



DIGESTION AND ABSORPTION OF FOOD

By

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Lecture outline

Introduction

Anatomy of the gastrointestinal tract

Stomach and stomach emptying

Digestion and absorption of carbohydrates

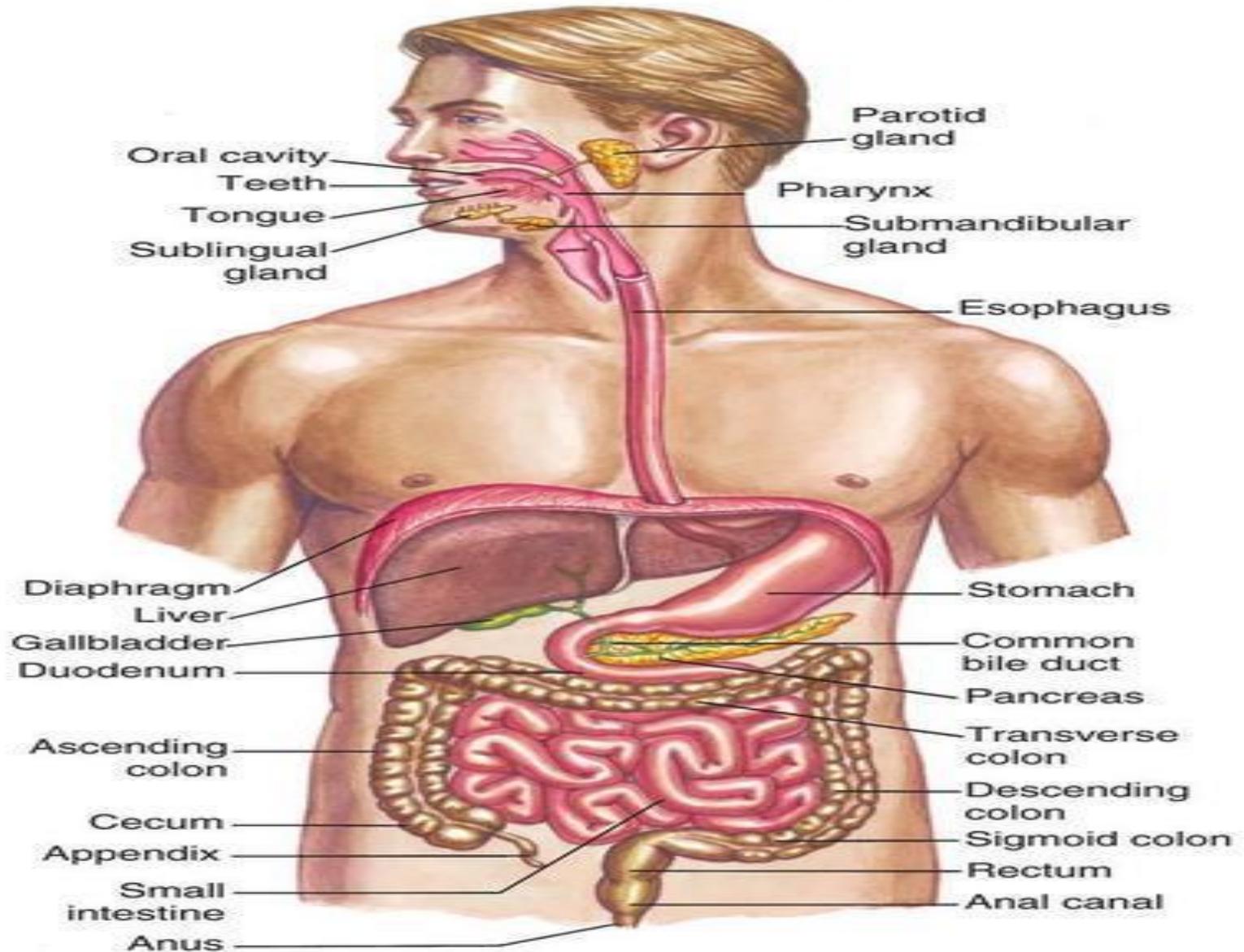
Digestion and absorption of proteins

Digestion and absorption of fats

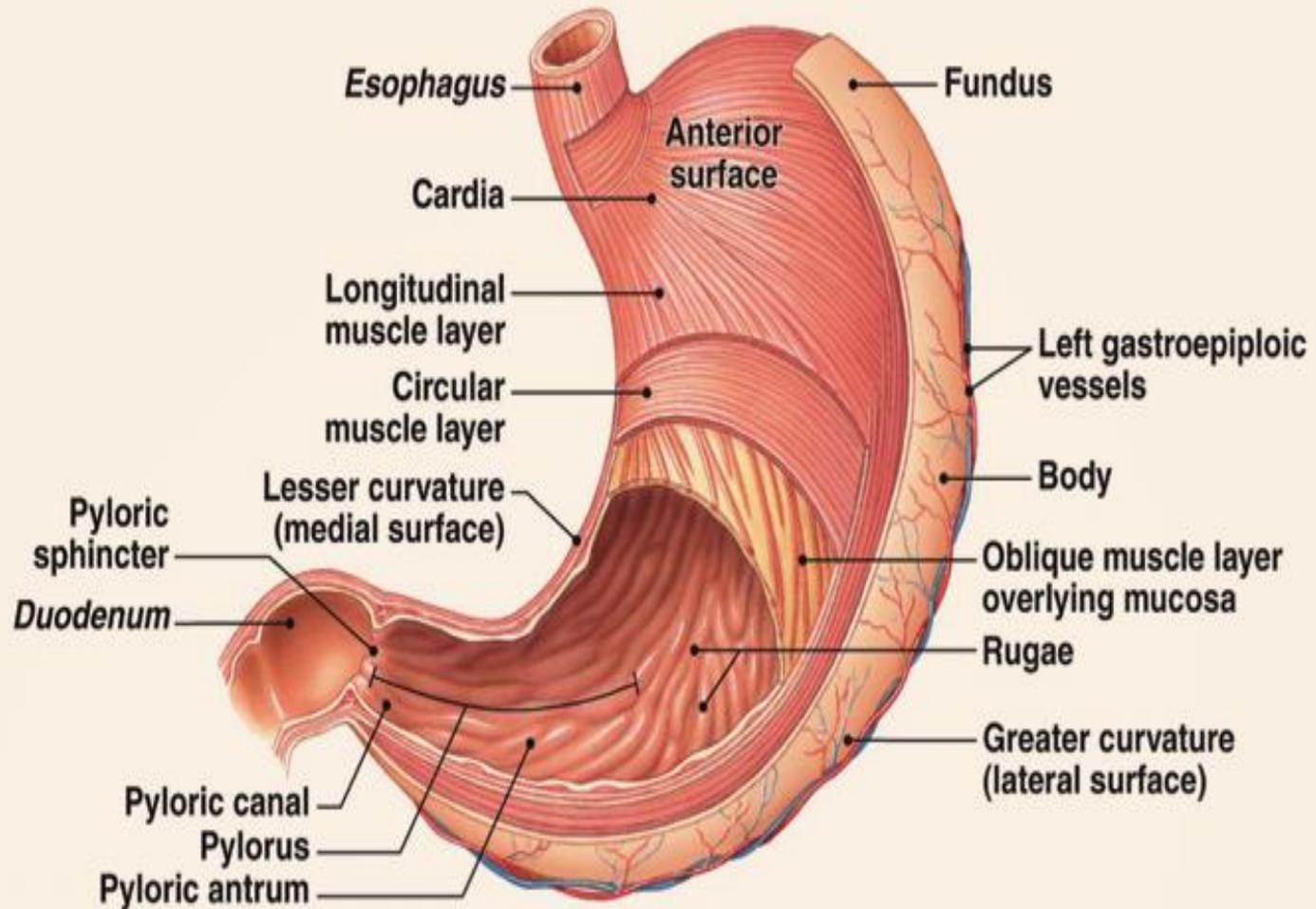
Conclusion

References

Anatomy of the gastrointestinal tract



Stomach & stomach emptying



Stomach emptying

- Mixing waves
- Hunger's contraction
- Pyloric sphincter

Carbohydrate digestion and absorption

Hydrolysis of carbohydrates . polysaccharides, disaccharides are converted to monosaccharides

Carbohydrates in the diet : starches , sucrose (cane sugar), lactose (milk products), glycogen from animal

Digestion of carbohydrate in the mouth: ptyalin or salivary amylase (alpha dextrin)

Digestion of carbohydrates in the small intestine

- Pancreatic secretion contains alpha amylase
- It is more powerful than salivary alpha amylase
- By the time chyme is emptied into the small intestine (duodenum and upper jejunum), all carbohydrates would have become digested

HYDROLYSIS OF DISACCHARIDES AND SMALL GLUCOSE POLYMERS INTO MONOSACCHARIDE BY INTESTINAL EPITHELIAL ENZYMES

- Enterocytes contain four enzymes (lactase, sucrase, maltase, isomaltase, alpha glucosidase)
- Lactose splits to glucose and galactose
- Sucrose splits into fructose and glucose
- Maltose splits into two molecules of glucose
- Isomaltose splits into two molecules of glucose

- Final products are all monosaccharides
- Glucose 90%
- Fructose and galactose 10%

Absorption of carbohydrates

- Secondary active transport of glucose

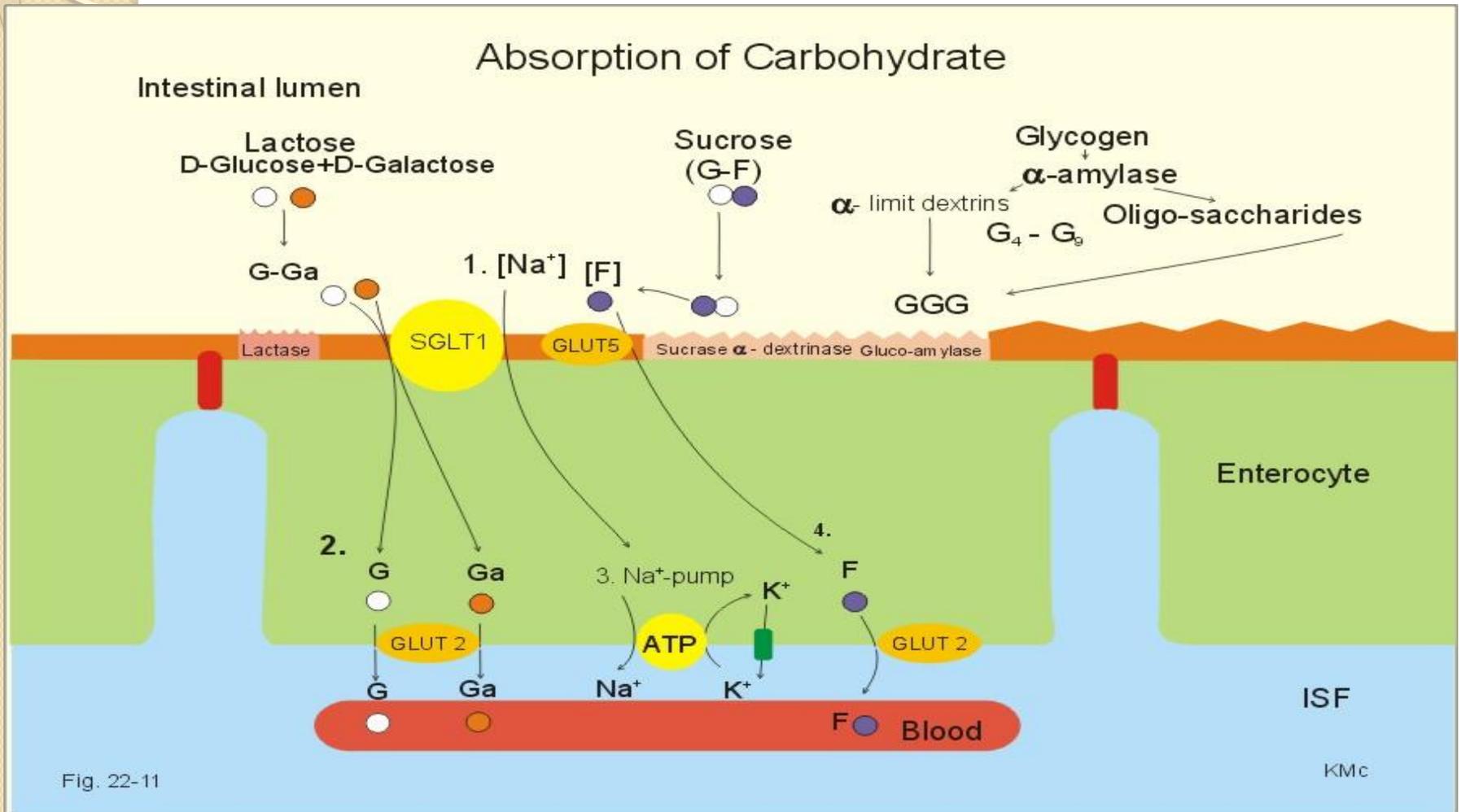
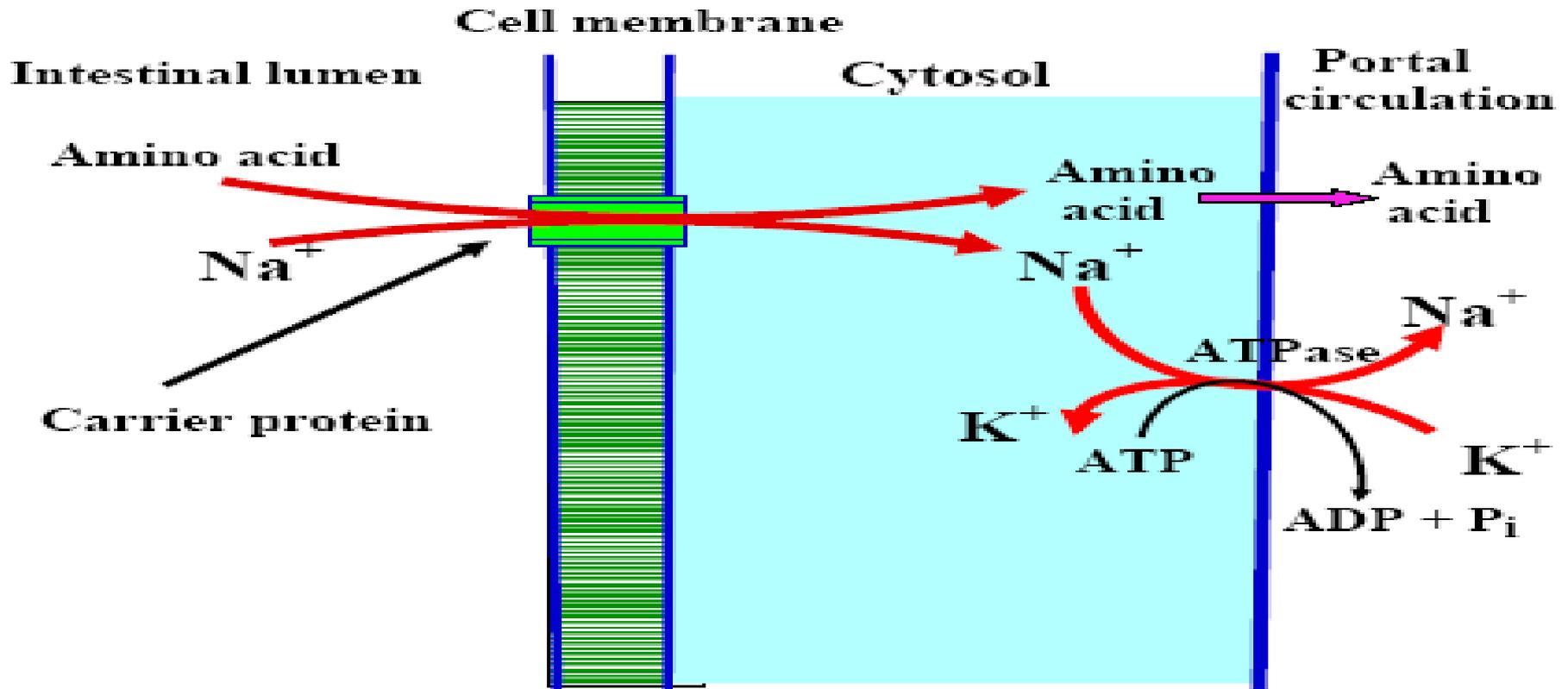


Fig. 22-11

Protein digestion

- Protein digestion starts from the stomach by the action of pepsin
- Digestion of collagen
- CCK , Secretin increases pancreatic juice secretion
- Stomach: Proteoses, peptones, polypeptides

Absorption of proteins



Carrier Protein Transport System

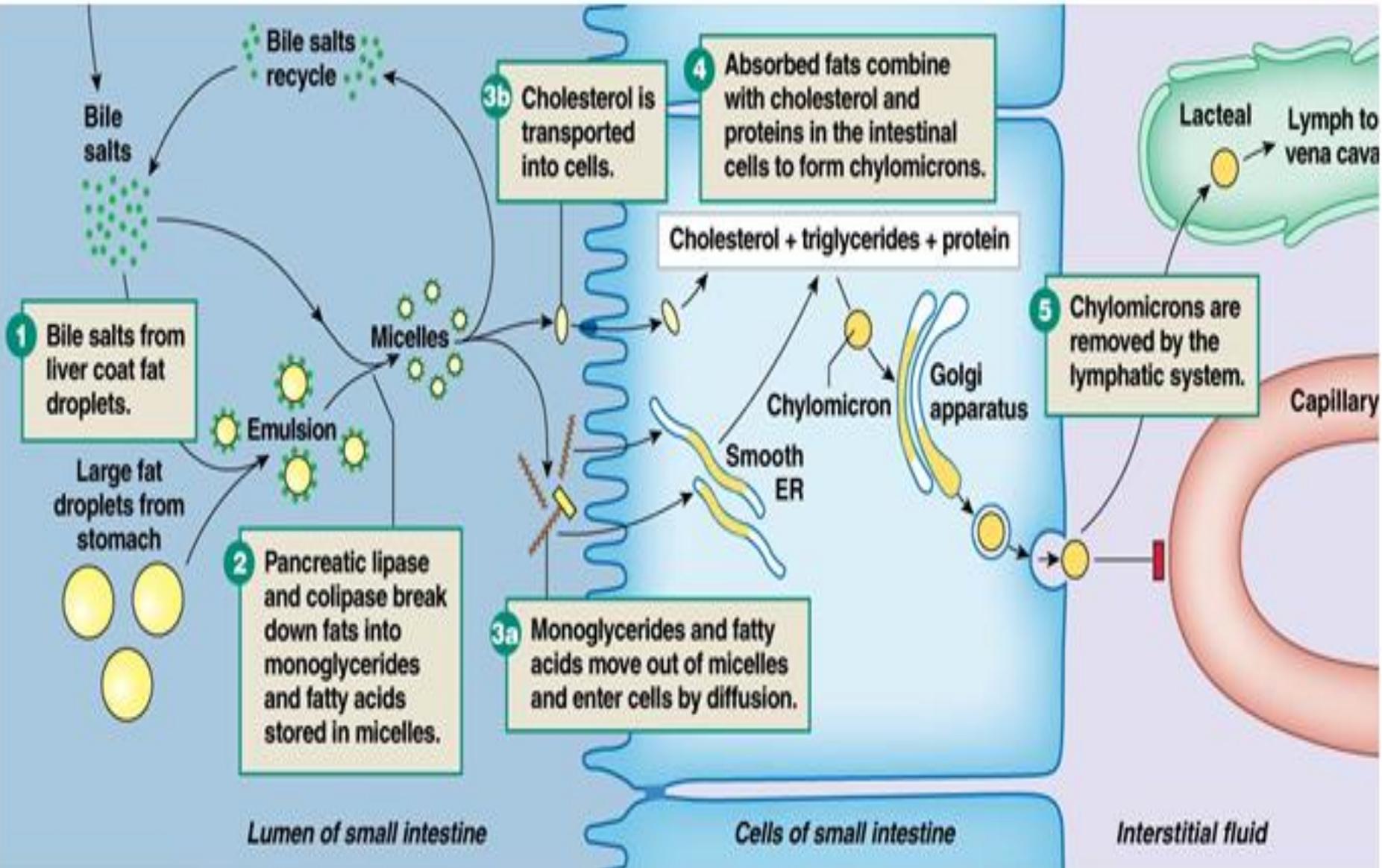
Fat digestion and absorption

- **Fats in the diet**
- Neutral fats (triglycerides)
- Cholesterol esters
- Phospholipids

Fat digestion

- Action of lingual lipase
- Digestion of fats in the intestine
- Emulsification of fat by bile salt and lecithin
- Digestion of triglycerides by pancreatic lipase
- Formation of micelles – by bile salts
- Digestion of cholesterol esters and phospholipids

Fat absorption



Absorption of water, vitamins & electrolytes

- Water by osmosis
- Vitamins: Fat soluble (A,D,E,K)

Water soluble vitamins (vitamin b12 and folate are Na independent. thiamin, riboflavin, niacin, pyridoxine, pantothenate, biotin and ascorbic acid are absorbed by carriers that are Na co-transporters)

- Electrolytes through channels

Clinical correlates

- Lactose intolerance
- Diabetes mellitus
- Diarrhea
- Pancreatitis



Thank you