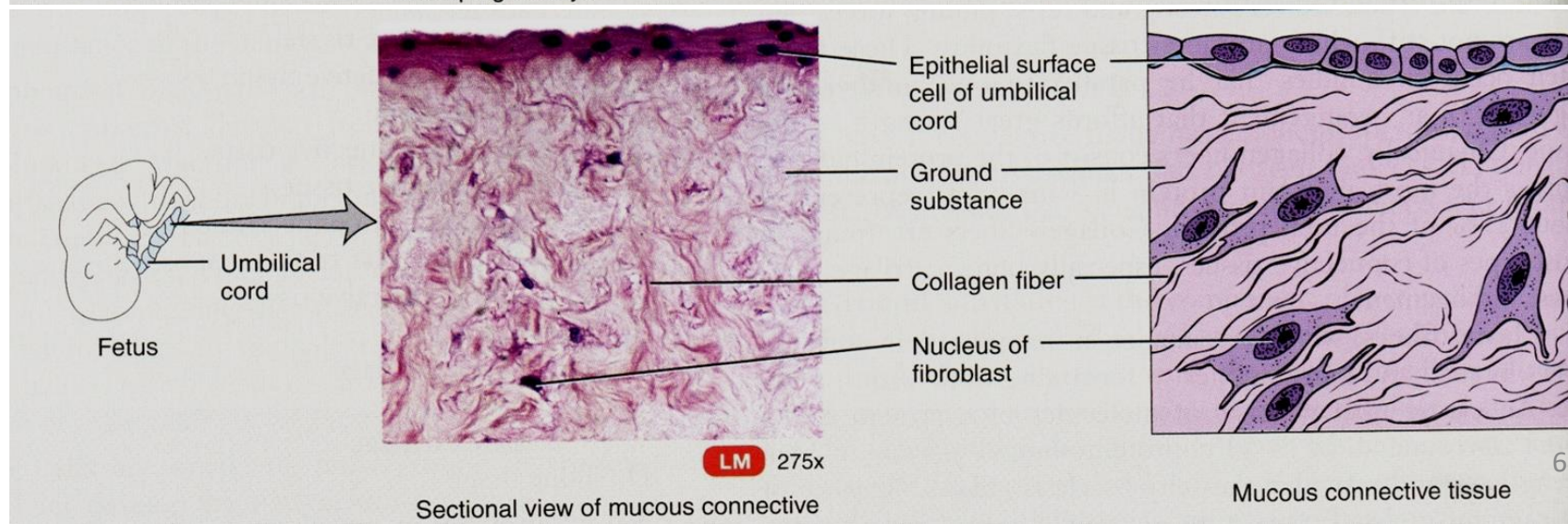
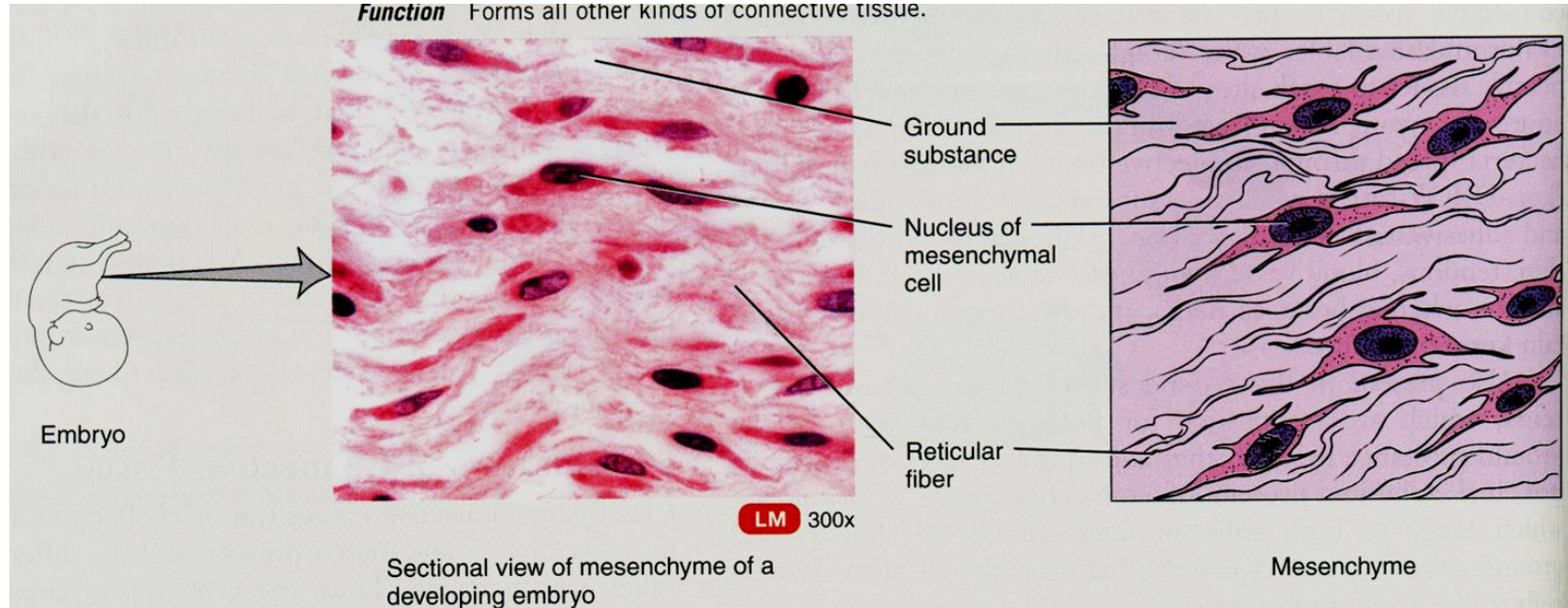


# Tissues:

## Embryonic connective tissue 胚胎結締組織 (臍帶)

Mesenchyme 間葉 fibroblast 纖維母細胞

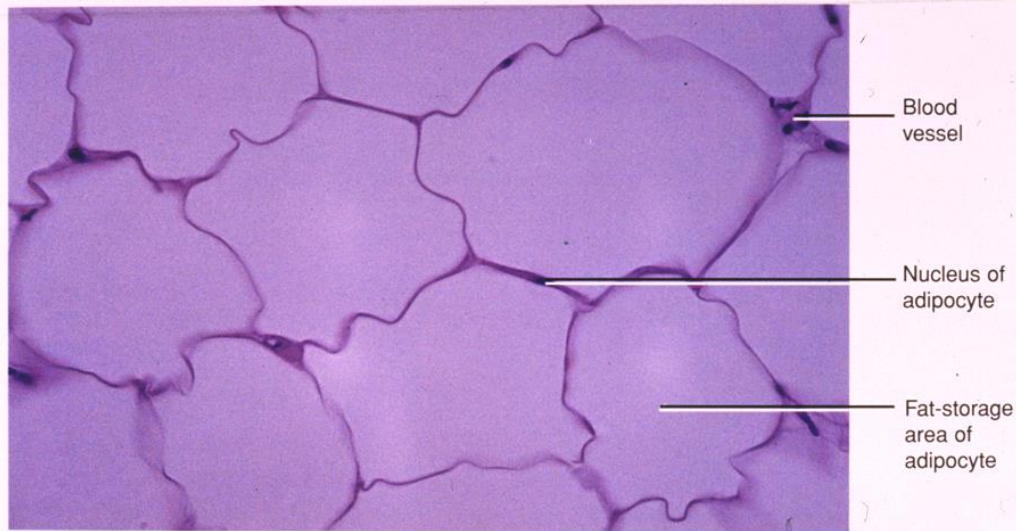
**Function** Forms all other kinds of connective tissue.



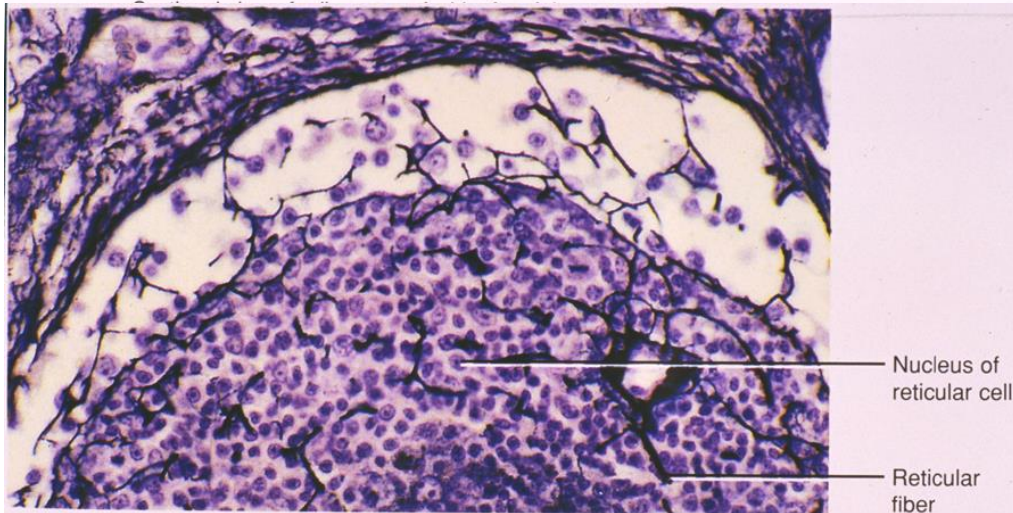


# Loose connective tissue 疏松結締組織

1. Adipose tissue 脂肪組織 (皮下、心、腎旁)
2. Reticular connective tissue 網狀結締組織 (淋巴結)



**Cell and  
extracellular space > fiber**

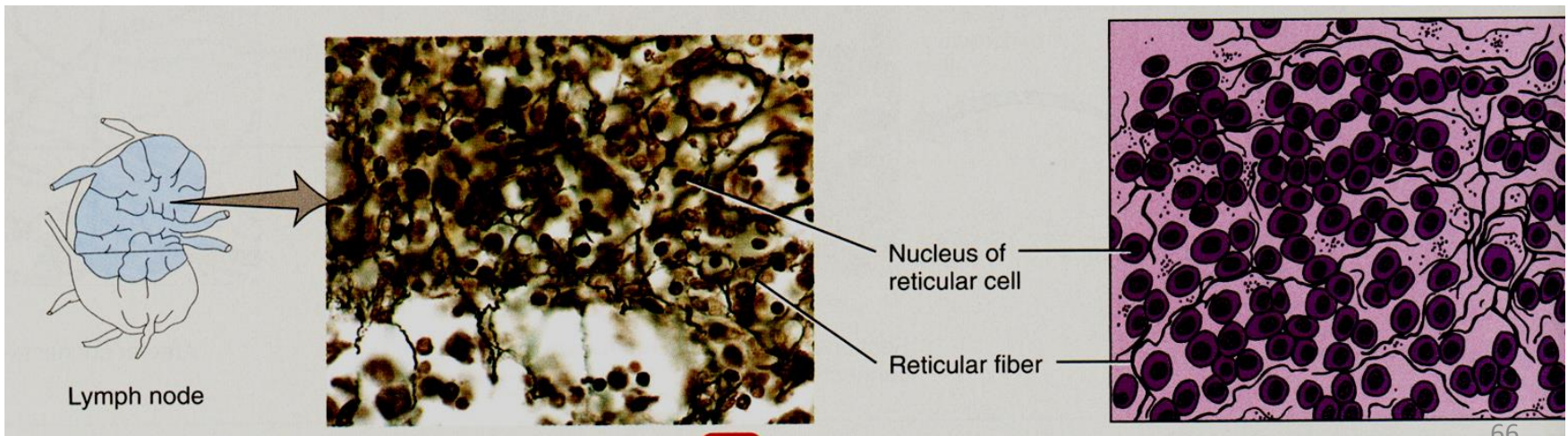
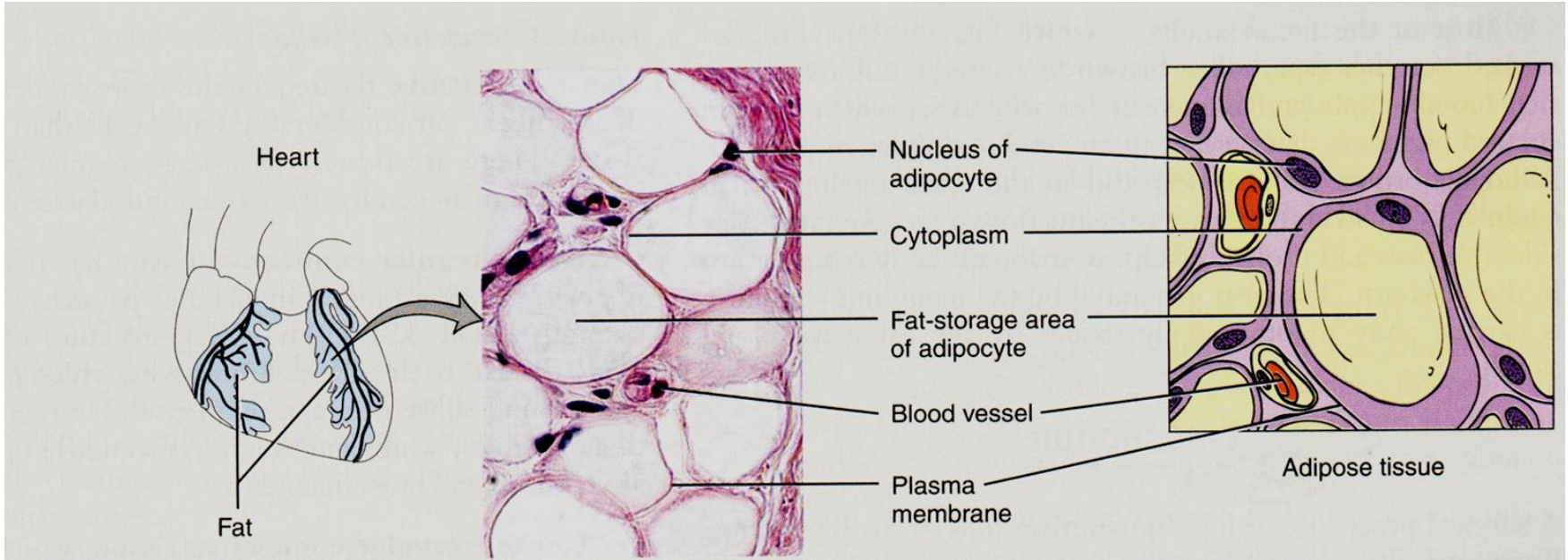


Sectional view of lymph node



# Loose connective tissue 疏松結締組織

1. Adipose tissue 脂肪組織 (皮下、心、腎旁)
2. Reticular connective tissue 網狀結締組織 (淋巴結)

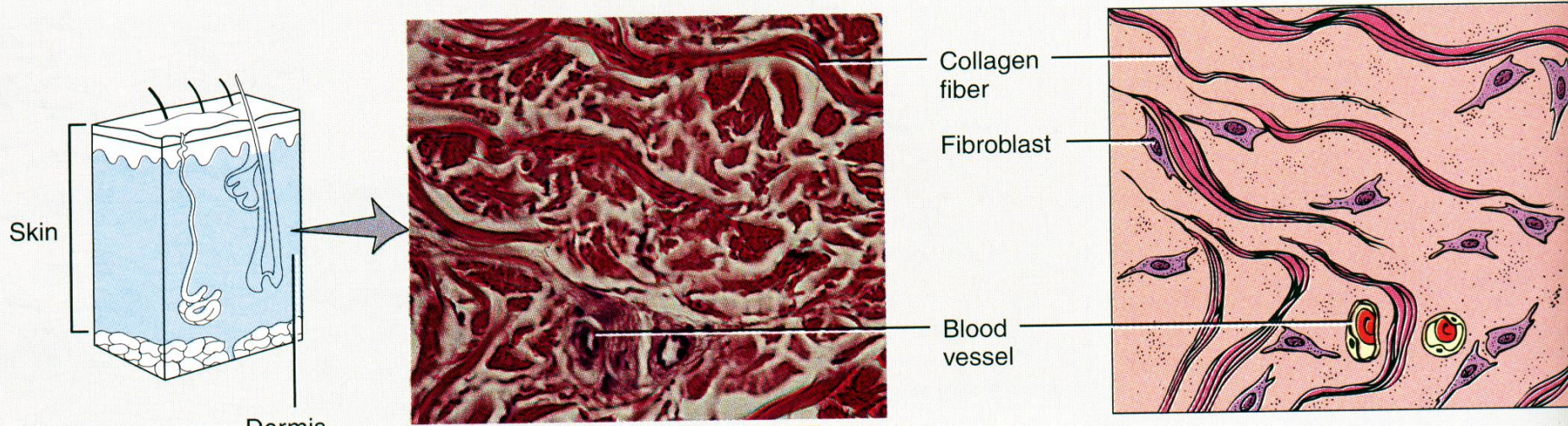
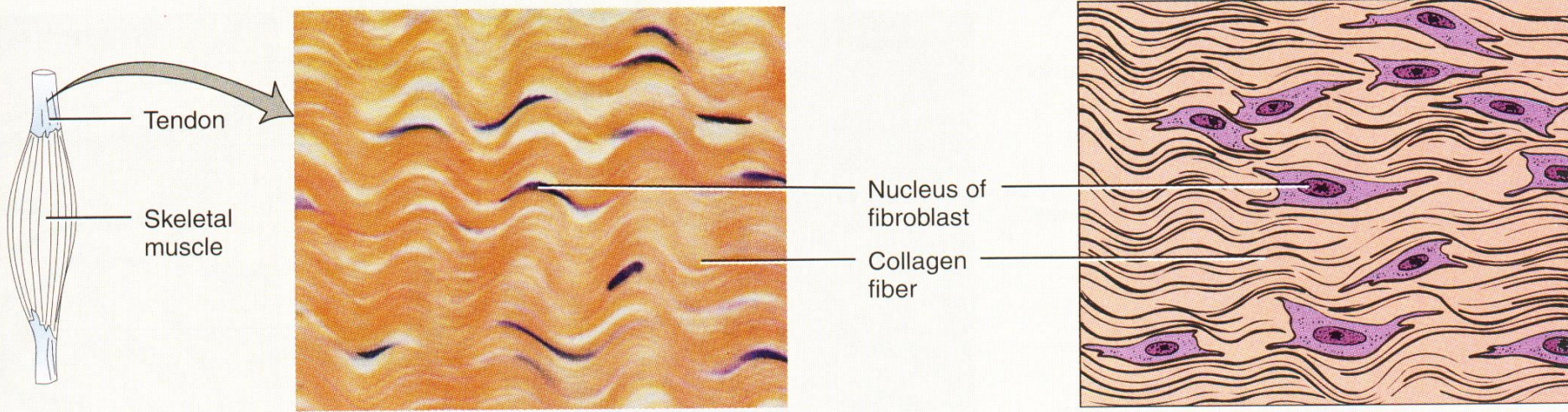




**Fiber > Cell and  
extracellular space**

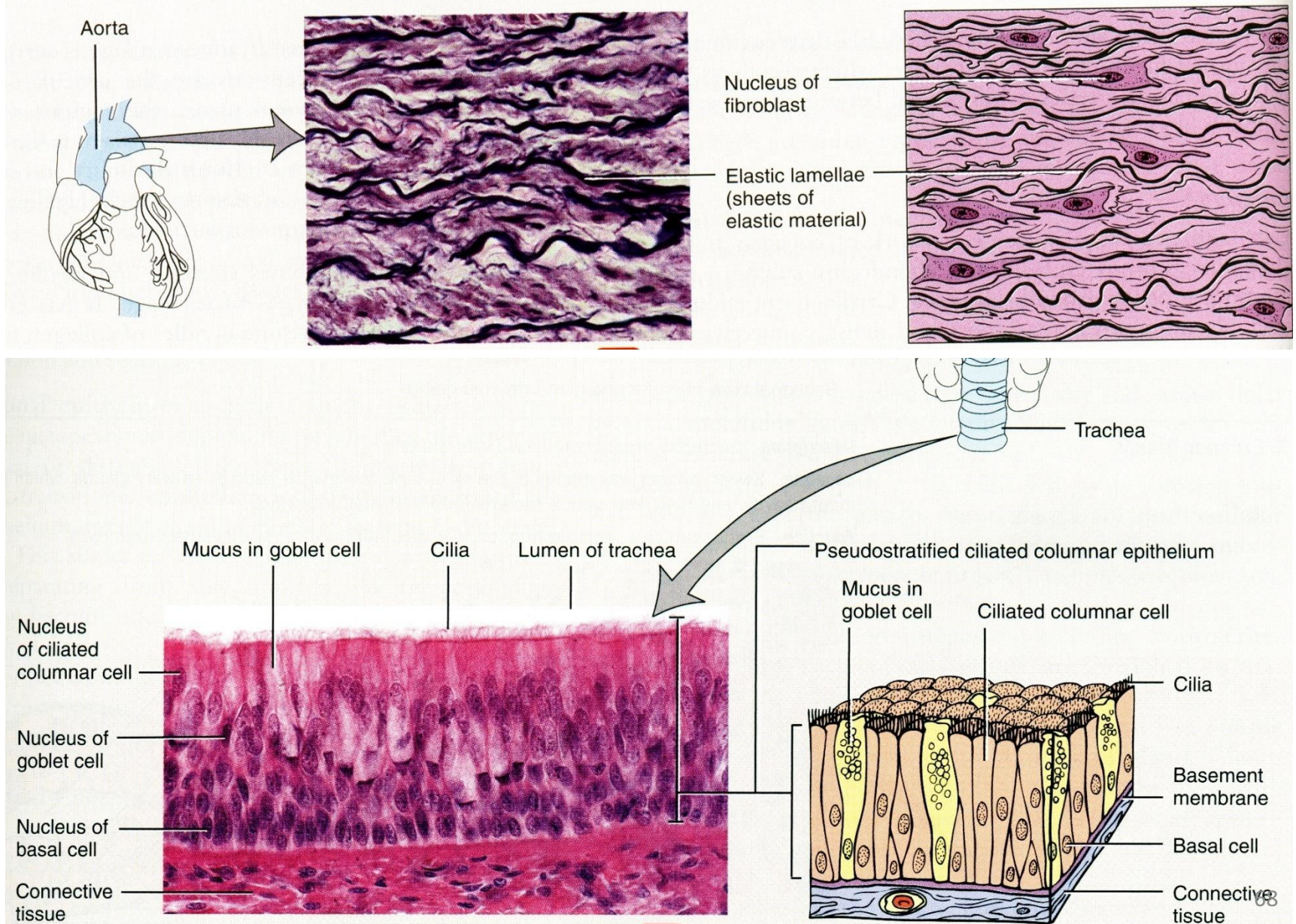
## Dense connective tissue 緻密結締組織

1. Dense regular connective tissue 規則緻密結締組織 (Tendon 韌帶)
2. Dense irregular connective tissue 不規則緻密結締組織 (dermis 真皮)





# Elastic connective tissue 彈性結締組織 (Artery 動脈壁, Trachea)





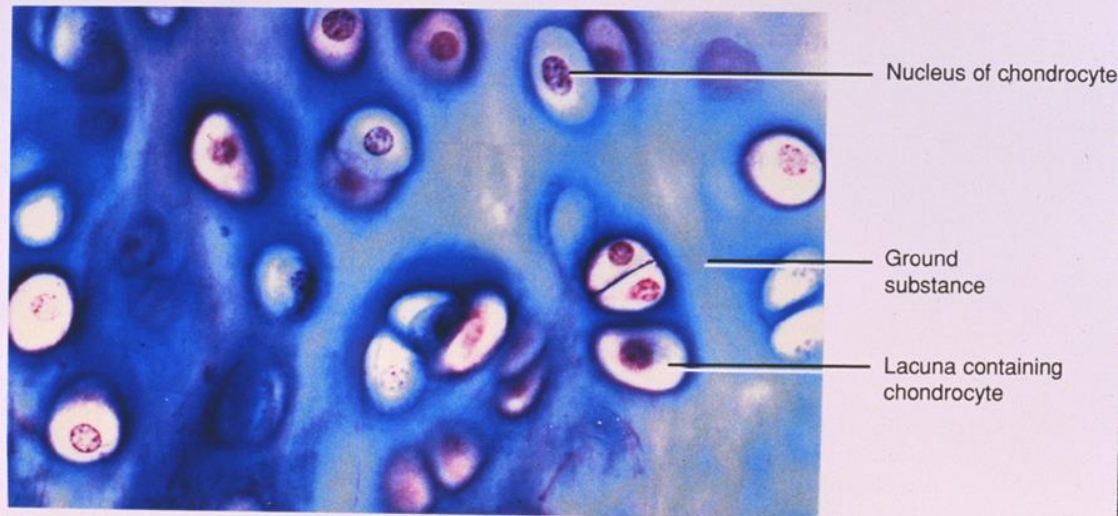
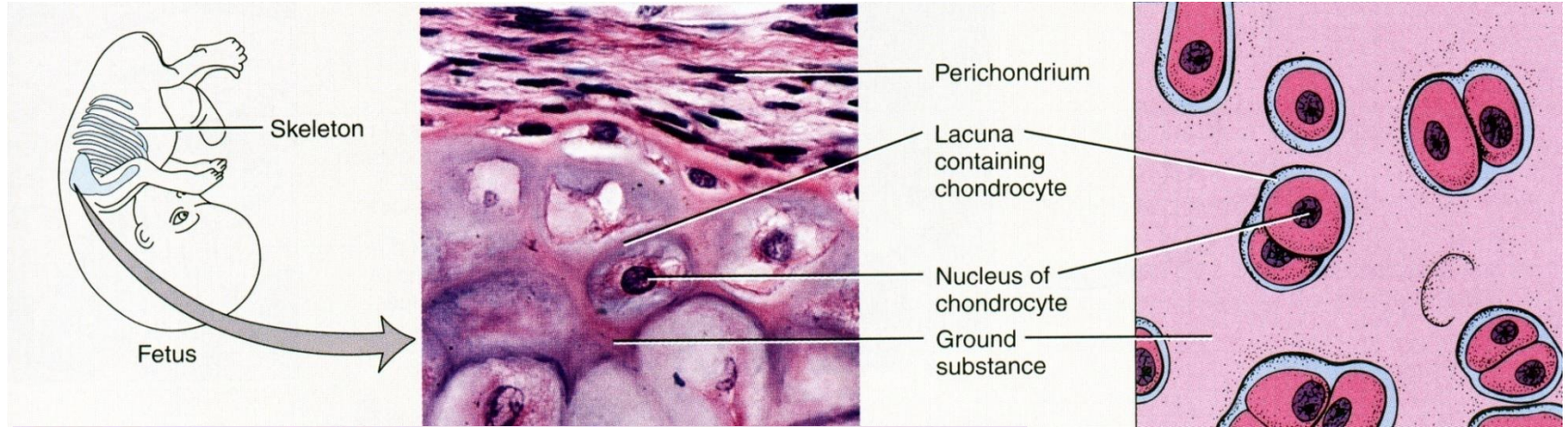
# Cartilage

**Hyaline cartilage** 透明軟骨(硬骨端、氣管)

**Chondroblast** 軟骨母細胞 → **Chondrocyte** 軟骨細胞

**Fibrocartilage** 纖維軟骨

**Elastic cartilage** 彈性軟骨

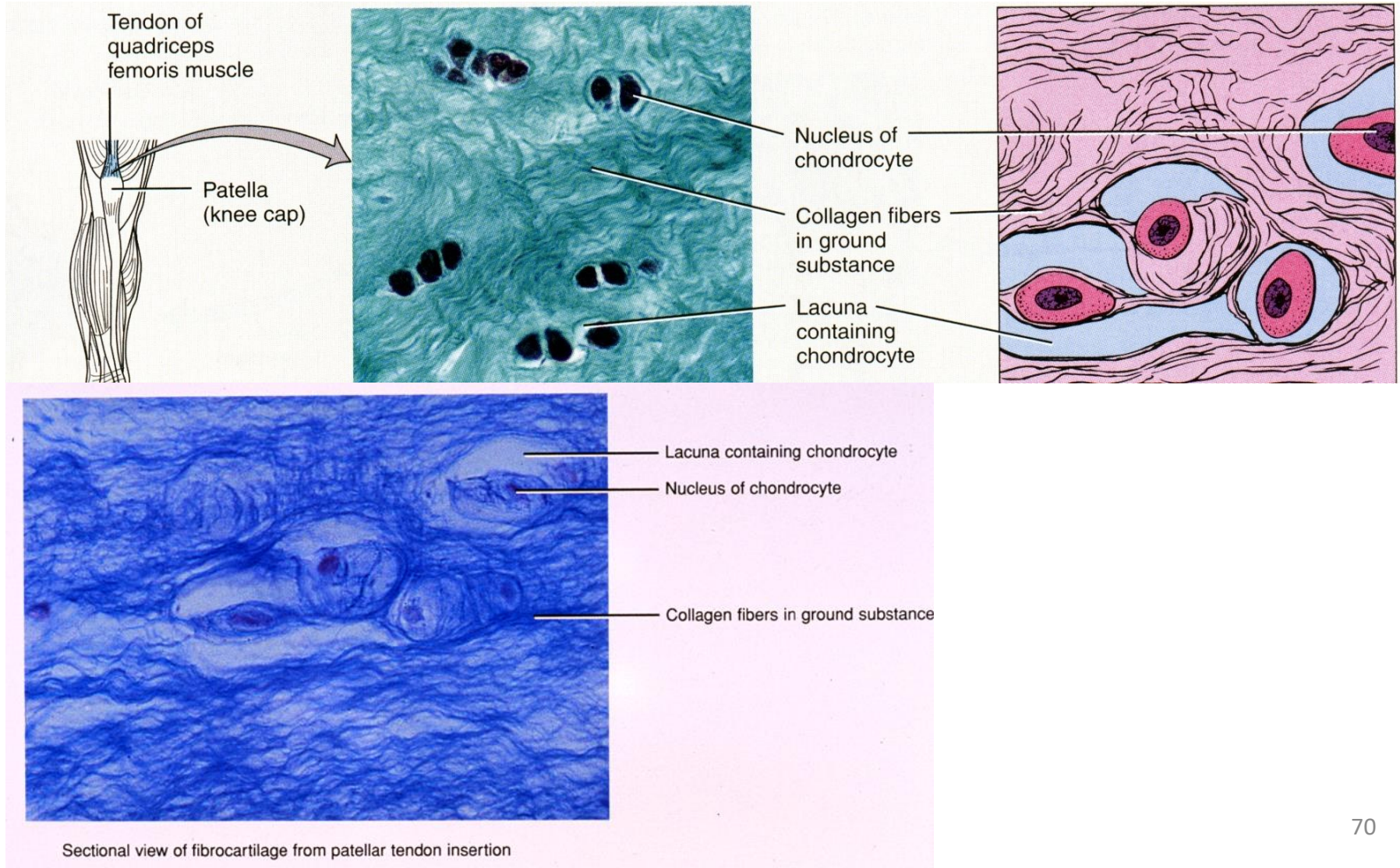


Sectional view of hyaline cartilage from trachea



# Cartilage

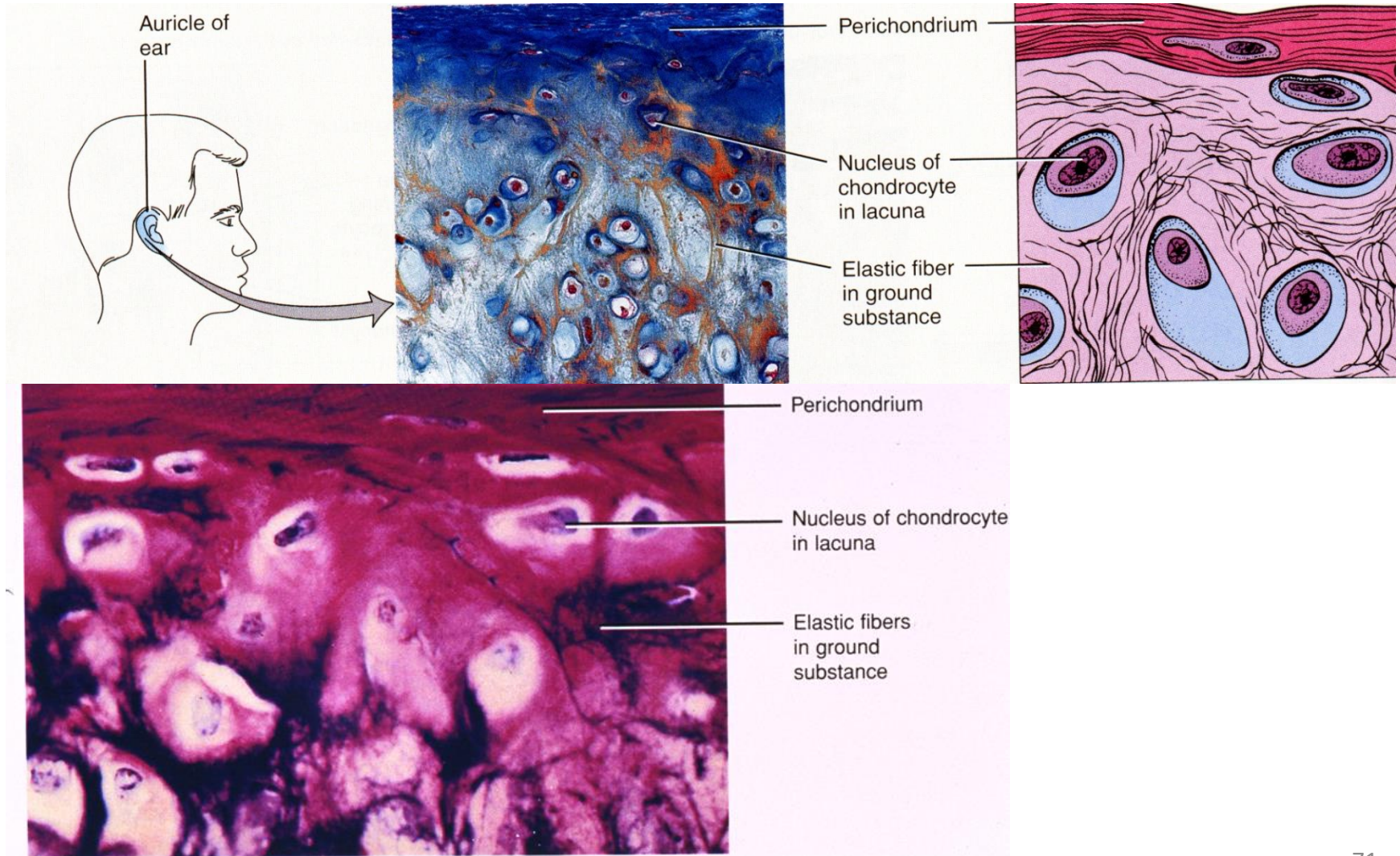
Fibrocartilage 纖維軟骨 (Pubic symphysis 恥骨聯合；椎間盤；髕骨韌帶)





# Cartilage

Elastic cartilage 彈性軟骨 (Epiglottis 會厭; 外耳殼)



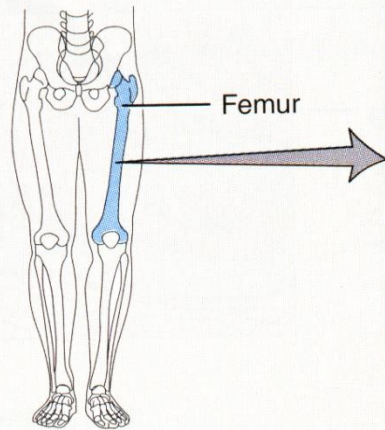
Sectional view of elastic cartilage from auricle of ear



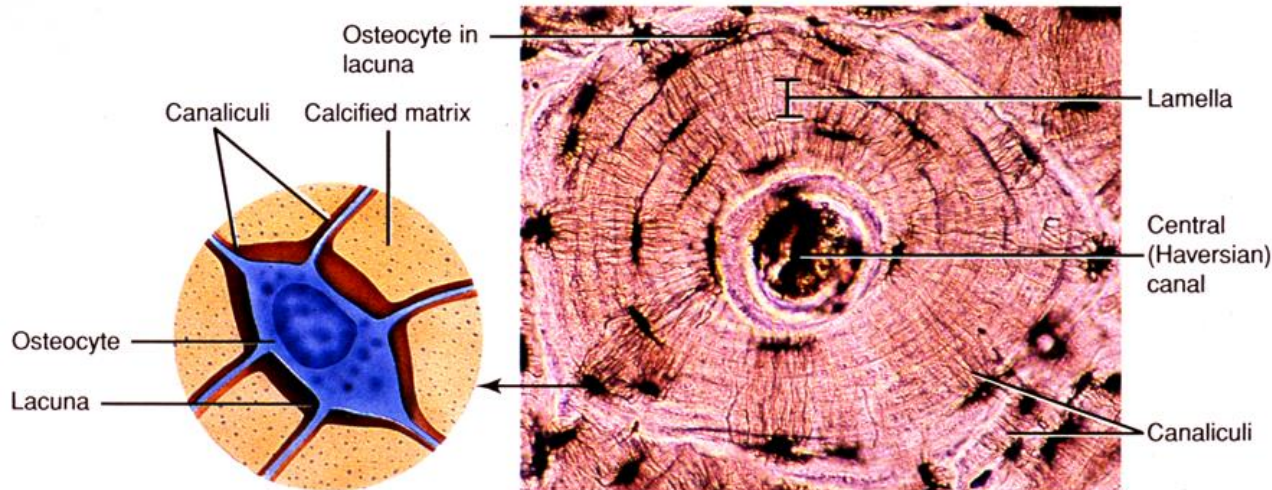
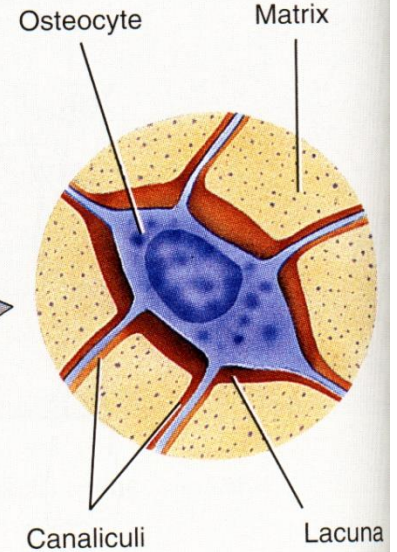
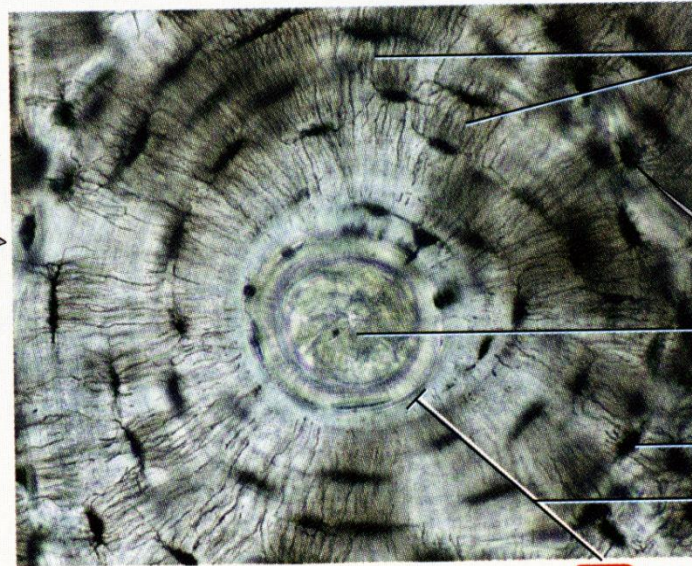
# Bone (osseous) tissue

Osteoblast 骨母細胞 → Osteocyte 骨細胞

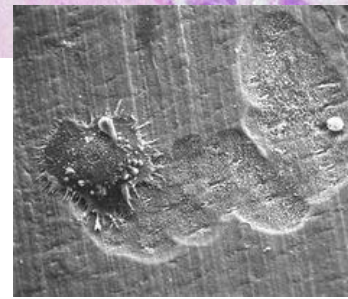
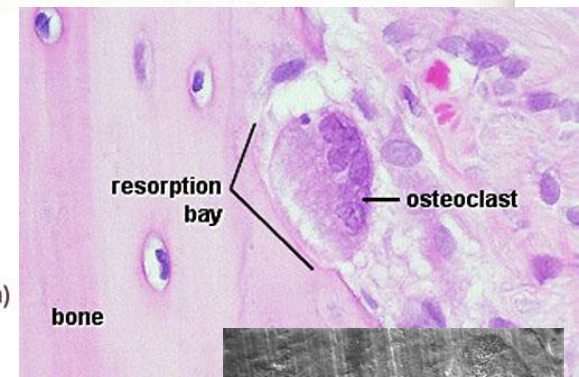
Osteoclast 蝕骨細胞



muscle tissue to enable movement.



Sectional view of an osteon (Haversian system) from the femur (thigh bone)

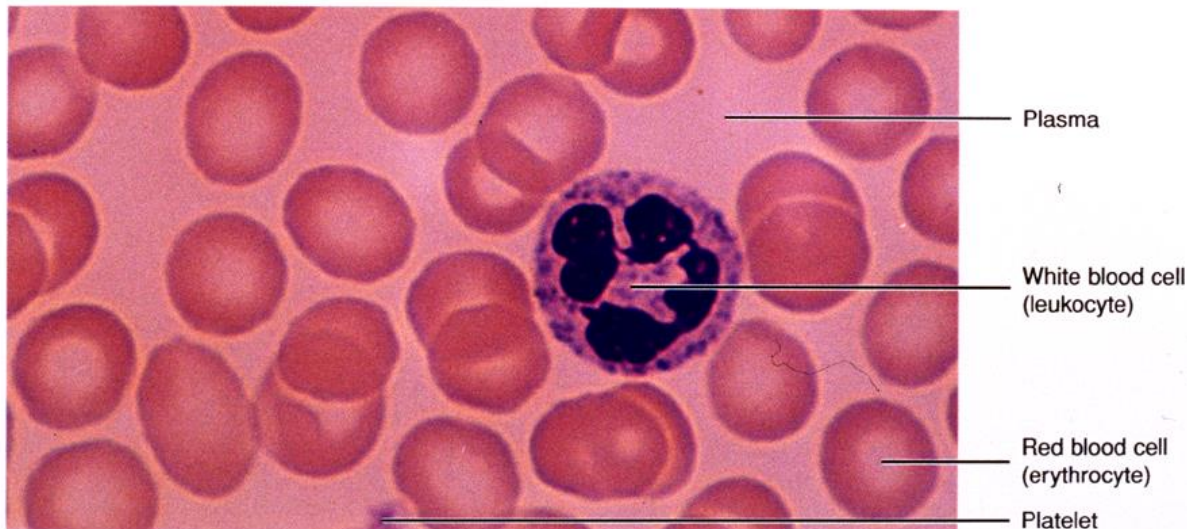
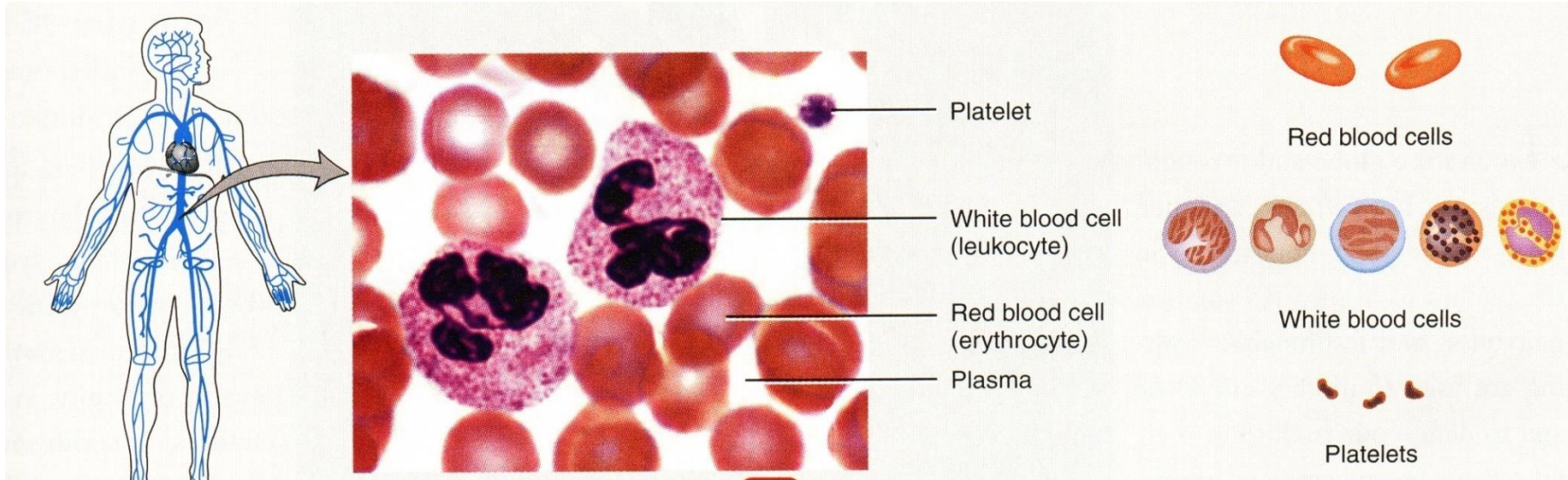




# Blood

Red blood cell  $\sim 7 \mu\text{m}$

White blood cells: lymphocyte, monocyte, neutrophil, basophil, eosinophil



Blood smear

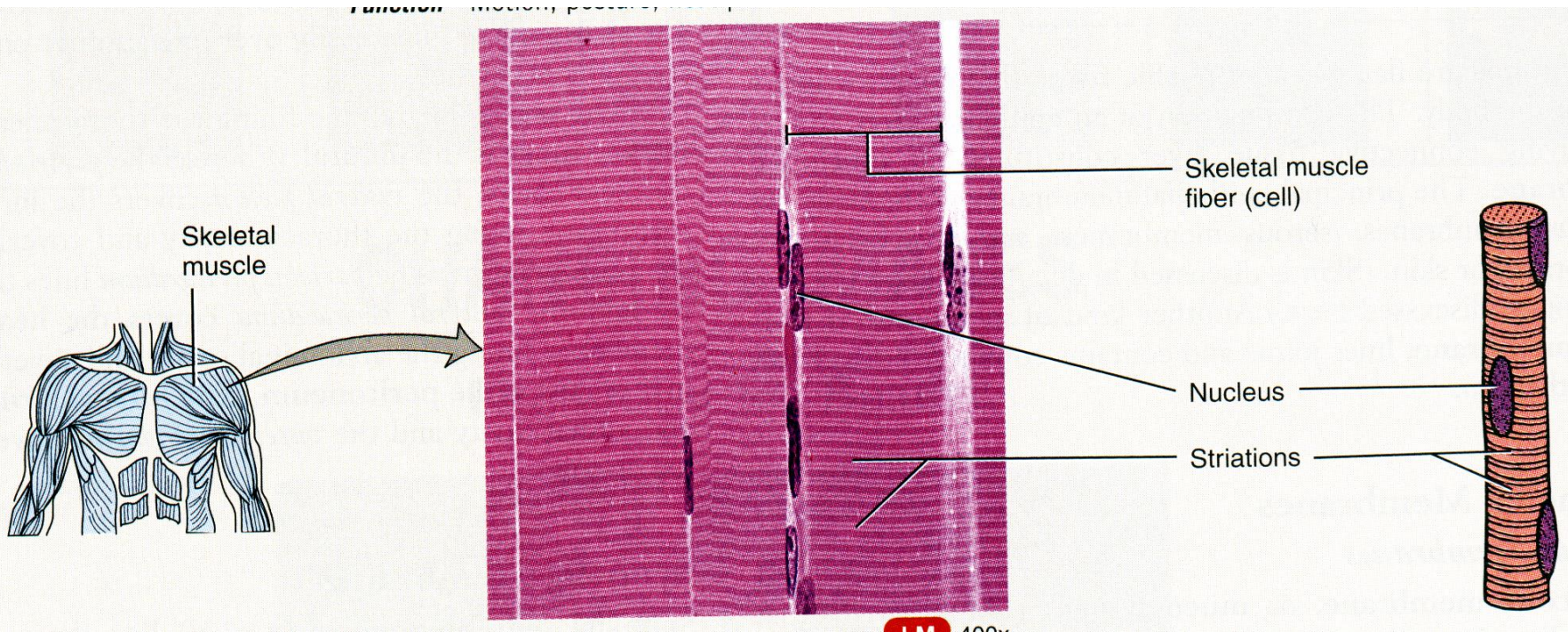


# Muscle tissues

## Skeletal muscle 骨骼肌 (四肢、顔面、消化道上部)

Cardiac muscle 心肌 (心臟)

Smooth muscle 平滑肌 (腸胃、血管、內臟臟壁管道)



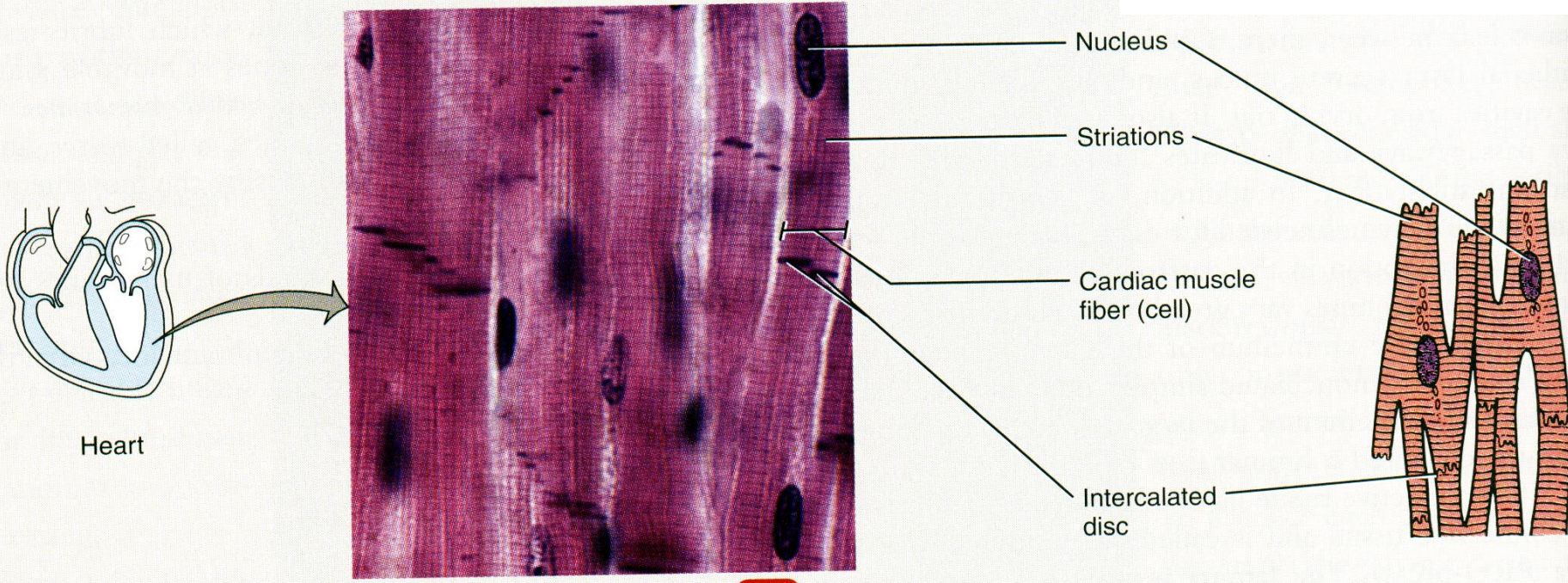
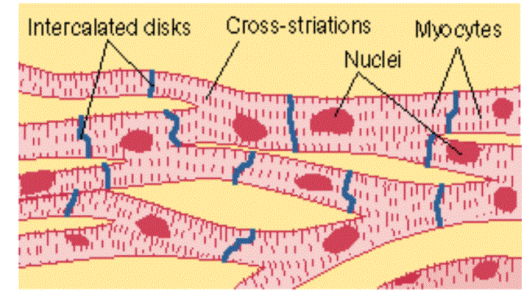


# Muscle tissues

Skeletal muscle 骨骼肌 (四肢、顔面、消化道上部)

## Cardiac muscle 心肌 (心臟)

Smooth muscle 平滑肌 (腸胃、血管、內臟臟壁管道)



Intermediate junction + gap junction



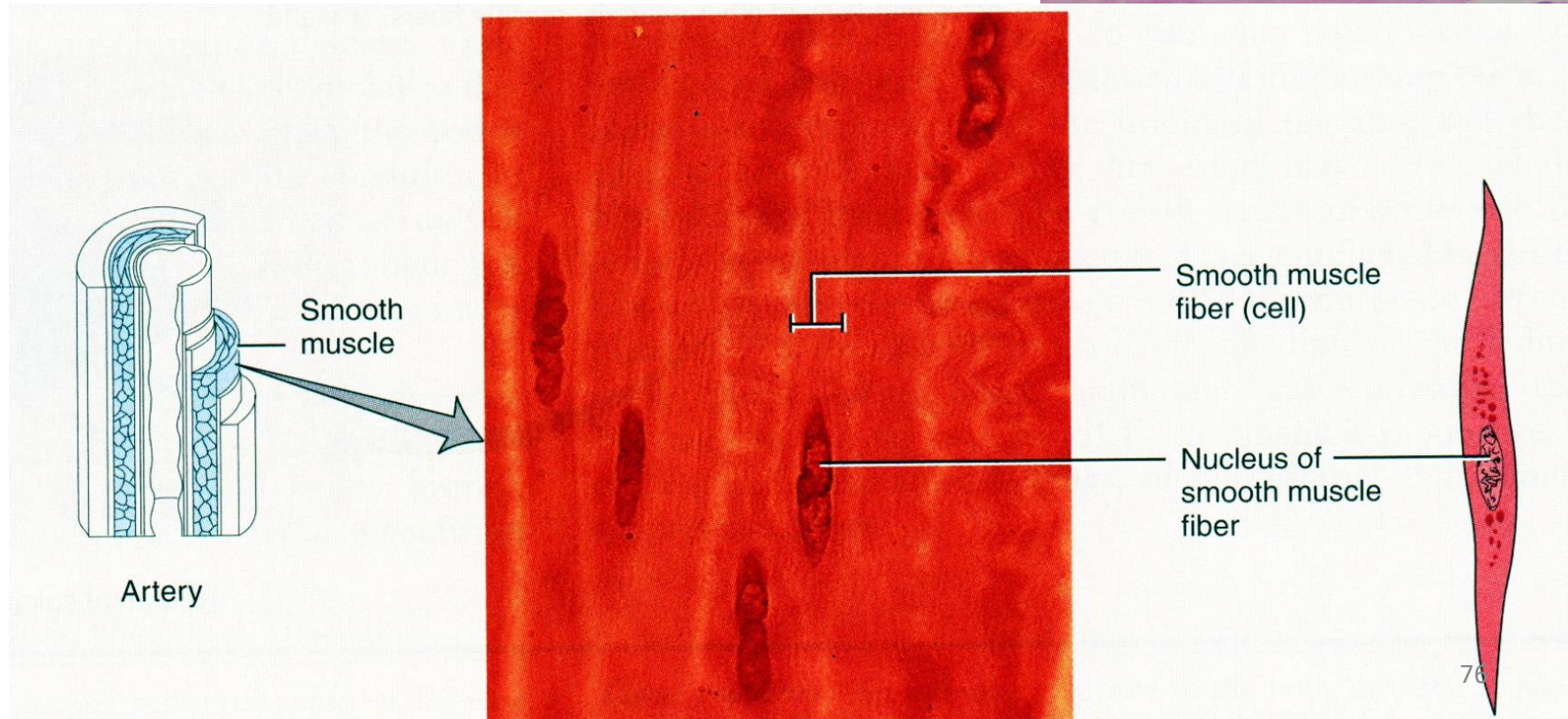
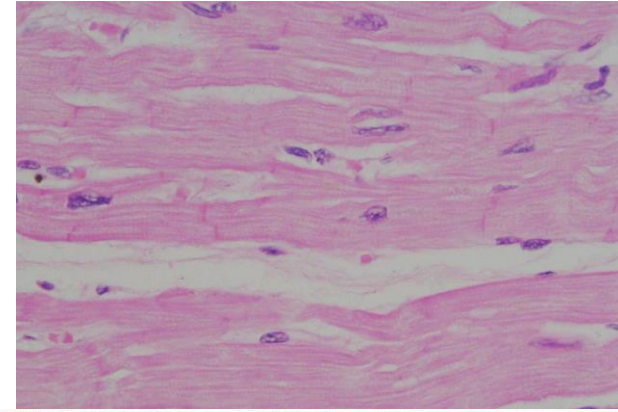
# Muscle tissues

Skeletal muscle 骨骼肌 (四肢、顔面、消化道上部)

Cardiac muscle 心肌 (心臟)

**Smooth muscle 平滑肌**

(腸胃、血管、内臓臓壁管道)



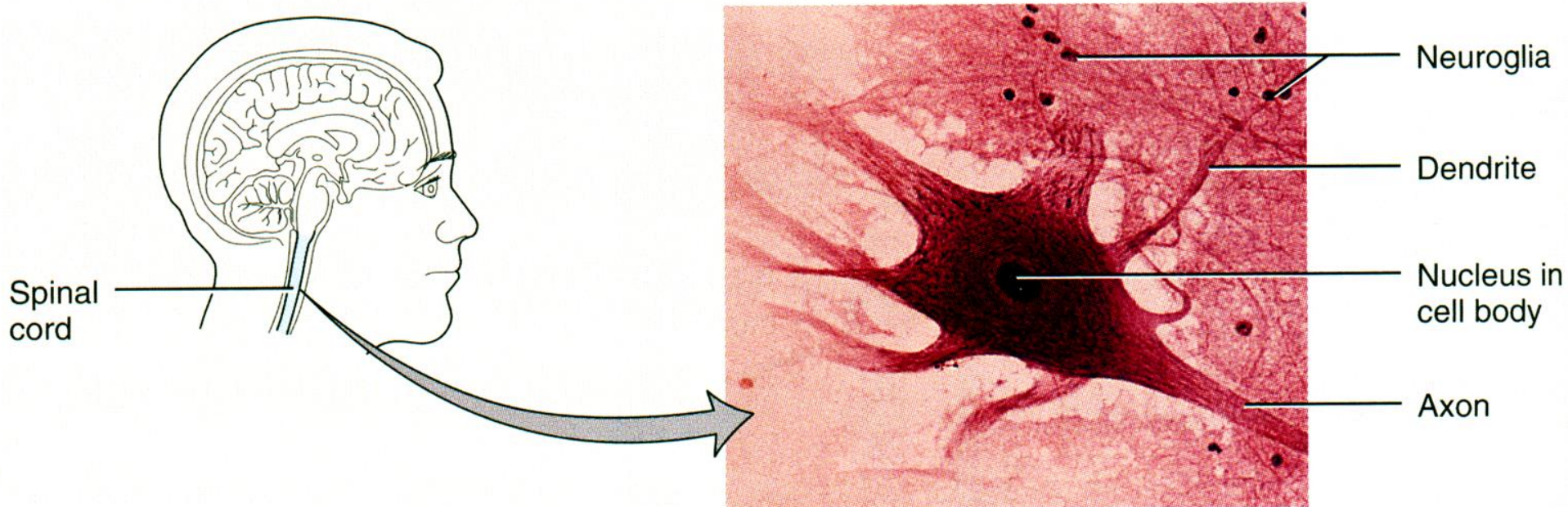


# Nervous tissues

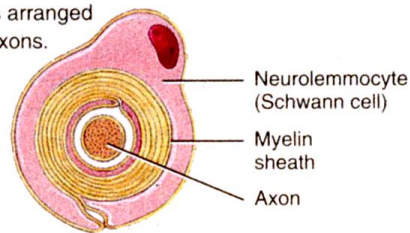
Neuron 神經元 CNS 中樞神經, PNS 週邊神經

Supporting cell

Glia 神經膠細胞 : Schwann cell 許旺氏細胞

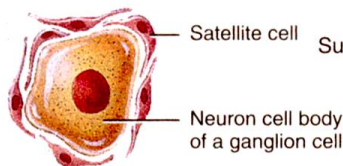


| Type                                   | Appearance                                 | Function                                                                    |
|----------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------|
| <b>Neurolemmocytes (Schwann Cells)</b> | Flattened cells arranged around PNS axons. | Each cell produces part of the myelin around a single axon of a PNS neuron. |

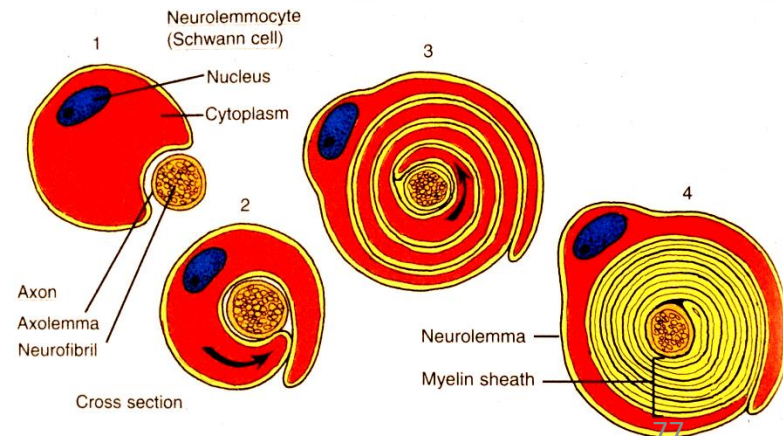


## Satellite cells

Flattened cells arranged around the cell bodies of neurons in ganglia (collections of neuronal cell bodies in the PNS).



Support neurons in PNS ganglia.



(a) Stages in the formation of a myelin sheath



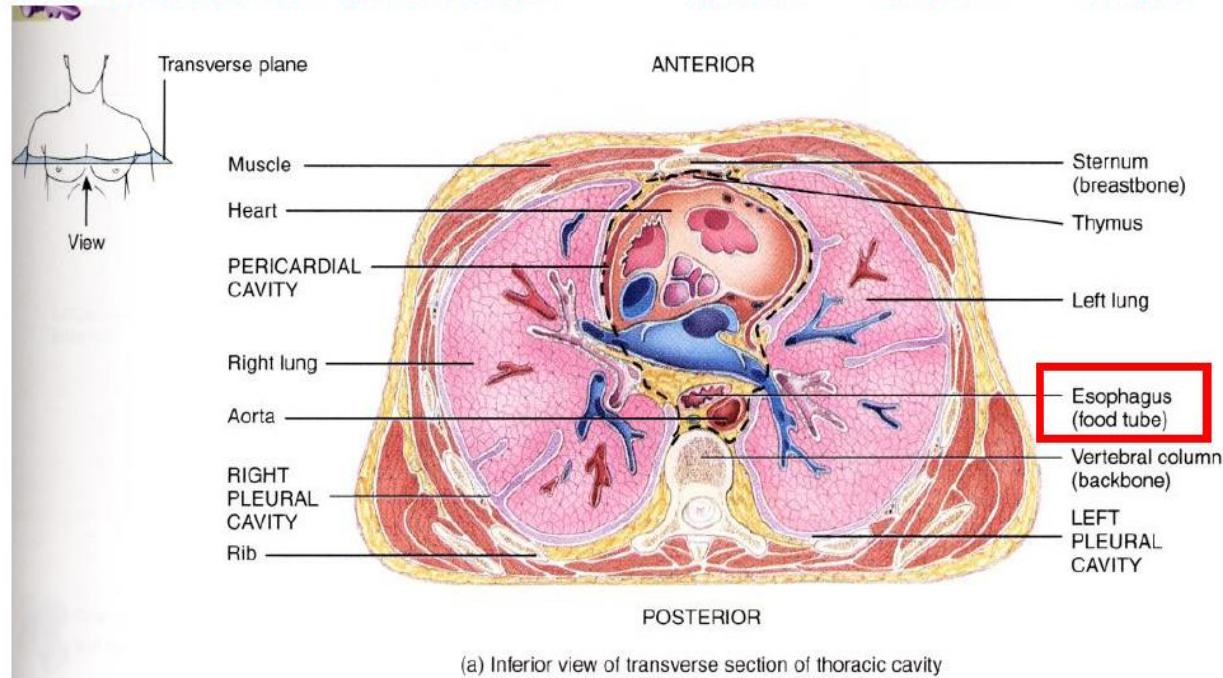
# 以“國考”重點“曉以大義”!

面對專業訓練所需要之基礎課程，同學學習態度以“學到賺到”!

102年第一次專門職業及技術人員高等考試牙醫師考試分試考試、藥師、醫事放射師、助產師、物理治療師、職能治療師、呼吸治療師、獸醫師考試

代號：1306 類科名稱：呼吸治療師 科目名稱：心肺基礎醫學（包括解剖學、生理學、藥理學）

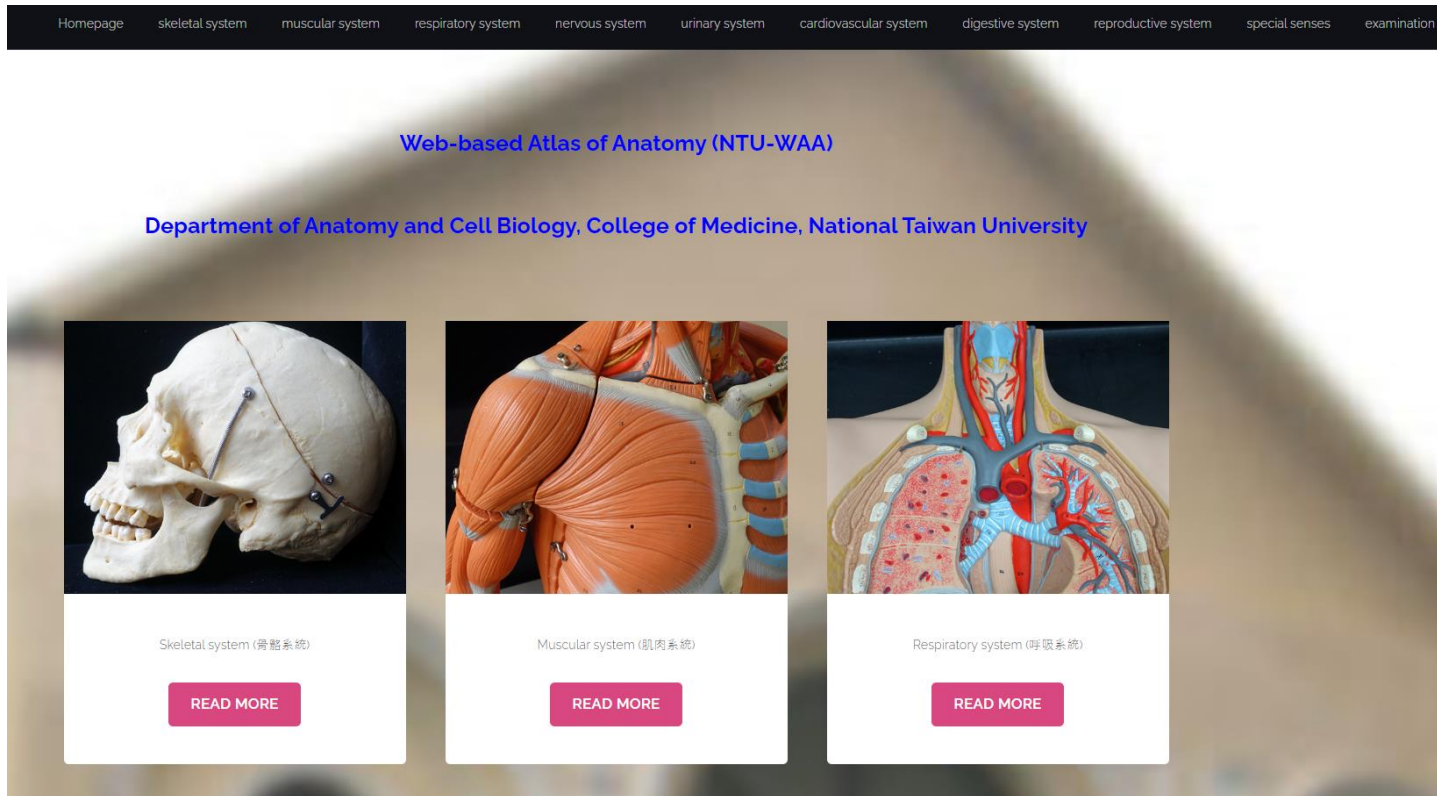
12. 緊貼在心臟後方的結構是： A.胸腺 B.胸管 C.氣管 D.食道





# Web-based Atlas of Anatomy (NTU-WAA)

- <http://140.112.120.113/~mfc/NTUWAA/>



必需使用 NTU VPN (NTU SSL VPN)



# Web-based Atlas of Anatomy (NTU-WAA)

- <http://140.112.120.113/~mfc/NTUWAA/>

## 實體圖譜 (非考試題目)

### cranium, face and foramina

[Skull anterior view](#)

[Separated skull anterior view](#)

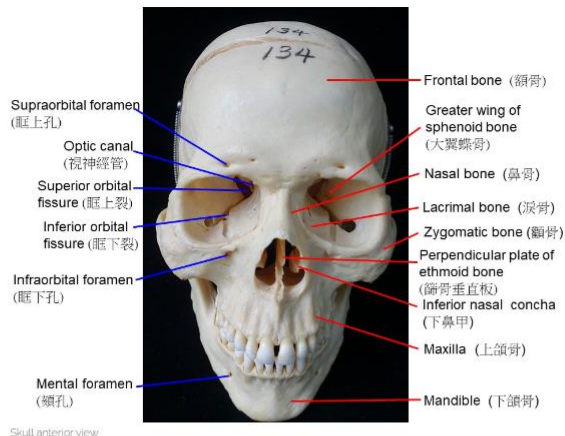
[Skull lateral view](#)

[Separated skull lateral view](#)

[Separated skull posterior view](#)

[Cranial base superior view](#)

[Cranial base inferior view](#)



### vertebral column

[Cervical vertebrae atlas \(C1\)](#)

[Cervical vertebrae axis \(C2\)](#)

[Typical cervical vertebrae](#)

[Typical thoracic vertebrae](#)

[Typical lumbar vertebrae](#)

[Sacrum](#)

### thorax

[Sternum](#)

[Rib 1](#)

[Typical rib](#)

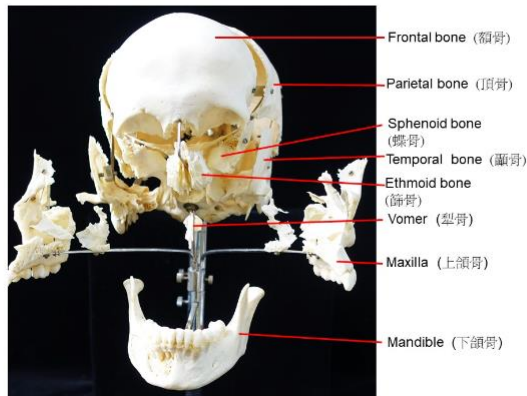
### upper extremities

[Clavicle](#)

[Scapula](#)

[Humerus](#)

[Ulna](#)



## 考試練習系統 (非考試題目)

### examination

此考試系統以台大醫學院健康照護相關科系之人體解剖學課程之中考與期末考之考試範圍進行設計

選取想參加的考試

midterm 及 final examination 題數為固定(lecture:40 題 lab:20 題)

- ☒ lecture midterm
- ☐ lab midterm
- ☐ lecture final examination
- ☐ lab final examination
- ☐ customizing lecture examination
- ☐ customizing lab examination

題數

10

確認考試範圍

可在排名表留下代號，  
方便自行確認熟悉度

必需使用 NTU VPN (NTU  
SSL VPN)

