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Digestive System: GI Physiology

Printable Flashcards — Pre-Med Biology

GI anatomy, mechanical and chemical digestion, bile, pancreatic enzymes, GI hormones, and absorption.

209 cards — Print double-sided, flip on long edge, then cut along dashed lines.

209 cards — Printable Flashcards

Free & Open-Source

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1

GI tract in order (the 'food highway'):

2

Small intestine parts in order:

3

Large intestine parts (simplified):

4

Accessory organs (not the tube, but help digestion):

5

Liver does what for digestion? (1-liner)

6

Gallbladder does what?

7

Pancreas does what for digestion? (high-level)

8

Trap check: gallbladder makes bile. True or false?

2

Duodenum -> jejunum -> ileum.

1

Mouth -> esophagus -> stomach -> small intestine -> large intestine -> rectum/anus.

4

Salivary glands, liver, gallbladder, pancreas.

3

Cecum -> colon -> rectum.

6

Stores and concentrates bile, then releases it into the small intestine.

5

Makes bile.

8

False. Liver makes bile; gallbladder stores it.

7

Releases digestive enzymes and bicarbonate into the small intestine.

9

The stomach connects to the small intestine at the...

10

The esophagus connects to the stomach at the...

11

Sphincter of Oddi controls flow of... into the duodenum.

12

Mechanical digestion means...

13

Chemical digestion means...

14

Chewing is mostly... mechanical or chemical digestion?

15

Stomach churning is mostly...

16

Peristalsis vs segmentation: which one MOVES food forward?

10

Lower esophageal sphincter (LES).

9

Pyloric sphincter.

12

Physical breakdown/mixing of food (chewing, churning, segmentation).

11

Bile and pancreatic juice.

14

Mechanical (plus saliva starts chemical digestion).

13

Breaking chemical bonds with enzymes (and acid in stomach).

16

Peristalsis.

15

Mechanical mixing (but stomach also does chemical digestion for proteins).

17

Peristalsis vs segmentation: which one MIXES food without much forward movement?

18

If you picked 'segmentation pushes food to the anus', what did you mix up?

19

Vomiting is mainly controlled by the...

20

Diarrhea can cause dehydration fast because...

21

Digestive enzymes are...

22

Enzyme names often hint at what they digest. Example: lipase digests...

23

Amylase digests...

24

Proteases/peptidases digest...

18

Segmentation mixes. Peristalsis propels.

17

Segmentation.

20

Water/electrolytes aren't absorbed properly, so you lose them in stool.

19

Brainstem (vomiting center), with reflex input from gut.

22

Lipids (fats).

21

Proteins that speed up digestion by cutting big molecules into smaller ones.

24

Proteins (peptides) into smaller peptides and amino acids.

23

Starch (carbohydrates).

25

Lipase digests...

26

Nucleases digest...

27

Why are some digestive enzymes released as inactive 'zymogens'?

28

Pepsinogen becomes pepsin in the...

29

Trypsinogen is activated into trypsin in the...

30

Enzymes work best at certain pH. Stomach enzymes prefer...

31

Small intestine enzymes (pancreatic enzymes) prefer...

32

Saliva helps digestion by... (2 big things)

26

DNA/RNA (nucleic acids).

25

Triglycerides into fatty acids + monoglycerides.

28

Stomach (acid helps activate it).

27

So they don't digest the cells that make them.

30

Acidic pH.

29

Small intestine.

32

Lubricating food and starting starch digestion (amylase).

31

Neutral to slightly basic pH.

33

Salivary amylase starts digestion of...

34

Mechanical digestion in the mouth is done by...

35

Swallowing: epiglottis job is to...

36

Esophagus main job is...

37

Heartburn/reflux happens when...

38

Stomach's big jobs (high level):

39

Chyme is...

40

Stomach acid (HCl) does what? (2 big roles)

34

Teeth and tongue.

33

Starch (carbs).

36

Transport food to the stomach (peristalsis).

35

Cover the airway so food goes into the esophagus, not the trachea.

38

Store food, mix it into chyme, start protein digestion.

37

Stomach acid moves back up into the esophagus (often due to weak LES).

40

Kills many microbes and denatures proteins (helps pepsin work).

39

The semi-liquid mix of food + stomach juices leaving the stomach.

41

Parietal cells make... (2 things)

42

Chief cells make...

43

Mucus (from mucous cells) protects the stomach by...

44

Why doesn't the stomach digest itself?

45

Pepsin digests...

46

Protein digestion starts in the...

47

Intrinsic factor is needed to absorb...

48

Vitamin B12 absorption happens mainly in the...

42

Pepsinogen (inactive protein-digesting enzyme).

41

HCl and intrinsic factor.

44

Mucus/bicarbonate barrier + tight cell junctions + rapid cell turnover.

43

Forming a barrier so acid/pepsin don't digest the stomach wall.

46

Stomach.

45

Proteins (it's a protease).

48

Ileum (with intrinsic factor).

47

Vitamin B12.

49

Gastric emptying is controlled by the...

50

Fatty meals tend to make the stomach empty...

51

Trap: most nutrient absorption happens in the stomach. True or false?

52

The small intestine is the main site of...

53

Duodenum's big job is...

54

Jejunum is famous for... (high-level)

55

Ileum is famous for absorbing... (2 classic things)

56

Villi and microvilli are there to...

50

Slower.

49

Pyloric sphincter + signals from duodenum.

52

Digestion completion + nutrient absorption.

51

False.

54

Absorbing lots of nutrients (the bulk of absorption).

53

Neutralize stomach acid and mix chyme with bile + pancreatic juices.

56

Increase surface area for absorption.

55

Bile salts and vitamin B12.

57

Brush border means...

58

Pancreatic bicarbonate is important because it...

59

Pancreatic amylase continues digestion of...

60

Pancreatic proteases digest...

61

Pancreatic lipase digests...

62

Absorption of monosaccharides and amino acids goes into...

63

Absorption of long-chain dietary fats goes into...

64

Micelles are used to...

58

Neutralizes stomach acid in the duodenum.

57

The microvilli-covered surface of intestinal cells, loaded with enzymes/transporters.

60

Proteins into peptides (then peptidases finish to amino acids).

59

Starch (carbs).

62

Blood capillaries -> hepatic portal vein -> liver.

61

Triglycerides (fats).

64

Deliver fat digestion products (fatty acids/monoglycerides) to the intestinal wall.

63

Lacteals (lymph) as chylomicrons, then to blood.

65

Chylomicrons are used to...

66

If bile is missing, fat absorption gets...

67

Bile is... (one line)

68

Bile's main digestive job is to...

69

Emulsification is...

70

Trap: bile breaks triglycerides into fatty acids. True or false?

71

Bile is stored in the...

72

Bile enters the small intestine in the...

66

Worse (steatorrhea: fatty stool).

65

Package absorbed fats for transport through lymph/blood.

68

Emulsify fats (turn big fat blobs into tiny droplets).

67

A liver-made fluid with bile salts that helps digest/absorb fats.

70

False.

69

Physical breakup of fat droplets (not chemical digestion).

72

Duodenum.

71

Gallbladder.

73

Bile salts are recycled mainly in the...

74

Enterohepatic circulation means...

75

Bilirubin is excreted mainly via...

76

Gallstones are usually made of... (basic)

77

Pancreas has two jobs: exocrine and endocrine. Exocrine means...

78

Pancreas endocrine job is mainly...

79

Pancreatic juice contains... (2 categories)

80

Why does the duodenum need bicarbonate?

74

Bile salts go gut -> reabsorbed -> back to liver -> reused.

73

Ileum.

76

Cholesterol crystals.

75

Bile (into the intestine).

78

Insulin and glucagon (blood sugar control).

77

It secretes digestive enzymes/bicarbonate into the gut.

80

To protect the intestine and let pancreatic enzymes work.

79

Digestive enzymes + bicarbonate.

81

Secretin's main effect is to stimulate...

82

CCK's main effects (high-level) are to stimulate...

83

If the duodenum senses too much acid, the hormone response is mostly...

84

If the duodenum senses fat, the hormone response is mostly...

85

GI hormones are mainly about...

86

Gastrin is released when the stomach is...

87

Gastrin mainly increases...

88

Secretin is released when the duodenum senses...

82

Pancreatic enzyme secretion and gallbladder contraction.

81

Pancreatic bicarbonate secretion (and bile).

84

CCK -> bile release + pancreatic enzymes.

83

Secretin -> more bicarbonate.

86

Stretched and when protein is present (and via vagus input).

85

Coordinating digestion: secretion + motility based on what's in the gut.

88

Acidic chyme.

87

Stomach acid (HCl) secretion and stomach motility.

89

Secretin's job is mainly to increase...

90

CCK is released when the duodenum senses...

91

CCK causes the gallbladder to...

92

CCK also causes the stomach to empty...

93

GIP (glucose-dependent insulinotropic peptide) is released in response to...

94

GIP tends to... (big effect)

95

GLP-1 (another incretin) generally...

96

Motilin is most active during...

90

Fat and protein.

89

Bicarbonate from pancreas
(and bile secretion from liver).

92

More slowly.

91

Contract (release bile).

94

Increase insulin secretion and
reduce stomach acid/motility a bit.

93

Glucose/fat in the small intestine.

96

Fasting (between meals).

95

Increases insulin, decreases glucagon,
and slows gastric emptying.

97

Somatostatin is basically a...

98

Ghrelin is linked to...

99

Enteric nervous system (ENS) is basically...

100

Parasympathetic (vagus) generally does what to digestion?

101

Sympathetic system generally does what to digestion?

102

Peristalsis is triggered by stretch in the gut wall. This is a...

103

Gastrocolic reflex means...

104

What's the point of sphincters in GI tract?

98

Hunger (often rises before meals).

97

General 'slow down' hormone
that inhibits many GI secretions.

100

Speeds it up (more motility/secretions).

99

A 'mini-brain' in the gut wall
that controls digestion locally.

102

Local reflex (ENS) that can be modulated by CNS.

101

Slows it down (less motility/secretions).

104

One-way control: prevent backflow
and regulate flow between sections.

103

Eating triggers increased colon motility
(you feel like you need to poop).

105

Ileocecal valve separates...

106

Most nutrient absorption happens in the...

107

Most water absorption happens in the...

108

Iron is absorbed mainly in the... (classic)

109

Calcium absorption is mainly in the... (classic)

110

Bile salts are reabsorbed mainly in the...

111

Vitamin B12 is absorbed mainly in the...

112

Folate (B9) absorption is mainly in the... (simple)

106

Small intestine.

105

Ileum (small intestine) from cecum (large intestine).

108

Duodenum.

107

Large intestine (colon), but
small intestine absorbs a lot too.

110

Ileum.

109

Duodenum/jejunum (and needs vitamin D).

112

Jejunum.

111

Ileum (with intrinsic factor).

113

Fat-soluble vitamins (A, D, E, K) need... for absorption.

114

Oral rehydration solution (ORS) works because... (core idea)

115

Large intestine main jobs (high-level):

116

Gut bacteria can make some... (classic vitamin)

117

Fiber is useful because it...

118

Fermentable fiber can be turned into... by gut bacteria.

119

Why does fiber sometimes cause gas?

120

Constipation is often basically...

114

Glucose helps sodium absorption, and water follows.

113

Normal fat absorption (bile + micelles).

116

Vitamin K (and some B vitamins).

115

Absorb water/electrolytes and form/store feces.

118

Short-chain fatty acids (SCFAs).

117

Adds stool bulk and supports healthy gut movement (and feeds good bacteria).

120

Slow transit -> too much water absorbed -> hard stool.

119

Bacteria ferment it and produce gas.

121

Hepatic portal vein carries blood from... to the liver.

122

Why send nutrients to the liver first? (one big reason)

123

First-pass effect (in meds, but concept) means...

124

Liver roles (name 3 besides bile):

125

Trap: absorbed fats go directly to the liver first. True or false?

126

Salivary glands secrete...

127

Stomach secretes... (3 key things)

128

Pancreas secretes... (exocrine)

122

The liver processes, stores, and detoxifies before nutrients hit the whole body.

121

The GI tract.

124

Detox, glycogen storage, making plasma proteins, processing nutrients.

123

Stuff absorbed from gut can be metabolized by liver before reaching the rest of the body.

126

Saliva (with amylase).

125

False (for long-chain fats).

128

Bicarbonate + digestive enzymes (amylase, lipase, proteases).

127

Acid (HCl), pepsinogen, mucus (plus intrinsic factor).

129

Small intestine (brush border) enzymes do what?

130

Lactase is a brush border enzyme. It breaks down...

131

Enteropeptidase (enterokinase) activates... (hard)

132

Why is trypsin activation kept in the small intestine?

133

GERD/reflux pain is worse when lying down because...

134

An ulcer is basically...

135

H. pylori is associated with...

136

Why does the duodenum need protection from acid too?

130

Lactose -> glucose + galactose.

129

Finish digestion at the intestinal wall (disaccharides -> monosaccharides, peptides -> amino acids).

132

To avoid the pancreas digesting itself.

131

Trypsinogen -> trypsin.

134

A sore where the protective lining fails and acid damages tissue.

133

Gravity isn't helping keep acid in the stomach.

136

Acid can damage it, so bicarbonate neutralizes acid quickly.

135

Some stomach/duodenal ulcers.

137

Antacids work by...

138

Carb digestion starts in the...

139

Protein digestion starts in the...

140

Fat digestion mostly happens in the...

141

Carbs are absorbed mainly as...

142

Proteins are absorbed mainly as...

143

Fats are absorbed mainly as... (in the gut wall)

144

If you see 'emulsification', it's about...

138

Mouth (salivary amylase).

137

Neutralizing stomach acid.

140

Small intestine (bile + pancreatic lipase).

139

Stomach (pepsin + acid).

142

Amino acids (and small peptides).

141

Monosaccharides.

144

Fats.

143

Fatty acids + monoglycerides
(then rebuilt into triglycerides).

145

If you see 'brush border enzyme deficiency', most likely issue is with...

146

Why does fat malabsorption cause oily stools?

147

Bolus is...

148

Chyme is...

149

Feces is...

150

If a question uses the word 'chyme', the action is happening in/after the...

151

If a question uses the word 'bolus', the action is happening in the...

152

Scenario: chyme enters duodenum and it's very acidic. What hormone rises first?

146

Unabsorbed fat stays in the gut and exits in stool (steatorrhea).

145

Carb digestion (like lactose intolerance) or final peptide cutting.

148

Food mixed with stomach acid/juices (stomach -> small intestine).

147

Chewed food ready to swallow (mouth -> esophagus).

150

Stomach.

149

The final waste after water absorption and bacterial processing (large intestine).

152

Secretin.

151

Mouth/esophagus stage.

153

Scenario: acid in duodenum -> secretin -> pancreas releases...

154

Scenario: fatty meal hits duodenum -> what hormone rises?

155

Scenario: CCK rises -> gallbladder does what?

156

Scenario: person had gallbladder removed. Can they still make bile?

157

Scenario: blocked bile duct -> main digestion issue is with...

158

Scenario: pancreas exocrine failure -> main digestion issue is...

159

Scenario: villi are damaged (like severe inflammation). Biggest problem is...

160

Scenario: lactase deficiency. Which nutrient is not digested well?

154

CCK.

153

Bicarbonate.

156

Yes (liver still makes bile), but storage/concentration is reduced.

155

Contracts (releases bile).

158

Poor digestion of carbs/proteins/fats (enzyme deficiency) and acid not neutralized well (low bicarb).

157

Fats (and ADEK vitamins).

160

Lactose (carb) -> leads to gas + diarrhea.

159

Malabsorption (less surface area).

161

Sucrase breaks down...

162

Maltase breaks down...

163

Lactase breaks down...

164

Brush border enzymes live on the...

165

If a disaccharidase is missing, the result is usually...

166

Lactose is...

167

Lactase is...

168

Lacteals are...

162

Maltose -> glucose + glucose.

161

Sucrose -> glucose + fructose.

164

Microvilli of small intestine cells.

163

Lactose -> glucose + galactose.

166

Milk sugar (a carbohydrate).

165

Osmotic diarrhea + gas
(undigested sugar stays in gut).

168

Lymphatic vessels in intestinal villi
that absorb fats (chylomicrons).

167

The enzyme that breaks lactose.

169

Why do fats go into lacteals instead of blood capillaries right away?

170

CCK name hack: chole-cysto-kinin basically hints...

171

If stomach pH gets TOO low (very acidic), the body tends to...

172

Vagus nerve (parasympathetic) generally does what to stomach acid?

173

Secretin and CCK tend to do what to stomach emptying and acid output? (high-level)

174

Bicarbonate neutralizes acid. Where does most digestive bicarbonate come from?

175

Trap: bile's main job is neutralizing acid. True or false?

176

Mechanical digestion match: chewing (mouth), churning (stomach), segmentation (small intestine). True?

170

Gallbladder movement (contracts).

169

Chylomicrons are too big for blood capillaries, so they enter lymph first.

172

Increases it (prepares for digestion).

171

Reduce acid secretion (negative feedback).

174

Pancreas.

173

Slow it down when duodenum needs time to digest.

176

True.

175

False.

177

Chemical digestion match: amylase (mouth + pancreas), pepsin (stomach), lipase (pancreas). True?

178

If a stem says 'food mixing in small intestine', answer is...

179

If a stem says 'wave pushing bolus down esophagus', answer is...

180

Hormone released when acid enters the duodenum:

181

Hormone released when fat/protein enters the duodenum:

182

Hormone that increases stomach acid and motility:

183

Fluid that emulsifies fats (not an enzyme):

184

Organ that makes bile:

178

Segmentation.

177

Mostly true.

180

Secretin

179

Peristalsis.

182

Gastrin

181

CCK

184

Liver

183

Bile

185

Organ that stores/releases bile:

186

Main fat-digesting enzyme in small intestine:

187

Enzyme that starts starch digestion in the mouth:

188

Protein-digesting enzyme in the stomach:

189

Structure that increases absorption surface area in small intestine:

190

Main site of nutrient absorption:

191

Main site of water reabsorption (exam answer):

192

Vessel that brings absorbed sugars/amino acids to the liver first:

186

Pancreatic lipase

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185

Gallbladder

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188

Pepsin

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187

Salivary amylase

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190

Small intestine

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189

Villi (and microvilli)

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192

Hepatic portal vein

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191

Large intestine (colon)

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193

Lymph vessels in villi that absorb fats:

194

Mixing contractions in small intestine:

195

Wave that moves food forward in GI tract:

196

GI tract order: mouth -> {{c1::esophagus}} -> {{c2::stomach}} -> {{c3::small intestine}} -> {{c4::large intestine}}.

197

Small intestine order: {{c1::duodenum}} -> {{c2::jejunum}} -> {{c3::ileum}}.

198

Mechanical vs chemical: chewing/churning = {{c1::mechanical}}; enzymes cutting bonds = {{c2::chemical}} digestion.

199

Peristalsis {{c1::moves}}; segmentation {{c2::mixes}}.

200

Bile {{c1::emulsifies}} fat; lipase {{c2::digests}} triglycerides.

194

Segmentation

193

Lacteals

196

GI tract order: mouth -> esophagus -> stomach -> small intestine -> large intestine.

195

Peristalsis

198

Mechanical vs chemical: chewing/churning = mechanical; enzymes cutting bonds = chemical digestion.

197

Small intestine order: duodenum -> jejunum -> ileum.

200

Bile emulsifies fat; lipase digests triglycerides.

199

Peristalsis moves; segmentation mixes.

201

Liver {{c1::makes}} bile;
gallbladder {{c2::stores}} it.

202

Acid in duodenum -> {{c1::secretin}}
-> pancreatic {{c2::bicarbonate}}.

203

Fat/protein in duodenum -> {{c1::CCK}}
-> gallbladder {{c2::contracts}} +
pancreas releases {{c3::enzymes}}.

204

Most absorption happens in the {{c1::small intestine}}; colon mainly absorbs {{c2::water}}.

205

Sugars + amino acids go to {{c1::blood}}
then {{c2::portal vein}} then {{c3::liver}};
fats go to {{c4::lymph}} as chylomicrons.

206

Stomach protein digestion:
{{c1::HCl}} + {{c2::pepsin}}.

207

Fat-soluble vitamins: {{c1::A}}, {{c2::D}},
{{c3::E}}, {{c4::K}} (need fat absorption).

208

LES = {{c1::lower esophageal sphincter}} (prevents reflux).

202

Acid in duodenum -> secretin -> pancreatic bicarbonate.

201

Liver makes bile; gallbladder stores it.

204

Most absorption happens in the small intestine; colon mainly absorbs water.

203

Fat/protein in duodenum -> CCK -> gallbladder contracts + pancreas releases enzymes.

206

Stomach protein digestion: HCl + pepsin.

205

Sugars + amino acids go to blood then portal vein then liver; fats go to lymph as chylomicrons.

208

LES = lower esophageal sphincter (prevents reflux).

207

Fat-soluble vitamins: A, D, E, K (need fat absorption).

209

Ileum absorbs {{c1::bile salts}} and {{c2::vitamin B12}} (with intrinsic factor).

209

Ileum absorbs bile salts and
vitamin B12 (with intrinsic factor).