

1. A 52-year-old man with a history of alcohol abuse presents with sudden severe abdominal pain associated with nausea and vomiting. Which of the following is true when considering serum testing for acute pancreatitis?

- A. Elevated amylase levels appear well before elevated lipase levels.
- B. Elevated amylase is more specific than elevated lipase for pancreatitis.
- C. Elevated lipase is more specific than elevated amylase for pancreatitis
- D. Elevated Amylase and elevated lipase are equally specific for pancreatitis
- E. Lipase has both salivary and pancreatic isoforms, which reduces specificity.

1: C

While lipase and amylase are both elevated in cases of acute pancreatitis, amylase is less specific to pancreatitis. In acute pancreatitis elevated lipase and amylase levels occur at approximately the same time (amylase within 5 to 8 hours after symptom onset, lipase within 4 to 8 hours after symptom onset). A number of causes of elevated serum amylase have been observed. These include elevations of the salivary amylase isoform due to salivary gland lesions or increases in the pancreatic isoform in cases of biliary tract disease or appendicitis.

2. Macroamylase refers to:

- A. The presence of complexes consisting of amylase and immunoglobulins that result in elevated amylase levels.
- B. The elevation of serum salivary amylase isoform in cases of ectopic pregnancy or ovarian malignancy.
- C. The presence of elevated serum amylase levels in acute pancreatitis
- D. The false elevation of amylase levels in lipemic specimens.
- E. The elevation of amylase levels in cases of biliary tract obstruction.

2: A

Macroamylases are complexes between IgG or IgA and amylase. These large complexes are not excreted by the kidneys. This asymptomatic phenomenon can result in a large increase in measured amylase concentrations

3. A 63-year-old woman with weight loss is found to have a slightly elevated alanine aminotransferase level of 45 U/L (N=8-33 U/L) and an elevated aspartate aminotransferase level of 150 U/L (N=4-36 U/L)

Which of the following is the most likely cause?

- A. Acute Viral Hepatitis
- B. Reye's Syndrome
- C. Acute Alcoholic Hepatitis
- D. Acute Mononucleosis
- E. Chronic Viral Hepatitis

3.C

Although AST may be briefly higher initially in some forms of acute injury, ALT is generally higher than AST in most forms of acute and chronic hepatic injury. However in alcoholic hepatitis AST is greater than ALT in alcoholic hepatitis. An AST/ALT ratio of 2:1 or greater is suggestive of that diagnosis.

4. A 33-year-old jaundiced man is found to have the following serum laboratory values: Total Bilirubin of 3.0 mg/dL (normal <1.0), Direct bilirubin of 2.7 mg/dL (normal <0.2).

Which of the following is the most likely cause?

- A. Gilberts Syndrome
- B. Fasting
- C. Crigler-Najjar syndrome
- D. Bile Duct Obstruction
- E. Hemolytic Anemia

4.D

Of the choices presented Gilberts Syndrome and Crigler-Najjar syndrome lead to increases in unconjugated bilirubin (indirect). A larger increase in unconjugated bilirubin would also be expected in cases of hemolysis. Although Dubin-Johnson and Rotor syndrome also lead to isolated elevation in conjugated bilirubin bile duct obstruction is the only plausible choice in this question.

5. A 53-year-old woman presents with chronic intermittent acute abdominal pain that is determined to stem from common bile duct obstruction. Which of the following liver function markers would one not expect to be highly elevated in the serum?

- A. Gamma-glutamyltransferase
- B. Total Bilirubin
- C. Alkaline Phosphatase
- D. Aspartate Aminotransferase
- E. Conjugated Bilirubin

5.D

Unlike the other markers, AST is not generally dramatically elevated in bile duct obstruction. Although there may occasionally be an acute increase in ALT and AST serum concentrations in cases of gallstones and other obstructions, ALT and AST levels fall and return to normal in 8 to 10 days.

6. Which of the following is the most specific serum marker for alcohol dependency?

- A. Carbohydrate Deficient Transferrin
- B. Lipase
- C. Gamma-Glutamyl Transferase
- D. AFP-L3%
- E. Lactate Dehydrogenase

6.A

Both GGT and CDT are markers of sustained alcohol consumption. CDT is the most specific marker of chronic alcohol abuse to date and consists of asialo transferrin isoforms. A number of factors can elevate GGT. Carbohydrate-deficient transferrin (CDT) is often used for diagnosis of chronic alcohol abuse.

7. Which of the following is not true of drug metabolism:

- A. In general, metabolism serves to increase the water solubility of xenobiotic compounds.
- B. Most Phase II reactions are mediated by the cytochrome P450 (CYP) enzymes
- C. Phase II reactions typically involve enzyme-mediated conjugation of compounds
- D. Phase I reactions typically involve oxidation of compounds
- E. Glutathione and Acetyl CoA often serve as cofactors in Phase II reactions

7.B

All statements are true, with the exception that CYP enzymes are generally associated with Phase I reactions, not phase II reactions as stated.

8. Warfarin metabolism is mainly performed by:

- A. P450 CYP3A4
- B. P450 CYP2C9
- C. P450 CYP2D6
- D. Thiopurine S-Methyltransferase (TPMT)
- E. N-Acetyl-Transferases (NATs)

8.B

CYP3A4—Mediates most phase 1 biotransformation reactions. Example substrates include: erythromycin, benzodiazepines, immune suppressors (cyclosporine, FK506), HIV protease inhibitors, Calcium Channel blockers, and methadone.

CYP2C9—Substrates include Warfarin, NSAIDs, Angiotensin II blockers

CYP2D6—Mediates Many phase 1 biotransformation reactions. Substrates include: Beta blockers, antidepressants, antipsychotics, codeine.

CYP2E1—Substrates include: Acetaminophen, Chlorzoxazone, Ethanol

Thiopurine S-Methyltransferase (TPMT)—Substrates include azothioprine and 6-mercaptopurine

9. An active form of an antidepressant is subsequently oxidized by P450 CYP2C9. Which patients would you generally expect to need the highest dose of antidepressants to maintain similar serum concentrations of active drug?

- A. Extensive metabolizers (EM)
- B. Intermediate Metabolizers (IM)
- C. Poor Metabolizers (PM)
- D. Ultrarapid metabolizers (UM)
- E. Females

9.D

Ultra-rapid metabolizers would oxidize the active antidepressant most rapidly and increase the rate of removal of bioactive compound. The slowest to the most rapid metabolic phenotypes are: PM, IM, EM, and UM.

10. Which of the following is untrue in cases of toxic overdose of acetaminophen?

- A. Depression of P450 enzyme activities by other therapeutic drugs result in the increased production of the toxic metabolite: N-acetyl-p-benzoquinone imine
- B. Glutathione depletion in alcoholics can lead to increased acetaminophen hepatotoxicity
- C. The Rumack-Matthew nomogram can be used to estimate the probability of hepatic toxicity if the time of ingestion and acetaminophen plasma concentration is known.
- D. Administration of N-acetylcysteine is a common antidotal therapy
- E. Children are generally not at risk of developing Reye's syndrome.

10.A

P450 enzyme activities may be increased by other therapeutic drugs and directly produce the toxic metabolite: N-acetyl-p-benzoquinoneimine. In the presence of glutathione this toxic intermediate is further metabolized through sulfate conjugation.

Answers B-D are all true. For answer E, Reyes syndrome in children is associated with Salicylate ingestion, thus answer E is also true.

Notes for question set:¹

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