LUMEN FLASH CARD

Course: MHD Topic: Jaundice

1	What is the biochemical definition of jaundice?	Bilirubin >2.5 mg/dl

2	What is the source for bilirubin?	• Senescent RBC's is the source for:
		  ○ 80% of bilirubin
		  ○ dead red cells are processed in reticuloendothelial system
		  ○ the heme moiety gets oxidized to biliverdin, which is then metabolized to bilirubin
		• Ineffective erythropoiesis
		  ○ bone marrow as a source
		• Hepatic hemoproteins

3	What does conjugated and unconjugated bilirubin refers to?	• The bilirubin (unconjugated) generated by senescence of rbc's is taken up by the liver • Liver conjugates bilirubin to glucuronic acid, generating bilirubin glucuronide (conjugated)
4	What are the characteristics of unconjugated bilirubin?	• Unconjugated bilirubin is tightly bound to albumin • It is not water soluble and is not excreted in urine • It can dissolve in lipids • It can cross blood brain barrier and cause encephalopathy • Neonatal brain cells, especially basal ganglia have an affinity for unconjugated bilirubin • Blue light, changes unconjugated bilirubin water soluble and can be excreted without conjugation
5	What is the liver's role in bilirubin metabolism?	The liver has a central role in metabolism of bilirubin: • Uptake • Conjugation

		• Excretion into bile
6	Describe the liver's role in bilirubin uptake.	• Follows dissociation of bilirubin from albumin
7	Describe the liver's role in conjugation of bilirubin.	• Bilirubin glucuronosyl transferace catalyzes and conjugates bilirubin to glucuronic acid, generating bilirubin glucuronide

8	What are the characteristics of conjugated bilirubin?	• Conjugated bilirubin is water soluble and is excreted in urine
		• Presence of bilirubin in urine is indicative of conjugated hyperbilirubinemia
		• Conjugated bilirubin is bound to albumin in two forms:
		  ○ reversible, similar to unconjugated bilirubin
		  ○ long standing period results in irreversible complex with albumin (biliprotein). This is not excreted by the kidney and can stay in serum for weeks, even after relief of obstruction.
		  ■ they disappear with normal degradation of albumin

9	Which of the following liver functions is rate limiting with regards to bilirubin: uptake, conjugation or excretion?	Excretory phase • Excretion is the rate limiting step

10	What happens to bilirubin excreted in the GI tract?	GI phase
		• After secretion in bile, bilirubin is transported through the biliary tract into the duodenum
		• Bilirubin is either excreted in feces or converted into urobilinogen by ileal or colonic bacteria
		• Urobilinogen gets absorbed from the ileum and colon into portal circulation
		  ○ some is taken up by the liver and re-excreted in bile
		  ○ the rest bypasses the liver and is excreted by the kidney

11	How do you classify jaundice by metabolic mechanisms?	• Overproduction • Decreased hepatic uptake • Decreased hepatic conjugation • Decreased excretion into bile
12		• Hemolytic jaundice • Hepatocelluar failure

	How do you classify jaundice by pathological mechanism?	• Cholestatic jaundice
		  ○ intrahepatic obstruction
		  ○ extra hepatic obstruction

13	What are the common causes for unconjugated hyperbilirubinemia?	• **Increased bilrubin production**
		  ○ hemolysis
		• Decreased hepatic uptake/**Decreased glucoronide conjugation**
		  ○ Gilbert's syndrome
		  ○ drugs
		  ○ physiologic newborn jaundice

14	What are the common causes for hemolysis presenting with jaundice?	• Hemoglobinopathy
		  ○ sickle cell anemia
		  ○ thalassemia
		• Megaloblastic anemia

15	What are the common causes for conjugated hyperbilirubinemia due to hepatocellular disorder?	• Hereditary disorder
		  ○ Dubin-Johnson Syndrome
		• **Hepatocelluar disease**
		  ○ viral hepatitis
		  ○ alcoholic hepatitis/cirrhosis
		  ○ ischemia/CHF
		  ○ autoimmune hepatitis
		  ○ metabolic: Rye syndrome, Wilson's disease

16	What are the common causes for conjugated hyperbilirubinemia due to excretory disorder?	**Cholestatic jaundice**
		• Intrahepatic
		  ○ granulomatous infection
		  ○ severe inflammation
		  ○ malignancy
		  ○ primary biliary cirrhosis
		  ○ drugs
		• Extrahepatic
		  ○ choledocholithiasis
		  ○ primary sclerosing cholangitis
		  ○ pancreatitis
		  ○ pancreatic carcinoma

17	You are evaluating a patient with jaundice. What important historical information would make you consider hepatitis?	• Nausea, vomiting, anorexia / hepatitis • Abdominal pain • Fever • Blood transfusion • Drug abuse • Ethanol • Travel

18	You are evaluating a patient with jaundice. What important historical information would make you consider obstructive jaundice?	• Duration long standing • Asymptomatic • Abdominal pain • Weight loss • Bowel habits • Medications • Pruritus • Acholic stools • Biliary surgery
19	What important historical information should you gather from the patient's history and why?	Answer • Duration long standing • Nausea, vomiting, anorexia / hepatitis • Asymptomatic / obstructive jaundice, cancer pancreas • Abdominal pain / cholecystitis, cholangitis, hepatitis, cancer • Fever / cholecystitis, cholangitis, hepatitis • Weight loss / cancer, cholangitis • Bowel habits • Blood transfusion / hepatitis • Drug abuse / hepatitis • Ethanol / fatty liver, alcoholic hepatitis, cirrhosis, pancreatitis • Medications INH, chlorpromazine, anabolic steroids, acetaminophen • Travel / hepatitis • Pruritus / bile salts get deposited in tissue and lead to itching. Obstructive jaundice • Acholic stools / obstructive jaundice • Biliary surgery / stones, cholangitis • Pregnancy • Inflammatory bowel disease / cholangitis • Surgery / post-op jaundice • Prior or concurrent malignancy / liver metastases • History of hemolytic anemia / sickle cell, thalassemia

20	What are the sites where you can detect jaundice?	• Sclera
		  ○ scleral tissue is rich in elastin, which has a high affinity for bilirubin
		• Urine
		  ○ darkening of urine and scleral icterus precede yellowing of skin

		• Skin
21	What are the other causes for yellow skin other than jaundice? How do you distinguish it from jaundice?	• Other cause of yellow skin is carotenemia • Carotenemia does not cause scleral icterus
22	Are tears yellow in a jaundice patient?	• No • Bilirubin is not present in true secretions like tears, saliva and pancreatic juice • Bilirubin is present in body fluids in proportion to their albumin content
23	A patient with spinal cord compression and leg paralysis develops hepatitis. Describe the sites where jaundice will be most evident. • Upper extremities • Lower extremities	• Jaundice of sclera, trunk and upper arms • Jaundice is influenced by blood flow and edema • Paralyzed extremities and edematous areas tend to remain uncolored
24	What is the pathophysiological effect of hyperbilirubinemia?	• Hyperbilirubinemia, per se, has no pathophysiologic effect • What about unconjugated bilirubin

25	What are the important physical findings you should gather from physical examination, when you suspect cirrhosis and why?	• Jaundice
		• Enlarged firm liver
		• Splenomegly/portal hypertension
		• Hyperestrogen state
		  ○ gynaecomastia
		  ○ testicular atrophy
		  ○ spider angiomata
		• Palmar erythema
		• Facial telengiectasia
		• Dupuytren's contracture

26	What are the important physical findings you should gather from physical examination, when you suspect obstructive jaundice and why?	• Jaundice • Greenish hue/long standing problem ○ Long standing jaundice assumes a greenish hue due to oxidation of circulating bilirubin to biliverdin • Palpable gall bladder/distal biliary obstruction from malignancy • Wasting/ malignancy, biliary disease • Scratch marks / Obstructive jaundice. Itching due to bile salt deposition • Xanthomata/ Primary biliary Cirrhosis
27		• Jaundice • Greenish hue/long standing problem. /Long

	What important physical findings should you gather from physical examination and why?	standing jaundice assumes a greenish hue due to oxidation of circulating bilirubin to biliverdin
		• Fever/biliary tract inflammation
		• RUQ tenderness/biliary tract inflammation
		• Enlarged tender liver/hepatic inflammation, malignancy
		• Palpable gall bladder/distal biliary obstruction from malignancy
		• Splenomegly/Portal hypertension
		• Hyperestrogen state/ Cirrhosis
		  ○ Gynaecomastia
		  ○ Testicular atrophy
		  ○ Spider angiomata
		• Palmar erythema/ Cirrhosis
		• Facial telengiectasia/ Cirrhosis
		• Dupuytren's contracture/ Cirrhosis
		• Wasting/ malignancy, biliary disease
		• Scratch marks / Obstructive jaundice. Itching due to bile salt deposition
		• Adenopathy/ cancer, lymphoma
		• Masses/ cancer
		• Xanthomata/ Primary biliary cirrhosis
		• Kayser-fleischer rings/ Wilson's disease

28	What are useful lab studies in evaluation of a jaundice patient suspected to have hepatitis?	• Urine bilirubin • Urine urobilinogen • Serum bilirubin total, direct and indirect • Liver enzyme • Alkaline phosphatase • Serological viral studies A, B, C, D, E, CMV • Liver biopsy
29	What are the useful lab studies in the evaluation of a patient with jaundice suspected to have obstructive jaundice?	• Urine bilirubin • Urine urobilinogen • Serum bilirubin total, direct and indirect • Liver enzyme • Alkaline phosphatase • CT • Ultrasound • MRI • Doppler flow • Endoscopic cholangiography • PTC (percutaneous transhepatic cholangiography) • ERCP (endoscopic retrograde

		cholangiopancretography) /cytology / biopsy
30	What are the manifestations of chronic bile stasis?	• Pruritus - bile salts • Steatorrhea - malabsorption • Fat soluble vitamin deficiency (K, A, D) • Elevated cholesterol - xanthomas • Progressive jaundice • Gallstones • Biliary cirrhosis • Hepatocellular carcinoma
31	All of the statements regarding unconjugated bilirubin are true except: A. 80% of bilirubin is derived from RBC's B. Heme moiety gets converted to biliverdin, which is metabolized to bilirubin C. Unconjugated bilirubin can cross blood brain barrier D. Unconjugated bilirubin is excreted in urine	D. **Unconjugated bilirubin is excreted in urine** • Unconjugated bilirubin is tightly bound to albumin and cannot be excreted in urine.
32	All of the following statements regarding conjugated bilirubin are true except: A. Kidney conjugates bilirubin to glucuronic acid B. Conjugated bilirubin is water soluble and is excreted in urine C. Presence of bilirubin in urine is indicative of conjugated bilirubinemia D. Bilirubin glucuronyl transferase catalyses and conjugates bilirubin	A. **Kidney conjugates bilirubin to glucuronic acid** • Liver conjugates bilirubin glucuronic acid. Conjugation is the last function to go.
33	The rate limiting step in the metabolism of bilirubin is: A. Bilirubin uptake B. Bilirubin conjugation	C. **Bilirubin excretion**

	C. Bilirubin excretion	
34	The following statements regarding urobilinogen are true except: A. Ileal and Colonic bacteria convert bilirubin to urobilinogen B. Urobilinogen is absorbed from Ileum and colon C. Urobilnogen is excreted by Kidney D. Urobilinogen is absorbed from GI tract and enters systemic circulation	D. **Urobilinogen is absorbed from GI tract and enters systemic circulation** • Urobilinogen is absorbed from the GI tract and enters portal circulation
35	Unconjugated hyperbilrubinemia can be seen in all of the following except: A. Gilbert's syndrome B. Thalassemia C. Dubin Johnson Syndrome D. Hemolysis	C. **Dubin Johnson Syndrome**
36	Jaundice in primary biliary cirrhosis is due to: A. Hepatocellualr failure B. Cholestatic jaundice C. Extrahepatic biliary obstruction D. Metabolic disorder	B. **Cholestatic jaundice**
37	Jaundice in sclerosing cholangitis is due to: A. Hepatocellualr failure B. Cholestatic jaundice C. Obstructive jaundice D. Metabolic disorder	C. **Obstructive jaundice**
38	When jaundice is associated with nausea, vomiting and anorexia, you should consider: A. Hepatitis B. Cancer of pancreas C. Sickle cell anemia	A. **Hepatitis**

	D. Dubin Johnson Syndrome	
39	When jaundice is associated with weight loss, you should consider: A. Hepatitis B. Cholangitis C. Pancreatitis D. Primary biliary cirrhosis	B. **Cholangitis** • Cancer and cholangitis are considerations when jaundice is associated with weight loss.
40	When jaundice is associated with pruritus, you should consider: A. Obstructive jaundice B. Hepatocellular jaundice C. Unconjugated hyperbilirubinemia D. Metabolic disorder	A. **Obstructive jaundice** • Bile salt deposition occurs in obstructive jaundice which is responsible for itching.
41	Darkening of urine and scleral icterus precedes yellowing of skin. A. True B. False	A. **True**
42	A patient with alchoholic hepatitis sustains a minor shoulder injury. You would prescribe: A. Aspirin B. Tylenol	A. **Aspirin** • Tylenol can be toxic in patients with liver disease due to increased p-450 enzyme activity.
43	Elevated bilirubin, per se, has no pathophysiological consequence in adults. A. True B. False	A. **True** • In children the unconjugated bilirubin can cross blood brain barrier and has affinity for basal ganglia (kernicterus).
44	Select the incorrect statement regarding post-op jaundice. A. Self limited B. 15% of open heart surgery C. Patients feel well with no anorexia D. Workup for gallbladder	D. **Workup for gallbladder disease** • It is common and is multifactorial (hemolysis, drugs, anesthesia, ischemia, hypoxia, sepsis)

	disease	
45	A liquid protein diet for weight loss carries the risk for gall bladder disease. A. True B. False	A. **True** • A liquid protein diet promotes gall bladder stasis and resultant in sludge/stone.
46	Which is the correct description of Gilbert's Syndrome. A. Is a genetic enzymatic defect in the liver B. Is due to increased hemolysis	A. **Is a genetic enzymatic defect in the liver**

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