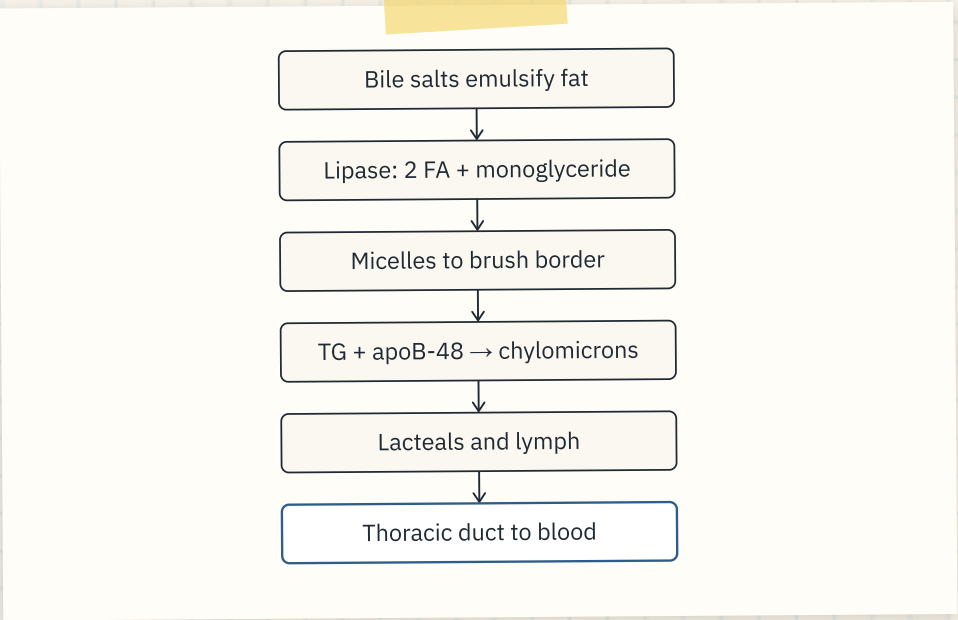
Carbohydrate and fat absorption

Two routes, two sets of failure points



Step by step

1. Starch: amylase, then brush-border enzymes
2. Sugars in: SGLT1 (glucose, galactose), GLUT5 (fructose)
3. Sugars out: GLUT2, into the blood
4. Fat: bile salts, lipase, micelles, chylomicrons
5. Chylomicrons travel by lymph, not the portal vein

SGLT1

1 glucose : 2 Na^+

glucose and galactose in by SGLT1; fructose by GLUT5; all three out by GLUT2

Failed step	Pattern or typical cause
Lactase	Gas, watery diarrhoea within 1–2 h
Lipase	Pancreatic insufficiency, e.g. chronic pancreatitis
Bile salts	Cholestasis, terminal ileal disease
Mucosa	Coeliac disease
Chylomicron assembly	Abetalipoproteinaemia

Pattern or cause by failed step (any fat step: steatorrhoea > 7 g/day)

Rule of thumb

Sugar problem: gas and watery diarrhoea

Fat problem: greasy stools and lost vitamins A, D, E, K

Medium-chain fats skip micelles and go mainly by the portal vein

Exam traps

- Chylomicrons bypass the portal vein at first; medium-chain fats do not.
- Steatorrhoea means more than 7 g of fat a day in stool.
- Malabsorption from pancreatic insufficiency appears only after about 90% of function is lost.
- Lactase deficiency does not cause fatty stools.

Carbohydrate and fat absorption: from plate to blood

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/gi-physiology-pathology/carbohydrate-fat-absorption

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