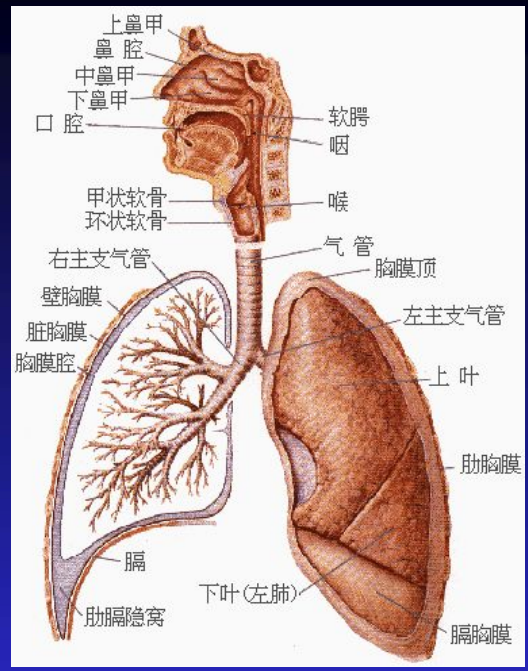
RESPIRATORY SYSTEM

Dept. of Histology and Embryology

周莉 教授

Respiratory System

- Nose
- Pharynx
- Larynx
- Trachea
- Bronchus
- Lung



NASAL CAVITY

1. Mucosa：epithelium and lamina propria

1.1 Vestibular Region:

1.2 Respiratory Region：

pseudostratified ciliated columnar epithelium, mixture glands (nasal glands), abundant blood vessels and lymphoid tissue in lamina propria

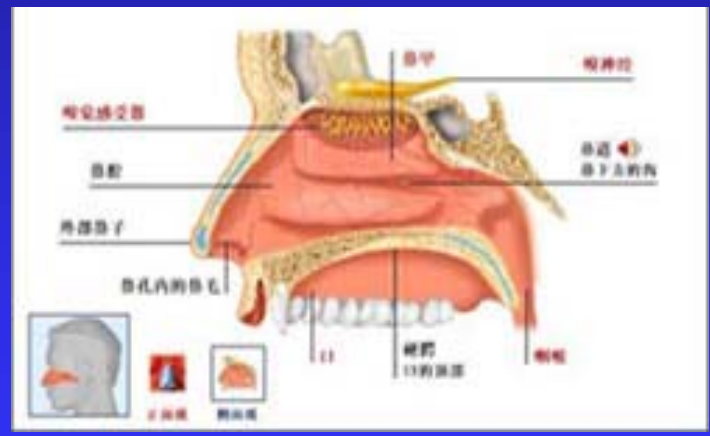
1.3 Olfactory Region

(1) Olfactory epithelium: pseudostratified ciliated columnar epithelium

A. supporting cells

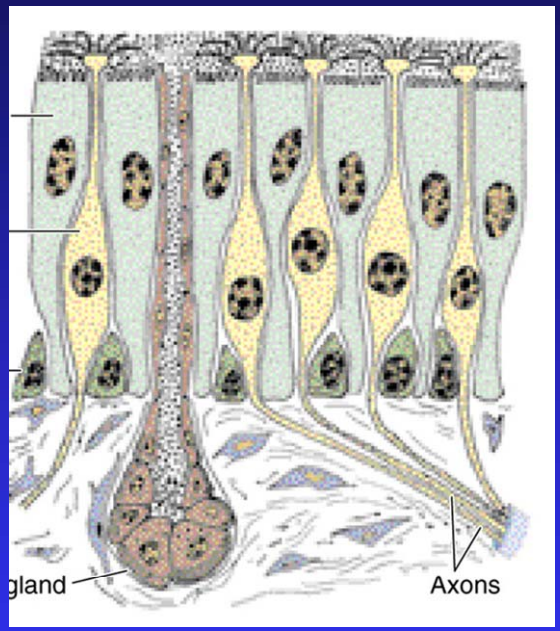
B. olfactory cells

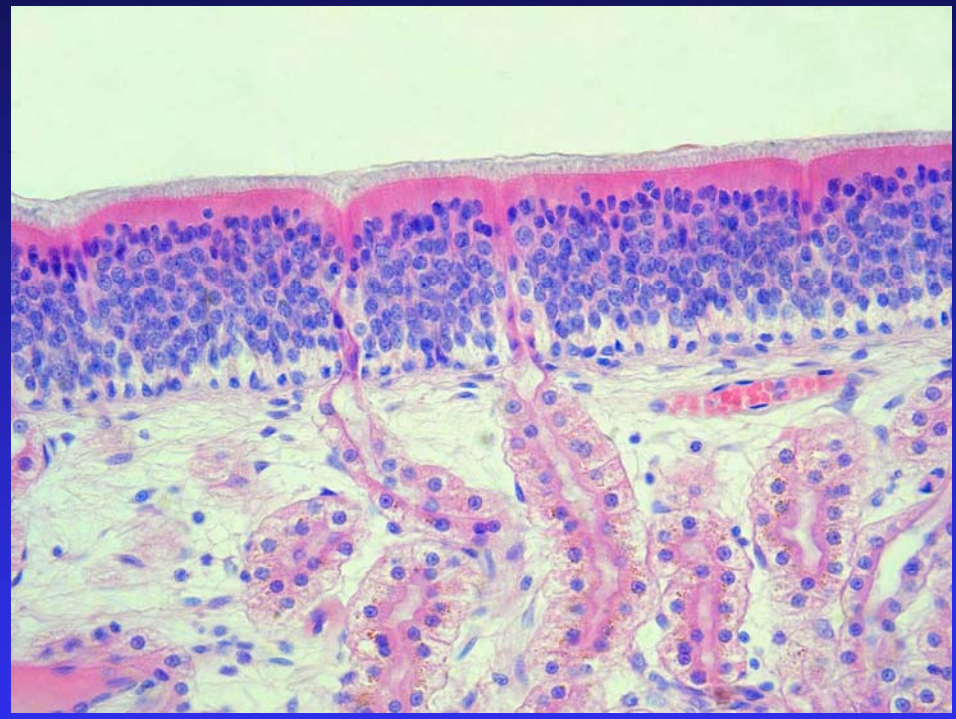
C. basal cells



(2) Lamina Propria:

olfactory glands (serous type)





Olfactory epithelium

TRACHEA AND BRONCHUS

Mucosa:

Pseudostratified ciliated columnar epiothelium

Lamina propia

Submucosa：LCT

Advantitia: cartilage tissue and CT

1. Mucosa

1.1 Pseudostratified ciliated columnar epithelium

(1) ciliated cells

(2) goblet cells

(3) basal cells

(4) brush cells

(5) diffuse neuroendocrine cells (small granule cells)

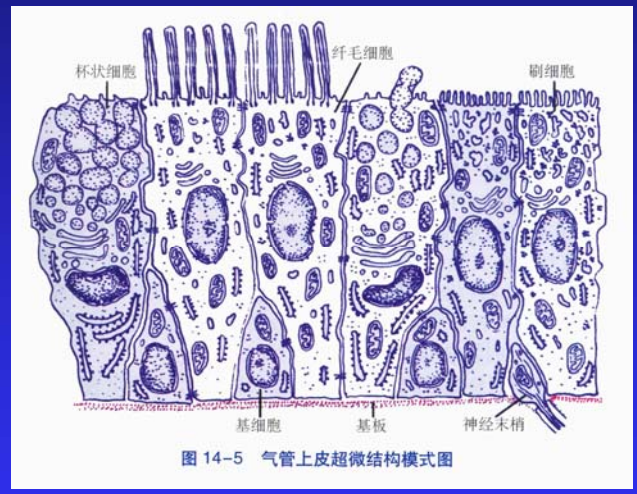
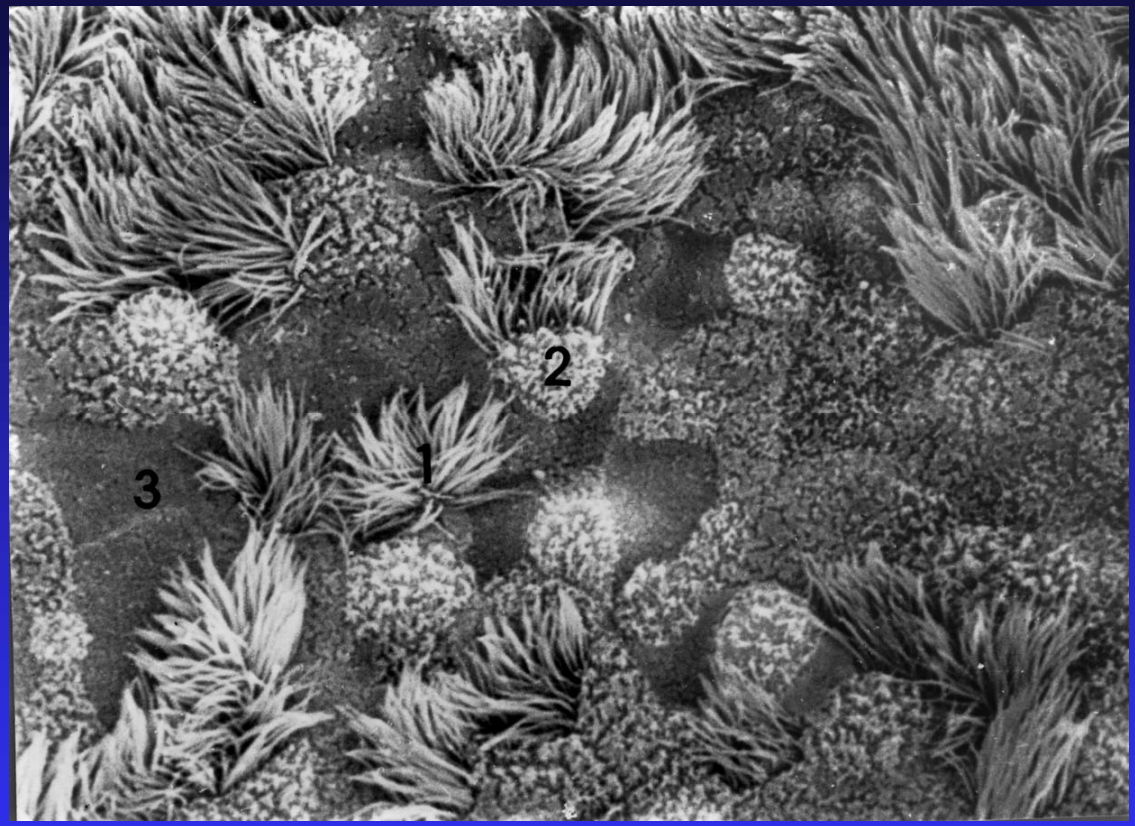
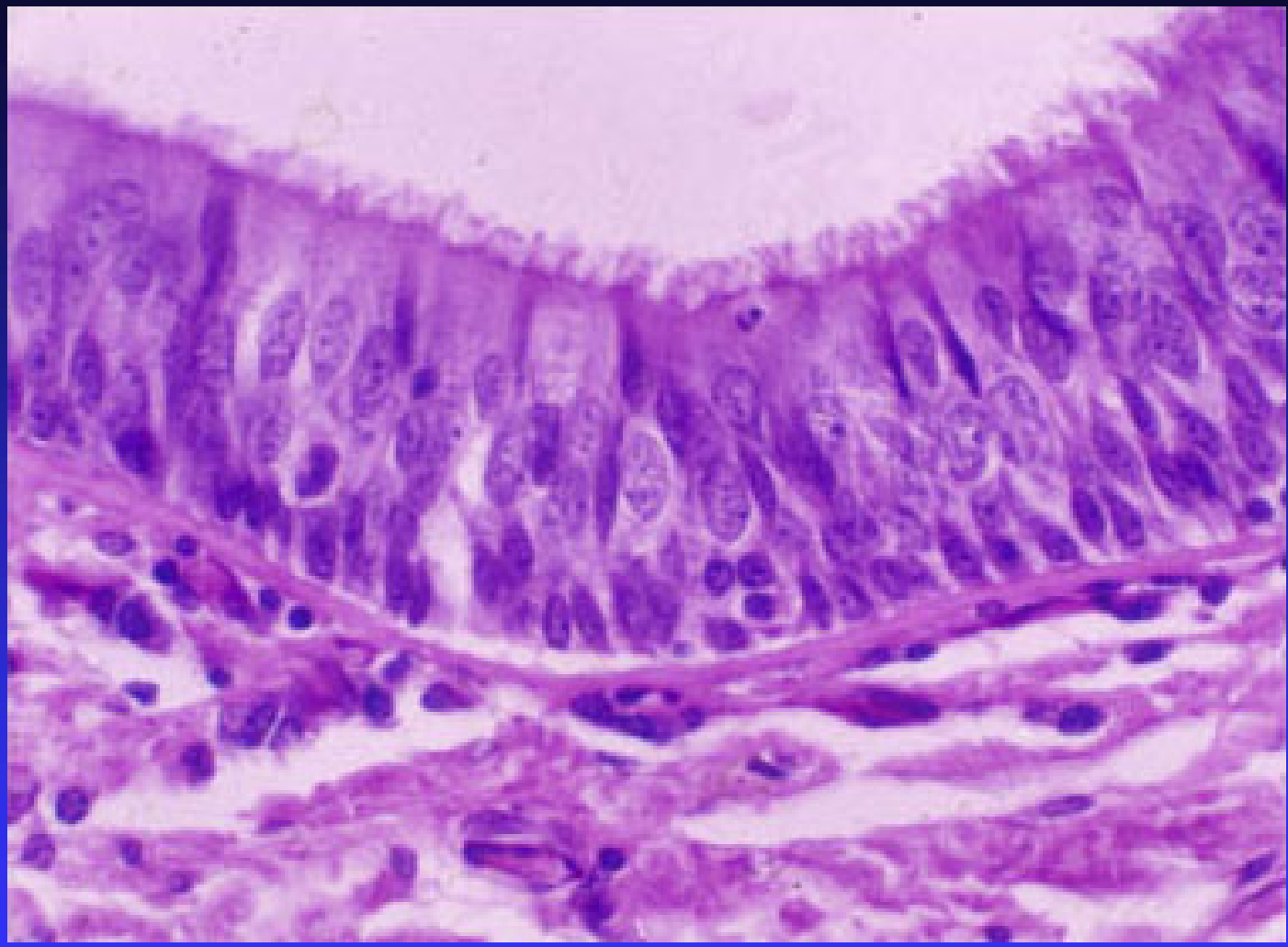


图 14-5 气管上皮超微结构模式图



Tracheal Sueface (SEM)



Pseudostratified ciliated columnar epithelium(LM)

1.2 Lamina Propria

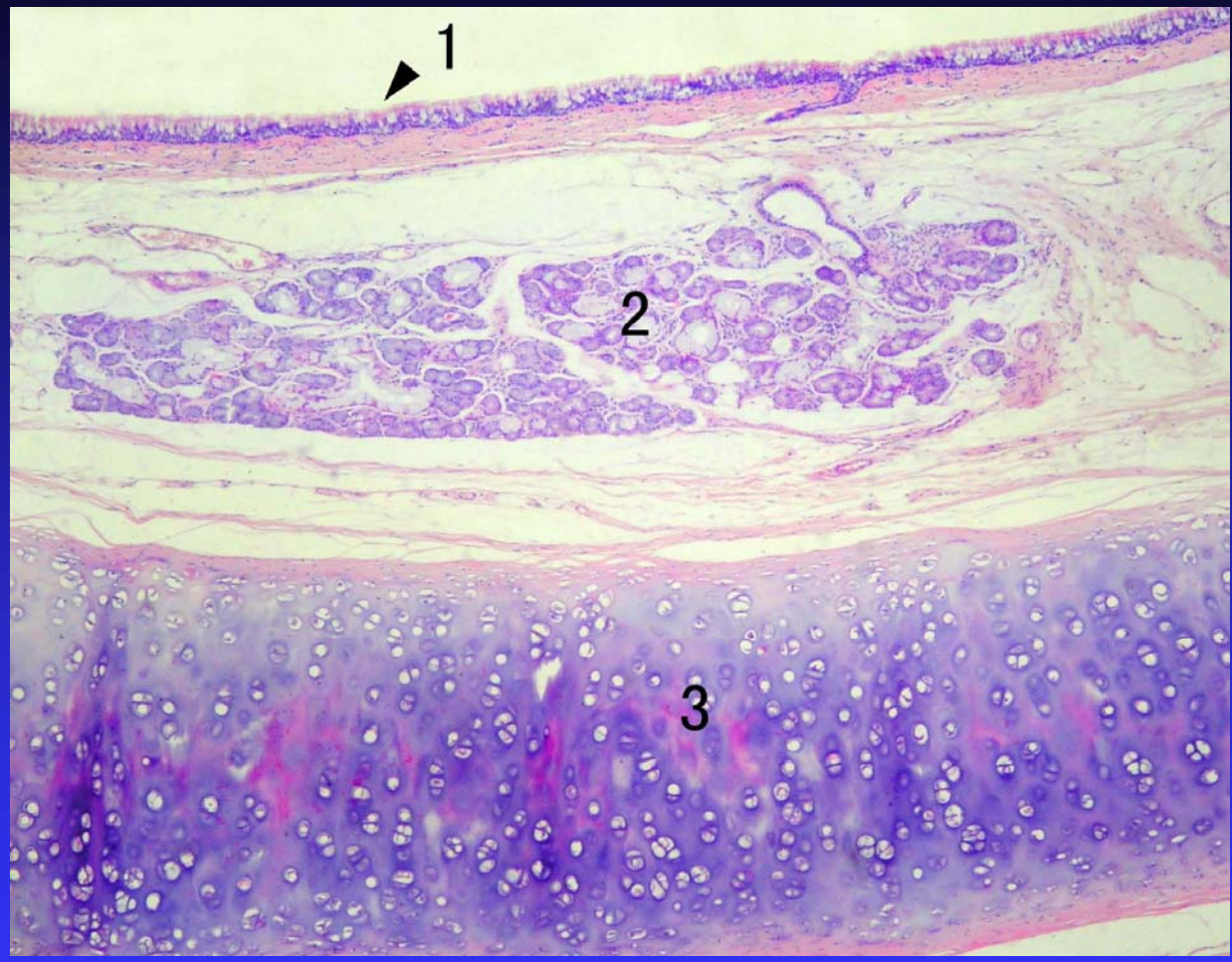
Thick basement membrane, CT，immune cells

2. Submucosa：LCT

Tracheal glands (mixture type)，mucous barrier

lymphoid tissue

the effects of sIgA

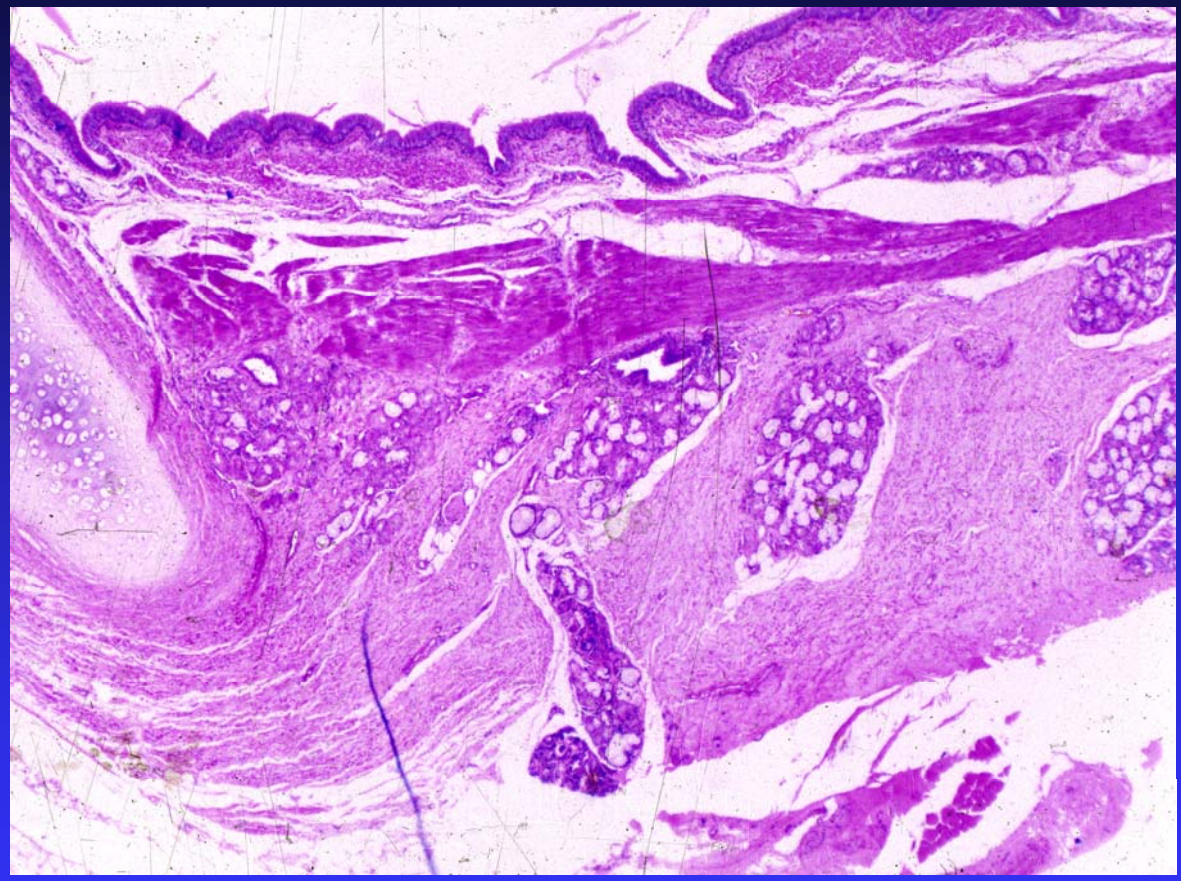


Tracheal wall

3. Advantitia

C- shaped rings of hyaline cartilage and LCT

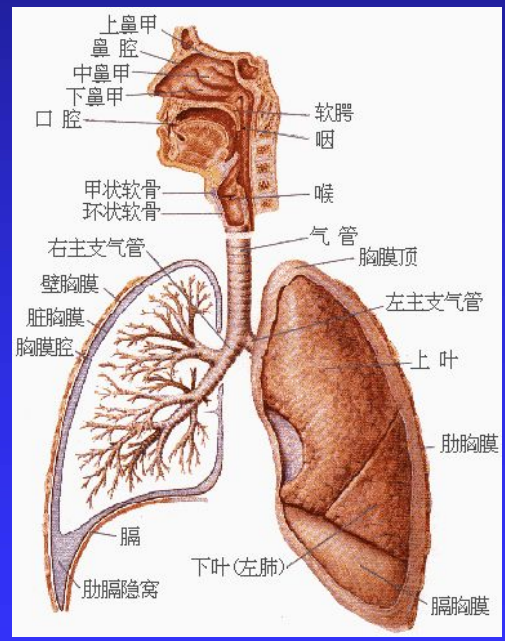
membrane portion：ligament rich in elastic fibers, smooth muscle and tracheal glands



membrane portion

LUNG

- Lung
  - serosa
  - parenchyma
  - interstitium
  - bronchial tree
    - lobar bronchi
      - segment bronchi
        - small bronchi
          - bronchioles
            - terminal bronchioles
  - Pulmanary alveolus



1. Pulmonary Conducting Portion

1.1 Lobar bronchi to small bronchi

①The epithelium changes from higher to lower; decrease of goblet cells

② Less numerous bunches of smooth muscle cells in the outer of lamina propria

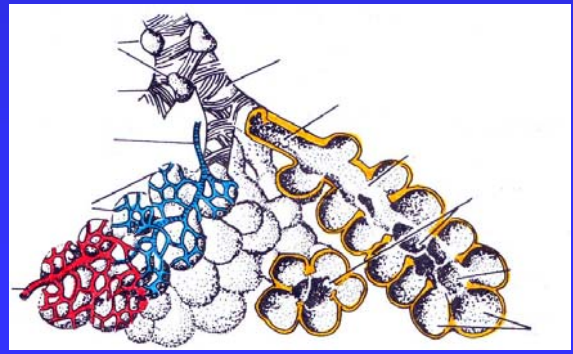
③ Gradual decrease of tracheal glands

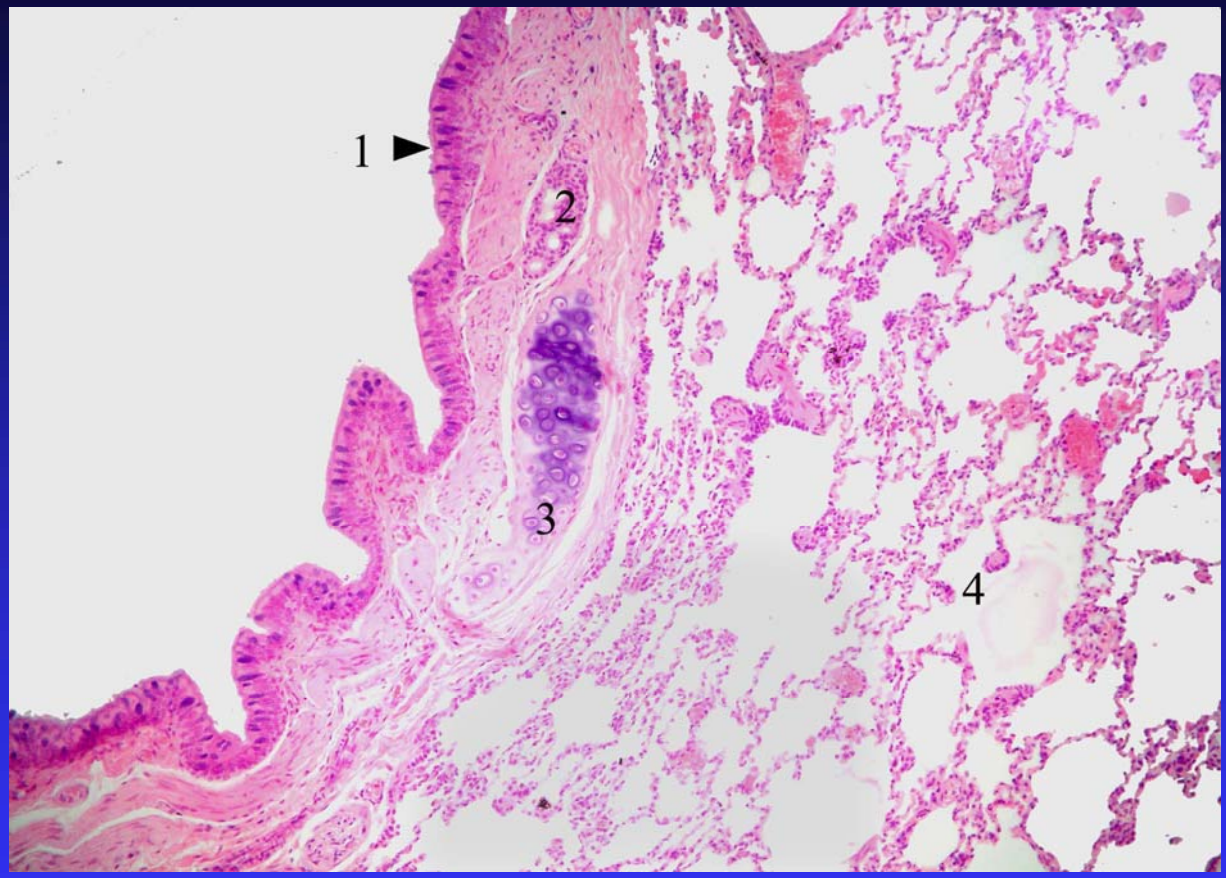
④The cartilage changes for pieces of cartilage

1.2 Bronchioles

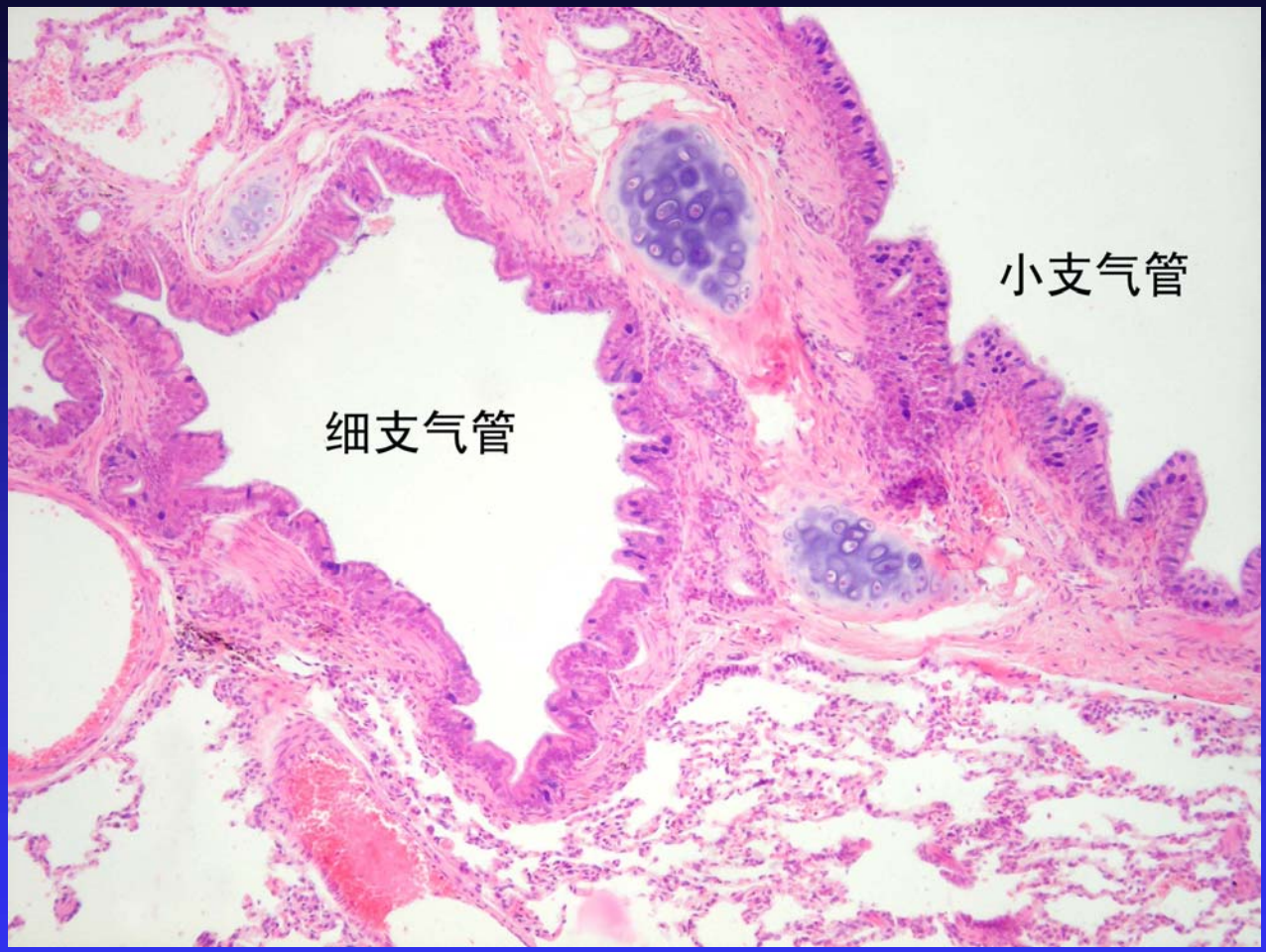
pulmonary lobules:

simple columnar ciliated epithelium





Small bronchi



Bronchiole

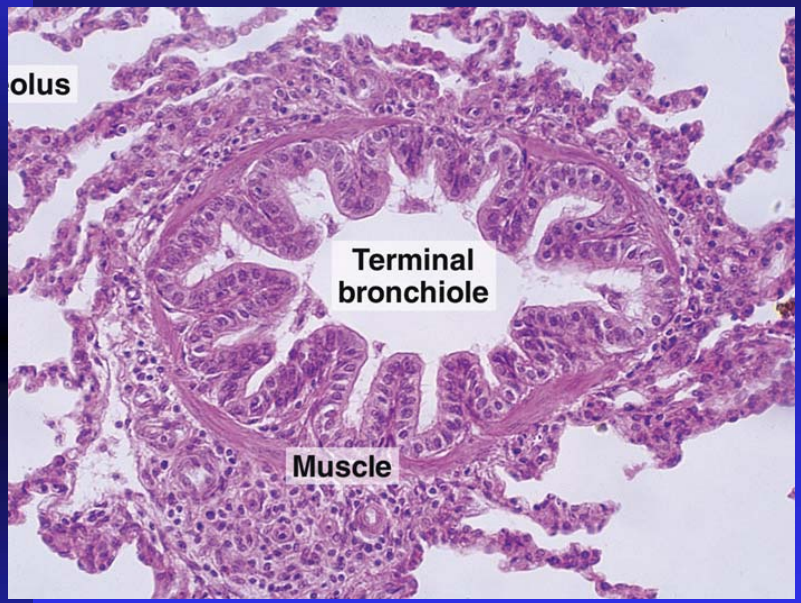
1.3 Terminal bronchiole

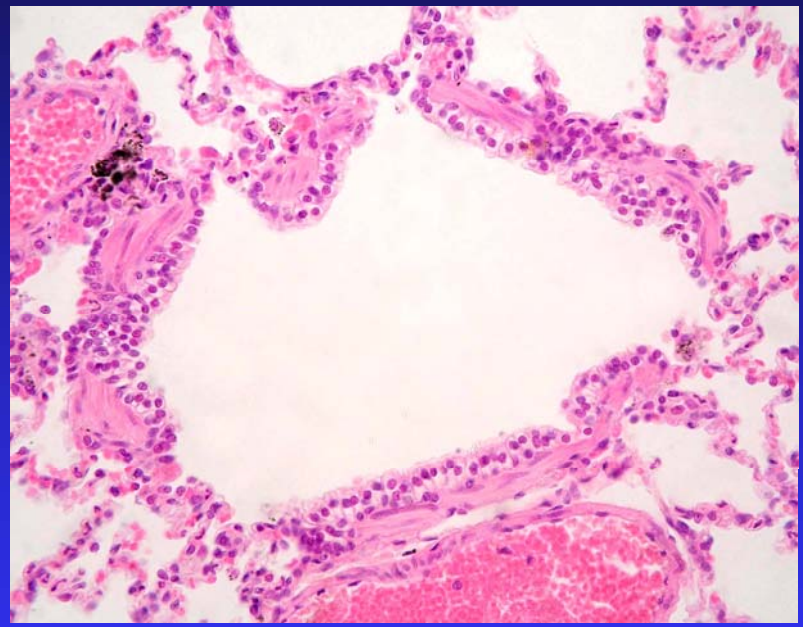
decrease of ciliated epithelium，no goblet cell, increase of secretory cells (Clara cells)

Clara cells: LM

EM: tapered cells, SER, secretory granules

Function：producing proteolytic enzyme, oxidase system（biological oxidation and detoxifcation）





Terminal bronchiole

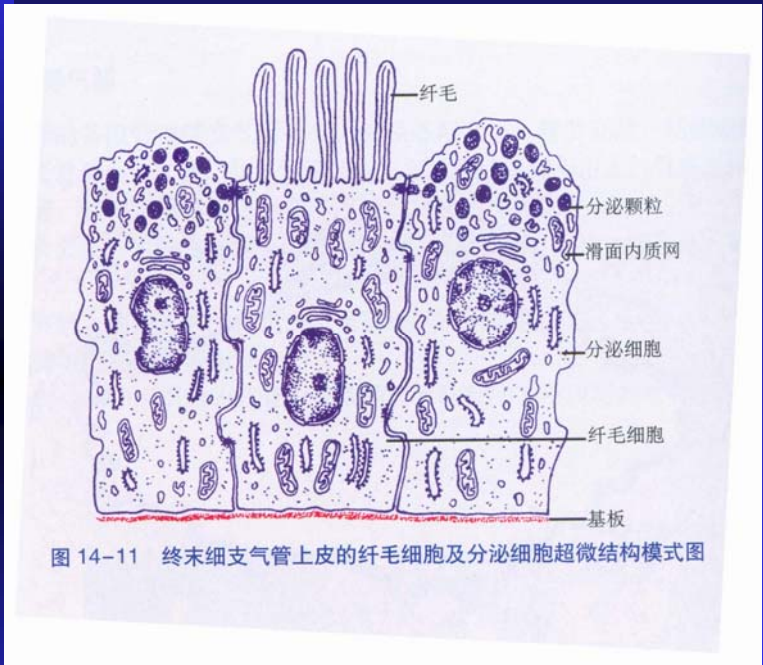
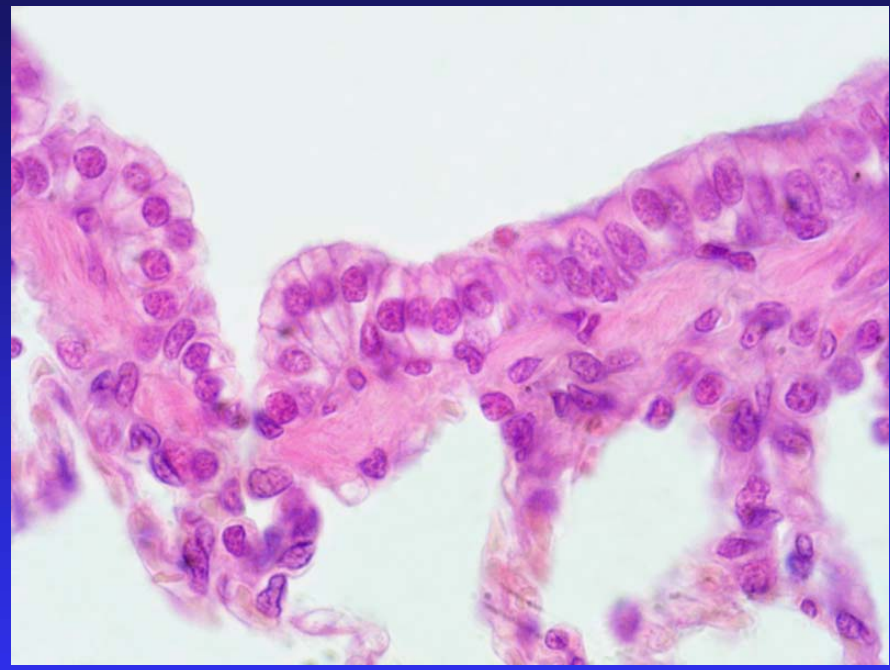


图 14-11　终末细支气管上皮的纤毛细胞及分泌细胞超微结构模式图



Clara cells

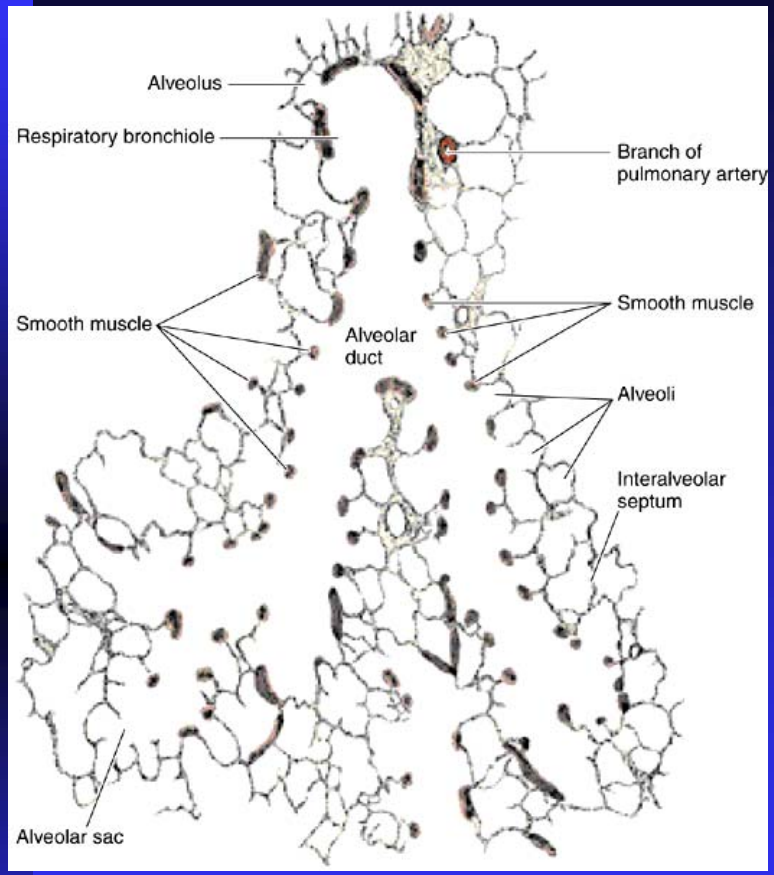
2. **Pulmonary** Respiratory **Portion**

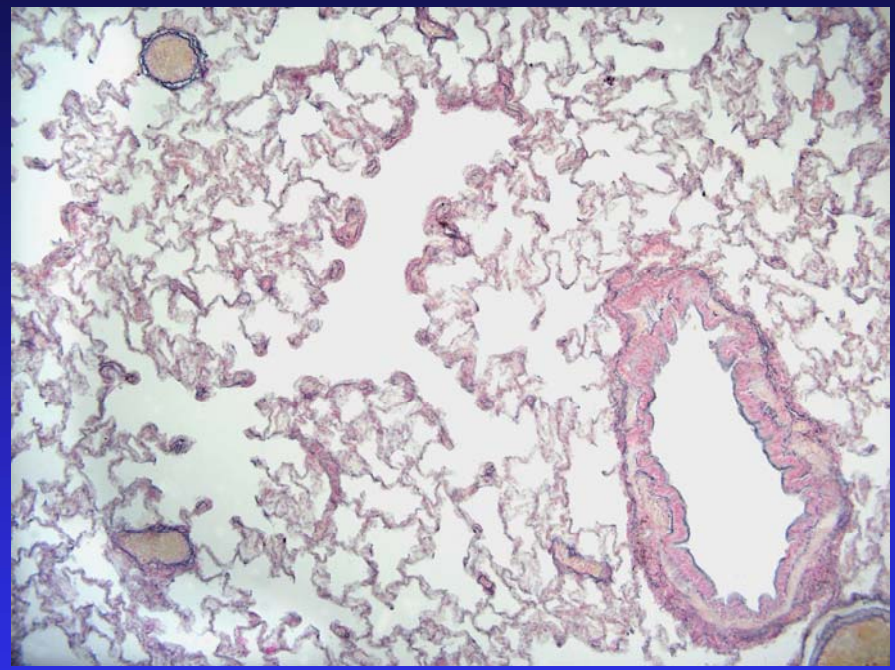
1.1 Respiratory bronchioles:

the lumen with openings of pulmonary alveoli

1.2 Alveolar ducts:

surrounded by the rim the alveoli，having knobs between adjacent alveoli





Pulmonary Respiratory **Portion**

1.3 alveolar sacs:

the site of common openings of pulmonary alveoli

1.4 pulmonary alveoli:

- The wall of pulmonary alveoli consists of simple alveolar epithelium and basement membrane
- The connective tissue between adjacent the alveoli is termed the alveolar septum

（1）the alveolar epithelium：

Type Ⅰ alveolar cells:

LM: squamous epithelium，

EM: tight junctions，pinocytotic vesicles （turnover of surfactant）

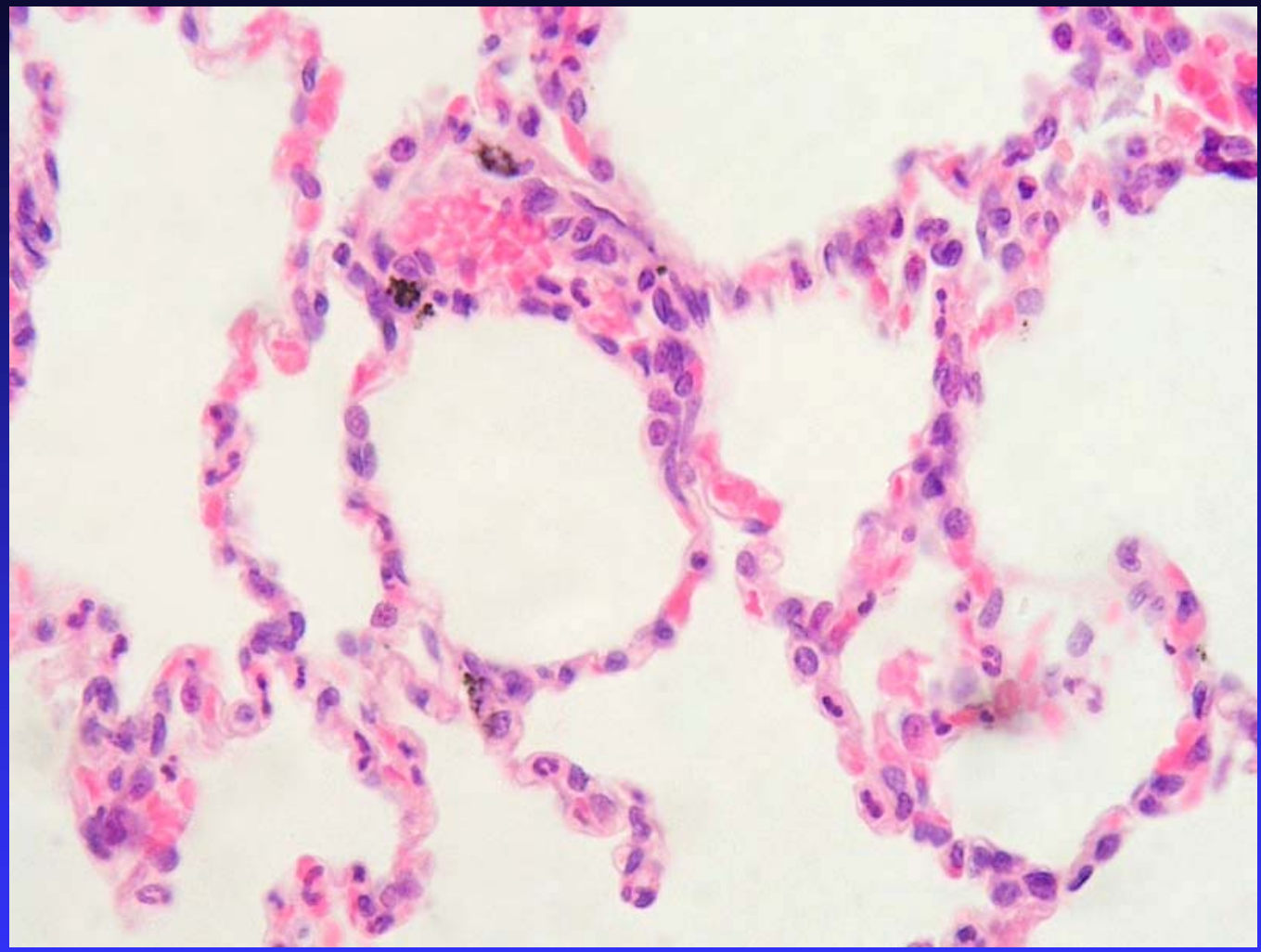
function: to participate in blood-air barrier

type Ⅱ alveolar cells：

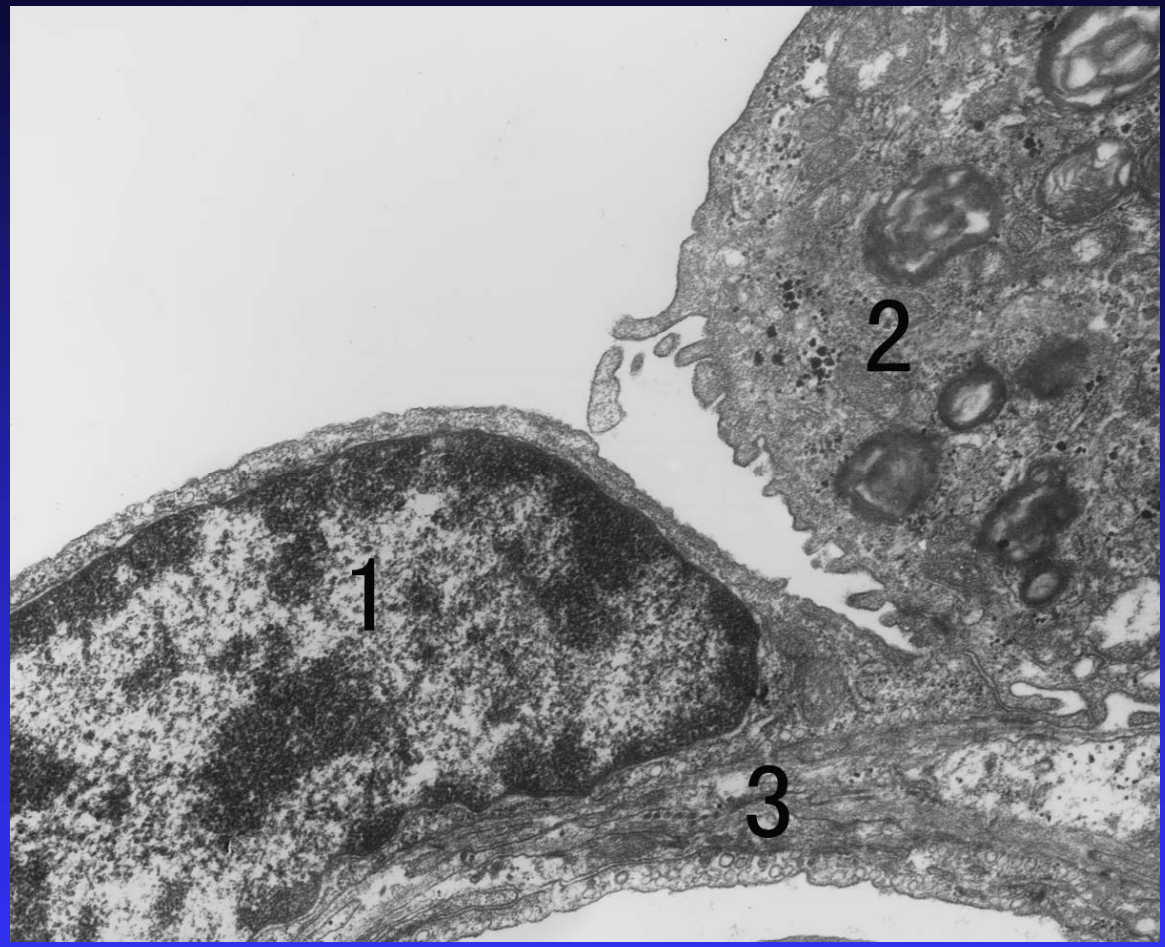
LM: cuboidal-shaped cells

EM：microvilli，RER，Golgi complex

osmiophilic multilamellar bodies (phospholipid, glycosaminoglycans and protein) function: secreting surfactant



Pulmonary alveolus in LM

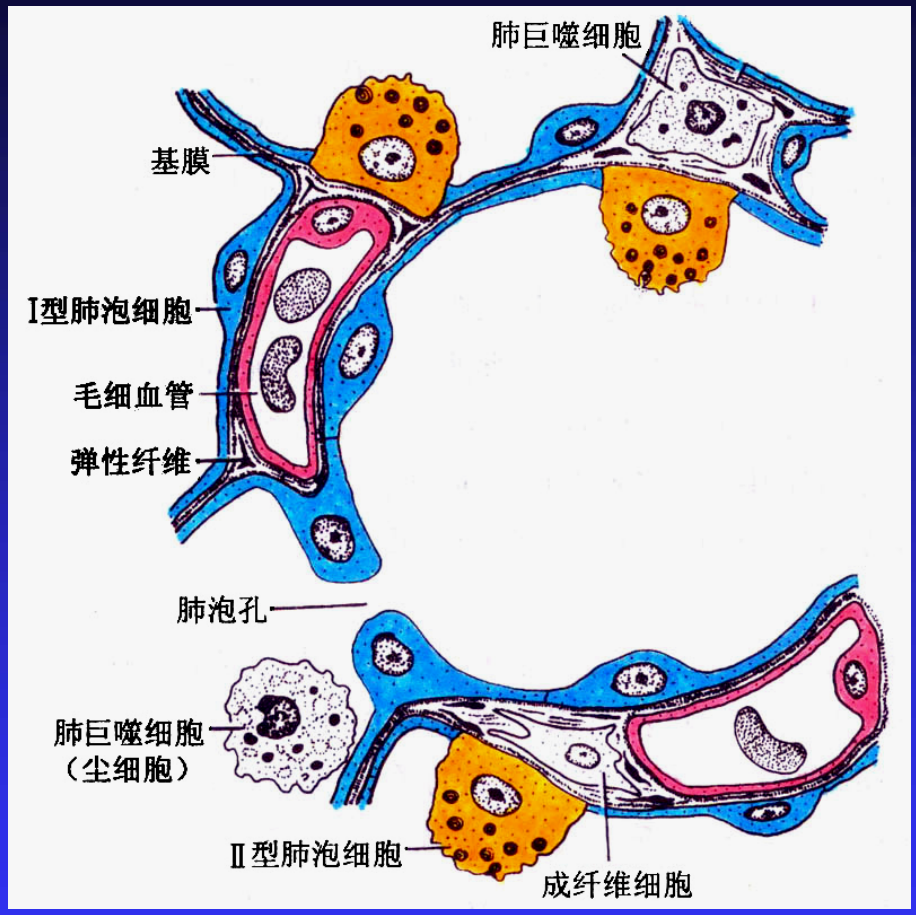


Pulmonary alveolus in TEM

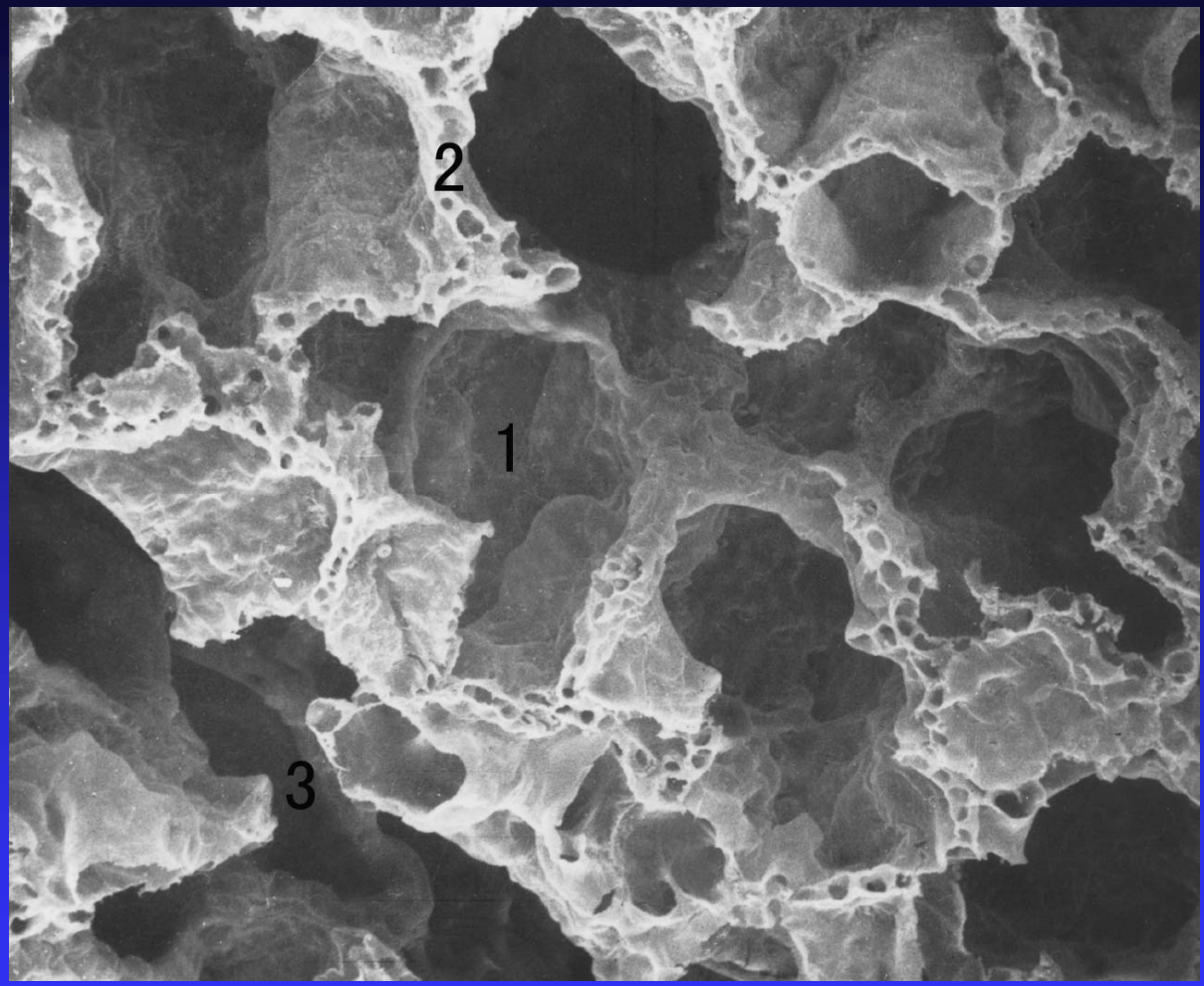
（2）alveolar septum

thin connective tissue，continuous capillaries meshwork，rich in elastic fibers, macrophages，plasma cells and mast cells

（3）alveolar pore



Pulmonary alveolus (Model)



Alveolar pore (SEM)

(4) Blood-air barrier:

surface fluid layer;

cytoplasm of type Ⅰ cells;

the basal laminas of the closely apposed epithelial and endothelial cells;

the cytoplasm of endothelial cells

3. Pulmonary Interstitium and Macrophages (dust cells)

The highlight of this chapter

1. **The** change rule of pulmonary conducting portion
2. The Structur and function of pulmonary alveolus