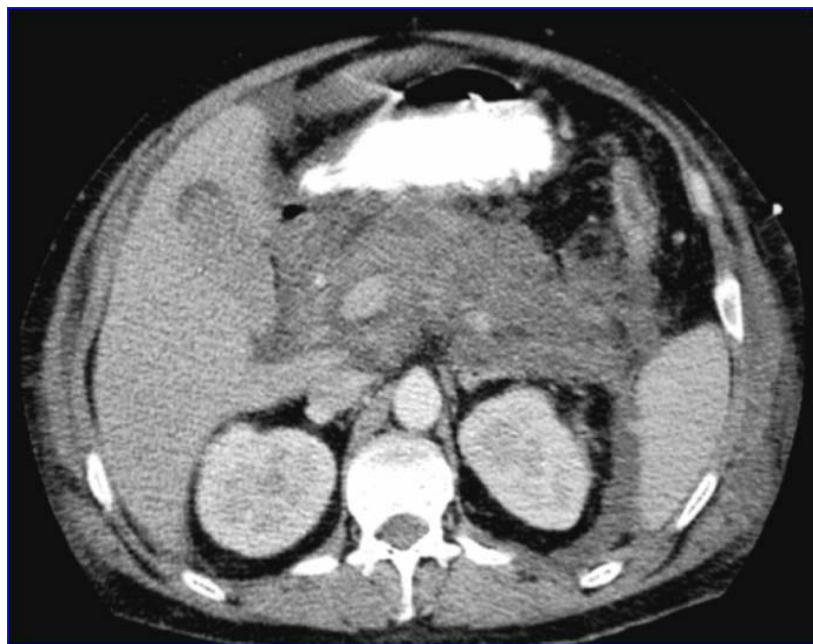


Gastrointestinal Pathophysiology Exam 2006
Tufts University School of Medicine

Instructions: please select the one BEST answer.

1. Three days into the hospitalization for an acute illness a CT scan is performed on a 32 year old woman. She initially presented to the emergency room with severe periumbilical pain, nausea, and vomiting. She denied any alcohol use and was on no medications. She had previously been feeling well. She was treated with intravenous fluids and kept nothing by mouth. An initial ultrasound exam of the abdomen revealed gallstones within the gallbladder and a mildly dilated common bile duct. Because her symptoms persisted and she developed a fever the CT scan was obtained.



Which of following statements best describes the pathophysiology of this condition?

- A. Obstruction of the cystic duct due to gallstones
 - B. Activation of pancreatic enzymes within the pancreas
 - C. Obstruction of the pancreatic duct due to proteinaceous plugs
 - D. Reduction in pancreatic enzyme synthesis and secretion
 - E. Reduction in stimulation of intracellular calcium signaling pathways
2. A 52 year old man has had heartburn for over 20 years. He reports no dysphagia or odynophagia. An upper endoscopy shows no significant hiatal hernia.

Which of the following esophageal motility test findings would you most likely expect to see in this patient?

- A. Frequent transient lower esophageal sphincter relaxations
- B. Elevated resting lower esophageal sphincter pressure

- C. Reduced resting lower esophageal sphincter pressure
 - D. Infrequent transient lower esophageal sphincter relaxations
 - E. High amplitude peristaltic contractions in the esophageal body
3. A 46 year old patient is referred for evaluation of abnormal liver function tests. The ALT is elevated at 115 U/l. His prior physician informed him that he has chronic hepatitis B and C. The physician also said that the hepatitis B is inactive (not actively replicating) and therefore medical therapy is not indicated.

Which of the follow sets of viral hepatitis serologies is most likely in this patient?

	Hepatitis B surface antigen	Hepatitis B surface antibody	Hepatitis B core IgM antibody	Hepatitis B e antigen	Hepatitis B e antibody	Hepatitis C antibody
A	Negative	Positive	Positive	Positive	Negative	Positive
B	Positive	Negative	Positive	Positive	Negative	Positive
C	Positive	Negative	Negative	Negative	Positive	Positive
D	Positive	Negative	Negative	Positive	Negative	Positive
E	Negative	Positive	Negative	Negative	Positive	Negative

4. A barium swallow x-ray on a 55 year old woman is shown below.



Which of the following would you most likely expect this patient to have?

- A. Dysphagia to solids and liquids
 - B. Dysphagia to liquids
 - C. A hiatal hernia
 - D. A duodenal ulcer
 - E. Esophageal cancer
5. A 65 year old woman has primary biliary cirrhosis and is awaiting liver transplantation. She has ascites and spider angiomata on physical examination and large esophageal varices on upper endoscopy.

Which of the following would most likely be decreased?

- A. Resistance to blood flow through the liver
 - B. Rate of blood flow through the splanchnic circulation
 - C. Level of vasodilators in the blood
 - D. Hepatic vein pressure gradient
 - E. Peripheral vascular resistance
6. A 66 year old woman has new symptoms of profuse watery non-bloody diarrhea. The diarrhea does not improve when oral intake is limited. She has had a 5 pound weight loss. All stool cultures are negative. Fecal leukocytes are negative. A Sudan stain performed on a stool specimen is negative. Stool electrolytes are checked: stool sodium concentration is 85mmol/l and stool potassium concentration is 50mmol/l.

Which of the following is the most likely diagnosis?

- A. Irritable bowel syndrome
 - B. Chronic pancreatitis
 - C. Carcinoid syndrome
 - D. Ulcerative colitis
 - E. Abuse of lactulose
7. A 75 year old man is admitted to the intensive care unit with upper gastrointestinal bleeding. An upper endoscopy is performed urgently after the patient is resuscitated with intravenous fluids and packed red blood cells. There is a large ulcer in the duodenal bulb with a visible vessel. Endoscopic therapy is applied and the bleeding stops. He is put on intravenous pantoprazole. A rapid urease test on a mucosal biopsy from the gastric antrum is positive.

Which of the following findings would one most likely find in this patient?

- A. Reduced gastric acid production
 - B. Parietal cell antibodies
 - C. Normal gastric acid production
 - D. Normal gastric antral mucosa
 - E. Markedly elevated gastrin level after a meal
8. A 68 year old woman complains of bright red blood per rectum with extreme pain with defecation. She reports no prior trauma. She had two caesarean sections at the time of the births of her children over 40 years ago. She has intermittent problems with constipation. She has no other medical history.

Which of the following findings would you most likely see on physical examination?

- A. External skin tags
- B. Scarring from perianal fistulae
- C. Anal fissure
- D. Internal hemorrhoids
- E. Pilonidal cyst

9. A 65 year old man, on TPN (total parenteral nutrition) for several months due to an obstructing esophageal cancer, complains of intermittent episodes of severe right upper quadrant abdominal pain radiating to the right shoulder. These episodes are associated with nausea and vomiting. A right upper quadrant ultrasound shows a few small gallstones and sludge in the gallbladder. His serum cholesterol level is 290 mg/dl (normal < 200mg/dl).

The most likely predisposing factor for this patient's sludge and gallstones is which of the following?

- A. TPN
 - B. Gender
 - C. Dehydration
 - D. Serum cholesterol level
 - E. Esophageal cancer
10. A 25 year old man has had intermittent diarrhea for the past year. Over the past 3 months his diarrhea has increased in frequency and he is waking at night to move his bowels. Lately he has noted blood in the stool with some mucus. He has quite a bit of urgency to move his bowels and notes that the volume of stool output is quite small. He denies significant abdominal pain except for some mild left lower quadrant discomfort associated with a bowel movement. His physical examination is normal. He has no fever. His serum ASCA (anti-saccharomyces cereversiae antibody) level is undetectable and pANCA (peri-nuclear antineutrophil cytoplasmic antibody) level is elevated.

Which of the following is the most likely colonoscopic finding?

- A. Normal rectum
 - B. Deep ulcers in the colon
 - C. Normal vascular markings
 - D. Diffuse and circumferential pinpoint ulcers in the colon
 - E. Pinpoint ulcers in ileum
11. You are evaluating a 29 year old physician for constipation. Her physical examination including ano-rectal exam is normal. Thyroid testing and serum calcium levels are normal. A colonoscopy is normal. You make a diagnosis of constipation-predominant irritable bowel syndrome. The patient has minimal response to bulk forming agents and osmotic laxatives. You recommend beginning tegaserod. The patient asks how this drug works.

Which of the following is the best description of the mechanism of action of tegaserod?

- A. It stimulates 5-HT₃ receptors
- B. It stimulates nitric oxide containing neurons
- C. It inhibits acetylcholine containing neurons
- D. It inhibits water absorption in the colon
- E. It stimulates 5-HT₄ receptors

12. A 44 year old man is awaiting liver transplantation for chronic hepatitis C induced cirrhosis. He has ascites, esophageal varices, and intermittent problems with hepatic encephalopathy. His recent blood tests are as follows:

ALT 76 U/l
AST 35 U/l
Alkaline phosphatase 105 U/l
Total bilirubin 4.5 mg/dl
Direct bilirubin 3.8 mg/dl
Prothrombin time 20 seconds (INR 1.8)
Platelet count 55,000
Albumin 3.2

Which of the following sets of blood tests provides the best assessment of this patient's liver synthetic function?

- A. Platelet count and total bilirubin
 - B. Prothrombin time and albumin
 - C. Prothrombin time and alkaline phosphatase
 - D. Prothrombin time and total bilirubin
 - E. Albumin and AST
 - F. Albumin and ALT
13. A 65 year old man presents with periumbilical abdominal pain which often radiates to the back. The pain has been present intermittently for over 3 years. Approximately 5 years ago he stopped drinking alcohol heavily. He used to drink two six-packs of beer daily, more on weekends. His physical exam is unremarkable. An abdominal CT scan reveals occasional small pancreatic calcifications. An endoscopic retrograde cholangiopancreatography shows a dilated, irregular pancreatic duct with dilated side branches.

Which of the following tests will most likely be abnormal in this patient?

- A. Lactulose hydrogen breath test
 - B. Helicobacter pylori serology
 - C. Fecal elastase
 - D. Fecal leukocytes
 - E. Vitamin C level
14. You are counseling a 14 year old boy, recently diagnosed with ulcerative colitis, and his parents about long-term complications of the disease. A colonoscopy revealed inflammation throughout the entire colon.

Which of the following complications is this patient most at risk for?

- A. Adenocarcinoma of the colon
- B. Peri-anal fistulae
- C. Colonic stricture
- D. Bile acid induced diarrhea

E. Gallstones

The following case presentation is for questions 15 and 16:

A 55 year old woman with scleroderma has, in addition to complaints of dysphagia to solids and liquids, a one year history of non-bloody diarrhea. She has additional symptoms of abdominal gas and bloating. She has lost approximately 10 lbs. In evaluating her dysphagia an upper gastrointestinal series with barium is performed and the radiologist gives more barium to allow examination of the small intestine. The small intestinal portion of the test is remarkable for several small bowel diverticula. You suspect her diarrheal symptoms are due to small intestinal bacterial overgrowth syndrome.

15. Which of the following tests will most accurately confirm your clinical suspicions?

- A. Aspiration of gastric contents at the time of upper endoscopy
- B. Aspiration of terminal ileal contents at the time of colonoscopy
- C. Sudan stain on a stool specimen
- D. Lactulose breath test
- E. Fecal osmotic gap
- F. Fecal chymotrypsin level

16. This patient has an abnormal bone density study. A vitamin D level is checked and it is low.

What is the most likely pathophysiologic mechanism that explains why vitamin D is malabsorbed in this patient?

- A. Excess bacteria cause rapid intestinal motility
- B. Bile acids are not appropriately reabsorbed
- C. Excess bacteria cause mucosal damage
- D. Pancreatic enzymes are inactive in the presence of excess bacteria
- E. Bile acids are deconjugated in the intestinal lumen

17. A 32 year old woman presents to the emergency room with severe epigastric and right upper quadrant pain 3 hours after eating a large cheeseburger. The pain occasionally radiates to her right flank and right back. She has a low grade temperature and is tender to palpation in the right upper quadrant of the abdomen. Her lab tests are as follows:

ALT: 44 U/l
AST: 25 U/l
Total bilirubin: 1.3 mg/dl
Alkaline phosphatase: 100 U/l
White blood cell count: 14,500
Amylase: 67 U/l
Lipase: 55 U/l

The most likely explanation for this patient's symptoms is:

- A. Acute cholecystitis

- B. Acute peptic ulcer disease
 - C. Acute pancreatitis
 - D. Acute alcoholic hepatitis
 - E. Acute hepatitis B
18. A 48 year old man is seen by his primary care physician because of persistent epigastric pain and nausea for the past month. He has had no vomiting or signs of gastrointestinal bleeding. He denies heartburn. He takes 8 ibuprofen daily for arthritic complaints. A urea breath test is negative. An upper endoscopy reveals multiple small ulcers in the gastric antrum. Biopsies are negative for malignancy. The patient is placed on omeprazole and his symptoms resolve. A repeat upper endoscopy 6 weeks later shows healing of the ulcers.

Which of the following best explains the pathophysiologic mechanism behind the development of ulcers in this patient?

- A. *H.pylori* colonization of the gastric antrum
 - B. Reduced blood supply to the stomach
 - C. Inhibition of prostaglandin synthesis
 - D. Absent gastric acid secretion
 - E. Markedly elevated gastrin levels
19. A 45 year old woman comes to your office distressed over a letter she received from the Red Cross. She went to donate blood but was informed that her liver function tests were elevated and a hepatitis C antibody was positive. She asks several questions about hepatitis C.

Which of the following statements best describes hepatitis C infection?

- A. A self-limited infection that resolves spontaneously
 - B. The hepatitis C antibody is protective providing immunity
 - C. Most patients will not develop chronic infection
 - D. The most common mode of transmission is through injection drug use
 - E. It may be transmitted by contaminated food or water
 - F. Approximately 60% of patients will develop cirrhosis
20. A 67 year old woman is admitted to the hospital due to progressive abdominal distension and peripheral edema. Physical examination reveals bulging flanks and shifting dullness. An abdominal ultrasound confirms the presence of ascites. A paracentesis is performed. The serum-ascites albumin gradient (serum albumin-ascitic fluid albumin) is calculated to be 0.8.

Which of the following is the most likely explanation for the ascites in this patient?

- A. Alcohol induced cirrhosis
- B. Cancer of the peritoneum (peritoneal carcinomatosis)
- C. Congestive heart failure
- D. Budd-Chiari syndrome
- E. Hepatitis B cirrhosis

The following possible answers are for questions 21-24

- A. Drug induced hepatitis
- B. Gilbert's syndrome
- C. Pancreatic cancer with obstruction of the common bile duct
- D. Acute hepatitis B
- E. Acute alcoholic hepatitis
- F. Autoimmune hemolytic anemia
- G. Autoimmune hepatitis
- H. Advanced cirrhosis due to hepatitis C
- I. Ischemic hepatitis
- J. Choledocholithiasis

For each patient with jaundice, select the most likely diagnosis:

- 21. A 22 year old man admitted to the intensive care unit with fulminant hepatic failure. He has a history of depression and intravenous drug use. His ALT is 1200 and his AST is 2500. His hepatitis C RNA is undetectable, hepatitis A IgM is negative, and hepatitis B core IgM is negative.
- 22. A 48 year old woman complains of fatigue due to a recent viral upper respiratory infection. Her total bilirubin is 6.2 mg/dl and the direct bilirubin is 1.9mg/dl. Her hemoglobin level is normal.
- 23. A 58 year old comes to the emergency room because his wife noted that he looked yellow. His Alkaline phosphatase is 88 U/l, ALT is 75 U/l, AST is 170 U/l, prothrombin time is slightly prolonged, albumin is 4.2 g/dl.
- 24. An 82 year old woman comes to the emergency room because her daughter noted that she was yellow. The patient has no complaints including no abdominal pain or fever. Her ALT is 78 U/l, AST is 80 U/l, Alkaline phosphatase is 750 U/l.

The following possible answers are for questions 25-28:

- A. Ulcerative colitis
- B. Crohn's disease
- C. Small intestinal bacterial overgrowth syndrome
- D. Irritable bowel syndrome
- E. Chronic pancreatitis
- F. Celiac sprue
- G. Carcinoid syndrome
- H. Lactose intolerance
- I. Clostridium difficile colitis
- J. Zollinger-Ellison syndrome

For each patient with non-bloody diarrhea, select the most likely diagnosis:

25. A 21 year old man with fever, right lower quadrant abdominal pain, and a palpable fullness in the right lower quadrant.
26. A 28 year old woman with weight loss, bloating, iron deficiency, and osteopenia. A lactulose breath test is negative and tissue transglutaminase antibodies are elevated.
27. A 40 year old man with ulcers in the distal duodenum and severe heartburn.
28. A 55 year old with a long history of alcohol abuse and prior surgery for ischemic small bowel with an anastomosis between proximal ileum and ascending colon. Fecal fat concentration measured on a specimen collected over 72 hours is elevated. A d-xylose test and glucose breath test are normal.

The following possible answers are for questions 29-30:

- A. Low baseline lower esophageal sphincter (LES) pressure
- B. Normal peristalsis in the esophageal body
- C. Simultaneous high amplitude contractions of the esophageal body
- D. Frequent transient LES relaxations
- E. Low upper esophageal sphincter pressure
- F. Elevated upper esophageal sphincter pressure
- G. Lack of LES relaxation with swallowing
- H. Normal LES relaxation with swallowing

For each patient with dysphagia, select the most likely esophageal motility findings:

29. 69 year old man with progressive dysphagia to solids and liquids. A barium study reveals a dilated esophagus with a “bird’s beak” appearance to the very distal esophagus.
30. 75 year old woman with severe chest pain which has prompted two emergency room visits. Cardiac testing is unrevealing.

NORMAL LABORATORY VALUES

Blood Chemistry

Albumin	3.5-5.0 g/dl
Alk. Phos.	to 125 U/I
Amylase	to 110 U/I
B ₁₂	150-1250ng/l
Bili., Direct	to 0.3 mg/dl
Bili., Total	0.1-1.0 mg/dl
Blood pH	7.35-7.45
BUN	8 to 20 mg/dl
Calcium	8.5-10.5 mg/dl
Carotene	0.5-2.0 mg/I
Chloride	97-107 meq/I
Cholesterol	140-280 mg/dl
CO ₂ , Total	22-33 mmol/l
CPK	to 1 20 U/I
Creatinine	0.6-1 .2 mg/dl

D-xylose at 2 hours	60 mg/l
Fasting glucose	70-110 mg/dl
Folate	3-21 ug/l
Gastrin	to 170 ng/l
Iron	50-150 ug/dl
Lipase	7-60 U/L
LDH	to 225 U/I
Phosphorus	2.5-4.5 mg/dl
Potassium	3.5-5.0 meq/l
Protein, Total	6-8 g/dl
AST	to 35 U/I
ALT	to 25 U/I
Sodium	135-145 meq/l
TIBC	250-400 ug/dl
Triglycerides	10-160 mg/dl
Uric Acid	2.0-7.5 mg/dl

Stool Studies

72-hour collection for fat < 5 g/24 hr.

Urine Studies

D-xylose over 4 g in 5-hour collection 125 g oral dose

Schilling test 7-22% in 24-hour collection

Blood Studies

D-xylose over 25 mg in a 2-hour serum sample (25 g oral dose)