

# *digestive system*

刘佳梅

# *Introduction of digestive system*

\* a long tube extending from the mouth to the anus, and associated with glands.

\* its main function:

*-digestion: physical/chemical*  
*-absorption*

\* three major sections

*-the oral cavity including oropharynx*

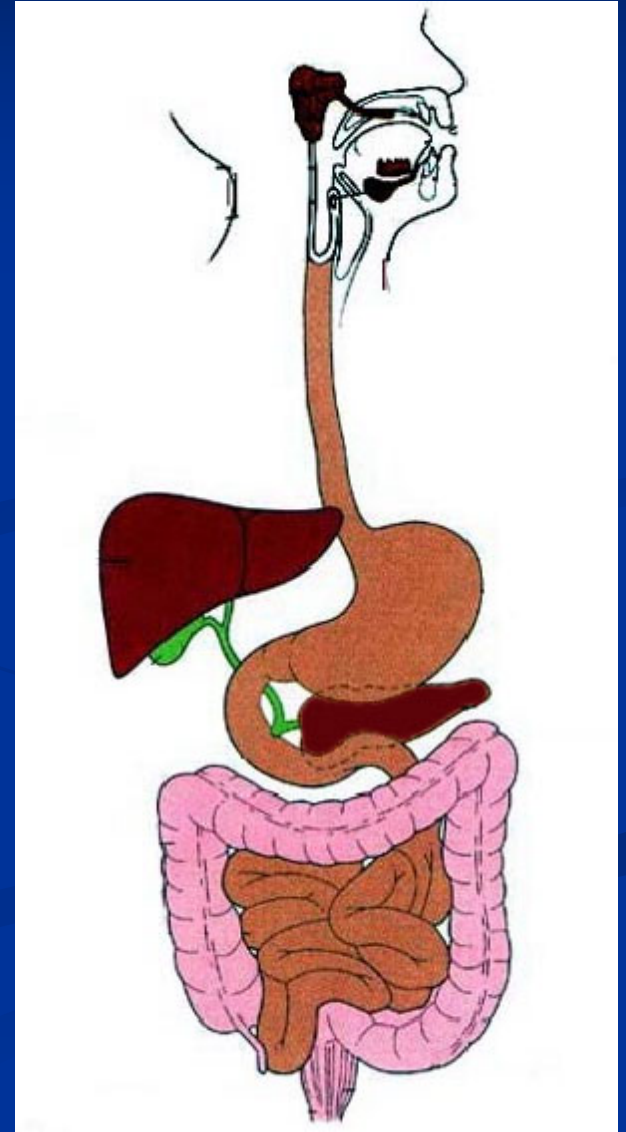
*-the tubular digestive tract*

*-the major digestive glands:*

*salivary glands,*

*pancreas,*

*liver,*



# general structure of tubular digestive tract

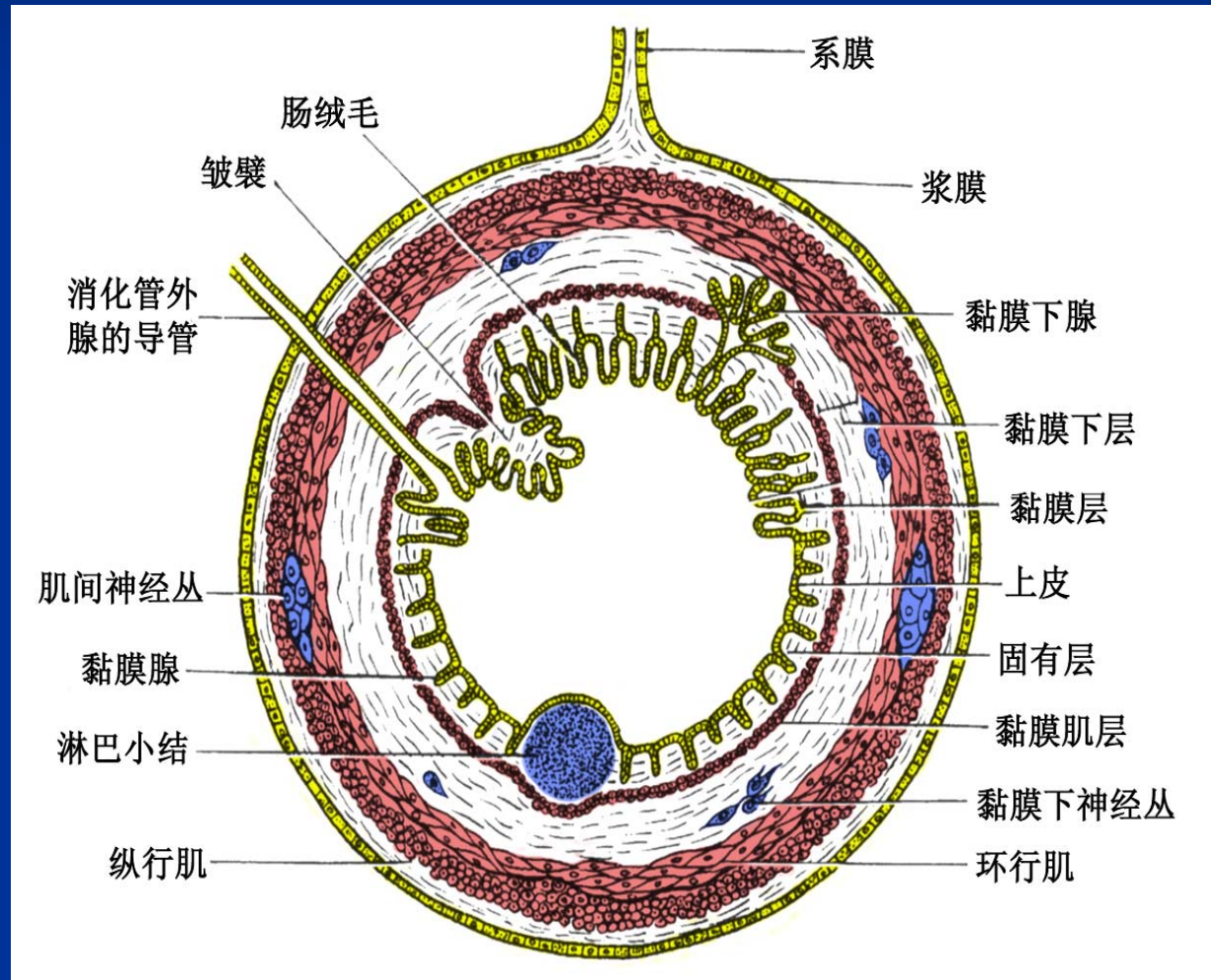
basically four layers

1. *Mucosa*

2. *Submucosa*

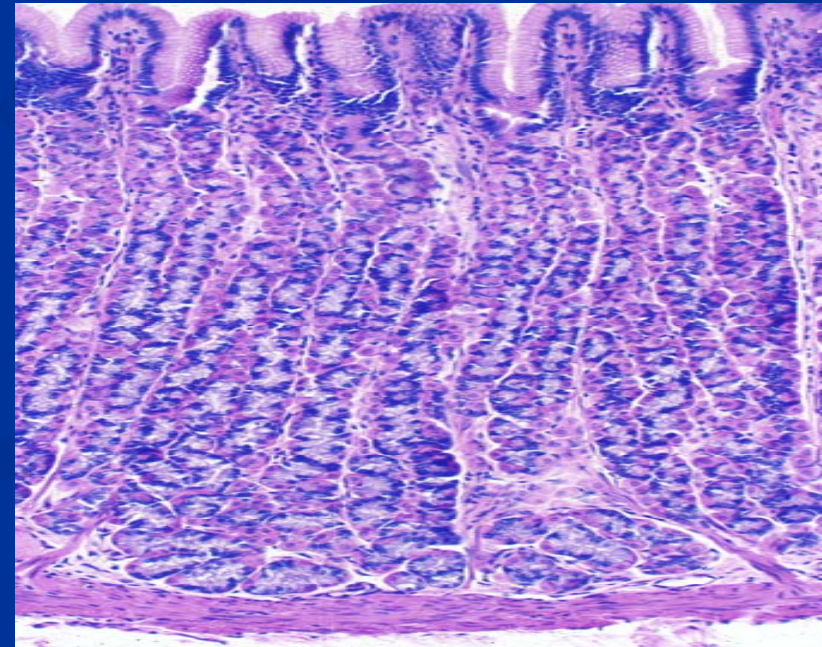
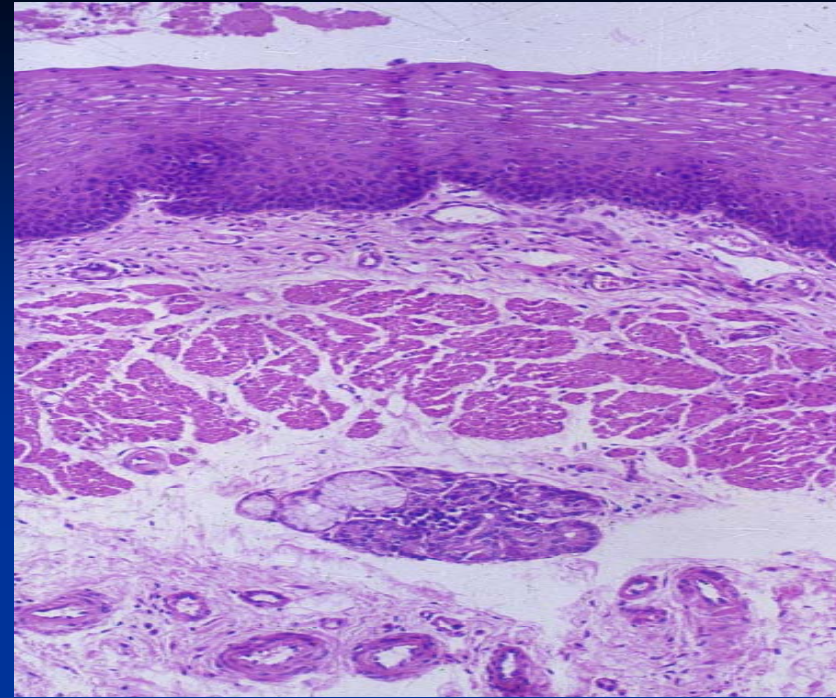
3. *Muscularis*

4. *adventitia*



# Mucosa (tunica mucosa)

1. Epithelium -----two types  
*stratified squamous*  
& *simple columnar epith.*
2. Lamina propria  
a layer of C.T.  
gland  
capillaries
3. Muscularis mucosa



# Submucosa

- \* C.T. with small blood / lymphatic vessels;
- \* glands only in the esophagus and duodenum
- \* submucosal plexus
- \* accumulation of lymphatic tissue quite frequently

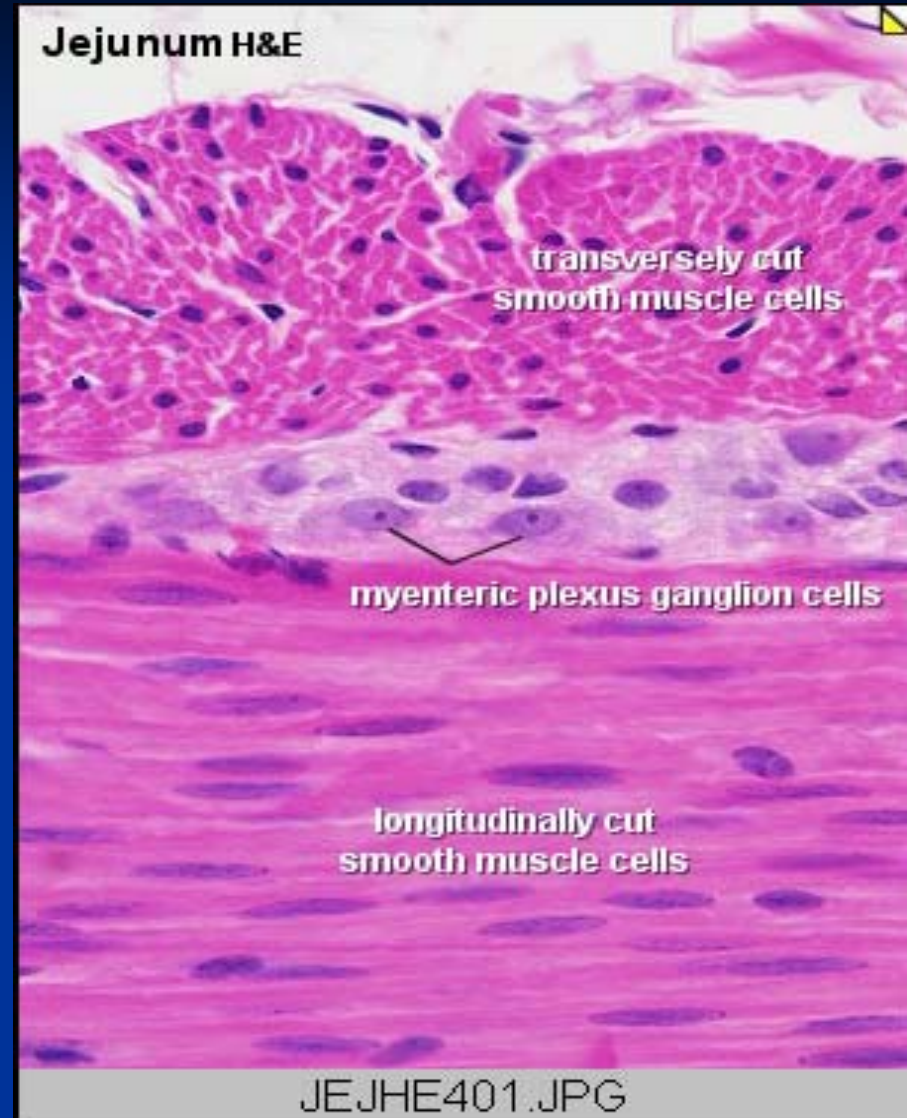
## *plicae*

- \* folds of mucosa and submucosa
- \* longitudinal/circular form.



# Muscularis

- \* two layers of smooth m.  
*inner layer: circular m.*  
*outer layer: longitudinal m.*
- \* upper esophagus & the anus with striated m.
- \* three layers in the stomach
- \* between two layers of m. are a vascular plexus and a nerve plexus



# *Adventitia*

the outmost layer formed  
by CT with two form:

\* *fibrosa:*

CT blending with  
surrounding structure

\* *serosa:*

C.T. + mesothelium



# Esophagus

mucosa:

stratified squamous epithelium

muscularis mucosa: longitudinal bunches of smooth muscle cells

submucosa:

esophageal glands

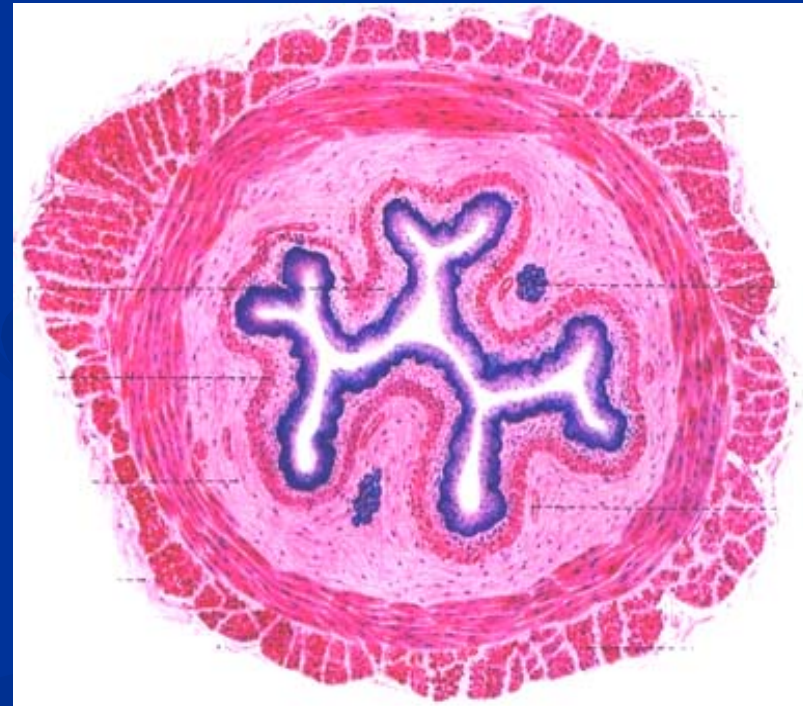
muscularis:

proximal end: skeletal muscle

distal end: smooth muscle

mid portion: mixture muscle

Advantitia: fibrosa







**Esophagogastric junction** (longitudinal section)

# Structural characteristic of stomach

\* **plicae, gastric pits** :

## **mucosa**

\* simple columnar epith.:

Surface mucous cells

\* lamina propria :gastric glands

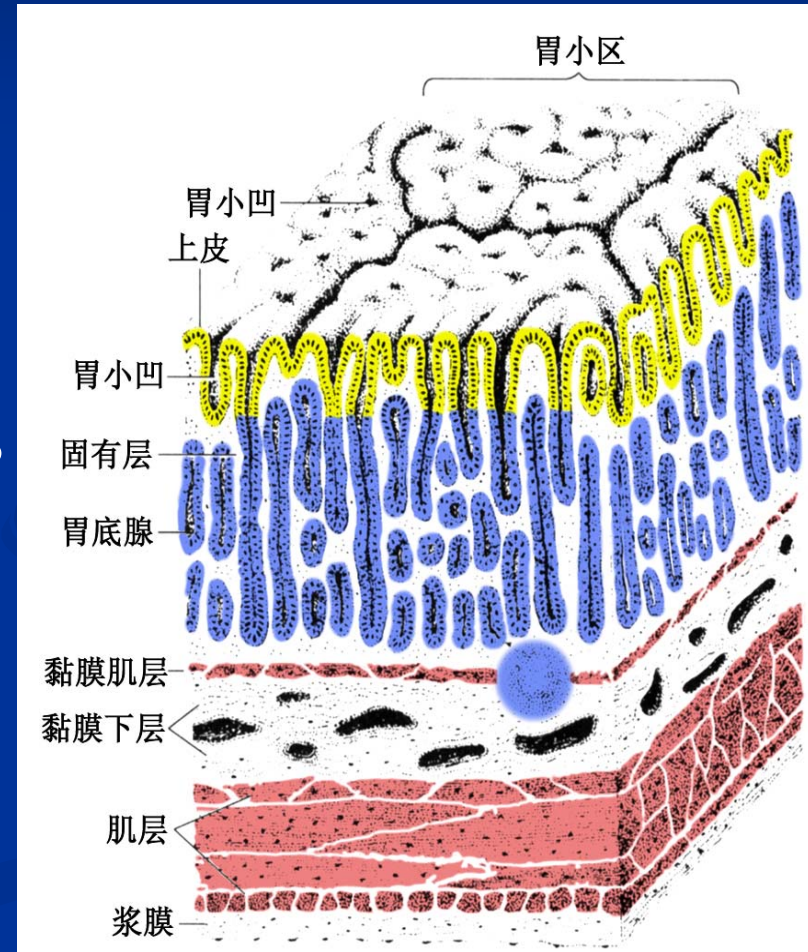
## **muscularis**

inner layer : oblique m.

middle layer : circular m.

outer layer : longitudinal m.

## **serosa**

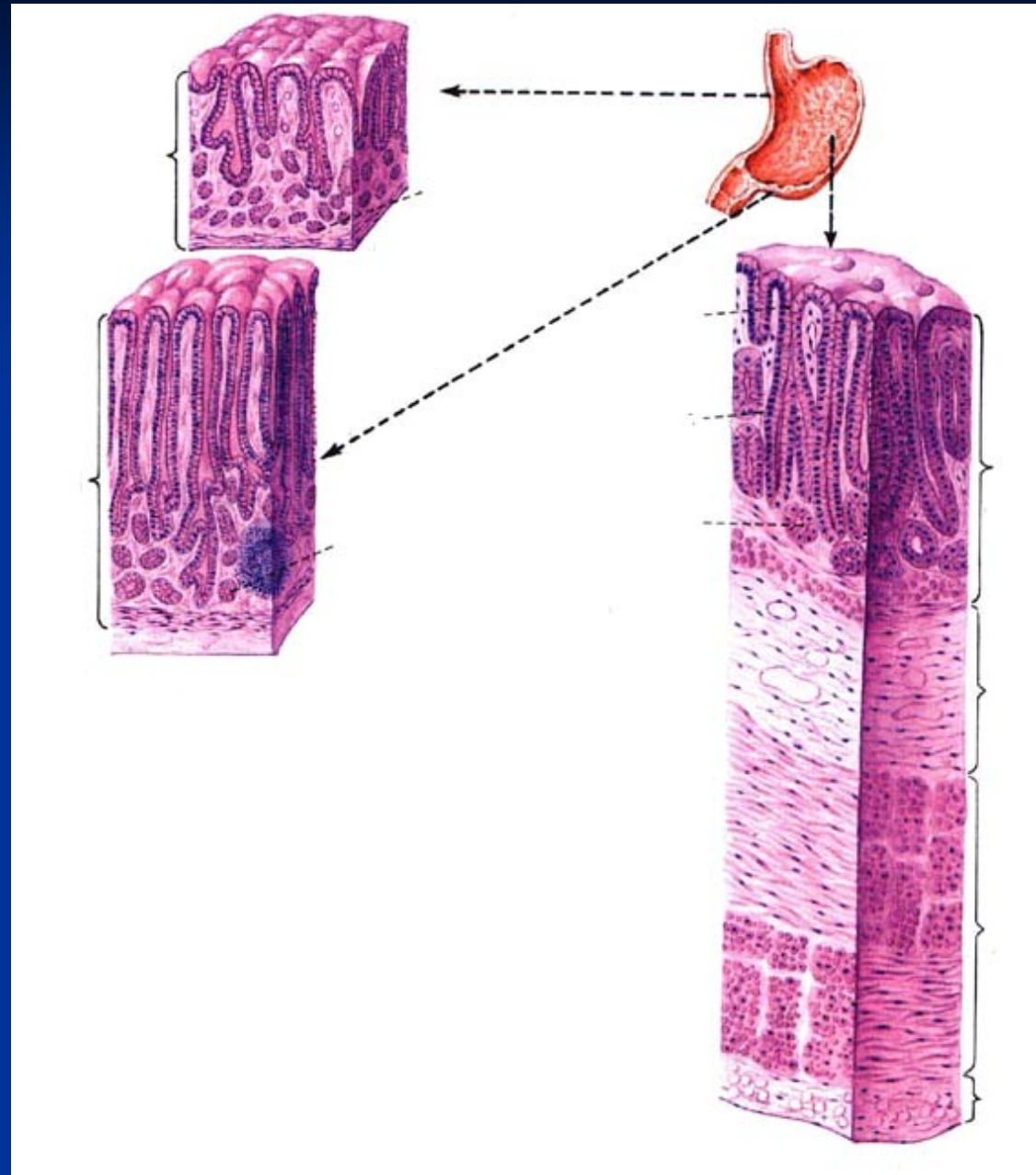


# Three types of gastric glands

cardiac glands

pyloric glands

fundic glands



# Longitudinal section of fundic gland

## *Cell types:*

\*surface mucous c.

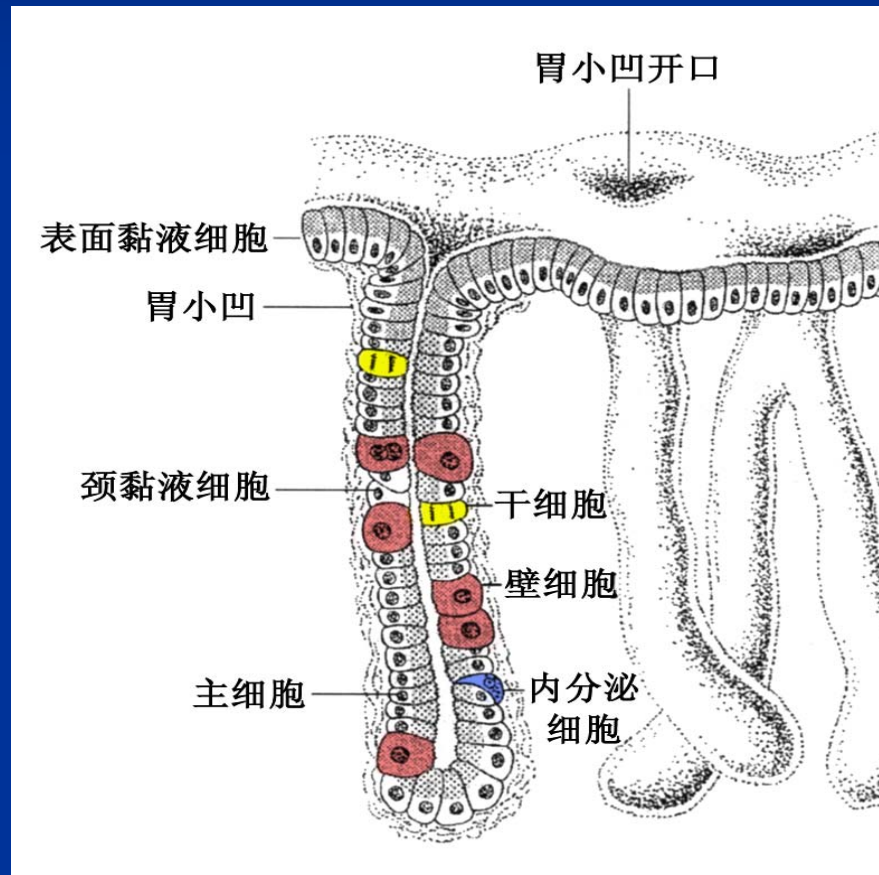
\*parietal c

\*mucous neck c.

\*endocrine cell

\* chief C

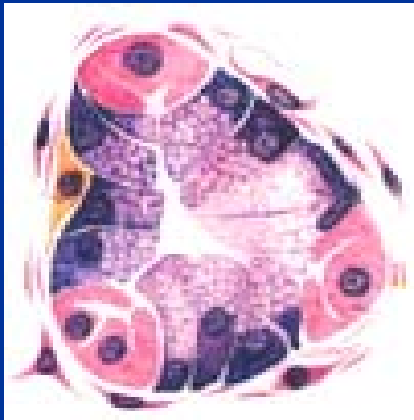
\* stem c



# Chief Cell

- \* located in the base of the gland
- \* with the typical appearance of a protein-secreting cell
- \* basophilic basal cytoplasm
- \* apical acidophilic zymogen granules
- \* secreting pepsinogen → pepsin

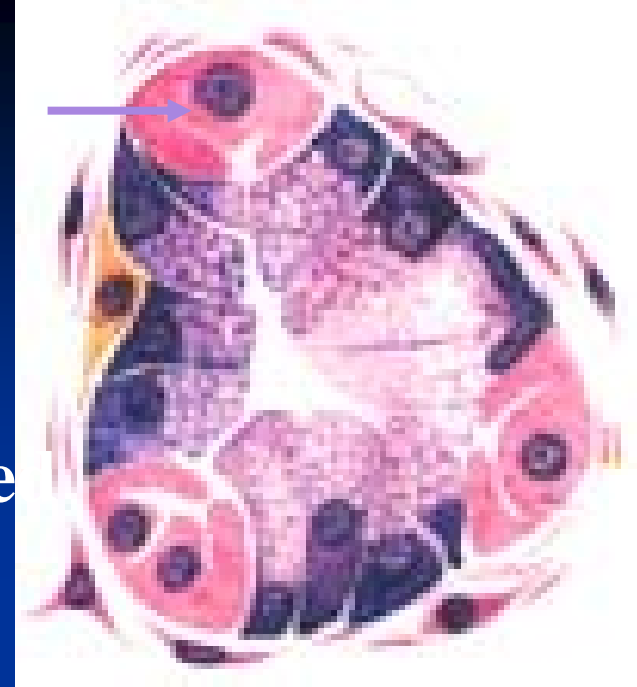
protein-----peptides



# *Parietal Cell*

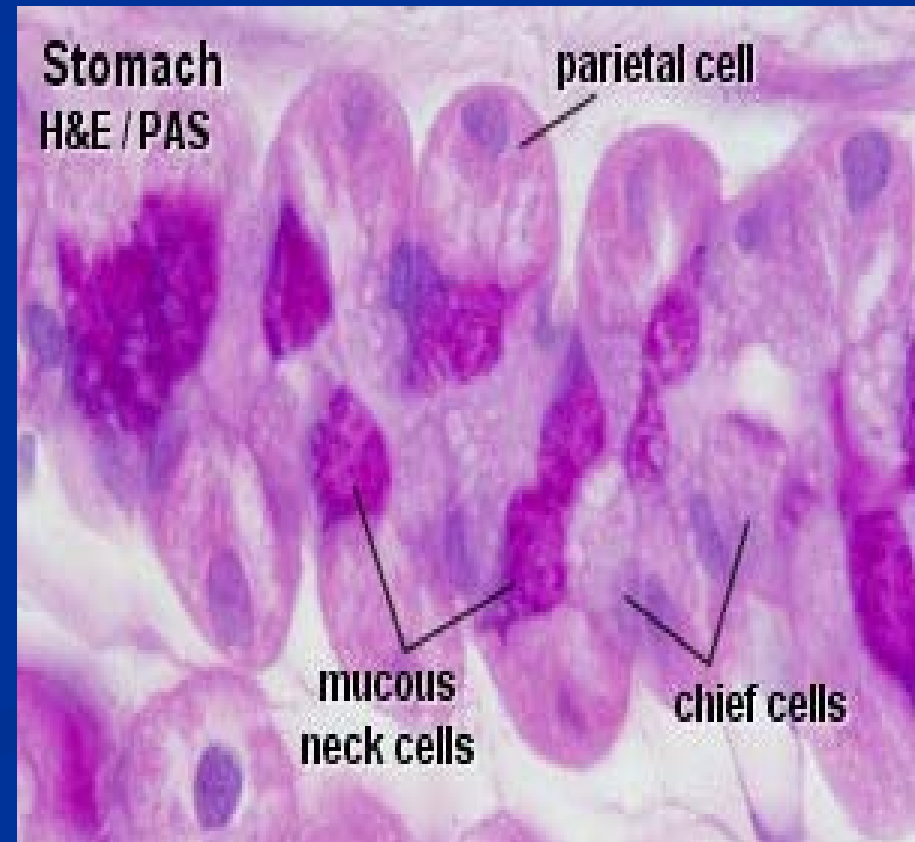
- \* Located mostly in upper half of the gland
- \* large round cell with centrally-located nucleus
- \* acidophilic cytoplasm
- \* Extensive invagination of the apical cell membrane forms *intracellular secretory canaliculus*

***Function :*** secreting hydrochloride acid (HCl)  
producing intrinsic factor



# *Mucous neck cell*

- \* located in the neck of the gland in small groups;
- \* flatten nucleus located in the base of cell;
- \* mucin granules lie in the supranuclear position;
- \* secreting acid mucus.



## Stem cell

- \*a group of undifferentiated cells located in the neck region of the gland;
- \*differentiating into surface mucous cells, chief cells and parietal cells;

## Endocrine cells

- \*ECL cell: histamine stimulated the acid production
- \*D cell: somatostatin inhibited secretion of parietal cells and other endocrine cells

## mucous-HCO<sub>3</sub>- barrier:



# *Small intestine*

**Divided into three parts:**

*duodenum*

*jejunum*

*ileum*

**Function:**

*\*digestion*

*\*absorption*

**\*secreted certain hormones**

plicae intestinal villus

## **Mucosa**

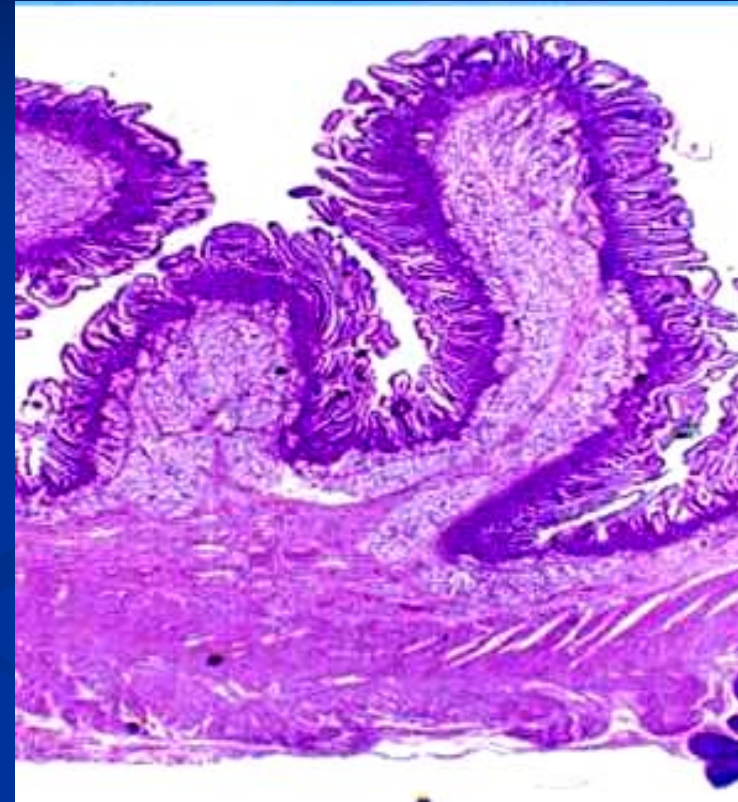
simple columnar epith. with  
many different types of cells  
small intestinal glands

## **submucosa**

LCT, duodenal glands

**muscularis:** internal circular  
sublayer and external  
longitudinal sublayer smooth  
muscle cells

**Advantitia:** serosa

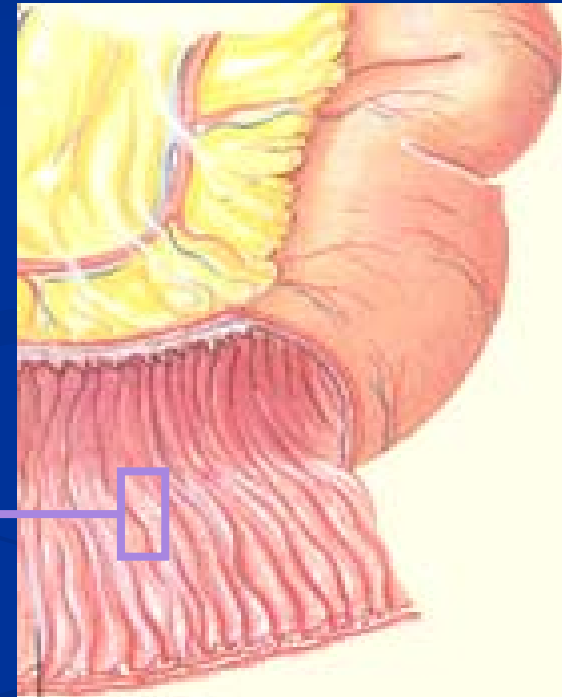
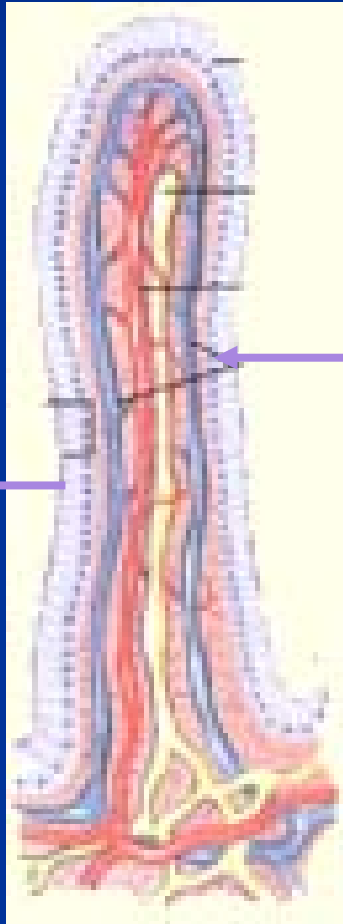
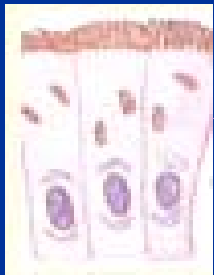


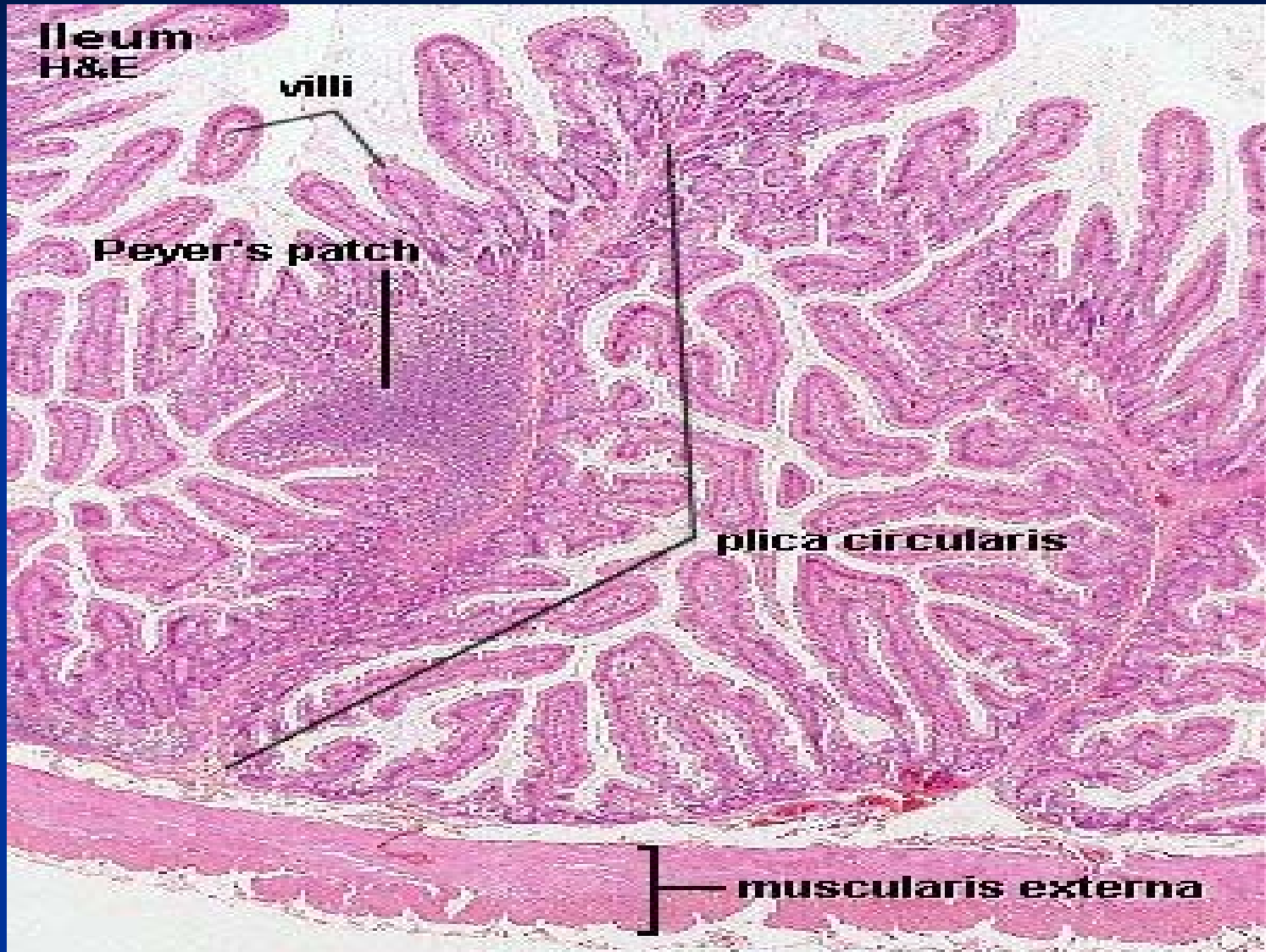
# *Terminology for small intestine*

**\*Plica :**

**\*intestinal villi :**

**\*microvilli:**





# Intestinal villi

## epithelium

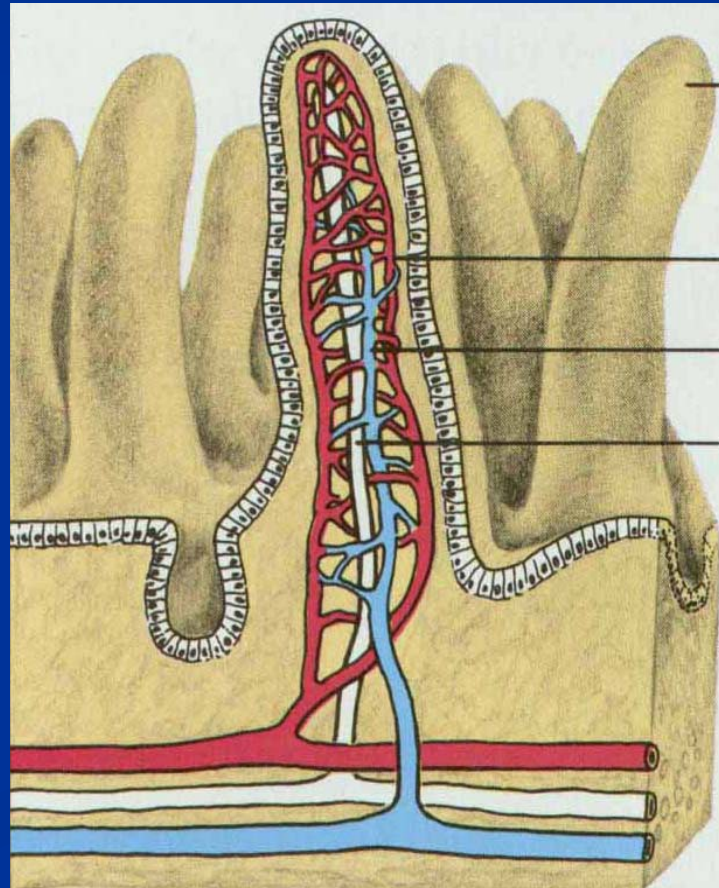
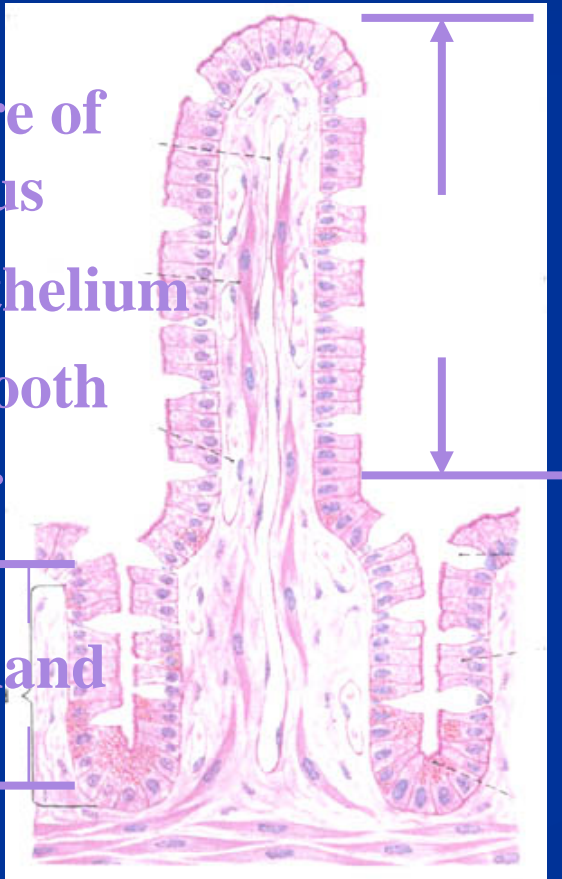
absorptive cells: LM: striated border

EM: microvillus, cell coat, SER and Golgi complex

Goblet cell

Core of villus  
epithelium  
Smooth  
m.f.

gland



## *Small intestine gland*

- \*infolding the epithelium to the lamina propria at the base of villus
- \*cellular components as same as that in the villous epith., except two types of cells:

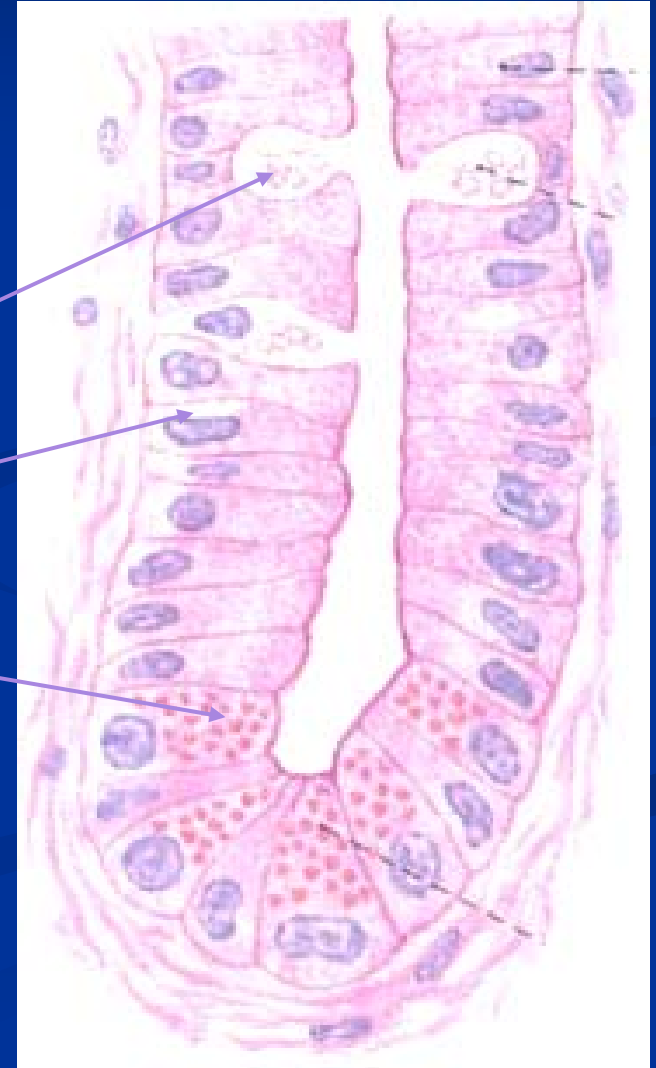
Goblet c.

Absorptive c.

**Paneth c**

**Stem c.**

Endocrine c.



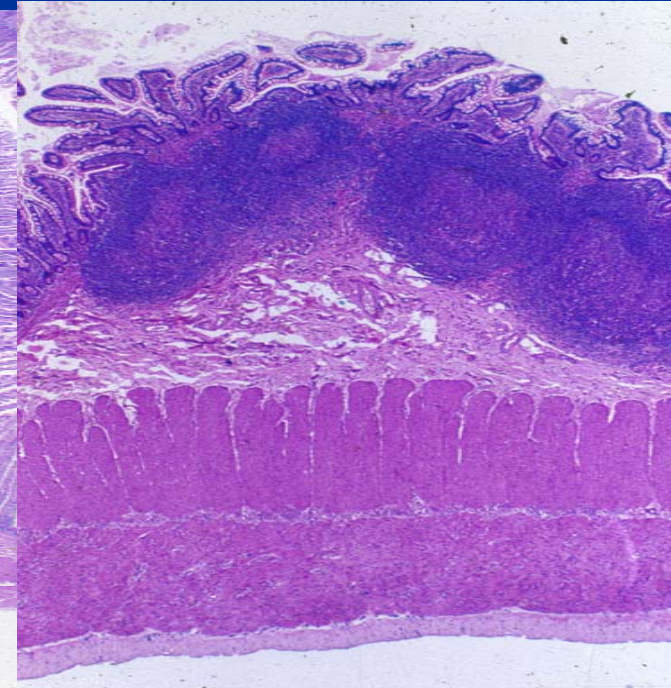
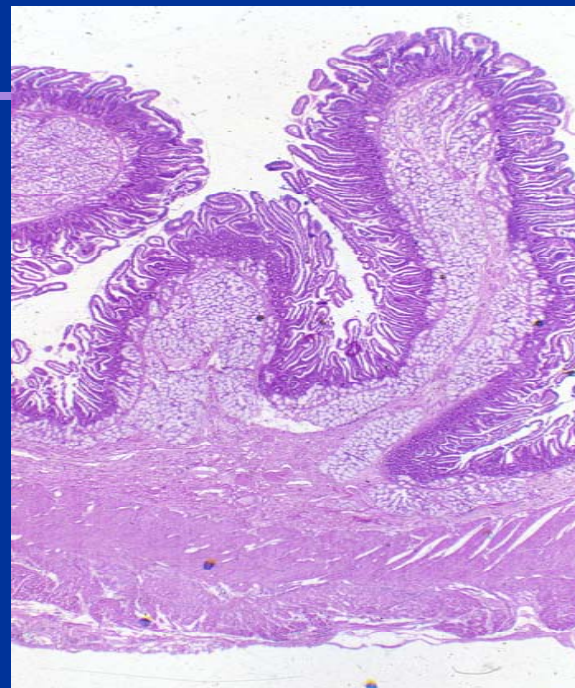
# *Paneth cell*

- \* found only in the base of the gland
  - \* pyramidal shape with a broad base and a narrow apex
  - \* having all features of protein-secreting cells
  - \* acidophilic granules in the apical cytoplasm
  - \* secreting defensin, lysozyme
- which involved in the control of infection



# *Regional difference in the small intestine*

	duodenum	jejunum	ileum
<b>Villi shape</b>	leaf-like	finger-like	becoming smaller
<b>Goblet C.</b>	+	++	+++
<b>Lymphatic tissue</b>	scattered L.C. solitary L.N.	Same as in duodenum	aggregated L.N.
<b>Glands</b>	Present	none	none





# *Large intestine*

- \* **three main sections:**

  - cecum including the appendix

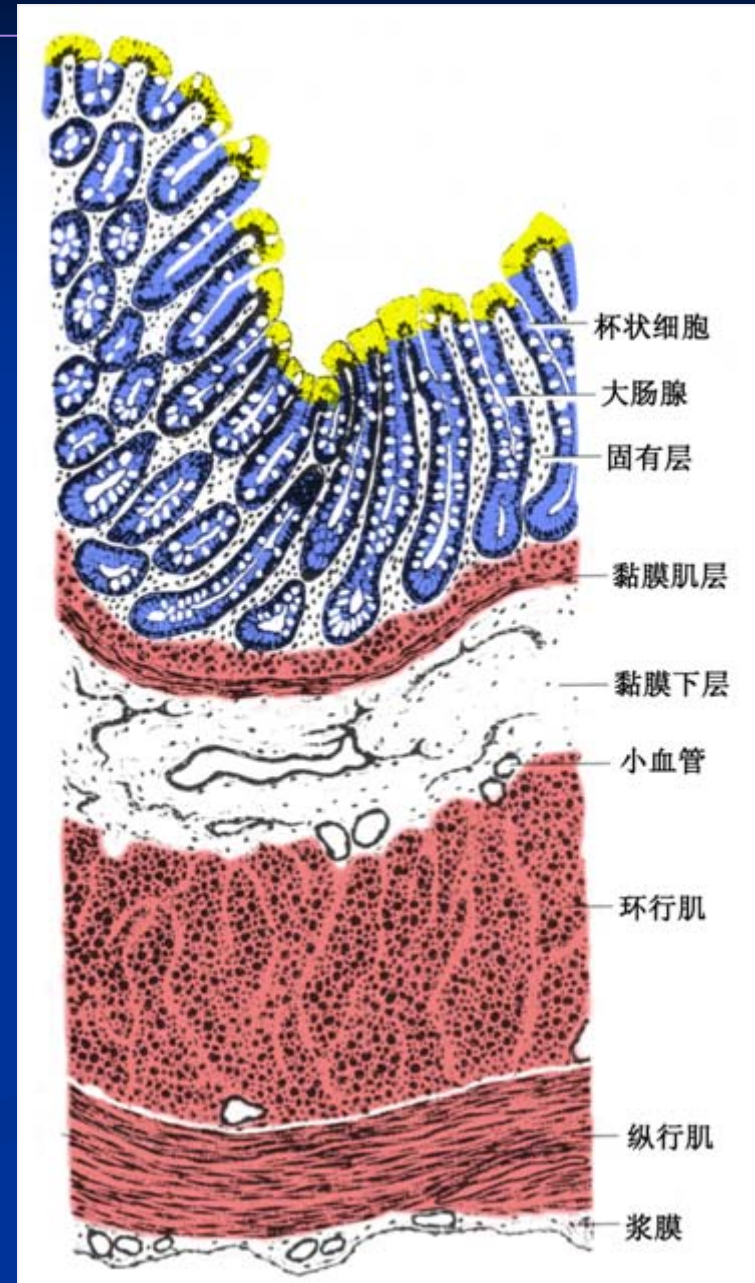
  - colon rectum with the anal canal

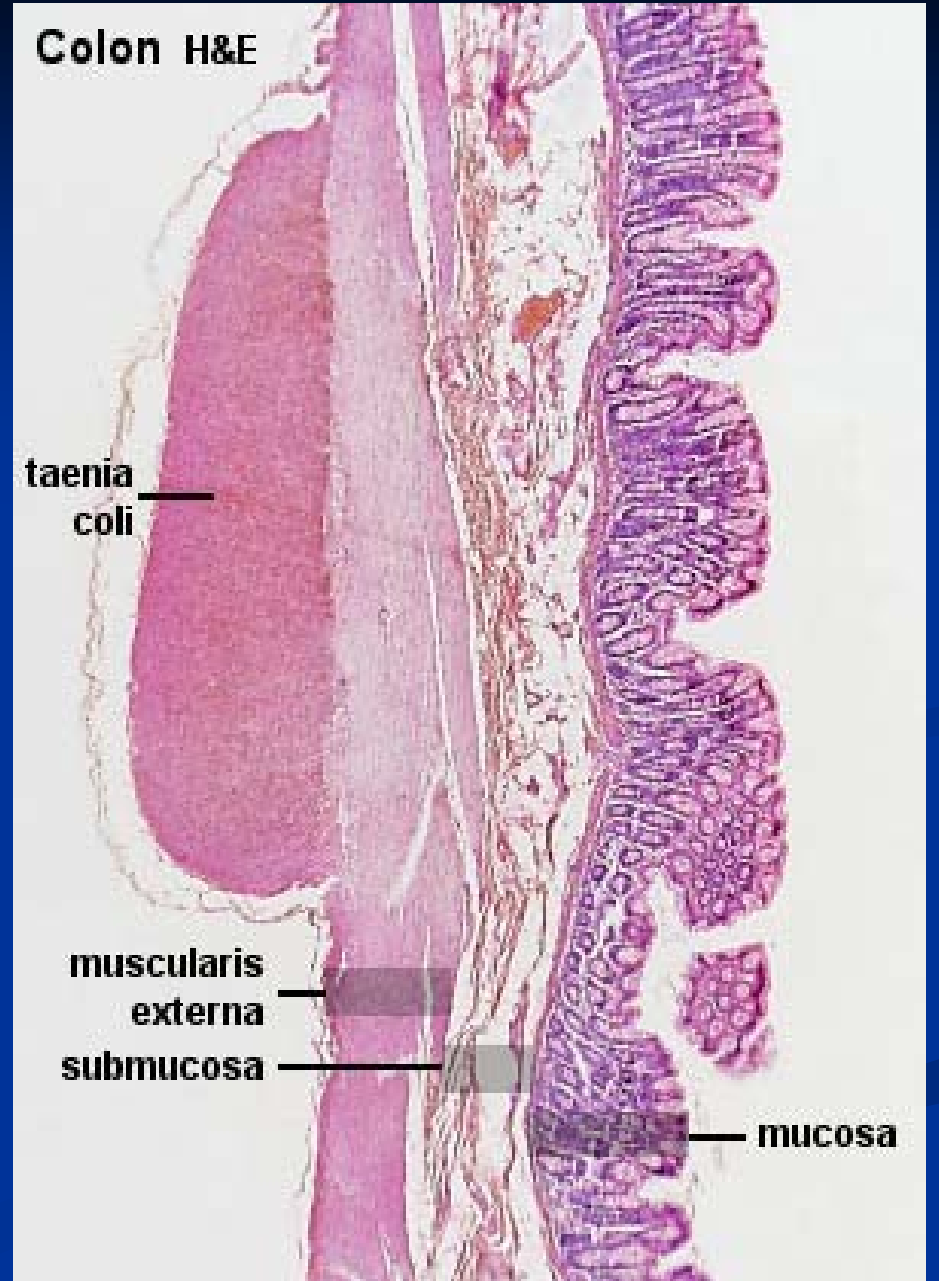
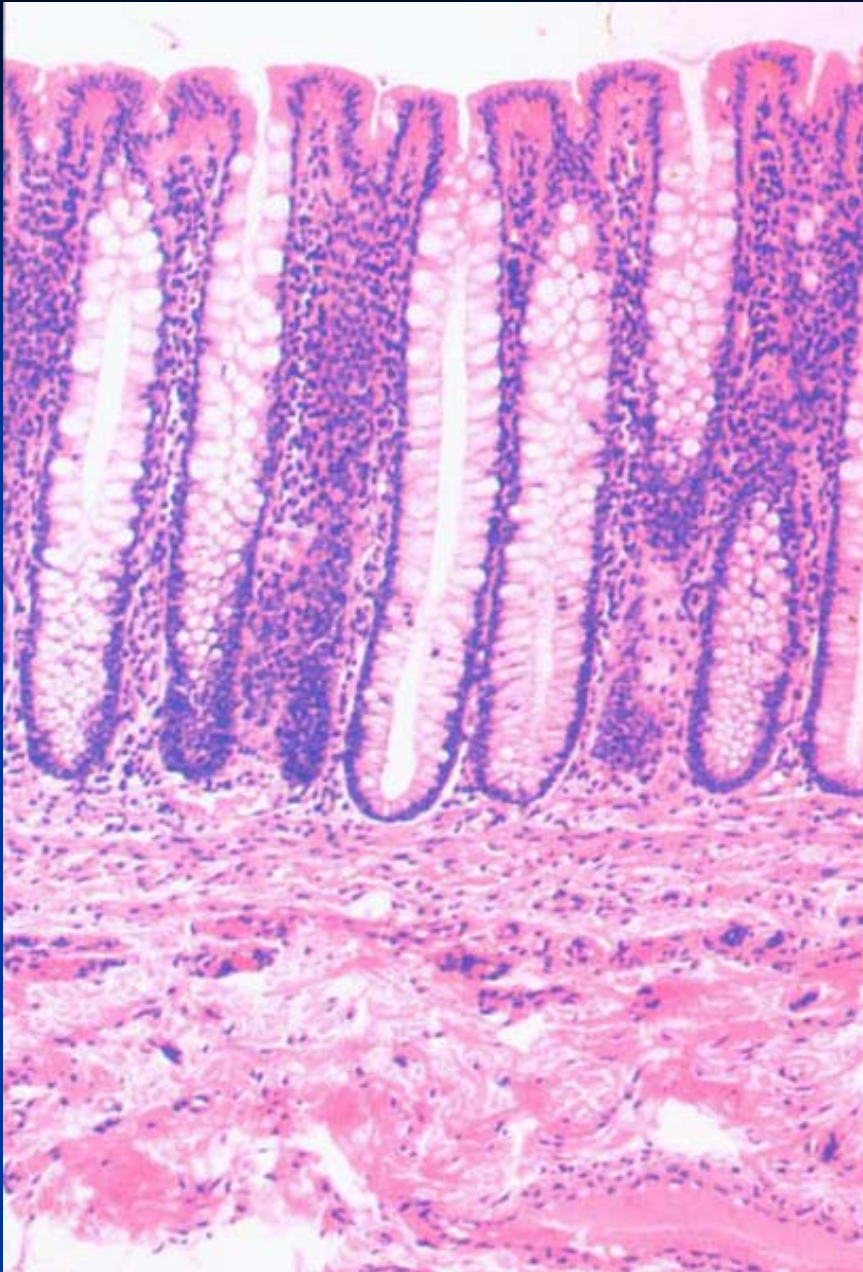
- \* **primary function is reabsorption of water and salt**

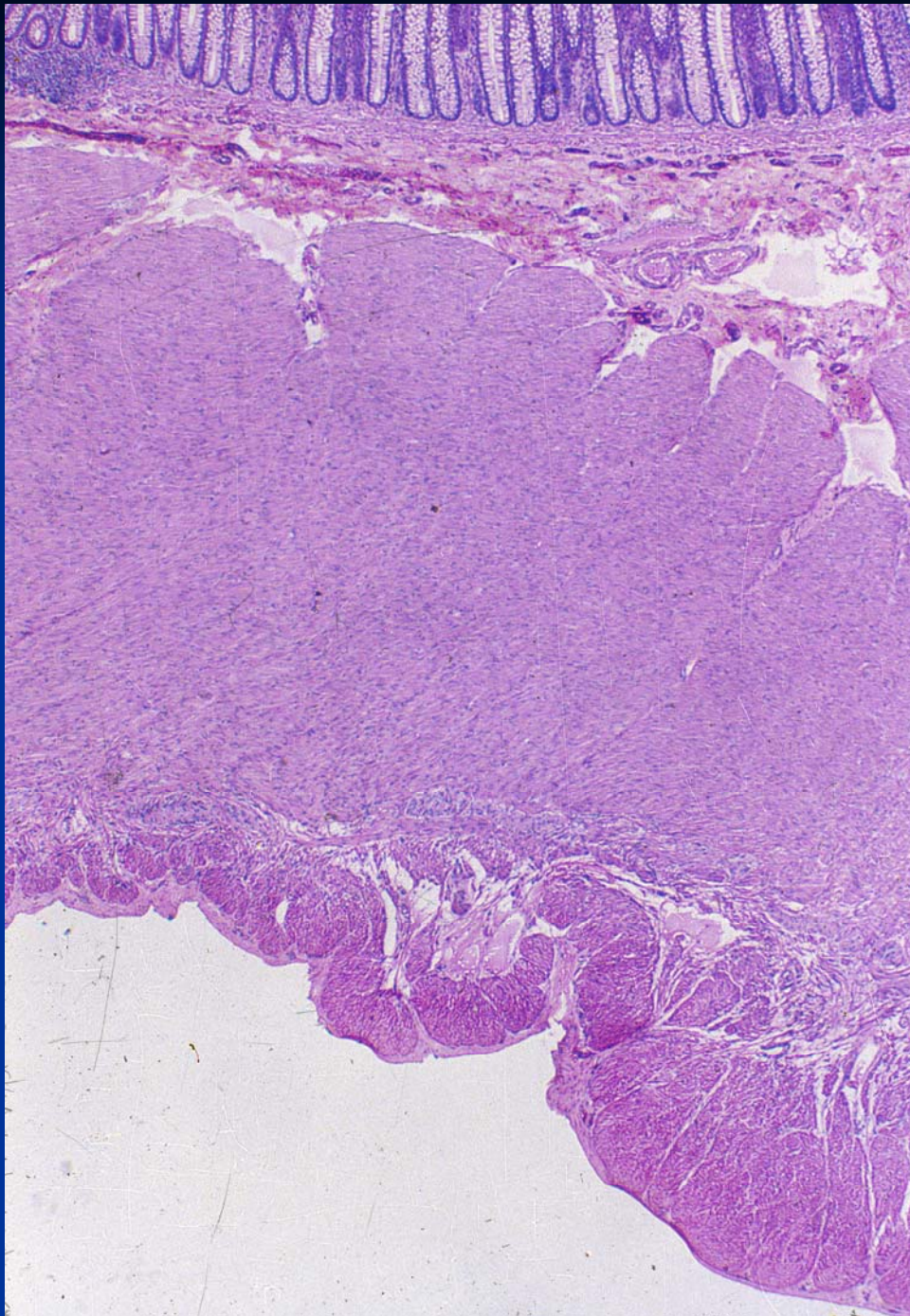
- \* **secreted mucus acts as a lubricant during transport of the intestinal contents**

# *Structural characteristic of cecum, colon & rectum*

- \* absence of plicae & villi
- \* surface and gland epith. with numerous goblet c.
- \* taeniae coli

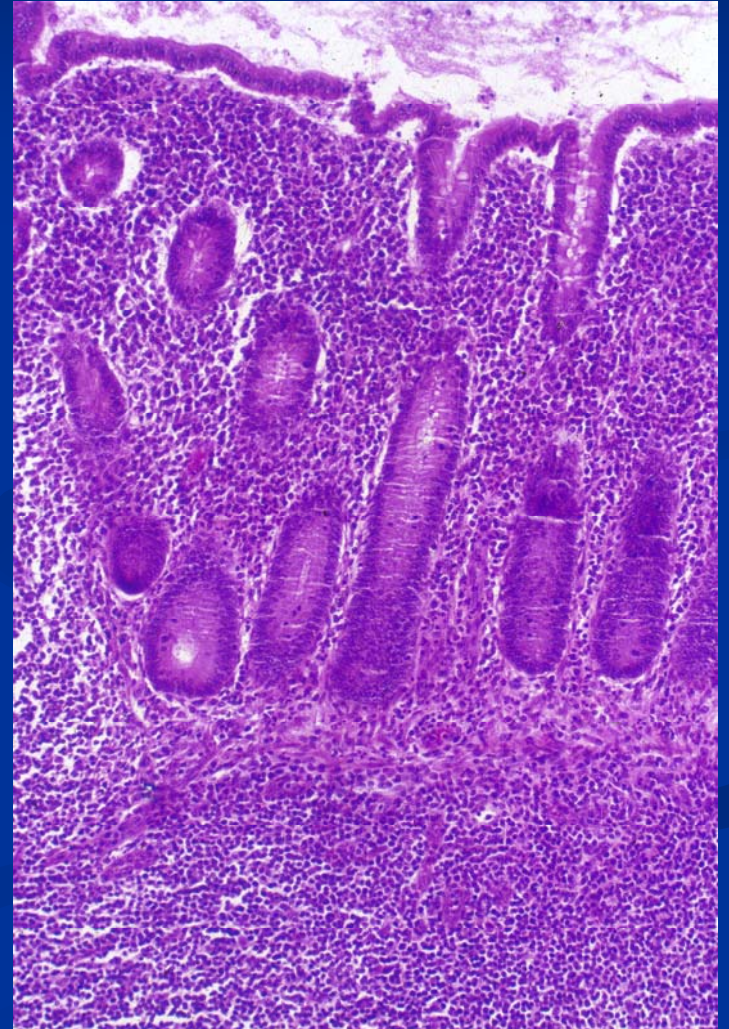






# *Structural characteristic of appendix*

- \* surface epith. with few goblet cells.
- \* rare intestinal glands
- \* lymphoid nodules
- \* very thin muscularis
- \* serosa

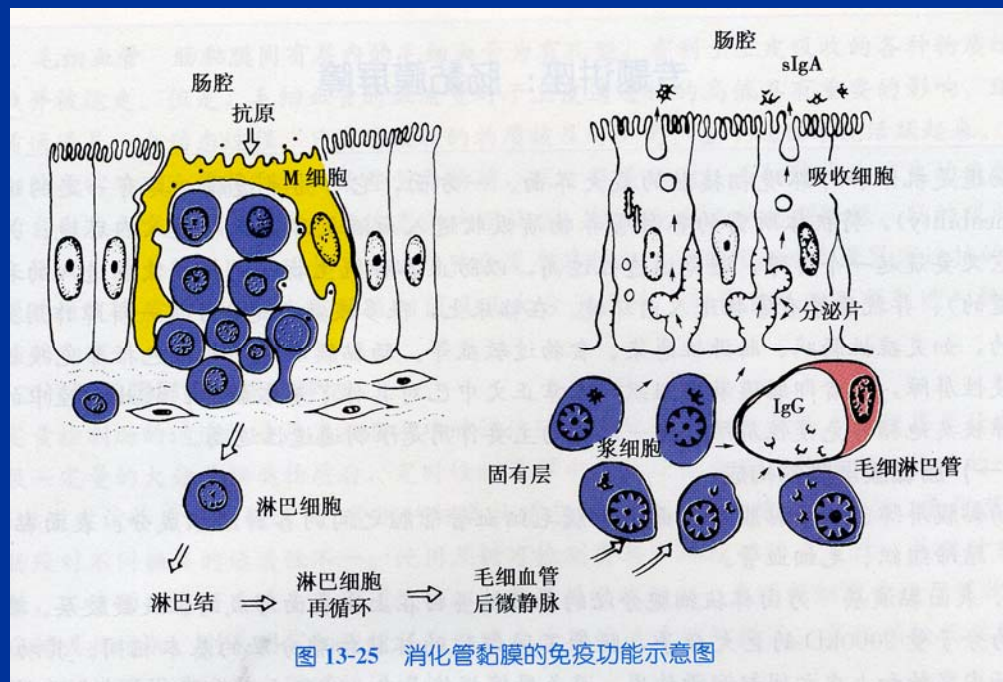


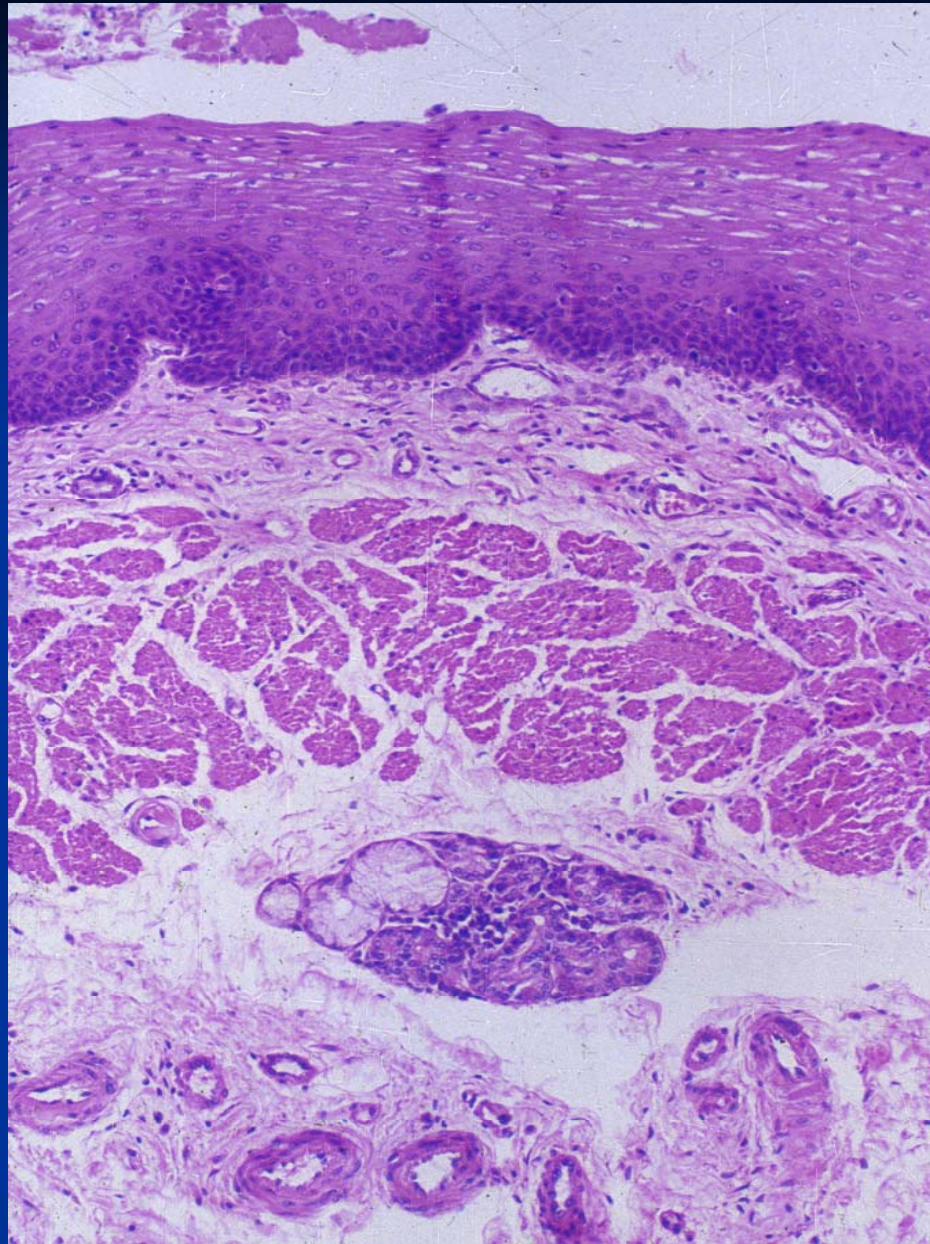
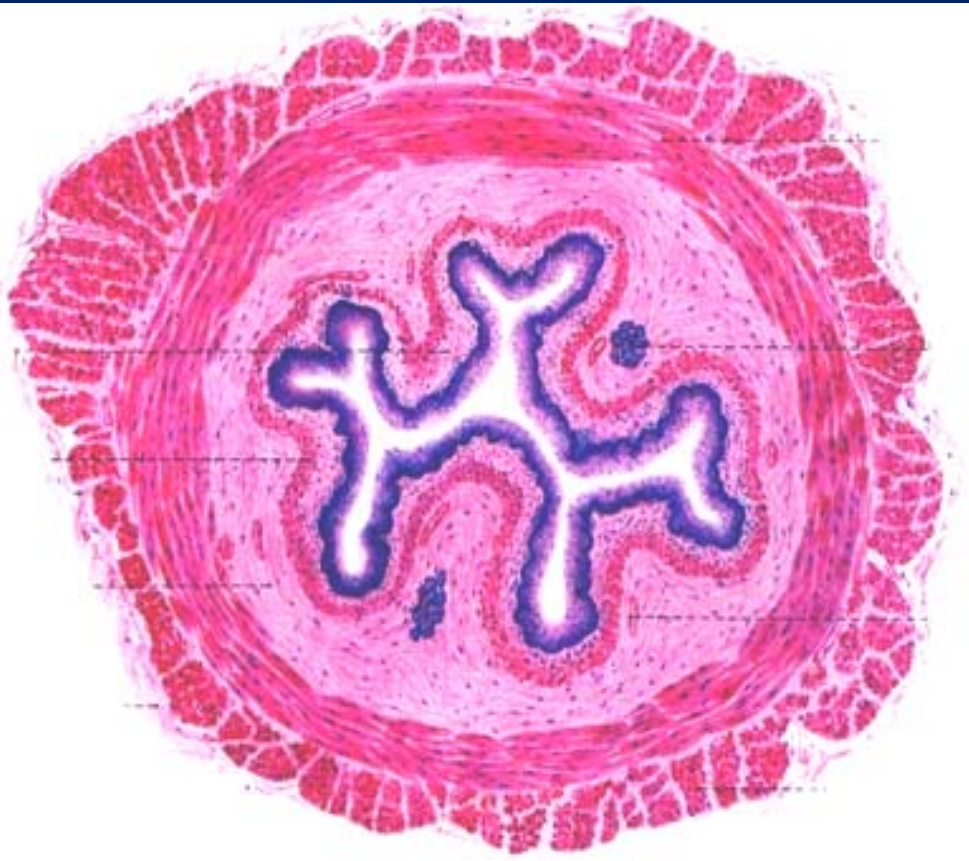
# *Lymphoid Tissue of Digestive Tract and Immune Function*

gut-associated lymphoid tissue: including lymphoid nodules in mucosa, lymphocytes, plasma cells and macrophages in lamina propria

and lymphocytes between epithelial cells

Function: microfold cells, IgA, secretory piece, sIgA

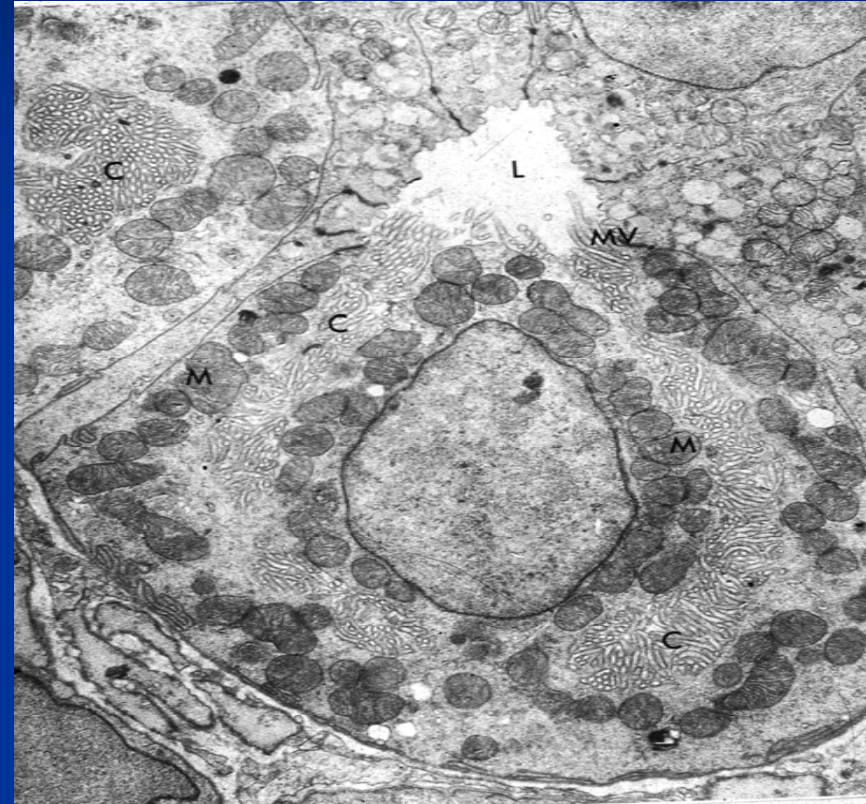
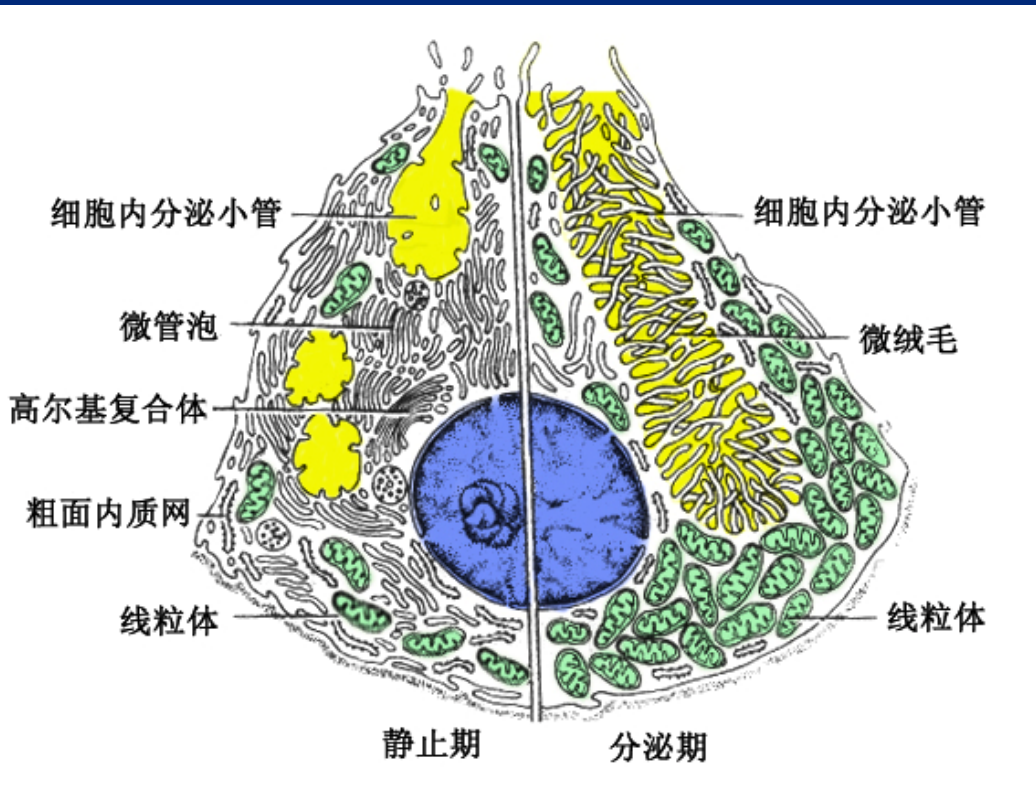




# *gastric pits*

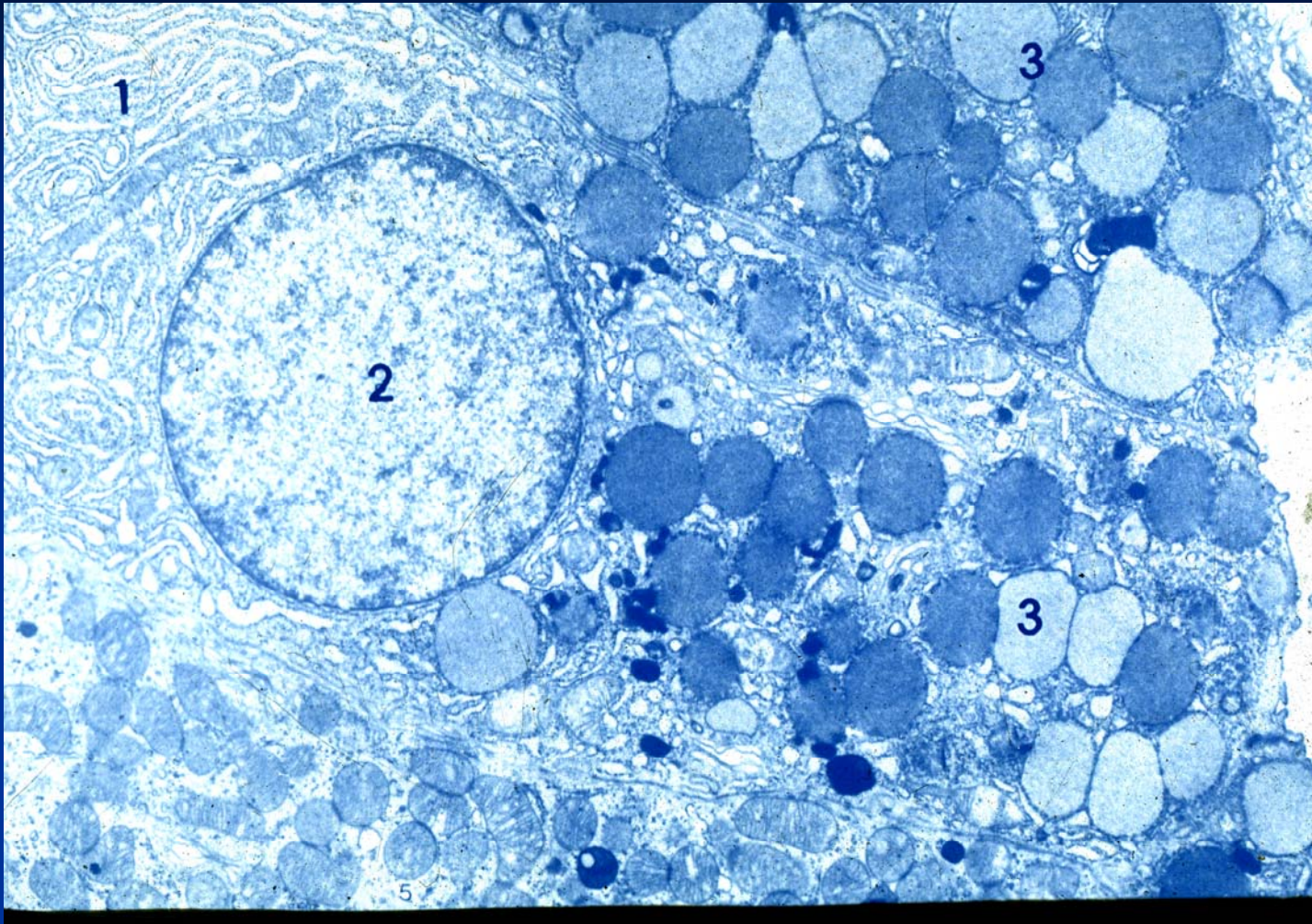


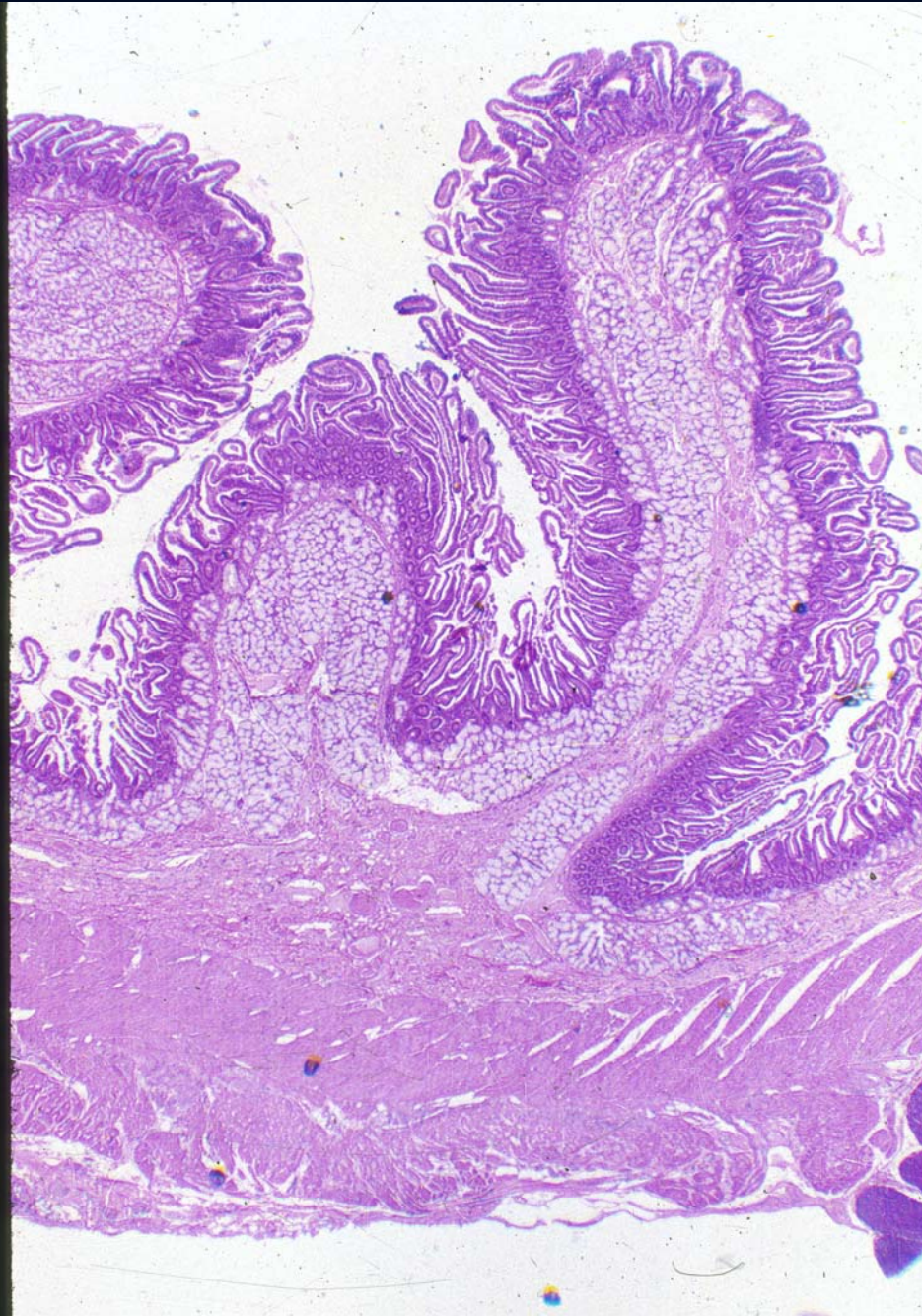


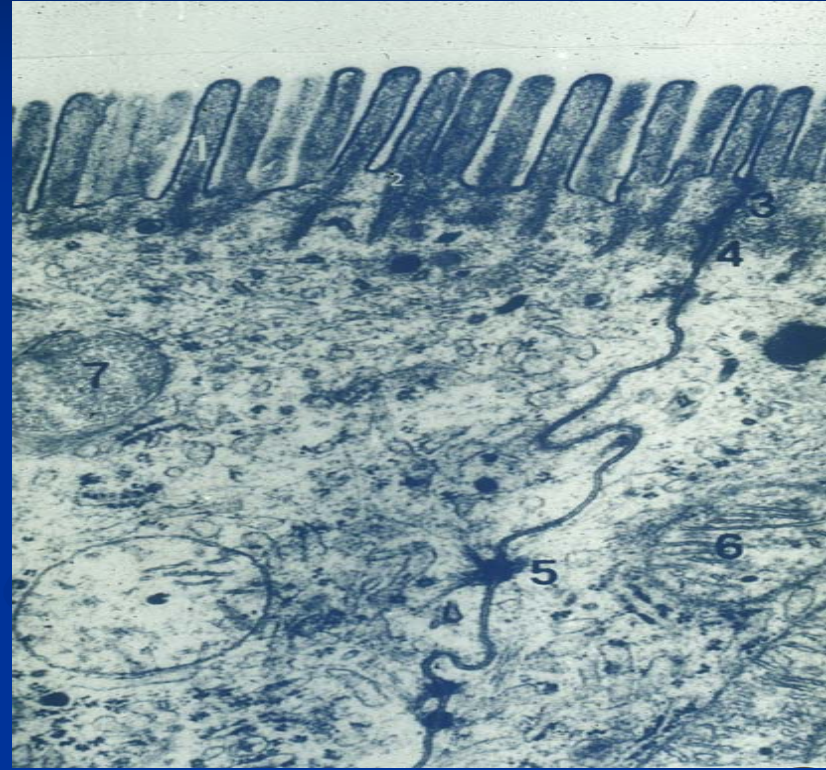
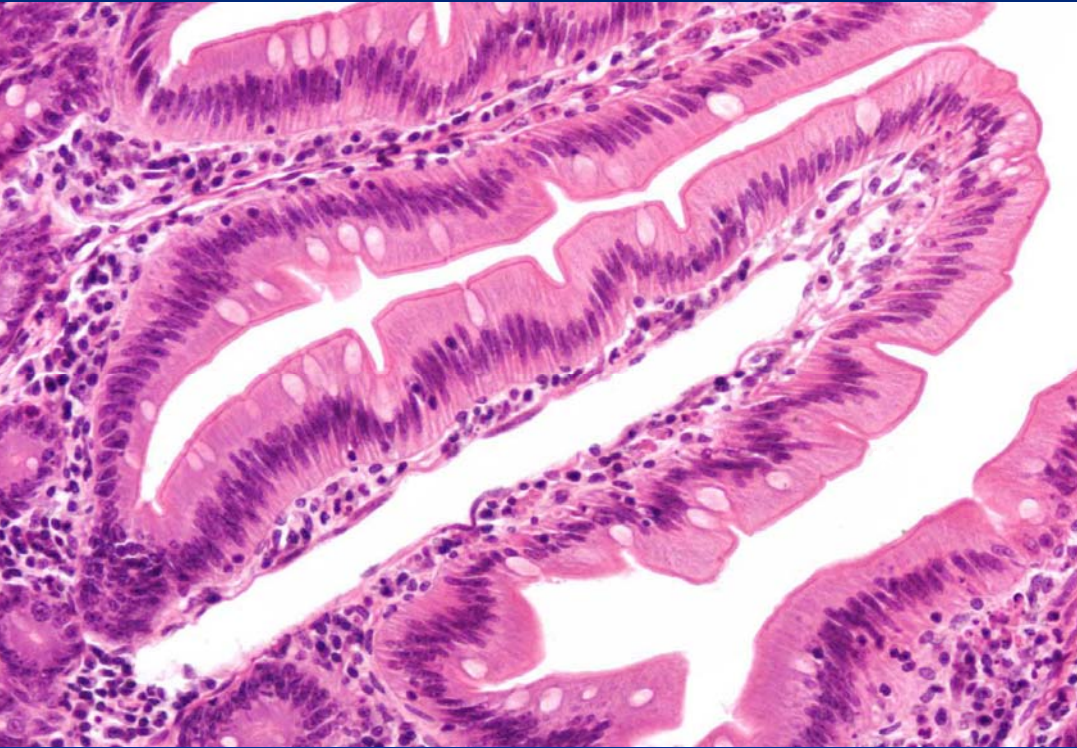


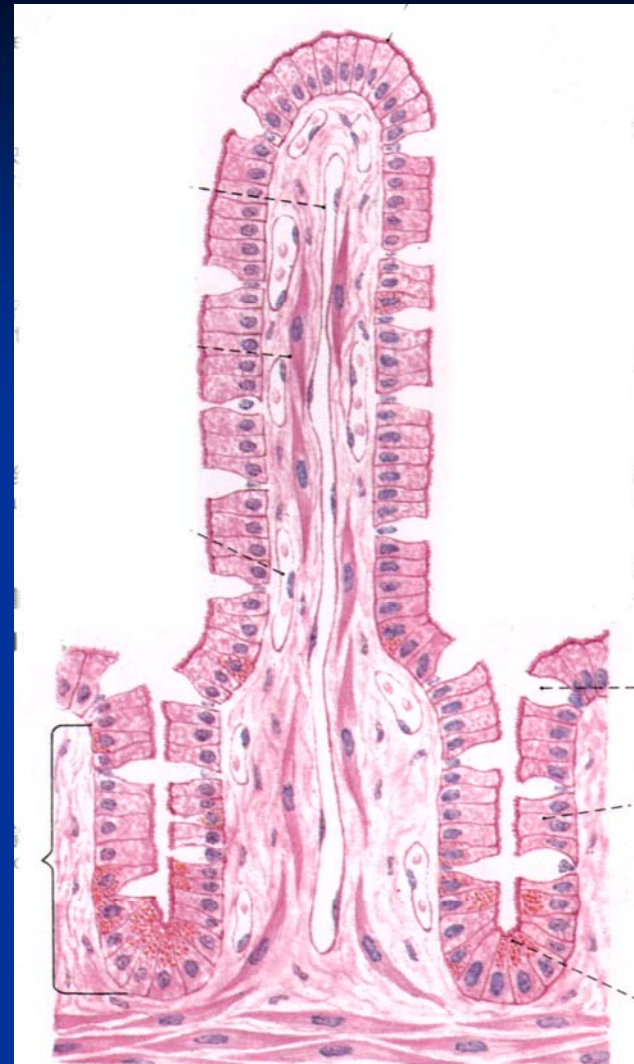
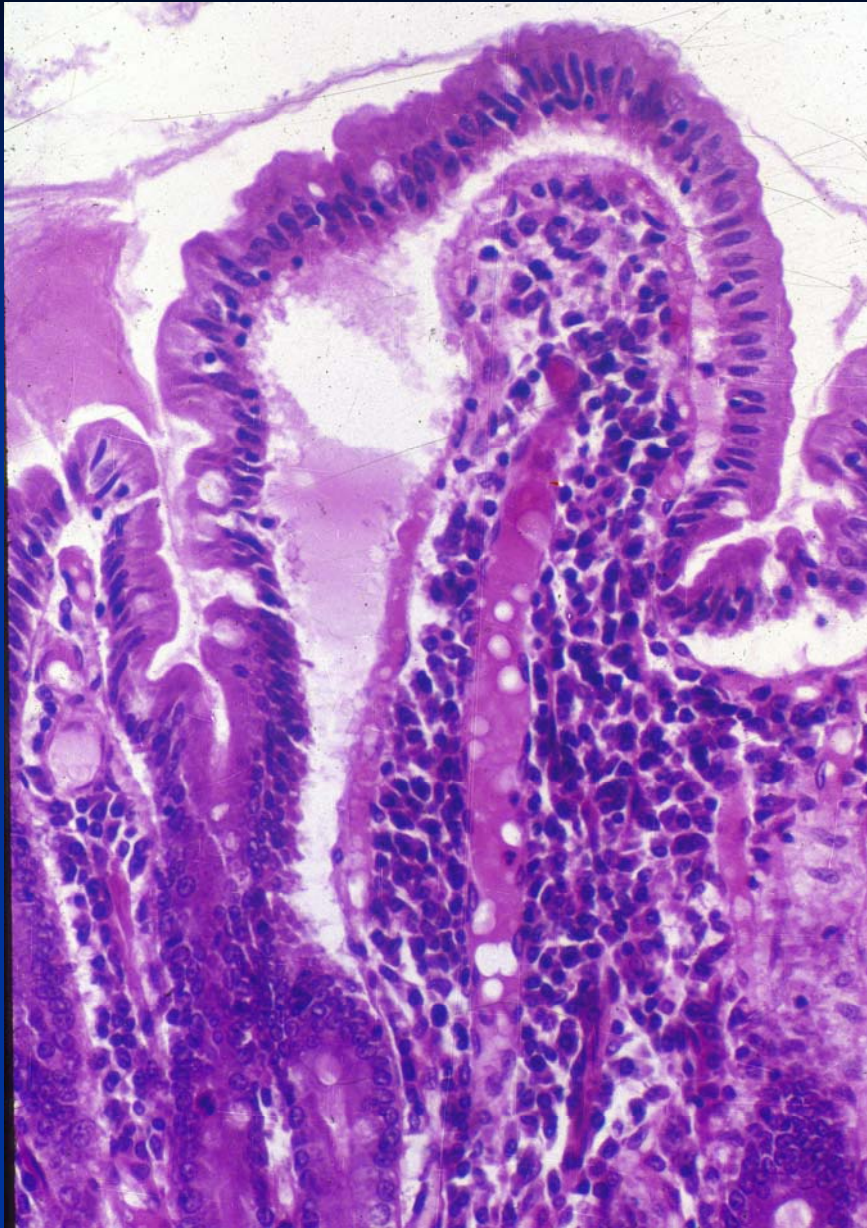
# Ultrastructure of Parietal cell





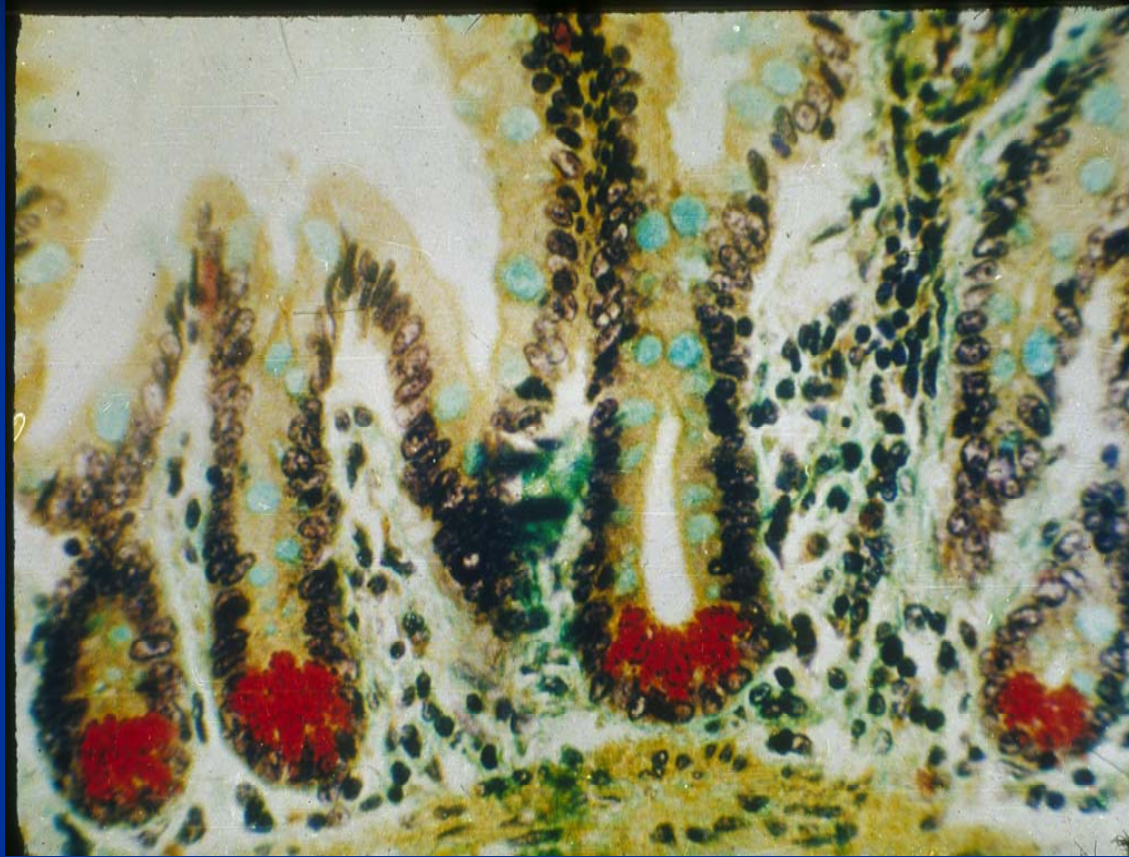
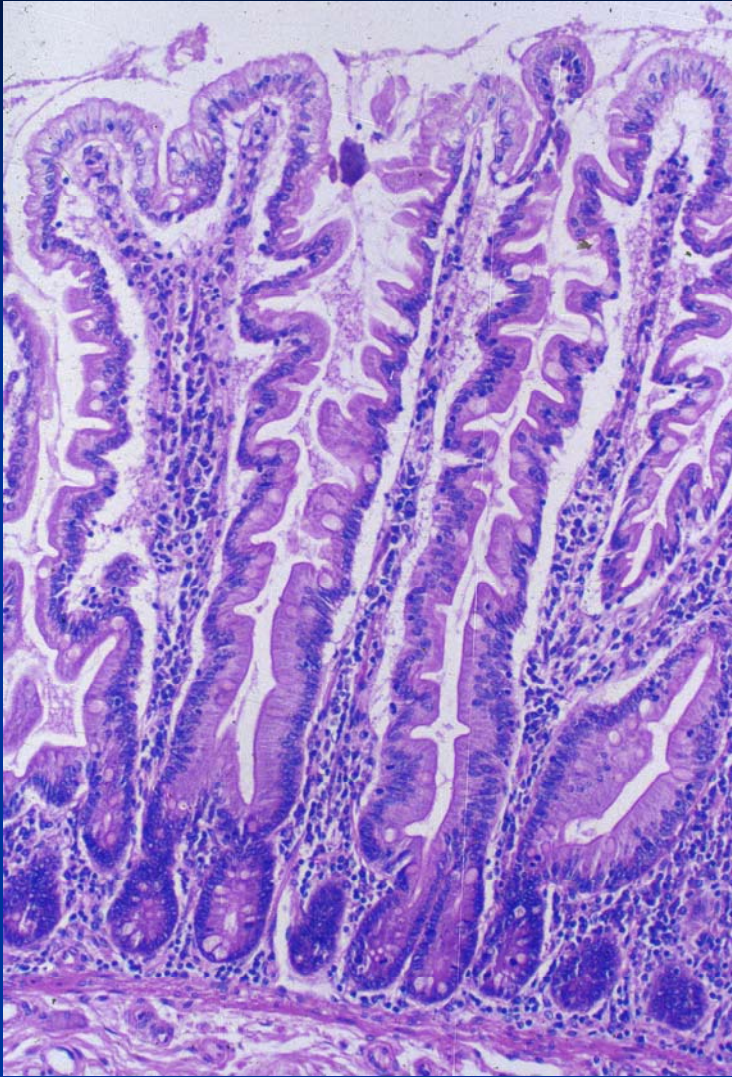






208. 肠绒毛和小肠腺 H·E 低倍  
Intestinal villus and gland





# *Function of surface mucous cell*

- \*secreting alkali mucin
- \*forms a protective layer in the lumen of stomach

*Pathogenesis: ulceration*

