Board Review Questions

1. A 68 year-old female presents with nausea, vomiting, epigastric pain, early satiety and a 20-pound weight loss over a six-week period. The pain is described as post-prandial, and relieved by vomiting. She has a history of osteoarthritis of the left knee, for which she has been taking daily ibuprofen for several years. There is no family history of gastrointestinal malignancies. An upper endoscopy shows a large amount of residual fluid in the stomach, and a normal duodenal bulb, but the gastroscope cannot be advanced into 2nd portion of the duodenum. A CT of the abdomen shows marked dilation of the stomach and bulb, a normal pancreas, and no stricture nor extrinsic masses. What is the most likely diagnosis?

   A. Bouveret’s syndrome
   B. Superior mesenteric artery (SMA) syndrome
   C. Annular pancreas
   D. NSAID-related stricture

2. A 60 year-old male presents for his first screening colonoscopy. A non-obstructing, ulcerated tumor is found in the sigmoid colon. A CT of the abdomen and pelvis does not show any evidence of intra-abdominal metastases, nor adenopathy. The patient undergoes a sigmoidectomy and pathology shows an invasive moderately differentiated adenocarcinoma. The tumor invades through the muscularis propria into the pericolorectal fibroadipose tissue. The proximal and distal margins are free of tumor. Fifteen lymph nodes are examined and are negative for malignancy. What is the next step in this patient’s management?

   A. Adjuvant radiotherapy
   B. Oxaliplatin, leucovorin, and 5-FU (FOLFOX)
   C. Repeat colonoscopy in one year
   D. Bevacizumab
   E. Combination radiation and chemotherapy

3. A 74 year-old male presents with a 50-pound weight loss over 1½ years, despite a good appetite. The patient denies abdominal pain. He has a history of 4-5 loose stools daily for the last 4 years, which had been previously attributed to IBS. He has a history of CAD and a stroke. He denies any history of alcohol intake. He has a mild normocytic anemia. A CT of the abdomen shows no masses, a normal liver and pancreas, and a jejunal diverticulum. His EGD and duodenal biopsies are unremarkable. His colonoscopy shows internal hemorrhoids and diverticulosis. Random biopsies show normal colonic tissue. What is the next best step in his management?

   A. Mesenteric ultrasound with doppler
   B. EUS with pancreatic function tests
   C. Glucose breath test
   D. Start gluten-free diet

4. A 27 year-old female with a family history of colon cancer presents for a colonoscopy for rectal bleeding. You find a 25 mm pedunculated polyp in the ascending colon and remove it in its entirety with a hot snare. The pathology shows a tubulovillous adenoma. What should you do next?

   A. Repeat her colonoscopy in 5 years
   B. Repeat her colonoscopy in 1 year
   C. Refer to surgery
   D. Refer to genetics
5. A 27 year-old male presents to your clinic two weeks after undergoing an ileocecectomy for a 15-centimeter terminal ileal stricture. He has a two-year history of Crohn’s disease, smokes 1 pack of cigarettes daily, and takes no medications. You want to prescribe him a medication that will delay the recurrence of Crohn’s disease. Which of the following has never been proven to prevent post-operative recurrence in a randomized controlled trial?

A. Infliximab  
B. Azathioprine  
C. Budesonide  
D. Metronidazole

6. A 63 year-old female presents to your clinic with diarrhea present for over one year. She has 4-5 loose stools daily, mostly after eating. She has a history of ileocolonic Crohn’s disease and underwent an ileocecectomy with segmental resection of the sigmoid for an ileosigmoid fistula 3 years prior. A recent colonoscopy showed a patent anastomosis, and normal neo-terminal ileum and colon. A recent MR enterography did not show any active small bowel inflammation, nor strictures. All of the following are reasonable next steps, except:

A. Glucose breath test  
B. Starting cholestyramine  
C. Starting budesonide  
D. Starting a probiotic

7. A 38 year-old female with history of depression presents with confusion. She was well until 4 days ago when she developed abdominal pain. Her PCP prescribed hydromorphone/acetaminophen 5/500 mg every 8 hours as needed. She also took an unspecified over the counter sleep aid medication during the past three nights.

V/S BP 117/74 Pulse 90 Resp 22 T 36.8 º C O2 sat 100%. She is well nourished. She is somnolent, disoriented and uncooperative. She has asterixis. There are no focal neurological deficits.

Labs: Hgb 12.5 WBC 8.7 platelets 149,000 INR 2.2. AST 6232 U/L ALT 9212 U/L, bilirubin 4.9 mg/dl, creatinine 3.1 mg/dl.

Which of the following would you recommend now?

A. Start lactulose therapy.  
B. Start treatment with D-penicillamine  
C. Intravenous steroids  
D. Intravenous N-acetylcysteine  
E. Intravenous Acyclovir.
8. A 20 year-old female presents with altered mental status. The weekend before admission she went camping. She is a high-school dropout and serum toxicology is positive for cannabis. No medications.

PE: She is jaundiced, disoriented and lethargic. She has asterixis. No stigmata of chronic liver disease. No organomegaly or ascites.

Labs: Hgb 9 Hct 25 WBC 3.5 Plt 100,000 Neut 76% AST 500 ALT 489 T. Bili 21 D. bili 6 Alk Phos 75 INR 2.0 creat 1.5 Glucose 56. Acetaminophen levels not detected. Acute hepatitis A and B serology negative. Ceruloplasmin levels pending.

Which of the following would you advise now?

A. Transjugular liver biopsy with pressure measurements  
B. Intravenous penicillin G  
C. Refer for liver transplantation  
D. Upper Endoscopy  
E. D-penicillamine

9. Which of the following patients is more likely to benefit from liver transplantation?

A. A 53 year-old female with acute acetaminophen hepatotoxicity with mild jaundice, AST and ALT > 3000, INR 1.6 and no hepatic encephalopathy  
B. A 50 year-old female with latent tuberculosis on therapy with isoniazid since 8 weeks ago presents with jaundice, ALT 600, INR 1.6. She is drowsy with slow mentation.  
C. A 22 year-old pregnant female on the third trimester of pregnancy who presents with a 3 day history of nausea, vomiting and abdominal pain. AST 600, ALT 500, T. bili 14, INR 1.6. She is drowsy with slow mentation.  
D. A 66 year-old female with congestive heart failure and atrial fibrillation who presents with hypotension, AST and ALT > 3000, T. bili 7.0, INR 1.6. She has mild confusion.

10. A 55-year old gentlemen with liver cirrhosis secondary to alcohol and hepatitis C complicated by ascites requiring four large volume paracentesis during the past months comes for evaluation after being found with a large infiltrative hepatocellular carcinoma in the left lobe with associated left portal vein thrombosis. He is capable of only limited self care and is confined to the bed or wheelchair more than 50% of daytime. On physical exam, he is severely malnourished and is on a wheelchair. He is slow in his thinking, but not confused. He has moderate ascites. Labs: Na 131 K 3.3 Cl 102 CO2 15 BUN 37 creat 1.57 Glucose 74 Alb 2.9 T. bilirubin 1.5 ALT 14 AST 123 Alk Phos 234  
WBC 11 Hgb 8.8 Hct 26.3 Plt 212,000 AFP 501,000.

The most appropriate management for his HCC at this time is:

A. Sorafenib  
B. Liver transplantation  
C. Locoregional therapy  
D. Surgical resection  
E. Supportive measures
11. Which of the following patients would benefit the most from surgical resection of the liver mass?

A. A 19 year-old asymptomatic female with a 7 cm hepatic adenoma which has not grown during the past year.
B. A 28 year-old female with dyspepsia and a 14 cm hepatic cavernous hemangioma.
C. A 45 year-old female with right upper quadrant pain and a 8 cm simple cyst.
D. A 20 year-old male with history of kidney stones and a 9 cm focal nodular hyperplasia.
E. A 56 year-old male with cirrhosis complicated by ascites and bleeding esophageal varices with a 1.8 cm HCC.

12. A 36-year old gentlemen presents with general malaise, intermittent fever and right upper quadrant abdominal pain. He returned approximately 6 months ago from an extended volunteer stay in rural India. He was treated for unspecified cause of diarrhea while there. His abdominal pain is worst with movement. Physical exam: BP 101/60 HR 102 T 38.6 C. He looks sick, RUQ is tender to palpation and his liver is enlarged. Labs: WBC 14,000 Hgb 12 Plt 345,000 CRP 88 mg/dl AST 18 ALT 25 Alk Phos 159 T. Bili 0.9 Alb 3.2. No peripheral eosinophilia. Blood cultures are pending. Entamoeba serology is pending.

What is the next best step?

A. Start metronidazole therapy
B. Radiological-guided drainage and cultures, start empiric broad-spectrum antibiotics
C. Surgical drainage and cultures, start empiric broad spectrum antibiotics
D. Partial hepatic resection
E. Start empiric broad-spectrum antibiotics
Autoimmune Hepatitis

13. A 63 year-old female with history of arterial hypertension, dyslipidemia, Diabetes Mellitus type 2, previous stroke, osteoporosis, recurrent urinary tract infections comes with a 3-day history of right upper quadrant pain, nausea, vomiting and joint pains. She has felt fatigued for the past week. She takes lisinopril, carvedilol, metformin, atorvastatin, insulin, nitrofurantoin and alendronate. She denies toxic habits.

On physical exam, she looks ill, no fevers. She is overweight, BMI 29. She is not jaundiced. She has right upper quadrant tenderness, no guarding, no rebound. No ascitic fluid wave. She has mild peripheral swelling.

Labs: WBC 9 Hgb 12 Hct 37 Plt 145,000 Neut 67% AST 698 ALT 800 T. bili 2 Alk Phos 167 creat 1.0 ESR 35, Glu 98, Albumin 3.8, INR 1.0, gamma-globulins 2.5. Hepatitis A IgM negative, Hepatitis B surface antigen negative, Anti-HCV negative, ANA 1: 160, Smooth-muscle antibody 1:40, Antimitochondrial antibody negative, ceruloplasmin negative, iron tests normal.

Liver vascular ultrasound: Normal liver architecture and vasculature. Cholelithiasis. No bile duct dilatation. No splenomegaly.

What is the next best step?

- A. Start Prednisone and azathioprine
- B. Liver biopsy
- C. Stop nitrofurantoin
- D. Stop atorvastatin
- E. ERCP

14. A 25 year-old female with autoimmune hepatitis returns for follow up. She was initially diagnosed 1 year ago after presenting with fatigue, joint pains, jaundice and elevated liver transaminases (ALT 568 AST 468 T. Bili 4.0 D. bili 2.8 Alk Phos 154, Alb 3.2). Serological workup at that time showed ANA 1:360, ASMA 1:80, AMA negative, gamma-globulins 2.6). A liver biopsy done at the time of diagnosis showed interface hepatitis with plasma cell infiltration with periportal fibrosis. Approximately 6 months ago, her liver tests were ALT 98 AST 101, T. bili 0.9, Alk Phos 110, Alb 3.6. She has been compliant with therapy.

She is presently asymptomatic and is currently being treated with Prednisone 10 mg and Azathioprine 50 mg orally daily. She is currently asymptomatic. CBC form today shows WBC 3.6 ANC 1900 Hgb 14 Hct 45 Plt 195,000. The liver tests from today showed an ALT 25 AST 29 T. bili 0.6, Alk Phos 100, gamma-globulins 1.0.

Which of the following would you recommend?

- A. Repeat liver biopsy
- B. Discontinue Prednisone
- C. Discontinue Azathioprine.
- D. Bone densitometry
- E. Repeat ANA and ASMA
Liver Disease and Pregnancy

15. A 31 year-old primigravida female with history of hypothyroidism at 15 weeks of gestational age comes to the clinic with a 5-day history of general malaise, nausea, vomiting and itching. She has noticed darker looking urine. One of her sisters developed itching and jaundice during pregnancy. Physical exam: She is jaundiced, looks ill. Gravid abdomen. There is mild discomfort in palpation of the right upper quadrant. Labs: AST 620 ALT 723 T. Bili 5.3 D. bili 2.8 Alk Phos 321 Alb 3.1. What is the likely cause of her elevated liver tests?

A. Intrahepatic cholestasis of pregnancy
B. Autoimmune hepatitis
C. Choledocholithiasis
D. Hypermesis gravidarum
E. Viral hepatitis

16. A 25 year-old female at 33 weeks of gestation presents with a 3-day history of general malaise, abdominal pain, nausea and vomiting. V/S BP 136/90, HR 95 T 37 On examination, she looks acutely ill and jaundiced. She is oriented though is slow in her thinking. There is a gravid abdomen. There is mild pitting edema in lower extremities. Labs: Glu 78 Creat 1.3 AST 456 ALT 565 T. Bili 12 D. Bili 8 Alk Phos 350 Alb 2.8 Hgb 10 WBC 19,000 Plt 99,000. INR 3. What is the most appropriate next step?

A. CT scan of the abdomen
B. IV acyclovir
C. Ursodiol
D. Emergent delivery
E. Hematology evaluation

Liver Transplantation

17. 63-year old gentleman Transplanted approximately 1 year ago for hepatitis C and alcohol related cirrhosis comes to the clinic for follow up. He has been feeling well and his post-transplant course has been excellent without major complications. He has gained approximately 15 lbs since transplant and is being treated for dyslipidemia with atorvastatin. He is maintained on single immunosuppression with tacrolimus. PE; He looks well, well healed surgical wound. His liver tests are elevated with AST 134 ALT 125 Alk Phos 151 T. bili 0.9 INR 1.0 creat 1.0 tacrolimus levels 6. Which of the following is the likely cause of his elevated liver tests?

A. Alcohol use
B. Acute cellular rejection
C. Hepatitis C
D. Non-alcoholic steatohepatitis
E. Atorvastatin
18. A 40-year old gentlemen who underwent living donor liver transplantation approximately 6 months ago for Primary Sclerosing cholangitis comes with itching and low grade fever. The donor was CMV positive and the recipient was CMV positive. Liver tests showed ALT 132 AST 67 Alk Phos 234 T. Bili 5 D. Bili 3.5 INR 1.0 Tacrolimus 9. A liver vascular ultrasound showed a patent hepatic artery with resistive indices being slightly high. There is no bile duct dilatation. Which of the following is the likely diagnosis?

A. Acute cellular rejection  
B. CMV hepatitis  
C. Anastomotic biliary stricture  
D. Hepatic artery thrombosis  
E. Recurrent primary sclerosing cholangitis

19. Which of the following patients is more likely to benefit and receive a liver transplant promptly?

A. A 30 year-old Asian gentlemen with hepatitis B vertically acquired diagnosed with a 4-cm HCC. T. bili 0.6 Plt 147,000 and no evidence of esophageal varices on upper EGD.  
B. A 61 year-old female with Primary biliary cirrhosis complicated by a remote history of variceal bleeding who comes with mild dyspnea on exertion, pO2= 56 mm Hg and Double double Echo is compatible with an intrapulmonary shunt.  
C. A 45 year-old male with Hepatitis C related cirrhosis complicated with ascites, variceal bleeding and hepatic encephalopathy. MELD score 13.  
D. A 36-year old female admitted 3 hours ago due to a suicidal attempt with acetaminophen started on N-acetylcysteine therapy. No encephalopathy.

**Approach To The Patient With Abnormal Liver Tests**

20. A 22-year-old female is referred to you for elevation of liver enzymes found on routine blood tests. She has a history of asthma and chronic iron deficiency anemia. She denies drinking alcohol or taking herbal supplements. There is no family history of liver disease. Her physical examination is completely normal and her BMI is 21 kg/m^2. Her laboratory tests reveal ALT of 88 U/L, AST of 67 U/L, total protein of 5.6 g/dL, albumin 3.2 g/dL, normal alkaline phosphatase, bilirubin and INR, hemoglobin 11 g/dL, and MCV 72 fL. Liver ultrasound is normal. The most likely diagnosis is:

A. Autoimmune hepatitis  
B. Fatty liver disease  
C. Celiac disease  
D. Primary biliary cirrhosis

21. A 26-year-old female nurse presents with isolated elevation in AST to 265 U/L found on routine blood tests. She is asymptomatic and has no other medical problems. Her ALT is 13 U/L and all other liver chemistry tests, muscle enzymes, and reticulocyte count are normal. Further testing for viral hepatitis, metabolic and cholestatic liver disease is negative. Liver ultrasound is normal. The next step to assess her elevated AST should be:

A. Liver biopsy  
B. MRCP  
C. Muscle biopsy  
D. No further work up
Alcohol

22. A 60-year-old woman is admitted to the hospital with a two-week history of progressive jaundice, abdominal distention, in the setting of a lifetime of substantial alcohol abuse —although abstinent since developed symptoms. She is noted to have spider angiomata, muscle wasting, obvious jaundice, with a protuberant abdomen on exam. No obvious asterixis is noted, and mental status is intact. The following labs are seen on presentation:
AST 58, ALT 40, total bilirubin 30.8, albumin 3, prothrombin time 19.4, INR 1.8, creatinine 2.78. calculated MELD = 36

Appropriate management at this point would include:

A. Transjugular liver biopsy to exclude other causes of liver disease
B. Initiation of prednisolone (40 mg/day for 4 weeks)
C. Trial of infliximab (10 mg/kg, given at q 4 weeks intervals)
D. Pentoxifylline therapy (400 mg orally 3 times daily for 4 weeks)

23. A 47-year-old man is admitted with clinically diagnosed acute alcoholic hepatitis with initial lab studies that are notable for a bilirubin of 28, PT of 16, and normal electrolytes. Prednisolone therapy was started. The best option to assess the patient’s likelihood of improvement while on treatment is:
A. An improvement in nitrogen balance, as measured by calorimetry
B. A decrease in bilirubin level of 2 mg/dl
C. A drop of 2 points in the CTP score
D. Calculation of the Lille Model

24. A patient on the liver transplant list at your institution is suspected of alcohol recidivism. He adamantly denies any alcohol abuse. Urine toxicology screen are consistently negative. Options for further testing to detect recidivism which have been shown to be helpful in making a decision about his transplant candidacy include:
A. Gamma GT
B. AST, and the AST/ALT ratio
C. An elevated mean corpuscular volume
D. Carbohydrate deficient transferring
E. None of the above

Chronic Hepatitis C Infection

25. A 45-year-old male with chronic HIV infection, hypertension, diabetes mellitus, and end-stage renal disease on intermittent hemodialysis is evaluated after developing a variceal bleed. Initial testing to exclude chronic hepatitis as a cause should include:
A. HCV antibody by ELISA, third generation
B. HCV RIBA assay
C. HCV quantitative TMA assay
D. HCV RNA by PCR
26. A 50-year-old male with a history of hypertension, peripheral neuropathy, undergoing evaluation for positive chronic hepatitis C, genotype 1, is seen in the clinic in follow-up. A liver biopsy done 1 year earlier had shown grade 1 activity, and stage 0 fibrosis. On exam, he has significant peripheral edema, and on laboratory studies, an acute increase in his serum creatinine to 1.8 mg/dL. Appropriate testing would include:

   A. A 24 hour urine collection
   B. Referral for consideration of a renal biopsy
   C. Measurement of serum complement components
   D. Measurement of serum cryoglobulins
   E. All of the above

27. An obese 55-year-old woman with a history of chronic hepatitis C infection and stage 3 fibrosis on a liver biopsy is referred for further evaluation of treatment options. She complains of pain in her knees, elbows, hips, and ankles, and has recently been diagnosed with sicca syndrome, fibromyalgia, and possible rheumatoid arthritis, based on a positive rheumatoid factor assay. Appropriate management might include:

   A. Low dose prednisone
   B. A trial of methotrexate
   C. Pegylated interferon plus ribavirin
   D. Referral to rheumatology for consideration of plasmapheresis

28. The likelihood of curing a patient with chronic hepatitis C infection is most dependent on:

   A. Duration of infection
   B. Patient's age, race, and sex
   C. Avoidance of alcohol while on treatment
   D. Genotype

29. Patients with histologically advanced liver disease (bridging fibrosis or cirrhosis), who are successfully treated for chronic hepatitis C infection and develop a sustained virologic response remain at risk for which of the following complications (in comparison to nonresponders or relapsers):

   A. Variceal hemorrhage
   B. Ascites
   C. Liver related to mortality or liver transplantation
   D. HCC
   E. All of the above

30. The risks of developing chronic infection or recurrent cirrhosis after undergoing a liver transplant for hepatitis C cirrhosis over the ensuing 5 years respectively are approximately:

   A. 50% and 50%
   B. 30% and 30%
   C. 30% and 100%
   D. 100% and 30%
31. A 26-year-old nurse in her 18th week of pregnancy suffers a needle stick injury from a HCV infected dialysis patient with a very high viral load. You recommend:

A. Screening using antibody and PCR assays
B. Screening of her husband and family
C. Termination of the pregnancy
D. Cesarean section at delivery, and avoidance of breast feeding

**NAFLD Questions**

A 55-year-old obese male with borderline diabetes presents to you with abnormal liver tests discovered 6 months ago. His mother died of end-stage liver disease of uncertain etiology. On physical examination: BMI 35 kg/m^2^ and mild hepatomegaly. His laboratory tests revealed the following: AST 106, ALT 118, with normal bilirubin, alkaline phosphatase and prothrombin time. A liver ultrasound showed diffuse increase in echogenicity and vascular blurring consistent with fatty infiltration. You suspect nonalcoholic fatty liver disease (NAFLD).

32. Which of the following is indicated to further evaluate the etiology of his mild transaminitis?

A. Obtain serology for hepatitis B and C
B. Screen for alcohol abuse
C. Review current medications and herbal supplements
D. Check a fasting lipid panel
E. All of the above

33. The patient denies excessive alcohol intake or the use of any herbal supplements. Serologies for hepatitis B and C are negative and the iron studies are within normal limits. Based on the previous findings, you make a diagnosis of NAFLD. All the following statements regarding NAFLD are true except:

A. NAFLD is considered the hepatic manifestation of the metabolic syndrome.
B. Obesity is a prerequisite for the development of NAFLD.
C. NAFLD has a histologic spectrum ranging from simple steatosis (fatty liver) to nonalcoholic steatohepatitis (NASH) to cirrhosis.
D. NAFLD is the most common cause of chronic liver disease in the United States.

34. Which of the following is not considered a part of the metabolic syndrome?

A. Hypertension
B. High low-density lipoprotein (LDL)
C. Low high-density lipoprotein (HDL)
D. Diabetes or impaired fasting glucose
E. Hypertriglyceridemia

35. Which of the following is not a feature of NASH on liver biopsy?

A. Hepatocyte ballooning
B. Steatosis
C. Lymphoid follicles
D. Perisinusoidal inflammation
E. Mallory-Denk bodies
36. What is the approximate prevalence of simple steatosis (fatty liver) and NASH in the United States population?

A. 30% and 3%
B. 5% and 0.5%
C. 60% and 15%
D. The prevalence of simple steatosis is around 50%; however, NASH is a rare condition.

37. You recommend exercise and weight loss for your patient; however, he is interested in pharmacotherapy. New evidence suggests that which of the following is effective treatment for NASH?

A. Metformin
B. Ursodeoxycholic acid
C. Betaine
D. Vitamin E
E. None of the above

38. Your patient asks you about the natural history of NAFLD. Which of the following statements is Answer:

A. Hepatocellular carcinoma is NOT part of the NAFLD spectrum.
B. Liver disease is the leading cause of death in patients with NAFLD.
C. Cirrhosis develops in about 50% of patients with NASH within 10 years of diagnosis.
D. Recurrence can occur after liver transplantation for NASH-related cirrhosis and steatosis can be seen in up to 60% of transplant recipients.

**Drug-Induced Liver Injury**

39. A 32-year-old male with history of Crohn’s disease presents with epigastric pain and abdominal fullness. His Crohn’s disease has been controlled with azathioprine and mesalamine. Physical examination reveals an enlarged liver (3 cm below the costal margin) and splenomegaly. Laboratory tests show thrombocytopenia with normal liver function including AST, ALT, albumin, bilirubin and INR. Liver vascular ultrasound demonstrates a nodular liver with evidence of portal hypertension and patent hepatic vessels. Liver biopsy reveals hyperplastic parenchymatous nodules without significant fibrosis or hepatic congestion. The most likely diagnosis is:

A. Primary sclerosing cholangitis
B. Sinusoidal obstruction syndrome
C. Nodular regenerative hyperplasia
D. Budd-Chiari syndrome

40. During a phase II clinical trial for a new medication for chronic hepatitis C infection, the development of jaundice and elevation of ALT to more than 8 times the upper limit of normal were noted in 4 of 1000 patients receiving the new medication. If this medication gets approved by the FDA, you expect one case of severe hepatotoxicity leading to death/ liver transplantation per every:

A. 2,500 patients treated with the new medication
B. 4,000 patients treated with the new medication
C. 25,000 patients treated with the new medication
D. 100,000 patients treated with the new medication
Ascites, Hepatorenal Syndrome and Encephalopathy

41. A 53 year-old man with cirrhosis due to non-alcoholic fatty liver disease presents with 2 months of abdominal distention and weight gain. On exam, he has bulging flanks, and increased flank dullness to percussion.

Laboratories:

- Na 130 mmol/L
- BUN 12 mg/dL
- Creatinine 0.4 mg/dL
- Total bilirubin 1.3 mg/dL
- Albumin 2.9 g/dL
- Prothrombin time 13.4 seconds

The medical therapy most likely to control his ascites is:

A. Fluid restriction
B. Dietary sodium restriction
C. Fluid restriction and dietary sodium restriction
D. Dietary sodium restriction and diuretics
E. Single large-volume paracentesis

42. A 32 year-old man with cirrhosis due to autoimmune hepatitis is admitted to the hospital with spontaneous bacterial peritonitis. He is hemodynamically stable, on no diuretics, and does not take NSAIDS. He is treated with broad-spectrum IV antibiotics, IV fluids, and IV albumin on admission. At the time of admission, his serum creatinine is 1.2. On day 5 of his hospitalization, his serum creatinine is 4.1, and he is anuric. He is diagnosed with hepatorenal syndrome.

Which of the following is true?

A. He has type II hepatorenal syndrome and should be evaluated for a combined liver/kidney transplant.
B. He has type I hepatorenal syndrome, and should be treated with daily IV albumin, octreotide, and midodrine, as a bridge to a liver transplant.
C. After a liver transplant, his renal function is unlikely to fully recover.
D. Pharmaceutical management involves vasodilator therapy, with the goal of improving renal perfusion.

43. Which of the following is true?

A. Hepatorenal syndrome type 1 is the most common cause of renal failure in hospitalized cirrhotics
B. Hepatorenal syndrome can be excluded if a spot urine Na is >10 mEq/L
C. Vasoconstrictors + albumin reverse hepatorenal syndrome type 1 in ~60% of patients
D. Hepatorenal syndrome cannot be definitively diagnosed in patients with SBP
E. None of the above are true
44. A 43 year-old man has cirrhosis due to NAFLD, which is complicated by ascites requiring several paracenteses over the last year. Ascitic fluid analysis is consistent with portal hypertension. When seen in the office 1 month ago, he had tense ascites and underwent a paracentesis. Labs 1 month ago: Na 129, K 3.8, Cr 0.8. His diuretics were increased from aldactone 150 mg/day to 200 mg/day, with no change in lasix 80 mg/day. When seen today, he is without complaints. On exam, he has mild ascites. Labs: Na 122, K 4.3, Cr 1.0.

Which of the following is the best recommendation for his management now?

A. Increase consumption of sports rehydration drinks  
B. Paracentesis  
C. Dietary sodium and fluid restriction  
D. Transjugular intrahepatic portosystemic shunt

**Metabolic Liver Diseases: HH, Wilson's Disease, A1AT Deficiency**

45. A 63 year-old woman is referred for elevated aminotransferases: ALT 76, Total bilirubin 0.6, Albumin 4.2, alkaline phosphatase 143. She has no symptoms.

Labs:Negative: hepatitis B surface antigen, hepatitis C antibody, antinuclear antibody, anti-smooth muscle antibody, serum protein electrophoresis  
Alpha 1-antitrypsin phenotype MM  
Ferritin 8000 ng/mL, % iron saturation 25  
HFE mutation analysis: H63D heterozygous.

Her liver ultrasound is normal. Her liver biopsy reveals iron staining of Kupffer cells, largely sparing hepatocytes.

The most likely cause of her elevated aminotransferases is:

A. HFE-related hereditary hemochromatosis  
B. Alpha 1-antitrypsin deficiency  
C. Alloimmune hepatitis  
D. Ferroportin disease

46. A 47 year-old man with a history of arthritis is referred to you by his rheumatologist. His laboratory evaluation is notable for ferritin 1850 ng/mL, iron 225 mcg/dL, TIBC 390 mcg/dL, %saturation 63. His hemoglobin, liver enzymes and albumin are normal. His HFE genotype is C282Y homozygous. On physical exam, he has no hepatosplenomegaly.

The best next step is:

A. Liver biopsy  
B. Phlebotomy  
C. Reassurance  
D. Iron chelation
47. An 18 year-old high school student presents to the emergency department with a several day history of nausea, emesis, and light-headedness, in addition to jaundice. She was treated with bactrim 1 week prior to presentation for a urinary tract infection. She has no past medical history. She has no family history of liver disease.

Labs:
- WBC – 5.2 K/microliter
- Hemoglobin – 8.2 g/dL
- Platelet – 111 K/microliter
- Total bilirubin – 11.0 mg/dL
- Direct bilirubin – 5.7 mg/dL
- AST – 64 U/L
- ALT – 17 U/L
- Albumin – 2.3 g/dL
- INR – 1.5
- Coombs – negative
- Parvovirum IgM – negative
- LDH – 409 U/L
- Haptoglobin - <20 mg/dL
- ANA negative
- Hepatitis A IgM negative
- Hepatitis B core IgM negative, hepatitis B core IgG positive, hepatitis B surface antibody positive
- Hepatitis C PCR negative
- Ceruloplasmin – 19

The best therapy for this disease is:

A. Steroids
B. IVIG
C. Trientene
D. Zinc
E. Entecavir

48. Which of the following alpha 1-antitrypsin deficiency phenotypes is not associated with liver disease?

A. ZZ
B. MS
C. SZ
D. Znull
Cholestatic Liver Diseases: PBC, PSC

49. Which of the following are established risk factors for the development of cholangiocarcinoma in patients with primary sclerosing cholangitis?

A. Duration of PSC
B. Duration of IBD
C. Colonic dysplasia associated with chronic ulcerative colitis
D. A and B
E. B and C
F. A, B and C

50. A 44 year-old man was recently diagnosed with primary biliary cirrhosis. Which of the following statements is Answer:?

A. If the antimitochondrial antibody is negative, the Answer: diagnosis of primary biliary cirrhosis requires histologic correlation.
B. A positive ANA and SMA mandate treatment with corticosteroids, in addition to ursodeoxycholic acid.
C. Most patients with primary biliary cirrhosis have an elevated IgG immunoglobulin fraction.
D. Ursodeoxycholic acid should be discontinued after liver enzymes normalize, in order to decrease the risk of excessive weight gain.

Pediatric Liver Disease

51. A 6-year-old girl is referred to you for evaluation of liver disease after presenting to her pediatrician with severe pruritus. Physical examination reveals a small child with excoriations on her trunk and extremities. A grade 2/6 systolic murmur is heard at the left upper sternal border. The liver is soft and palpable at 1 cm below the right costal margin. There is no splenomegaly. A chest X ray reveals butterfly vertebrae in her thoracic spine. Laboratory studies reveal AST 112 U/L, ALT 127 U/L, alkaline phosphatase 711 U/L, GGT 956 U/L, total bilirubin 3 mg/dL, INR of 1.1. Which one of the following is the most likely diagnosis?

A. Progressive familial intrahepatic cholestasis (e.g., Byler's disease)
B. Primary sclerosing cholangitis
C. Alagille syndrome
D. Alpha-1-antitrypsin deficiency

52. You are evaluating a 15-year-old male with alpha-1 antitrypsin deficiency for liver transplantation due to the presence of end-stage liver disease and portal hypertension. His parents ask you about potential complications and survival data in pediatric liver transplantation. Which of the following statements are true regarding the outcome of liver transplantation in children

A. Expected one year patient survival is approximately 99%
B. Chronic rejection results in graft loss in approximately 5% of children
C. Primary non-function has been virtually eliminated as a clinical problem
D. All of the above
Hepatitis A

53. A 31 year old married mother of a two year old daughter comes to the emergency room because she profoundly weak for 3 days and has started vomiting 12 hours ago. She has previously been well. She takes not medications other than birth control pills. She is accompanied by her husband of 10 years. No one in the family has been ill. She has no relevant past medical history, and no travel history. She has lived in Tucson all of her life.

Physical exam is normal except for right upper quadrant tenderness.

Initial laboratory tests reveal the following

- WBC 3,800
- Hemoglobin 11.5 gm/dl
- Urinalysis normal
- Electrolytes normal
- Total Bilirubin 2.1 mg/dl
  - Direct reacting 2.0
- AST 624
- ALT 899
- Alkaline phosphatase 211

Hepatitis panel

- HBsAg negative
- Anti HB c negative
- Anti HBs positive
- Anti HAV IgM positive

What measures should be taken to protect the this patient’s husband and daughter

A. Immune globulin (IG) for husband and daughter
B. Hepatitis A vaccine for husband and daughter
C. IG for daughter, Hepatitis A vaccine for husband
D. Hepatitis A vaccine for daughter, IG for husband
E. Vaccinate daughter test husand for immunity

54. For protection from Hepatitis A routine vaccination (pre-exposure prophylaxis) is recommended for which of the following groups

A. Men who have sex with men
B. Users of illegal non-injection drugs
C. Those with chronic liver disease
D. A and B only
E. A and C only
F. B and C only
G. A, B, and C
**Hepatitis B**

55. Amongst adults with vertically-acquired hepatitis B, which factor at the time of initial testing, is most associated with the development of hepatocellular carcinoma

   A. Male gender  
   B. Smoking  
   C. Alcohol use  
   D. Viral load

56. In a person chronically infected with hepatitis B, cccDNA is most likely to be found in the hepatocyte:

   A. Cytoplasm- mitochondria  
   B. Nucleus - incorporated into host DNA  
   C. Cytoplasm – Golgi apparatus  
   D. Nucleus – unincorporated into host DNA

57. This photomicrograph is most likely to have come from a patient with

   A. Hepatocellular carcinoma  
   B. Autoimmune hepatitis  
   C. Hepatitis B  
   D. Primary biliary cirrhosis  
   E. Alcohol-induced liver disease

58. A 62 year old woman is being considered for chemotherapy for newly diagnosed stage 4 non-Hodgkins lymphoma. At age 26, she had an acute episode of icterus with associated liver enzyme elevations from which she recovered uneventfully after 3 weeks. She was told she had acute hepatitis B but “got over it.” She currently has normal liver enzymes, CBC, and the serum HBV DNA PCR, and HCV RNA reveals no detectable virus. An abdominal CT scan shows a normal appearing liver.

Which of the following pre-treatment serologic profiles, if any, is associated with worsening viral disease on treatment:

   A. HBsAg -/ anti HBc -/ anti HBs +  
   B. HBsAg -/ antiHBc +/ anti HBs -  
   C. HBsAg +/anti HBc +/ anti HBs -  
   D. None of the above
59. A well 38 year old woman born in Shanghai, living in Los Angeles, is in the third trimester of her first pregnancy. She has a normal physical examination apart from findings related to pregnancy. She is found to have the following laboratory findings

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST</td>
<td>20</td>
</tr>
<tr>
<td>ALT</td>
<td>18</td>
</tr>
<tr>
<td>HBsAg</td>
<td>positive</td>
</tr>
<tr>
<td>Anti HBc</td>
<td>positive</td>
</tr>
<tr>
<td>Anti HBs</td>
<td>negative</td>
</tr>
<tr>
<td>HBV DNA</td>
<td>$7 \times 10^7$ IU/ml</td>
</tr>
</tbody>
</table>

What strategy is associated with the lowest rate of HBV transmission to her newborn:

A. Give mother lamivudine  
B. Give newborn HBIG  
C. Give newborn active immunization  
D. A, B an C are Answer:  
E. B and C only are Answer:

**Portal Hypertension Bleeding**

60. A cirrhotic who has never bled is found to have varices at screening endoscopy. Which factor is least associated with likelihood of bleeding within the next two years?

A. Number of variceal channels seen  
B. Size of varices  
C. Presence of red wale markings  
D. Childs Pugh score

61. A 60 year old woman well-compensated stage 4 primary biliary cirrhosis with no history of GI bleeding patient has a surveillance endoscopy. It reveals the following:

Which of the following is/are the most reasonable option(s) for this patient?

A. Band ligation  
B. Injection sclerotherapy  
C. Beta blocker therapy  
D. TIPS  
E. A and C  
F. B and D
62. A 48 year old alcoholic male stopped drinking alcohol 6 months ago after undergoing inpatient detoxification. You are asked to see him because of an episode of hematemesis that occurred a week ago. This occurred when he had a flu like illness and had protracted nausea with vomiting. He took aspirin for symptoms control during his flu like illness. You are consulted and asked to perform an upper intestinal endoscopy to look for a cause for bleeding.

On physical examination he has normal vital signs. The general exam in normal inclding heart and lung exams. Abdominal examination: liver is frim and 4 cm below right costal margin; the spleen is barely palpable. There is no flank bulge or shifting dullness. There is nor peripheral edema. Neurologic exam is normal including absence of astereixis

Lab studies:

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<tr>
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<td></td>
</tr>
<tr>
<td>Platlet count</td>
<td>130,000</td>
<td>150-300,000</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>1.4 mg/dl</td>
<td>0.5-1.1</td>
</tr>
<tr>
<td>AST</td>
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<tr>
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remote hepatitis profile negative

During in patient alcohol treatment he was seen by another gastroenterologist who recommended a transvenous liver biopsy with pressure measurements including hepatic venous pressure gradient (HVPG). This was accomplished. The biopsy showed early cirrhosis; the pressures obtained are as follows

- Right atrial: 3 mm Hg
- Free hepatic vein: 5 mm Hg
- Wedged hepatic vein: 13 mm Hg

Select the factor that most influences your assessment of the pre-test probability of finding esophageal varices on endoscopy in this patient

A. HVPG
B. Platelet count
C. Childs-Pugh score
D. MELD score
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- Right atrial: 3 mm Hg
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An endoscopy is performed in the patient described above (see endoscopic photo)

Which of the following represents the soundest course of action?

A. Beta blocker therapy
B. Screening endoscopy in 1 year
C. Screening endoscopy in three years
D. None of the above
Portal Hypertension - Cirrhosis

64. You are asked to see in consultation a 58 year old woman with a long drinking history who has developed sudden weight gain and swollen ankles. A CT scan was performed. Her husband has recently been treated for nine months with isoniazid. Her liver tests are normal and serum based markers for liver disease are all negative or normal. The CBC is normal except for a platelet count of 52,000. The prothrombin time INR is 1.8

Which of the following is least important in her evaluation?

A. Upper intestinal endoscopy (EGD)
B. Percutaneous liver biopsy
C. Paracentesis
D. MELD score calculation

Vascular Disease

65. Acute thrombosis of the hepatic vein (Budd Chiari syndrome) is often associated with preserved venous drainage from

A. Entire right hepatic lobe
B. Entire caudate lobe
C. Entire left lobe
D. Lateral segment of left lobe

66. A 55 year old woman in Chicago is admitted to the hospital because of the onset 4 days ago of right upper quadrant pain, followed by progressive abdominal distention and weight gain of 20 pounds. Her husband notes that her eyes look yellow. Her past medical history includes mild hypertension treated with hydrochlorothiazide 12.5 mg per day. She takes no other medications, herbal supplements, etc. She has two grown children. Her alcohol intake consists of a glass or two of wine on weekends only. There has been no travel outside the Midwest over the past 10 years.
Physical examination reveals the following:
Temperature: 37 degrees
Scleral icterus
Absence of neck vein distention
Normal heart and lung examination
Liver edge 4 inches (10 cm) below the right costal margin.
Abdominal distention and shift dullness
Neurological exam normal

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<tr>
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<tr>
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Acute hepatitis profile negative

Urinalysis reveals bilirubinuria but is otherwise normal

An ultrasound report describes an enlarged liver without focal lesions or duct dilatation and massive ascites. The spleen is enlarged. Hepatic vessels were “abnormal”

Which of the following is most likely to be associated with her illness?

A. Protein S deficiency
B. Factor V Leiden mutation
C. Myeloproliferative disorder
D. Protein C deficiency

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Abdominal distention and shift dullness
Neurological exam normal
Lab studies:

- Hemoglobin: 18 gm/dl (normal 12-14)
- White blood cell count: 12,200 (normal 5-10,000)
- Differential count: normal
- Platelet count: 210,000
- Bilirubin: 12.6 mg/dl
- AST: 490 IU/ml (5-40)
- ALT: 520 IU/ml (5-50)
- Alkaline phosphatase: 160 IU/ml (60-115)
- Prothrombin time: INR 1.4 (1)

Acute hepatitis profile negative

Urinalysis reveals bilirubinuria but is otherwise normal

An ultrasound report describes an enlarged liver without focal lesions or duct dilatation and massive ascites. The spleen is enlarged. Hepatic vessels were “abnormal”

Which of the early management strategies for this patient is least appropriate?

A. Liver transplantation  
B. Anticoagulation  
C. TIPS  
D. Angioplasty

Small Bowel and Colon Board Review Questions

68. A 19 year old female with 6 month history of abdominal pain, diarrhea, and 10 lb weight loss presents for evaluation. She was previously told she has irritable bowel syndrome. A transglutaminase IgA is checked and is elevated. The next best management step is:

A. Start lactose free diet  
B. Start gluten free diet  
C. Upper endoscopy with duodenal biopsies  
D. Lower endoscopy with ileal biopsies

69. A 55 year old female presents with diarrhea for 2 years. She denies any weight loss or other significant GI symptoms. She undergoes an EGD and colonoscopy for further evaluation. Duodenal biopsies are normal, but the random colon biopsies reveal lymphocytic colitis. The next best management step is:

A. Start gluten free diet  
B. Start infliximab  
C. Start methotrexate  
D. Start budesonide
70. A 60 year old male presents with 6 months of diarrhea. A colonoscopy reveals severe sigmoid colon diverticulosis with some scattered inflammation in the sigmoid colon, near the diverticuli. The remainder of the colon and terminal ileum appeared normal. Colon biopsies in the sigmoid reveal focal active colitis, but colon biopsies from the remainder of the colon are normal. Stool infectious studies are normal. The next best management step is:

   A. Start azathioprine
   B. Start infliximab
   C. Start augmentin
   D. Start ibuprofen

71. A 45 year old female with history of scleroderma presents with 6 months of diarrhea. She denies any other GI symptoms. EGD and colonoscopy with biopsies are unrevealing. Stool infectious studies are negative. Small bowel follow through reveals jejunal diverticuli. The next best test is:

   A. Gastric emptying test
   B. Glucose breath test
   C. Mesenteric vascular ultrasound
   D. H. pylori breath test

72. A 24 year old patient with history of ulcerative colitis on azathioprine and prednisone is admitted to the hospital for abdominal pain and bloody diarrhea. The patient does not improve despite 5 days of intravenous steroids. A flexible sigmoidoscopy is performed and reveals significant inflammation with ulcerations. Biopsies reveal many enlarged cells with intranuclear inclusions with a surrounding clear halo. The best next treatment options is:

   A. Start ganciclovir
   B. Start fluconazole
   C. Start acyclovir
   D. Start meropenem

73. A 30 year old male with history of Crohn’s disease who is being treated with infliximab 5 mg/kg every 8 weeks does well for 6 months then develops recurrence of abdominal pain and bloody diarrhea. A flexible sigmoidoscopy reveals active inflammation and stool infectious studies are negative. At 4 weeks after last infliximab dose, antibodies to infliximab (ATI) and infliximab levels are checked. The patient’s ATI assay is negative, and his infliximab level is 15 mcg/ml. The next best treatment option is:

   A. Start adalimumab
   B. Start natalizumab
   C. Increase infliximab dose
   D. Start certolizumab pegol

74. A 55 year old male with history of pan-ulcerative colitis presents for a routine surveillance colonoscopy. He is found to have a 5 mm polyp in the sigmoid colon. The polyp is easily removed and random biopsies are taken around this polyp. The polyp is found to be adenomatous, but the biopsies around this polyp and throughout the remainder of the colon show quiescent colitis with no signs of dysplasia. The next best management step is:

   A. Total colectomy
   B. Repeat surveillance colonoscopy in 3-6 months
   C. Sigmoid resection
   D. Repeat surveillance colonoscopy in 1-2 years
75. A 40 year old male presents with chronic right lower quadrant pain. He denies any other GI symptoms. A CT enterography reveals no evidence of bowel inflammation, but shows an enlarged mucous filled appendix. A colonoscopy is performed and reveals a large noncompressible bulge at the appendiceal orifice, but is otherwise normal. The next best management step is:

A. Appendectomy
B. Right hemicolectomy
C. PET scan
D. Repeat CT scan in 6 months

**Constipation and Anorectal disorders**

76. The following pathology is:

A. Premalignant
B. Causes damage to nerves
C. Benign
D. Both A and B

77. What is the most appropriate Answer: for the following X-ray?

A. Requires an immediate surgical intervention
B. Requires aggressive laxation
C. Condition can be helped by a colonoscopy
78. The patient with this anorectal manometry can be helped by:

A. Colectomy
B. Anal sphincter myotomy
C. Prokinetic agent
D. Biofeedback

79. Osmotic laxatives:

A. Are safe in patients with renal impairment.
B. Require adjustment in patients with hepatic impairment
C. Can cause pseudomelanosis coli
D. None of the above

80. This rectal biopsy was taken from which of the following subjects?

A. A 27 year old woman with chronic constipation and straining
B. A 65 year old man with rectal adenoma
C. A 3 year old with rectal bleeding
81. What is the most appropriate statement concerning the following X-ray?

A. Almost always requires a surgical repair  
B. Common in both men and women  
C. Both A and B  
D. None of the above

82. This anorectal manometry tracing:

A. Taken from a 65 year old woman with a history of chronic constipation  
B. Taken from a 2 year old male toddler with constipation  
C. Taken from a 28 year old woman with post obstetric fecal incontinence  
D. Is normal
83. This anorectal tracing is consistent with:

A. Spinal cord disruption at the level of lumbar spine
B. Spinal cord disruption at the level of sacral spine
C. Myenteric neuropathy
D. None of the above
Board Review Answers

1. Answer: B
This patient has an NSAID-related diaphragm-like stricture at the D1-D2 junction. Her history is consistent with a gastric outlet obstruction-like picture. It was found at laparoscopy and treated with a stricturoplasty. These strictures are not seen on cross-sectional imaging. Bouveret’s syndrome is gastric outlet obstruction caused by duodenal impaction of a large gallstone. SMA syndrome is obstruction at the third portion of the duodenum. There was no evidence of an annular pancreas on the CT.

2. Answer: C
This patient has stage IIA (T3, N0, M0) colon cancer and would not benefit from adjuvant chemotherapy or radiation. Adjuvant chemotherapy is controversial in stage II, but could be recommended in T4 tumors, poorly differentiated histology, positive margins, or if <13 nodes are sampled.

3. Answer: C
Has symptoms and signs of malabsorption—the possibilities include pancreatic insufficiency, mucosal diseases of the small bowel, and SIBO. Of these, the most likely is SIBO, due to negative biopsies and the presence of the small bowel diverticulum.

4. Answer: D
Her young age, FH, and right colon lesion makes Lynch syndrome possible.

5. Answer: C
Budesonide is the only one of these that has not prevented post-op recurrence in a randomized controlled trial.

6. Answer: C
She has factors that predispose her to SIBO and bile-salt diarrhea, so A and B would be reasonable. She could have IBS in addition to Crohn’s, so D would also be reasonable. She has no signs of active disease, so C is a poor choice.

7. Answer: D
Acute acetaminophen hepatotoxicity accounts for almost half of all cases of acute liver failure in the United States. It is characterized by a hyperacute biochemical pattern with markedly elevated transaminases (ALT median 4149, high 26,000), high creatinine and modest elevation in bilirubin. Acetaminophen hepatotoxicity is most often seen in women and may occur as therapeutic misadventures (accidental overdoses) or as suicidal attempts. In most instances, the history is unreliable. Acetaminophen levels are often detectable (77% of cases), though not always.

Acetaminophen is a dose-related toxin, with higher dosing generating the highly reactive and toxic intermediate, N-para-aminobenzoquinone imine (NAPQI). N-acetylcysteine is the specific antidote that supplies glutathione, to limit NAPQI formation yielding instead the readily excreted nontoxic mercaptopuric acid.
8. Answer: C
Acute liver failure (ALF) can be the initial presentation of Wilson’s disease (WD). An acute presentation is more common in females. ALF secondary to WD is characterized by modest elevations in serum aminotransferases (typically < 2000IU/L) with a normal or subnormal level of alkaline phosphatase. A serum alkaline phosphatase/bilirubin ratio of less than 2 is highly suggestive of ALF WD. A rapid progression to renal failure and concurrent Coombs-negative hemolytic anemia is typical. Serum ceruloplasmin levels are usually decreased but the positive predictive value of low ceruloplasmin is poor. The serum copper level is usually elevated to > 200 mcg/dL. Urgent transplantation is needed and when listed these patients receive the highest priority for liver transplantation (status 1A). The positive cannabis toxicology should not impede clinicians to refer for liver transplantation. A full psychosocial evaluation is universally undertaken prior to proceeding with liver transplant listing.

9. Answer: B
The etiology of acute liver failure (ALF) is the most important prognostic variable. Acetaminophen intoxication, shock and hepatitis A have favorable outcomes with spontaneous recovery rates between 58% and 64% compared to drug induced, autoimmune, and indeterminate ALF (approx 20% to 25%). In addition, the grade of encephalopathy at presentation is another prognostic determinant. Patients who present with grade III-IV encephalopathy usually have an outcome (death or transplant) approximately 3-4 days after clinical presentation. Isoniazid accounted for 13 percent of the non-acetaminophen drug ALF in a study of the UNOS database, followed by phenytoin, valproic acid and propylthiouracil.

10. Answer: E
He has advanced hepatocellular carcinoma with a poor performance status (ECOG 3). Supportive measures and palliative care evaluation is the best option. His elevated alpha fetoprotein levels suggest metastatic disease. In the absence of treatment options metastatic workup is not necessary. If his performance status was better, a CT scan of the chest +/- Bone scan for staging purposes is indicated. Locoregional therapy would be palliative treatment to be considered in the presence of a good performance status. Sorafenib has proven to improve survival in Child-Pugh class A cirrhotic patients with a preserved performance status. Surgical resection and liver transplantation are contraindicated in the presence of portal vein thrombosis as this implies a high post-surgical or post transplant recurrence.

11. Answer: A
Hepatic adenomas are benign epithelial tumors that usually arise in women of childbearing age who have no previous history of liver disease. Hepatic adenomas are strongly associated to oral contraceptive use. The natural history of hepatic adenomas is not well established and has been associated with malignant transformation (8-13%), spontaneous hemorrhage and rupture. Surgical resection is recommended for all symptomatic (right upper quadrant or epigastric pain) hepatic adenomas and adenomas > 5 cm in diameter. In the absence of symptoms or for adenomas < 5 cm in diameter, discontinuation of oral contraceptives and repeat liver imaging in 6 months would be an acceptable approach after discussion with patient. If no change in size and or the lesion is growing, surgical resection should be considered.

Large (> 5 cm) benign lesions not at risk of malignant transformation (hemangioma, FNH, cysts) may rarely cause symptoms. It is important to evaluate and exclude all other causes of pain prior to recommending surgical resection. Patients with portal hypertension complications and HCC should be evaluated for liver transplantation. If liver transplant is not feasible, locoregional therapies such as radiofrequency ablation offer a survival benefit for lesions less than 2 cm comparable to surgical resection.
12. Answer: A
Amoebic liver abscess is the most common extraintestinal manifestation of Entamoeba. In developed countries, amebiasis is most commonly seen in travelers to endemic areas or natives of those areas. For travelers to an endemic area, clinical presentation usually occurs within 8 to 20 weeks after returning, although longer incubation periods have been reported. Concurrent diarrhea is present in less than one-third to half of patients, although some patients report history of dysentery within the previous few months. This entity should be suspected in the setting of fever and right upper quadrant pain together with relevant epidemiology. Confirmation of the diagnosis is usually done with radiographic imaging and Entamoeba serology. On ultrasound, the abscess appears as a round well-defined hypoechoic mass. On CT scan, it appears as a low-density mass with peripheral enhancing rim. Almost all patients with amoebic liver abscess develop positive serology. In endemic areas, positive serology may indicate previous exposure and would not distinguish acute disease from previous exposure. This patient who presents with the usual clinical manifestations, epidemiology and radiographic findings, metronidazole therapy should be started pending serologic testing.

13. Answer: C
Drug-induced autoimmune hepatitis makes up approximately 10% of patients with well characterized autoimmune hepatitis, with more than 90% of those cases associated with two drugs: nitrofurantoin and minocycline. Other medications that may mimic autoimmune hepatitis are alpha-methyldopa, hydralazine, halothane, infliximab and adalimumab. The serological and histologic features of drug-induced hepatitis are similar to autoimmune hepatitis, though drug-induced hepatitis rarely is associated with advanced fibrosis or cirrhosis. The responsible medication should be stopped, though spontaneous resolution of liver injury may not occur and immunosuppressive medications (prednisone +/- azathioprine) may be necessary, especially in sicker patients. In long-term follow up, relapse after discontinuation of immunosuppressive medications should not occur in patients with drug-induced autoimmune hepatitis.

14. Answer: D
Conventional therapy for adults with autoimmune hepatitis includes prednisone monotherapy and combination therapy with prednisone and azathioprine. Treatment is continued until remission, treatment failure, incomplete response or drug toxicity. There is no recommended minimum or maximum duration of therapy. This patient seems to be responding to therapy at least per biochemical and symptomatic parameters, after lagging behind on biochemical parameters at 6 months after the start of therapy. Both a liver biopsy and a trial of discontinuation of therapy at some point are both reasonable options, however the best recommendation to give to this patient on long-term corticosteroid therapy is to monitor for bone disease with a bone densitometry. Patients on long-term corticosteroid therapy should be monitored for bone disease at baseline and then annually.

Liver Disease and Pregnancy Answers

15. Answer: E
Acute viral hepatitis is the most common cause of jaundice during pregnancy and may occur at any trimester. Intrahepatic cholestasis of pregnancy is usually manifested by the development of itching and pruritus in the second or third trimester of pregnancy, with resolution of itching a couple of weeks after pregnancy. There is a familial predisposition and may recur in future pregnancies. The risk of gallstones increases during pregnancy and symptoms are more common in the second or third trimester. Choledocholithiasis may be managed with ERCP if needed. The best timing for cholecystectomy if needed is the 2nd trimester. Hyperemesis gravidarum may occur in the first trimester or early in the second trimester usually presents with intractable vomiting and dehydration. Autoimmune diseases usually enter in remission during pregnancy.
16. Answer: D
She is in the 3rd trimester of pregnancy and presents with jaundice, altered mental status, and coagulopathy. She has acute fatty liver of pregnancy therefore immediate delivery is warranted. Herpes hepatitis may occur in the third trimester of pregnancy but is characterized by very high liver transaminases (>2000) and normal bilirubin. HELLP syndrome also usually occurs in the third trimester of pregnancy but would not cause coagulopathy or encephalopathy and the platelet counts are usually normal. Subcapsular liver hematomas may develop spontaneously and a CT scan of the abdomen is recommended before delivery if the patient is stable.

Liver Transplantation Answers

17. Answer: C
Chronic hepatitis C recurs universally in the post-transplant period and progresses to cirrhosis in up to 20% of patients at 5-years post-transplant. Alcohol recidivism after transplant occurs in up to 40% of patients, though approximately 5% of transplanted patient who resume drinking will develop significant graft dysfunction. Recurrence of non-alcoholic steatohepatitis is very common after transplant. Calcineurin inhibitors are diabetogenic (tacrolimus>>cyclosporine) and may cause dyslipidemia (cyclosporine>>tacrolimus).

18. Answer: C
Living donor liver transplant recipients have a higher rate of biliary complications (up to 30% of patients) than deceased donor recipients. Anytime a post-liver transplant patient is ill, the first step is a liver vascular ultrasound to assess the patency of the vascular structures. A thorough infectious workup is needed also, with consideration of a liver biopsy to exclude rejection and ERCP/PTC to exclude biliary strictures. The absence of bile duct dilatation does not exclude the possibility of a biliary stricture in the post transplant patient. CMV disease is the most common infectious complication after the first month of transplant with the peak incidence occurring in the first 4 months after transplant. The affected individual is sicker than our patient, usually presenting with myalgias, diarrhea and general malaise. The higher incidence of CMV occur in CMV donor +/-CMV recipient - individuals. Most transplant programs keep CMV D+/R- and CMV D+/R+ individuals with antiviral prophylaxis during the first 3-months after transplant.

19. Answer: B
MELD score is a good predictor of three month mortality in patients with end-stage liver disease and is the standard organ allocation criteria. There are standardized MELD exceptions criteria that will automatically give the affected individual a MELD score of 22 at the time of listing. These exception include HCC patient within Milan criteria (one lesion < 5 cm or up to three lesions each < 3 cm), hepatopulmonary syndrome (with pO2 at room air < 60 mm Hg and no significant evidence of primary pulmonary disorder), cystic fibrosis, familial amyloidosis, portopulmonary hypertension (with mean pulm. artery pressures < 35 mm Hg and peripheral vascular resistance < 400 dynes/sec/cm) and primary hyperoxaluria (MELD score of 28).

Approach To The Patient With Abnormal Liver Tests – Answers

20. Answer: C
Elevation in aminotransferases in patients with undiagnosed celiac disease has been described. The mechanism is unknown. The history of chronic iron deficiency anemia and the low MCV are suggestive of celiac disease. A celiac panel should be part of the evaluation of patients with non-specific elevation in AST and ALT.
21. Answer: D
This patient has macro-AST and no further work up is necessary. Macro-AST is formed when immunoglobulins (typically, IgG, IgM, or IgA) complex with AST, resulting in false positive elevation because of ineffective renal clearance. The recognition of macro-AST as a benign cause of isolated elevation of AST levels is important to avoid unnecessary and invasive testing.

Alcohol Answers
22. Answer: D
Discussion:
Acute hepatitis is a clinical syndrome, diagnosed in the appropriate clinical setting. It is also true, however, that patients may present with decompensated liver disease and a liver biopsy may not show evidence of acute alcoholic hepatitis in 20% or more. Liver biopsy, however, is typically reserved for patient's where there is a question about the diagnosis. A number of risk scores exist to estimate prognosis in patients; the best known of these is in the Maddrey discriminant score, which in her case is 60.24.

Alternative scoring systems have used but I think a surgically useful the MELD score, and, based on her presentation, she has a very high short term mortality. Given this, it is reasonable to consider therapy. The best data exists regarding the use of corticosteroids, with an NNT of 5 - but her renal failure would also raise some concern. All the trials of steroids excluded patients with renal failure, and the data on pentoxifylline suggest some utility in preventing HRS – even in patients with pre-existing kidney injury.

References:

23. Answer: D
Discussion:
The patient is clearly ill, with a Maddrey discriminant function score of 41.8, implying a poor short-term prognosis. A number of prognostic scores exist to estimate the outcome before beginning treatment, as well as on therapy (reviewed in reference #1, as well as the AASLD guidelines). Markers such as the change in the Child Pugh score are unfortunately not sensitive enough to be useful; changes in nitrogen balance are a reflection of the nutritional status of the patient, but, unfortunately, are very slow to change. A useful clinical tool is the early change in bilirubin level, but the optimal method is the use of the Lille score, which incorporates bilirubin change at day 7, along with other variables; when tested, it had a superior ability to distinguish outcomes compared to other markers.

References:
24. Answer: E
Discussion:
Although all of these different biomarkers have been tested as methods of detection for recidivism, none of them are sufficiently sensitive nor specific to make such an important decision as transplant candidacy.

References:

25. Answer: D
Discussion:
Screening for hepatitis C infection is recommended in all patients with HIV, given a high degree of overlap of risk factors; similarly, patient is on chronic hemodialysis should be screened.
Although patients in this situation may have very low viral loads, as well as normal aminotransferases, the guidelines suggest that the initial evaluation should begin with standard antibody testing. Approximately 6% of HIV-positive patients however may not manifest HCV antibodies – and therefore, HCV RNA testing should be done in HIV-positive pts with unexplained liver disease who are anti-HCV negative.

Reference:

26. Answer: E
Discussion:
The patient presents with a number of signs which are strongly suggestive of renal involvement with hepatitis C - related to essential mixed (type II) cryoglobulinemia, leading to membranoproliferative glomerulonephritis. The early presentation of cryoglobulinemia may be just proteinuria and renal dysfunction without other symptoms.
Although his liver biopsy does not demonstrate significant disease which would trigger treatment, symptomatic cryoglobulinemia is an indication for HCV antiviral therapy regardless of the stage of liver disease. If antiviral therapy is successful in inducing a sustained virologic response, several studies suggest that there is improvement in clinical, biochemical, immunologic, and renal histologic features.

Reference:
27. Answer: C
Discussion:
The patient presents with relatively advanced liver disease secondary to chronic hepatitis C on biopsy, but, in addition, a host of symptoms which may be related to hepatitis C as well. Rheumatologic complications of hepatitis C virus infection are common and include vasculitis, sicca symptoms, myalgia, arthritis, and fibromyalgia. Data concerning the optimal treatment of HCV-associated arthritis are mostly derived from small series, but suggest that standard therapy is safe in these patients. Symptomatic cryoglobulinemia seems to respond well to antiviral therapy even in patients who do not achieve virological response. Given her advanced disease, she should be considered for therapy with interferon and ribavirin. The other choices may be reasonable for management of her rheumatologic complaints, but ignore her liver disease.

Reference:

28. Answer: D
Discussion:
A number of factors have been implicated in determining the likelihood of response to treatment for hepatitis C. with interferon and ribavirin, the most important of which are IL28B polymorphisms, HCV genotype and, to a lesser extent, the baseline viral load. The IL 28b status does correlate with race, but does not overlap completely. Duration of infection does correlate with extent of fibrosis, which is also important but, again, variation exists in the rate of fibrosis progression. Lastly, the influence of alcohol on treatment outcome is probably modest.

29. Answer: E
Discussion:
Long-term follow up studies of patients with hepatitis C cirrhosis who are treated and have a SVR generally have demonstrated good clinical outcomes - with possibly regression of fibrosis on follow up liver biopsy, and a significant improvement in survival, as well as other complications of end stage liver disease. The risk, however, of HCC is persistent, and, therefore, patients should be screened indefinitely.

References:

30. Answer: D
Discussion:
Reinfecion of the graft is virtually universal after a liver transplant for chronic hepatitis C; fortunately, however, the risk of progression to cirrhosis is not. A small percentage of patients may develop a fulminant form of recurrence, fibrosing cholestatic hepatitis, which carries a dismal prognosis. The rate of fibrosis progression among those who developed recurrent disease.is significantly accelerated compared to the situation in the non-transplant of the liver. Thus, most studies suggest a roughly 30% risk of cirrhosis at 3-5 years post transplant.

References:
31. Answer: A  
**Discussion:** 
The rate of seroconversion for healthcare workers who suffer a needle stick injury from a hepatitis C infected patient is estimated at approximately 1.8%. Although postexposure prophylaxis for healthcare workers exposed to hepatitis B and HIV and significantly impact on the likelihood of developing a chronic infection, there are no comparable data for patients with hepatitis C exposures. There is no indication for changing occupational practices, and the risk of transmission within the family is probably low. There is no evidence to support termination of the pregnancy, or changing the plan for delivery in pregnant patients with hepatitis C. Similarly, there is no evidence of an increased risk of transmission to the baby via breast feeding.

**References:**
2. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure prophylaxis MMWR, June 29, 2001/54

**NAFLD Answers**

32. Answer: E  
The diagnosis of NAFLD requires the exclusion of other competing causes that can lead to mild elevation of liver enzymes and fatty infiltration of the liver. NAFLD resembles alcoholic liver disease and excessive alcohol use must be ruled out. Medications that can cause hepatic steatosis include corticosteroids, amiodarone, methotrexate, and estrogens.

Other liver diseases that should be investigated include chronic viral hepatitis, hemochromatosis, alpha-one antitrypsin deficiency, Wilson disease and autoimmune hepatitis. Patients with NAFLD should be evaluated for the presence of other co-morbidities such as type 2 diabetes, dyslipidemia, hypertension, obstructive sleep apnea, hypothyroidism and polycystic ovarian syndrome.

33. Answer: B  
NAFLD is the most common chronic liver disease in the Western world. NAFLD is strongly associated with obesity and insulin resistance and is currently considered the hepatic manifestation of the metabolic syndrome. Fatty liver can develop in lean individuals with insulin resistance. NAFLD encompasses a wide spectrum of conditions associated with the over-accumulation of lipids in the liver, ranging from simple steatosis (fatty liver) to NASH which is characterized by the accumulation of fat in the liver along with evidence of hepatocyte damage, inflammation and different degrees of scarring or fibrosis. Although most patients with NAFLD tend to have a benign nonprogressive clinical course, some may have a progressive disease with the development of cirrhosis and its complications.
34. Answer: B

The metabolic syndrome is defined as the presence of three or more of the following parameters: 1) impaired glucose tolerance (fasting blood glucose ≥ 100 mg/dL), 2) high blood pressure (≥130/85 mmHg), 3) elevated triglyceride level (> 150 mg/dL), 4) low HDL level (<40 mg/dL for men and <50 mg/dL for women), and 5) abdominal obesity (waist circumference >102 cm for men and >88 cm for women).

35. Answer: C

The principal histologic features of NASH include the presence of macrovesicular steatosis, ballooning degeneration of hepatocytes, a mixed lobular inflammation, perisinusoidal fibrosis, and Mallory-Denk bodies. The NAFLD activity score (NAS) was developed in an attempt to standardize the histological diagnostic criteria. It consists of the unweighted sum of scores for each of the following lesions: steatosis, lobular inflammation, and ballooning. A NAS of ≥5 is consistent with NASH (3). The presence of lymphoid follicles is suggestive of chronic hepatitis C infection.

36. Answer: A

NAFLD is estimated to be present in about 30% of the general population in the United States. NASH occurs in approximately 3% of the population.

37. Answer: D

Currently, there is no FDA-approved medical therapy for NASH. Consistent weight loss through diets designed to produce a caloric deficit of 500 to 1000 cal/day is recommended in addition to moderate intensity exercise (the goal is to lose 7-10% of body weight over the course of 6-12 months). Different agents have been used to treat NASH with variable results including metformin, ursodeoxycholic acid, betaine, and omega-3 fatty acids. Recently, two large randomized clinical trial (the PIVENS trial in adults and the TONIC trial in children) demonstrated that vitamin E at a dose of 400 IU twice daily was effective in improving NASH. Caution should be taken when prescribing vitamin E as recent data suggests that it may increase overall mortality and the risk of prostate cancer in men. We recommend that treating NASH with vitamin E should be initiated and monitored by a specialist (1). Pentoxifylline improved histological features of NASH in a recent randomized placebo-controlled trial (2).

38. Answer: D

Hepatocellular carcinoma (HCC) can develop in 2-3 % of patients with cirrhosis due to NAFLD and these patients should be screened for HCC. Natural history studies have shown that cardiovascular disease is the leading cause for death in patients with NAFLD whereas liver disease ranks third. New evidence suggests that NAFLD by itself confers a substantial cardiovascular risk independent of the metabolic syndrome and that the histologic severity of liver injury correlates with more atherogenic lipid profiles (4). It is estimated that cirrhosis develops in 15-20% of patients with NASH (5). Recurrence of NAFLD after liver transplantation is common and up to 60% of transplant recipients with NASH can develop significant steatosis within a few months post-transplant (6). Furthermore, 5-10% of these patients may have recurrence that progresses to cirrhosis in long-term follow-up.
Drug-Induced Liver Injury Answers

39. Answer: C
Nodular regenerative hyperplasia (NRH) is a severe complication of azathioprine that can develop in Crohn’s disease patients and leads to portal hypertension in the absence of liver cirrhosis. Macroscopically it manifests as diffuse nodulation of the liver with evidence of portal hypertension. Histologically, the hallmark of NRH is the development of hyperplastic parenchymatous nodules without extensive fibrosis. Treatment is by stopping azathioprine and managing portal hypertension complications.
Although primary sclerosing cholangitis, sinusoidal obstruction syndrome, and Budd-Chiari syndrome are known liver-related complications that can develop in Crohn’s disease, the clinical presentation and biopsy findings and are not consistent with any of these diagnoses.

40. Answer: A
According the Hy’s rule, the development of severe acute hepatocellular injury (significant elevation in ALT) with clinical jaundice in patients with drug-induced liver injury is associated with poor prognosis with a case fatality rate of 10%. This rule is used by the FDA for evaluation of potential hepatotoxicity during clinical trials. In this example, one in every 250 patients developed jaundice with significant elevation of ALT, which means that one case of severe hepatotoxicity will develop per every 2,500 patients treated.

Ascites, Hepatorenal Syndrome and Encephalopathy Answers

41. Answer: D
Sodium restriction and diuretics. Dietary sodium restriction, not fluid restriction, results in weight loss. Fluid restriction is only necessary in the setting of profound hyponatremia (Sodium 120-125). Only ~10-15% of patients with cirrhosis will gain control of ascites with dietary sodium restriction alone, without diuretics. A single large-volume paracentesis, without initiation of dietary sodium restriction or diuretics, will likely provide short-term relief only.

42. Answer: B
He has type I hepatorenal syndrome, and should be treated with daily IV albumin, octreotide, and midodrine, as a bridge to a liver transplant. Hepatorenal syndrome has two types. Type I is characterized by a rapid reduction in renal function, as defined as a doubling of serum creatinine to >2.5 mg/dL, or a 50% reduction in the initial creatinine clearance to a level <20 mL/minute in less than 2 weeks. It should be managed in the hospital. Type II has a less rapidly progressive course, and may be managed in outpatients. Medical therapy of type I hepatorenal syndrome involves volume expansion and vasoconstrictor therapy. Liver transplant has been shown to rapidly reverse renal failure when due to type I hepatorenal syndrome.

43. Answer: C
Vasoconstrictors + albumin reverse hepatorenal syndrome type 1 in ~60% of patients. Approximately 2/3 of acute renal failure in hospitalized patients is pre-renal azotemia, of which approximately 2/3 is volume responsive. Of those patients whose pre-renal azotemia does not respond to volume expansion, the majority of patients have HRS type 1. Patients with HRS may have elevated urine sodium excretion if recently given diuretics. HRS cannot be definitively diagnosed in patients who are in cardiovascular shock, but can be diagnosed in the setting of active infection.
44. Answer: C
Dietary sodium and fluid restriction. This patient has hyponatremia related to portal hypertension, which is worsened by dietary sodium intake and diuretic use. Restriction of dietary sodium and modest fluid restriction should improve serum sodium. His ascites is responding to diuretics, so neither a paracentesis nor a TIPS is necessary.

Metabolic Liver Diseases: HH, Wilson's Disease, A1AT Deficiency
Answer:

45. Answer: D
Ferroportin disease. Her HFE genotype is very rarely associated with iron loading. Ferroportin disease is an autosomal dominant disorder of iron metabolism caused by a mutation in ferroportin, which prevents iron export from reticuloendothelial macrophages. It is characterized by an elevated ferritin with a normal serum iron and transferrin saturation. Her alpha 1-antitrypsin phenotype is normal, and her liver biopsy does not show the characteristic PAS-positive, diastase–resistant globules of alpha 1-antitrypsin deficiency. Alloimmune hepatitis is a disease of iron overload of the neonate.

46. Answer: A
Liver biopsy. He has HFE-mediated hereditary hemochromatosis with iron overload. A liver biopsy is indicated for patients with ferritin >1000 or abnormal liver enzymes. Patients with a ferritin >1000 are significantly more likely to have cirrhosis than those with a ferritin <1000. After the liver biopsy, he should be referred for phlebotomy.

47. Answer: C
Trientene. This patient has Wilson’s disease. She has a Coombs negative hemolytic anemia with evidence of liver dysfunction. She needs to be de-coppered with a chelating agent, such as trientene. Zinc has a role in maintenance of a copper depleted state. She has evidence of prior exposure to hepatitis B.

48. Answer: B
MS. The S allele, when inherited either with the M allele or with another S allele, does not cause liver disease, as the abnormal protein product does not accumulate in the hepatocyte.

Cholestatic Liver Diseases: PBC, PSC Answers

49. Answer: E
Duration of IBD and colonic dysplasia associated with chronic ulcerative colitis (B and C). The duration of PSC is not a risk factor for cholangiocarcinoma. Approximately half of patients with PSC and cholangiocarcinoma are diagnosed with cholangiocarcinoma within 1 year of diagnosis of PSC.

50. Answer: A
If the antimitochondrial antibody is negative, the Answer: diagnosis of primary biliary cirrhosis requires histologic correlation. ANA or smooth muscle antibodies are found in approximately half of patients with PBC who do not have overlap with autoimmune hepatitis. Most patients with PBC have an elevated IgM fraction; elevated IgG is found more often in patients with PBC/AIH overlap. Ursodeoxycholic acid should be continued indefinitely in patients with PBC.
Pediatric Liver Disease Answers

51. Answer: C
Alagille syndrome is caused by a mutation in JAG-1 gene and is characterized by paucity of intrahepatic bile ducts and the following features: 1) chronic cholestasis with disproportionate elevation of GGT, 2) dysmorphic facies, 3) cardiac anomalies, most commonly peripheral pulmonic stenosis and tetralogy of Fallot, 4) butterfly vertebrae, and 5) posterior embryotoxon of the eye.

52. Answer: B
Orthotopic liver transplantation (OLT) is now the accepted definitive therapy for many children with end-stage liver disease. Liver transplantation in children is associated with excellent outcome; however, the one year patient survival is approximately 85-90%. Chronic rejection can lead to graft loss in 5% of children. Non-compliance with immunosuppression in teenagers is a major risk factor. Primary non-function of the graft may develop in approximately 5% of patients after cadaveric liver transplantation and is characterized by encephalopathy, coagulopathy, minimal bile output, and progressive renal and multi-system failure.

Hepatitis A Answers

53. Answer: B.
Rationale (reference) Answer: B. In June 2007 US Guidelines were revised and now recommend hepatitis A vaccine, in lieu of immune globulin, be used after exposure to prevent infection in healthy persons aged 1-40. (reference: www.cdc.gov/hepatitis/HAV/HAVfaq.htm)

54. Answer: G
Rationale (reference) Answer: g. The complete list of groups deemed to be at sufficient risk for HAV to warrant routine immunization include, in addition to a-c above, all children at age 1; children and adolescent ages 2-18 who live in states or communities where routine hepatitis A vaccination has been implemented because of high disease incidence, persons traveling to or working in countries that have high or intermediate rates of hepatitis A, users of illegal injection (and non-injection) drugs, persons who work in labs containing HAV, or with HAV-infected primates, those with clotting disorders who receive clotting factor concentrates. (reference: www.cdc.gov/hepatitis/HAV/HAVfaq.htm)

Hepatitis B Answers

55. Answer: D
Rationale (reference) Viral load. All choices increase risk for development of hepatocellular carcinoma but within each category, risk is higher as the viral load increases.

56. Answer: D
Rationale: Ccc is a circular strand of viral DNA within the host nucleus. It has been referred to as a “mini chromosome.” It serves as a source for potential HBV reactivation even in those who have otherwise immunologically “cleared” the virus (i.e., serum HbsAG negative/antic HBc positive/anti HBs positive

57. Answer: C
Rationale (reference) The photomicrograph demonstrates ground glass hepatocytes. It is typically seen in chronic hepatitis B. Ground glass hepatocytes may also be seen in certain drug induced liver injury.
58. Answer: C
Rationale (reference). Reactivation of hepatitis B under the influence of disease or treatments that depress the immune system may occur in those with inactive hepatitis B (hepatitis carriers), and, much less often in those with anti HBc in the absence of discernable HBsAg. Disease reactivation may be severe.

59. Answer: D
Rationale (reference): Although she has normal liver enzymes this woman had a very high very load. This defines the immune tolerant phase of HBV infection. Currently, treatment of those in the immune

**Portal Hypertension Bleeding Answers**

60. Answer: A
Rationale: The Northern Italian Endoscopy Club natural history study found the strongest correlation with subsequent bleeding when screening endoscopy revealed larger varices, those with red wale markings, in those with more advanced cirrhosis. The number of channels was not related to bleeding risk.

61. Answer: E
Rationale (reference): The endoscopic image reveals large esophageal varices with red wale markings. These finding indicate a high risk for bleeding. Evidence for reduction in first bleeding episodes exists for both beta blockade and band ligation and the AASLD practice guideline sanctions each (although beta blockade is preferred).

62. Answer: A
Rationale (reference) This patient has an elevated HVPG; however, esophageal varices are likely to form until the HVPG is at least 10-12 mm Hg. This patient has a HVPG of 8 mm Hg. Other clinical predictors given as choices are less well correlated with the presence or absence of varices.

63. Answer: C
Rationale (reference) The endoscopic photograph shows no esophageal varices. AASLD Practice Guideline # 3: In patients who have compensated cirrhosis and no varices on the initial EGD, it should be repeated in 3 years (Class I, Level C). If there is evidence of hepatic decompensation, EGD should be done at that time and repeated annually. Our patient has compensated cirrhosis (Childs A; MELD 9). There is no established role for beta blockers in the prevention of esophageal varices.

**Portal Hypertension – Cirrhosis - Answers**

64. Answer: C
Rationale (reference) The CT scan shows changes typical for cirrhosis, and ascites. When cirrhosis is unambiguously present, and the etiology is clear, a liver biopsy is not helpful. In the presence of cirrhosis, screening for varices by EGD, and assessing the degree of severity (MELD score) is appropriate. New-onset ascites should be evaluated, and the history of close contact with a family member with tuberculosis raises the question of tuberculosis peritonitis.
Vascular Disease – Answers
65. Answer: B
Rationale. The venous drainage from the caudate lobe is often directly into the vena cava (not through the hepatic vein). In acute Budd Chiari syndrome damage to the caudate lobe is often spared resulting in hypertrophy of the caudate lobe in about 75% of cases. Caudate lobe hypertrophy is found in about 75% of patients. DELEVE et al. Hepatology; 2009; 49:1729

66. Answer: C
Rationale (reference) Myleoproliferative disorders account for 40-50% of cases of hepatic vein thrombosis in adults. Corresponding percentages for other choices: Protein S deficiency – 7-20%; Factor V Leiden mutation – 6-32%; Protein C deficiency 10-30%.
AASLD PRACTICE GUIDELINES
Vascular Disorders of the Liver. DELEVE, VALLA, AND GARCIA-TSAO HEPATOLOGY, May 2009

67. Answer: A
The information provided in the case scenario provides circumstantial evidence for a meyeloproliferative disorder. Liver transplantation is not conidered appropriate for such individuals. Anticoagulation is the standard treatment and the other choices may be considered if there is clinical deterioration despite anticoagulation. AASLD PRACTICE GUIDELINES
Vascular Disorders of the Liver. DELEVE, VALLA, AND GARCIA-TSAO HEPATOLOGY, May 2009

Small Bowel and Colon Board Review Answers
68. Answer: C
An elevated transglutaminase IgA suggests celiac disease, but since there is still a possibility of a false positive blood test result, an upper endoscopy with duodenal biopsies should be performed to confirm the diagnosis before a gluten free diet is started. A lactose free diet would be started if lactose intolerance is suggested, not celiac disease. Ileal biopsies may be helpful to evaluate for Crohn’s disease, but would not be helpful to confirm possible celiac disease in the setting of an elevated transglutaminase IgA.

69. Answer: D
This patient has lymphocytic colitis. The initial treatment options for lymphocytic colitis include loperamide, bismuth subsalicylate, budesonide, and mesalamine. Infliximab and methotrexate are not used in the initial treatment of lymphocytic colitis. Although there is an association of microscopic colitis with celiac disease, since the duodenal biopsies were normal, it is unlikely that the patient has celiac disease, so a gluten free diet would not be the best option here.

70. Answer: C
This patient appears to have diverticular associated colitis. The initial treatment of diverticular associated colitis is usually a course of antibiotics. Mesalamine agents can also be used. Infliximab and azathioprine would not be appropriate treatment options at this point. Ibuprofen and other NSAIDs may worsen colitis and would not be helpful.

71. Answer: B
The patient’s history of scleroderma with possible small bowel dysmotility and jejunal diverticuli raise possibility of small bowel bacterial overgrowth as a cause of the patient’s diarrhea. A glucose breath test can check for bacterial overgrowth, or an empiric course of antibiotics can be used to see if there is symptom improvement. A gastric emptying test would check for gastroparesis and a mesenteric vascular ultrasound would check for mesenteric ischemia, and neither of these conditions would be expected to cause solitary diarrhea. H. pylori infection can cause dyspepsia, but would not be expected to cause diarrhea.
72. Answer: A
The patient appears to have cytomegalovirus (CMV) infection based on the biopsy results. The initial treatment of CMV infection is ganciclovir. Foscarine is usually used as a second line CMV treatment agent. Acyclovir, fluconazole, and meropenem are used for herpes virus infections, fungal infections, and bacterial infections, respectively, and would not be helpful in the treatment of CMV infection.

73. Answer: B
Since the patient has no detectable ATI, and infliximab level is greater than 12 mcg/ml 4 weeks after last infliximab dose, then it is unlikely that a dose increase of infliximab, or a switch to another anti-TNF medication such as adalimumab or certolizumab pegol will help. In these cases, a switch into another class of medications, such as natalizumab, would be the preferred treatment approach.

74. Answer: B
The patient appears to have an adenoma-like mass (ALM) in an area of previous colitis. Studies show that if these lesions can be easily removed endoscopically and if biopsies of normal appearing flat mucosa around the polyp do not reveal dysplasia, then these patients can be monitored with more intensive surveillance colonoscopies every 3-6 months. Colonic resection is not necessary for ALMs, and repeat colonoscopies every 1-2 years are not appropriate since more frequent monitoring is warranted.

75. Answer: A
This patient appears to have an appendiceal mucocele, which is considered a premalignant lesion and should be removed via appendectomy. A right hemicolectomy is not needed. A PET scan is not helpful here. Monitoring with repeat CT scans is not appropriate since if not removed, these lesions may rupture leading to pseudomyxoma peritonei which can lead to intraperitoneal adhesions and bowel obstruction.

Answers for Constipation and Anorectal Talk

76. Answer: C
Psudomelanosis Coli is a benign condition (corresponding to question slide 1)

77. Answer: C
Ogilvie syndrome can be helped by colonoscopic decompression (corresponding to question slide 2)

78. Answer: D
Tracing is consistent with dyssynergic defecation (corresponding to question slide 3)

79. Answer: D

80. Answer: A
This is a solitary rectal ulcer. (Corresponding to question slide 5)

81. Answer: D
Defecogram shows a rectocele. (Corresponding to question slide 6)

82. Answer: D
This is a normal rectoanal inhibitory reflex (corresponding to questions slides 7)

83. Answer: D
Tracing from a patient with Hirschsprung’s disease (Corresponding to question slide 8)