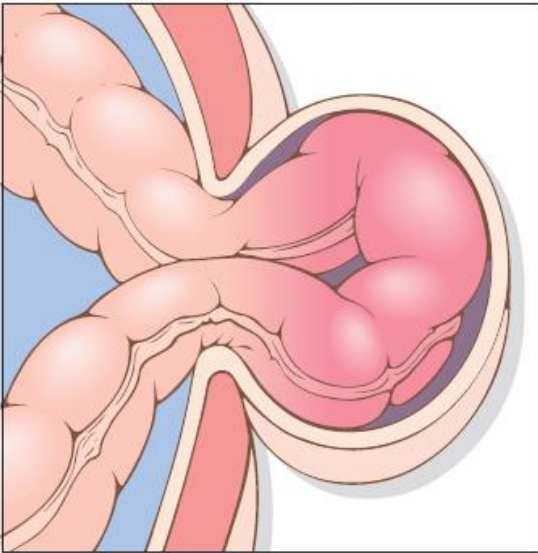


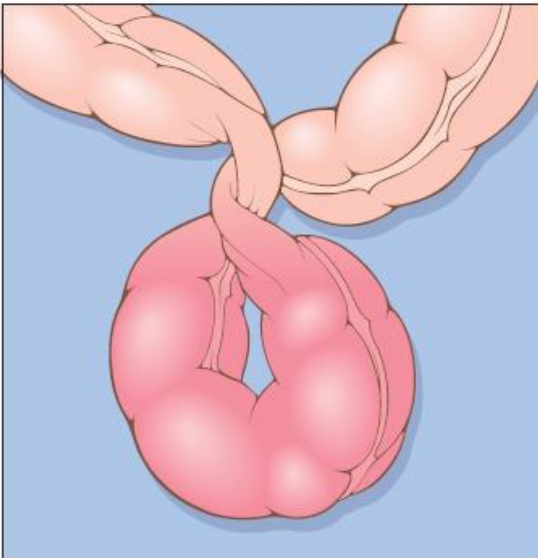
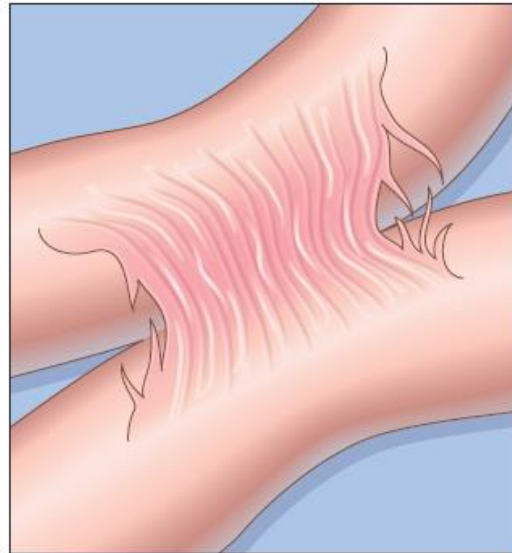


## Small & Large Intestines

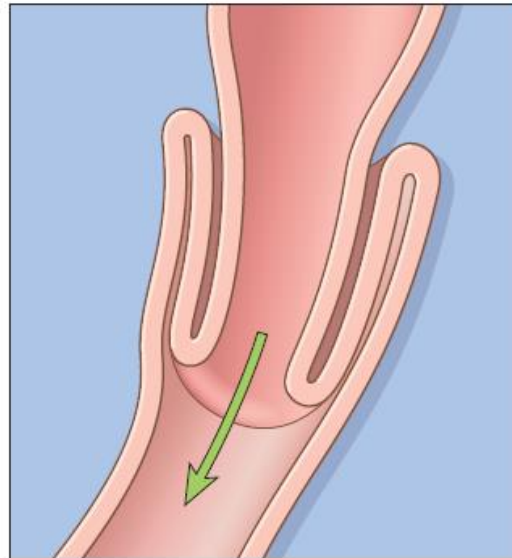
**Herniation**



**Adhesions**



**Volvulus**



**Intussusception**

## **Intestinal Obstruction**

small intestine:

- relatively narrow lumen
- most often involved

80%

Remaining:

- Tumors
- Infarction (Ischemia-reperfusion)

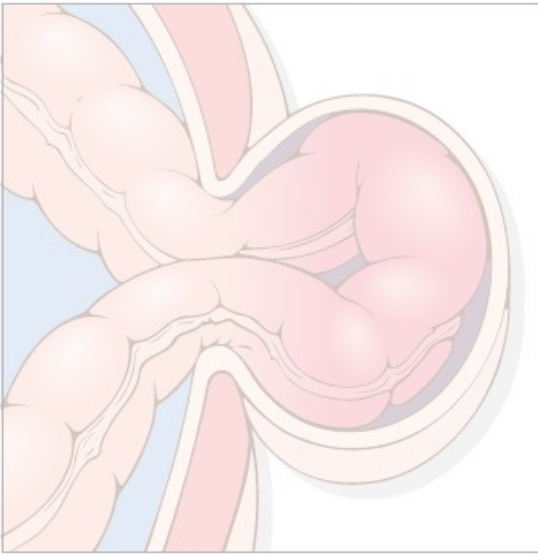
Pain

Distention

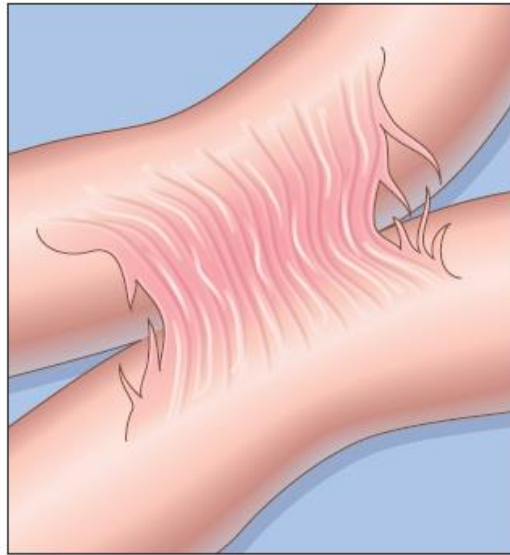
Vomiting

Constipation

**Herniation**



**Adhesions**



## **Intestinal Obstruction**

small intestine:

- relatively narrow lumen
- most often involved

80%

Remaining:

- Tumors
- Infarction (Ischemia-reperfusion)

Pain

Distention

Vomiting

Constipation



## Intestinal Obstruction

### Hirschsprung Disease:

Congenital defect in colonic innervation

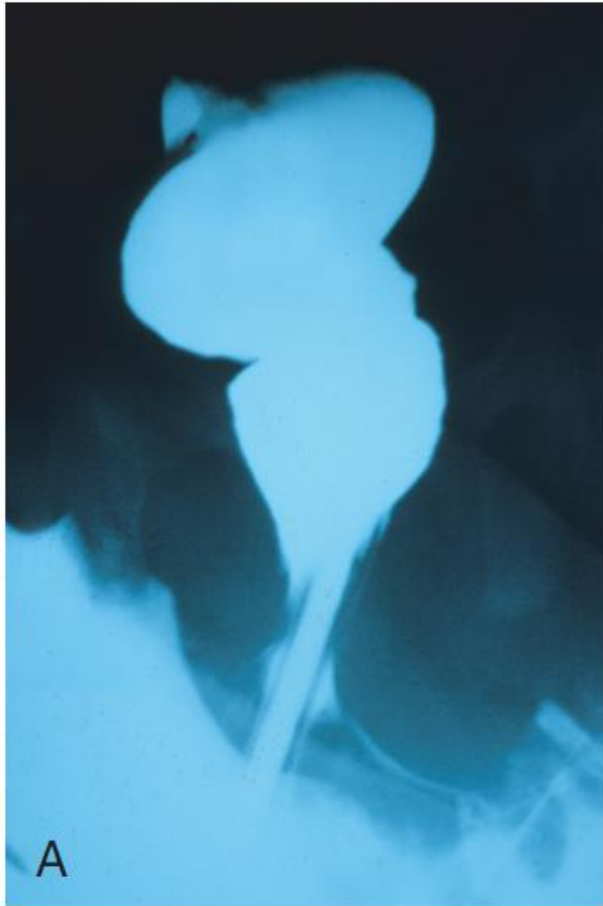
Isolated or in combination

More common in ♂

More severe in ♀

Presentation

- Failure to pass meconium
- Obstructive constipation





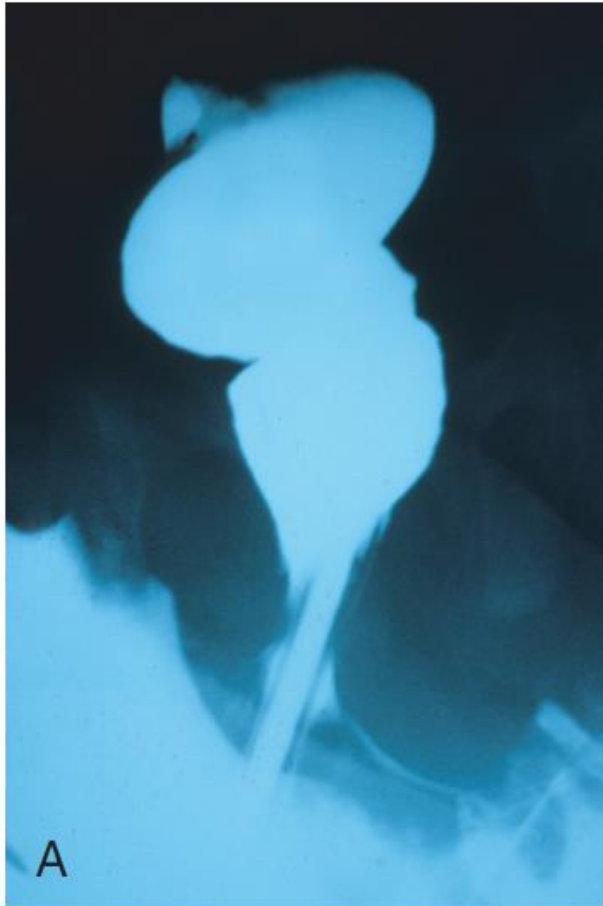
## Intestinal Obstruction

### Hirschsprung Disease:

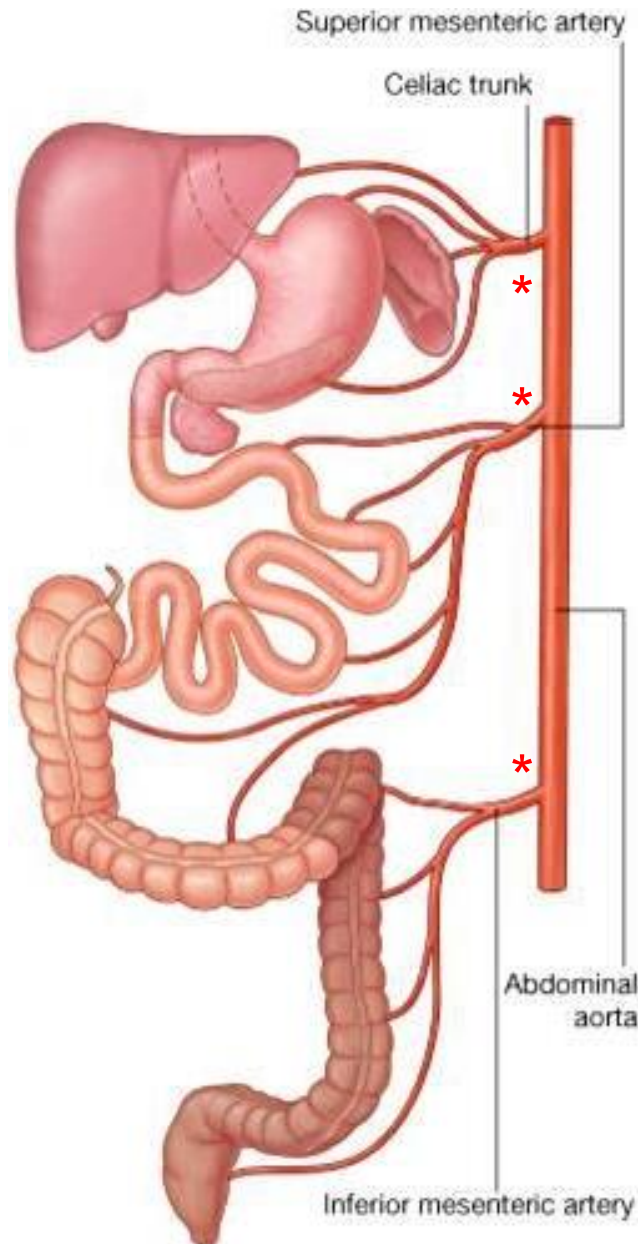
Meissner submucosal plexus and the Auerbach myenteric plexus absent in rectum (always) or more

Aganglionic region normal or contracted with proximal dilation

Tx: Surgical resection



Remember watershed zones

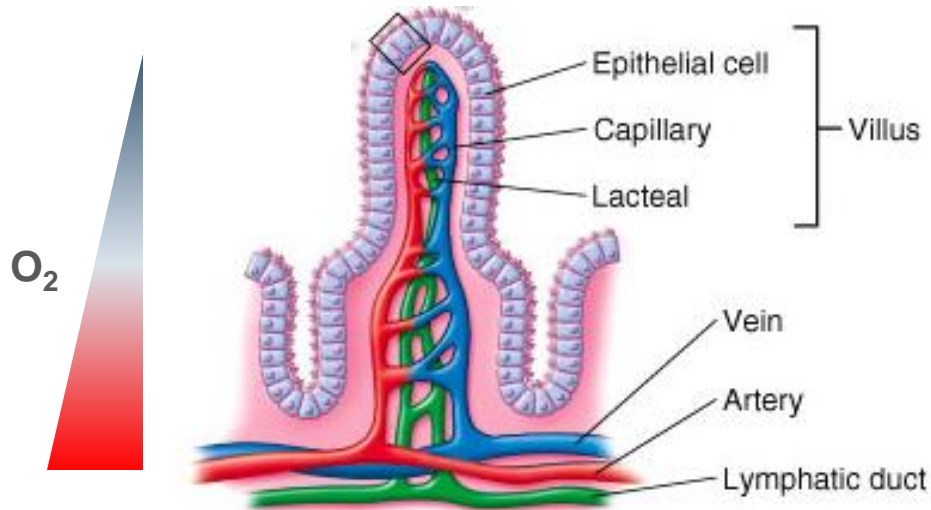


## Ischemic Bowel Disease

Interconnections & collaterals make the bowel more resistant to ischemia\*

Infarction  
Transmural>Mural>  
Mucosal

Hypoperfusion vs acute  
vascular obstruction



## Ischemic Bowel Disease

Crypts protected (stem cell compartment)

Surface epithelium more susceptible to injury

Two injury phases (Ischemia-reperfusion)

Outcome mostly depends on severity of compromise, duration and which vessel



# Ischemic Bowel Disease

## Morphology

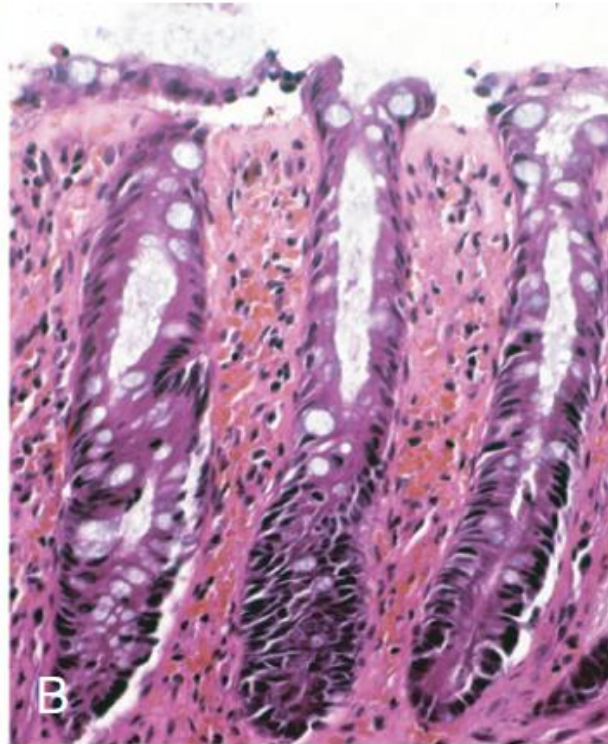
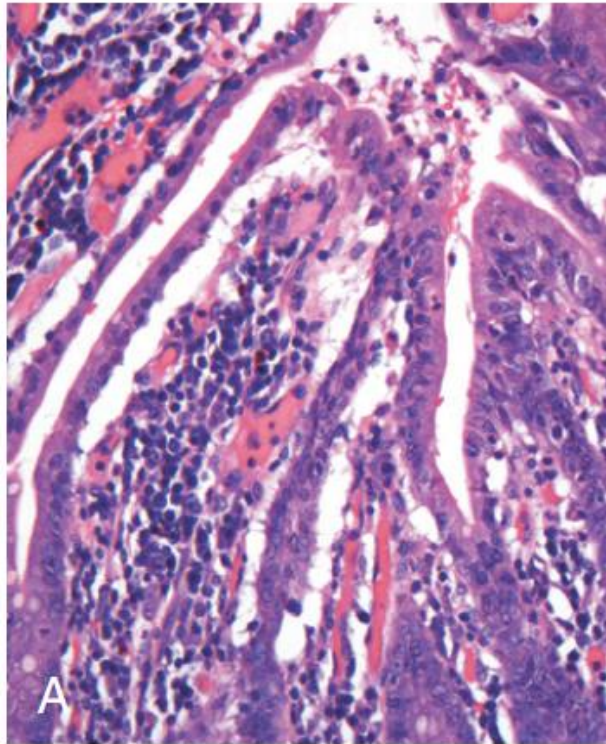
Atrophy or sloughing of surface epithelium (A)

Fibrous scarring with chronic ischemia (B)

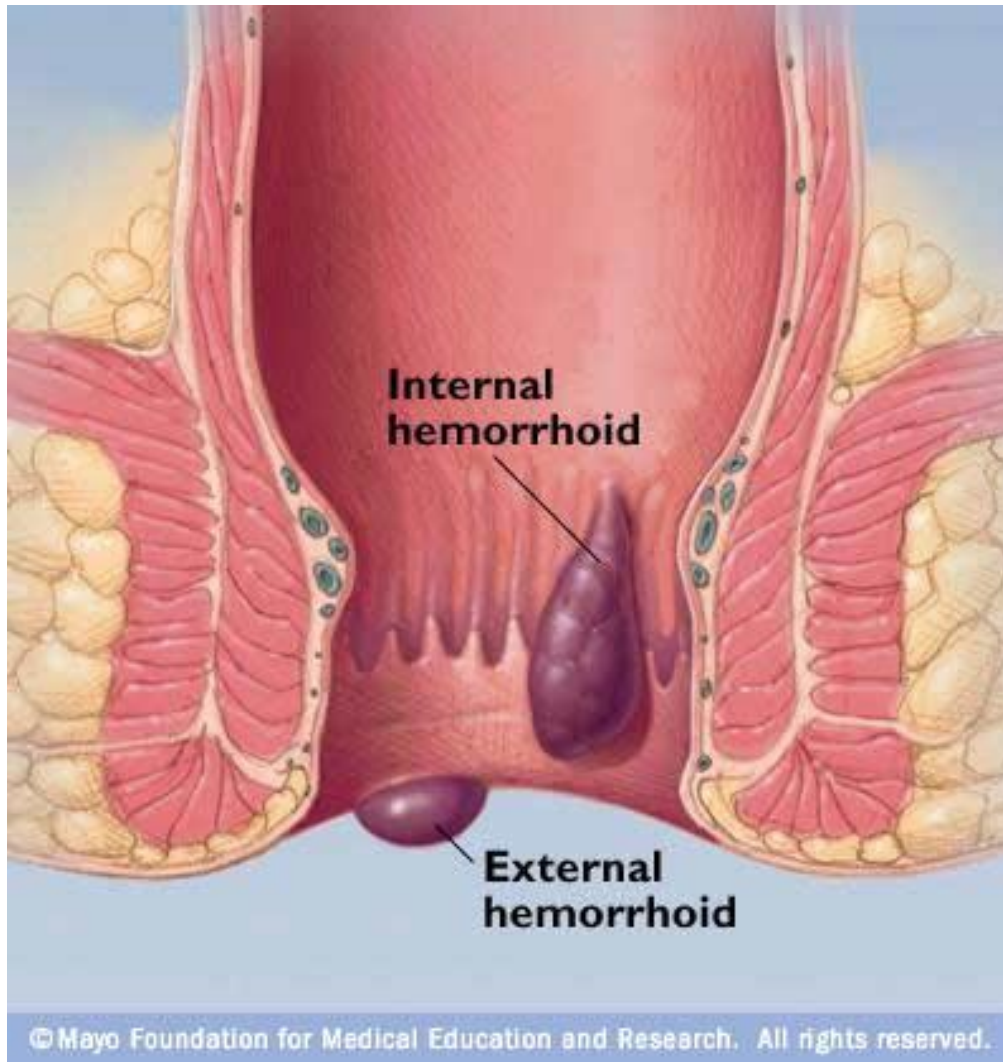
## Clinical Features

- Older, co-existing CVD
- Severe pain/Guarding
- N/V, bloody diarrhea
- Reduced peristalsis
- Blood loss → Shock
- Sepsis

DDx AA, AC, PU







## Hemorrhoids

Dilated anal and perianal collateral vessels

Increased intra-abdominal and venous pressure

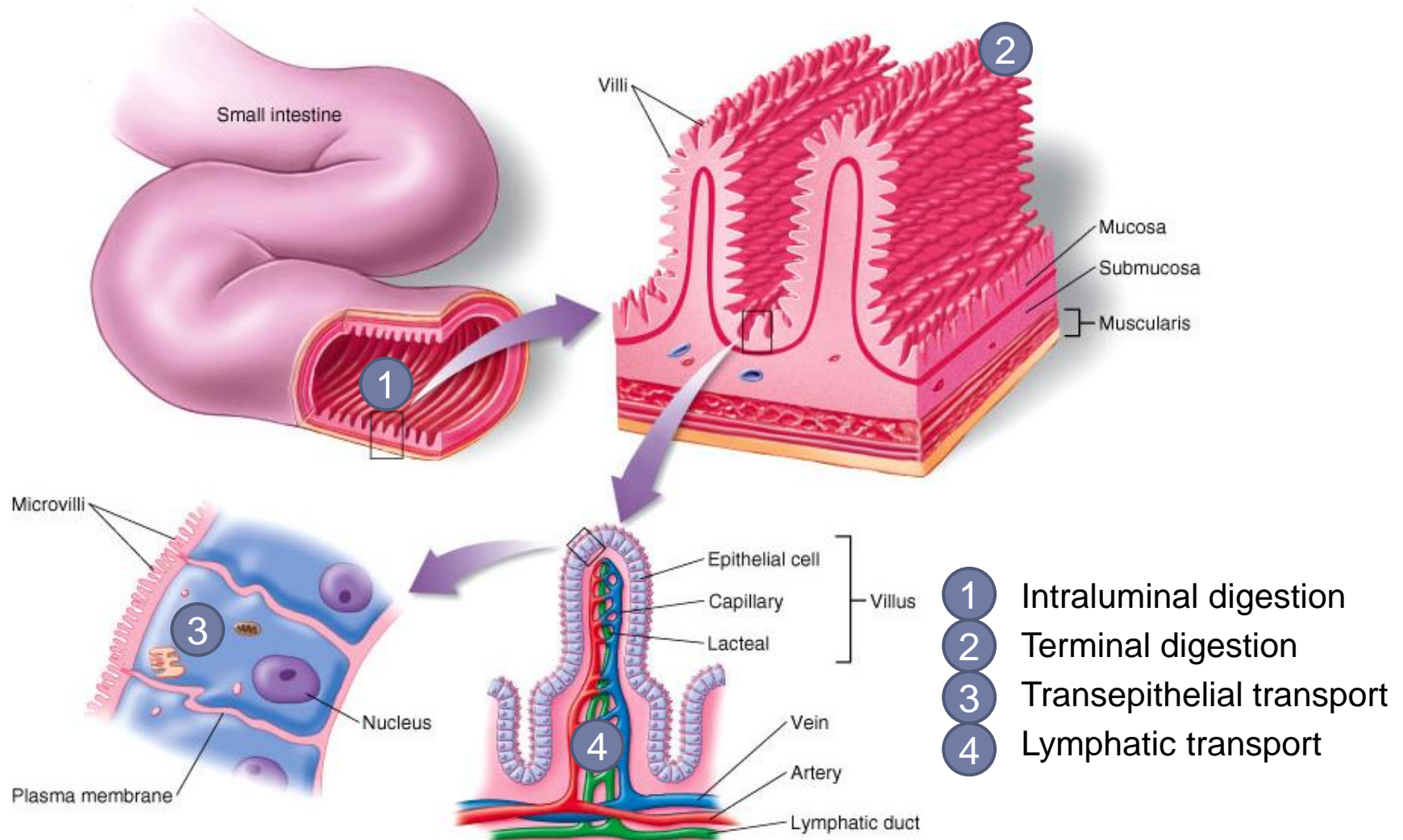
- Constipation/straining
- Pregnancy
- Portal hypertension

### Clinical Features

- Pain
- Bleeding (bright red)

Tx: sclerotherapy, banding, IR coagulation, surgery

# Digestion

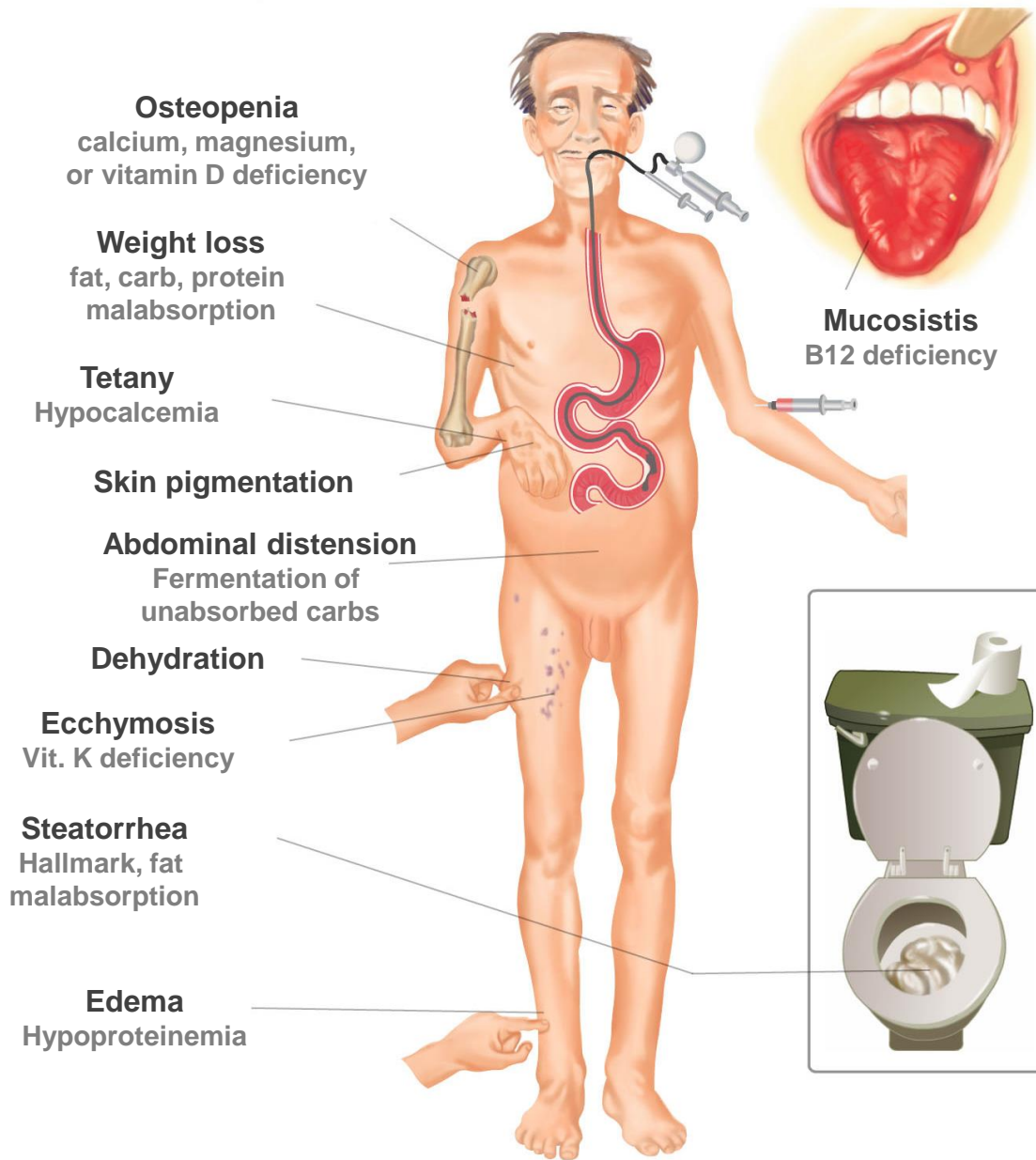


# Malabsorption

	1	2	3	4
Disease	Intraluminal Digestion	Terminal Digestion	Transepithelial Transport	Lymphatic Transport
Celiac disease		+	+	
Tropical sprue		+	+	
Chronic pancreatitis	+			
Cystic fibrosis	+			
Primary bile acid malabsorption	+		+	
Carcinoid syndrome			+	
Autoimmune enteropathy		+	+	
Disaccharidase deficiency		+		
Whipple disease				+
Abetalipoproteinemia			+	
Viral gastroenteritis		+	+	
Bacterial gastroenteritis		+	+	
Parasitic gastroenteritis		+	+	
Inflammatory bowel disease	+	+	+	







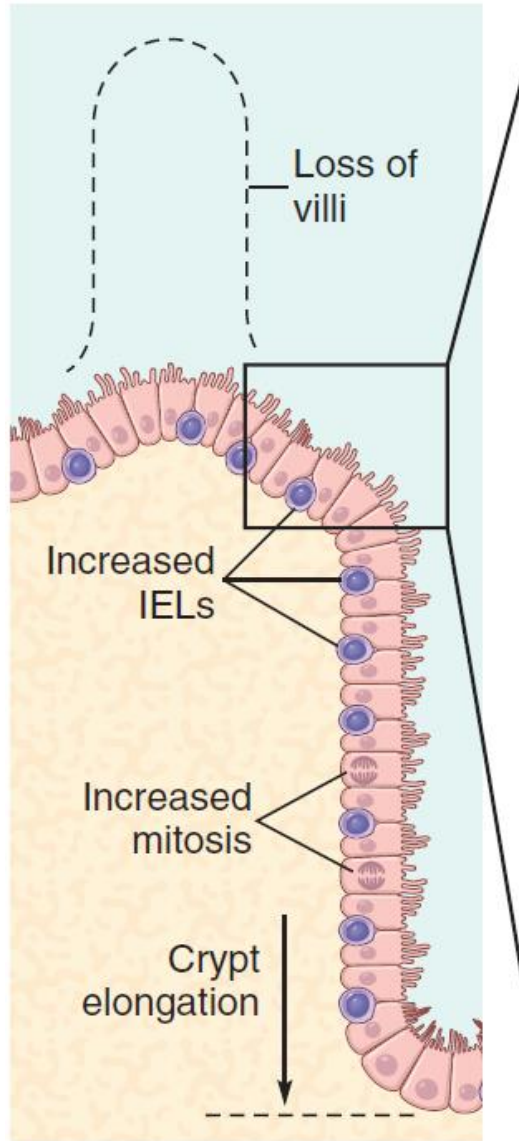
## Malabsorption Syndromes

Resemble each other more than they differ

- Diarrhea
- Flatus
- Abdominal pain
- Weight loss

### Consequences

- |              |                             |
|--------------|-----------------------------|
| - Anemia     | pyridoxine,                 |
| - Mucositis  | folate, vit B <sub>12</sub> |
| - Bleeding   | Vit. K                      |
| - Osteopenia | Ca, Mg,                     |
| - Tetany     | Vit. D                      |
| - Neuropathy | Vit. A or B <sub>12</sub>   |



## Celiac Disease

Gluten-sensitive enteropathy (2 age groups)

Immune mediated reaction to Gliadin resulting in:

- Villous atrophy
- ↑ Intraepithelial lymphocytes (IELs)
- Epithelial proliferation
- Crypt elongation

↓ area → malabsorption  
Anemia (Iron, B<sub>12</sub>, Folate)

Tx: Gluten free diet

## Celiac Disease

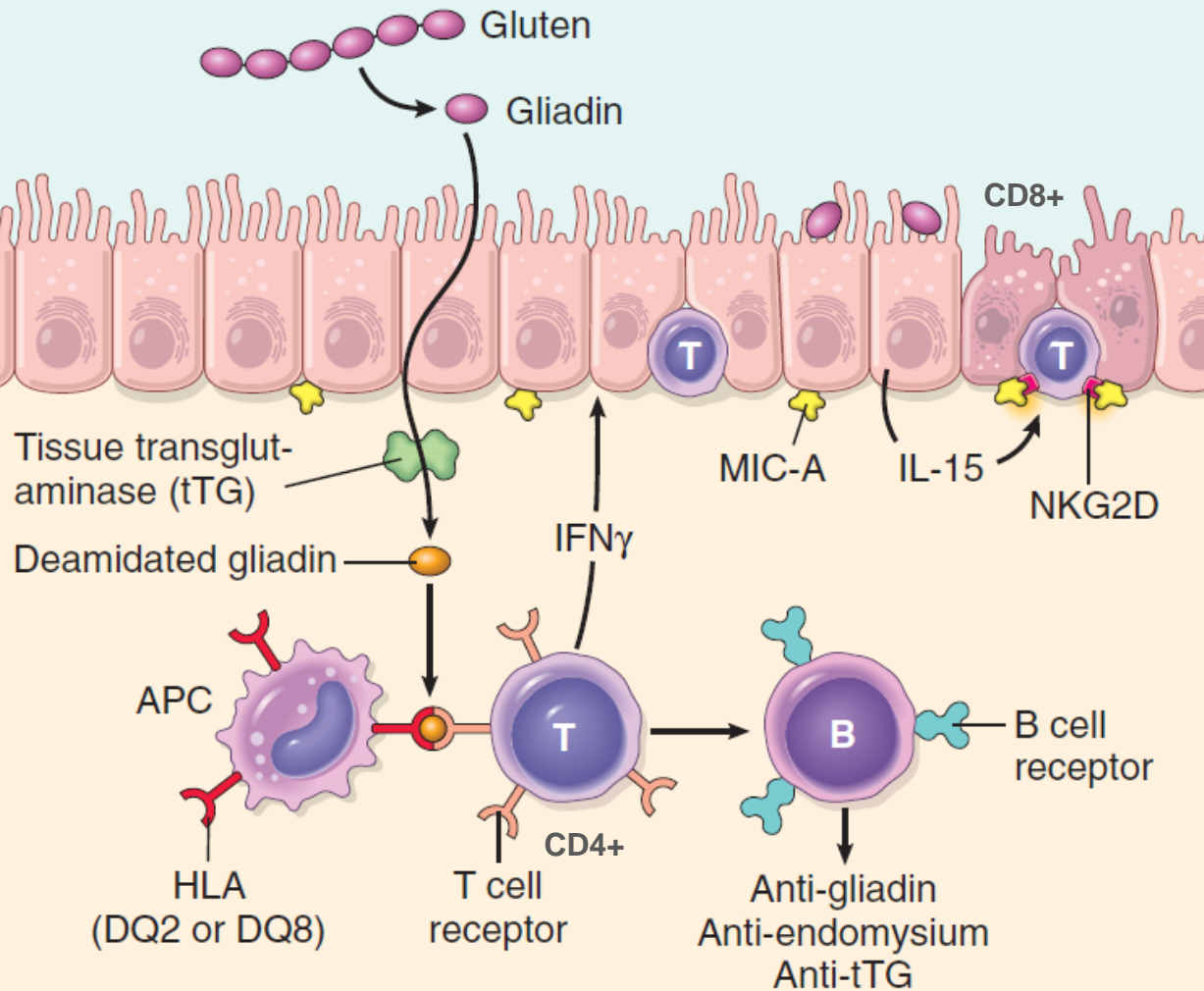
APC-CD4+ activation,  
cytokine production

B-cell response (Ab):

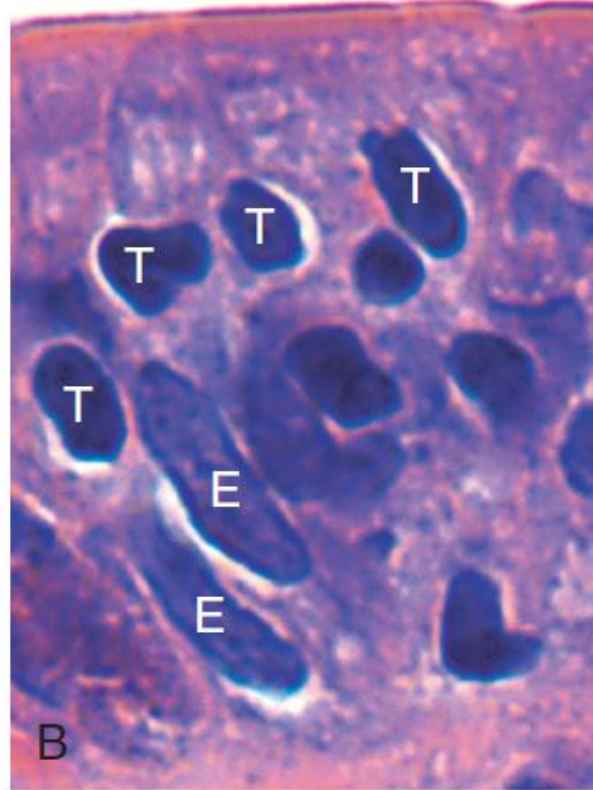
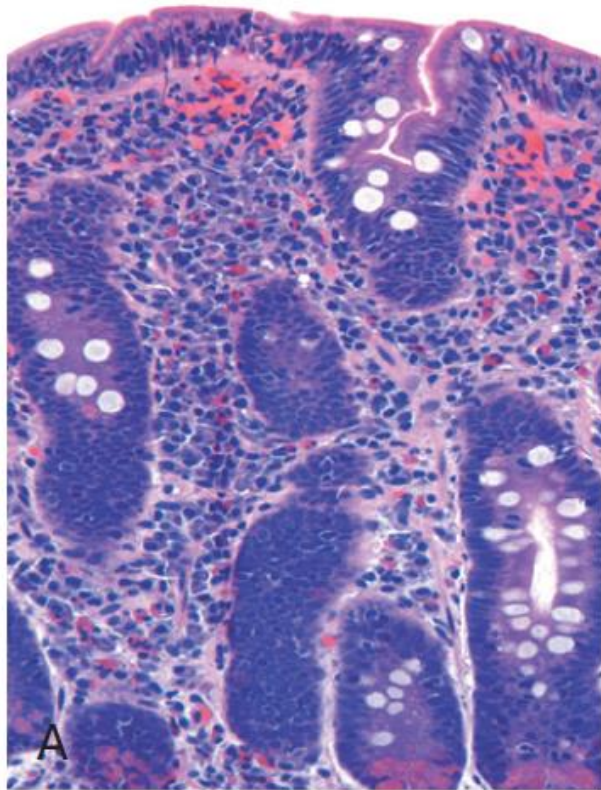
- anti-tissue transglutaminase
- anti-deamidated gliadin
- anti-endomysial (Dx)

IL-15 induced CD8+  
response

Epithelial damage, more  
Gliadin crosses, more  
damage.







## Celiac Disease

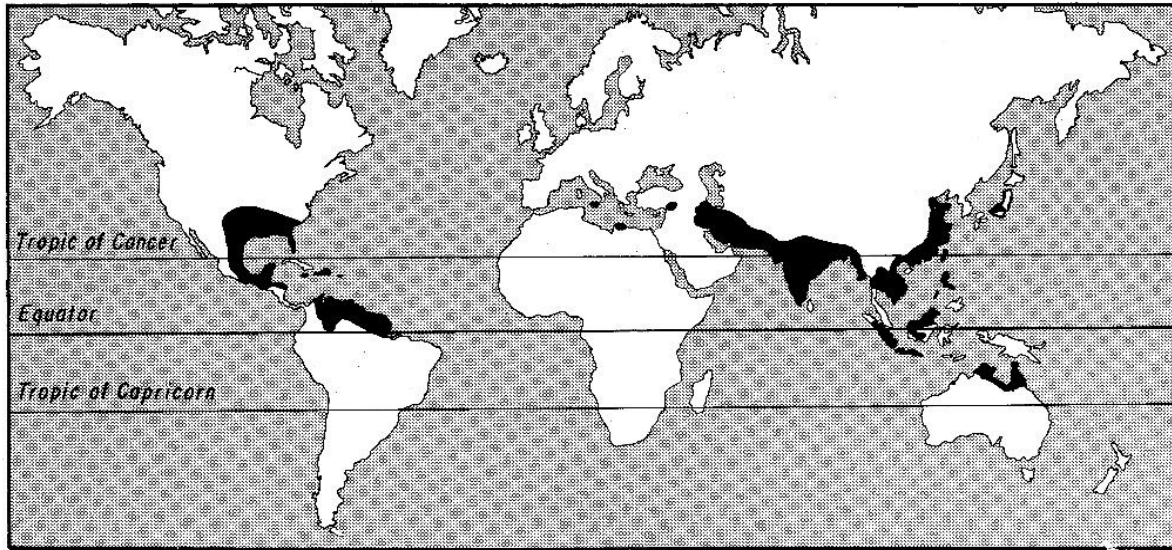
Villous atrophy & crypt hyperplasia (A)

↑ Intraepithelial lymphocytes (IELs) (A,B)

Non-specific changes, combined with serology becomes specific

*Silent:* Serology + villous atrophy, no symptoms

*Latent:* Serology only



## Environmental Enteropathy

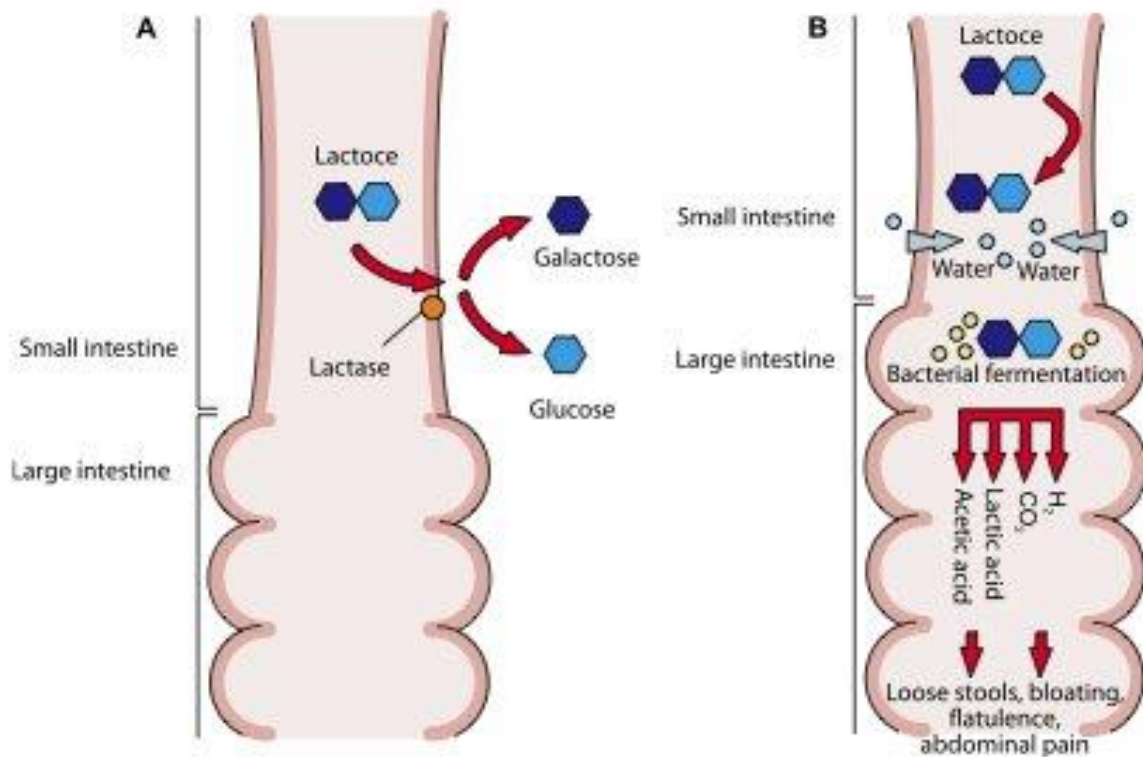
Previously known as tropical sprue

150 million children worldwide (stunted growth)

Malnutrition?  
Infection?

Repeated diarrhea during the first 2-3yrs of life

Similar histology to celiac disease



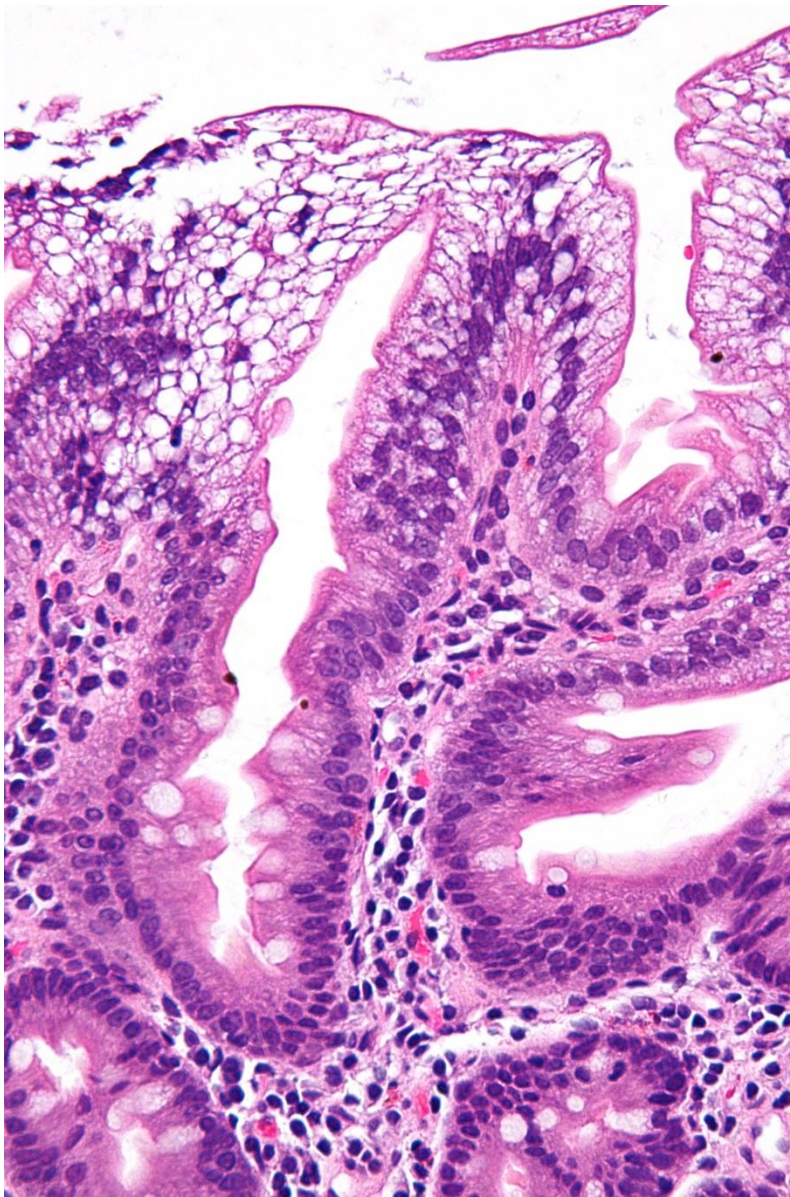
## Lactase Deficiency

Biochemical defect with  
Unremarkable biopsy

*Congenital* (AR) rare

*Acquired* downregulation  
after childhood or after  
enteric viral/bacterial  
infections





## Abetalipoproteinemia

AR (rare)

Transepithelial transport defect

Inability to secrete triglyceride-rich lipoproteins leading to accumulation in the epithelial cells

Manifests during infancy with failure to thrive, diarrhea, and steatorrhea