

### Causes of elevated alkaline phosphatase

#### Hepatobiliary

- ☐ Bile duct obstruction
  - ☐ Choledocholithiasis
  - ☐ Malignant obstruction
  - ☐ Bile duct flukes
- ☐ Bile duct stricture
- ☐ Ductopenia
- ☐ AIDS cholangiopathy
- ☐ Cholestatic liver diseases
  - ☐ Primary biliary cirrhosis
  - ☐ PSC
- ☐ Medications and drug-induced liver injury
- ☐ Infiltrative diseases of the liver
  - ☐ Sarcoid
  - ☐ Granulomatous hepatitis
  - ☐ Tuberculosis
  - ☐ Amyloid
  - ☐ Metastatic cancer
  - ☐ Lymphoma
- ☐ Hepatic abscess
- ☐ Hepatocellular carcinoma
- ☐ Viral hepatitis
- ☐ Cirrhosis
- ☐ Vanishing bile duct syndrome
- ☐ Ischemic cholangiopathy
- ☐ Benign recurrent cholestasis
- ☐ Sarcoidosis
- ☐ Alcoholic liver disease
- ☐ Intrahepatic cholestasis of pregnancy
- ☐ Benign post-operative jaundice
- ☐ ICU jaundice or multifactorial jaundice
- ☐ TPN
- ☐ Liver allograft rejection
- ☐ Acute alcoholic hepatitis
- ☐ Sickle cell liver crisis
- ☐ Sepsis
- ☐ Congestive heart failure
- ☐ Hemophagocytic lymphohistiocytosis

#### Non-hepatic

- ☐ Bone disease
  - ☐ Osteomalacia
  - ☐ Paget's disease
- ☐ Primary bony malignancy

### Causes of elevated alkaline phosphatase (cont)

- ☐ Bony metastases
- ☐ Hyperthyroidism
- ☐ Hyperparathyroidism

Source: <http://acgblog.org/wp-content/uploads/2016/12/AJG-Kwo-et-al-ACG-Liver-Chemistries-Guideline-2017.pdf>

### Continued

- ☐ Pregnancy (third trimester)
- ☐ Chronic renal failure
- ☐ Lymphoma
- ☐ Extra-hepatic malignancy
- ☐ Congestive heart failure
- ☐ Childhood growth
- ☐ Infection
- ☐ Inflammation
- ☐ Influx of alkaline phosphatase after a fatty meal
- ☐ Blood type O and B
- ☐ Myeloid metaplasia
- ☐ Peritonitis
- ☐ Diabetes mellitus
- ☐ Gastric ulcer
- ☐ Increasing age, especially women

PSC, primary sclerosing cholangitis; TPN, total parenteral nutrition.

### Algorithm for Evaluation - Normal

#### Normal total bilirubin & serum transaminases

1. History & physical exam  
confirm with serum GGT
2. If GGT normal --> evaluate for non-hepatobiliary etiologies  
If GGT abnormal --> obtain right upper quadrant ultrasound, evaluate for potential hepatotoxic medications, check AMA, ANA, & SMA
3. If evaluation negative & alkaline phosphatase > 2x ULN --> consider liver biopsy  
If evaluation negative & alkaline phosphatase 1-2x ULN -> consider observation  
If ductal dilatation identified --> ERCP or MRCP  
If AMA positive --> evaluate for primary biliary cirrhosis/cholangitis
4. If persistent elevation of serum alkaline phosphatase after 6 months observation --> consider liver biopsy

### Algorithm for evaluation - Elevated

#### Elevated serum transaminases ± elevated bilirubin

1. History & Physical exam

Check right upper quadrant ultrasound

2. If ductal dilatation --> ERCP, MRCP

If no ductal dilatation --> check AMA, ANA, SMA

3. If AMA positive --> evaluate for primary biliary cirrhosis/cholangitis

If AMA negative & alkaline phosphatase > 2x ULN --> consider liver biopsy or MRCP

If AMA negative & alkaline phosphatase 1-2x ULN --> consider observation

4. If persistent elevation of serum alkaline phosphatase after 6 months observation--> consider liver biopsy or MRCP



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