Interpretation of Laboratory Tests

HIHIM 409

Topics Covered

- BMP/CMP
- CBC
- Coagulation Studies
- Urinalysis

BMP vs. CMP

- BMP/Chem-7:
  - Sodium
  - Chloride
  - Potassium
  - CO2/Bicarbonate
  - BUN
  - Creatinine
  - Glucose

- CMP/Chem-12:
  - Same as BMP plus:
    » AST
    » ALT
    » Albumin
    » Bilirubin
    » Alkaline Phosphatase

Sodium (Na)

- Normally 125-145 mmol/l
- Collect in red top tube
- Increased: Diabetes inspidius, exessive sweating, Cushing's syndrome
- Decreased: Excess body water (CHF, renal failure, small cell lung cancer, brain disorders), hypothyroidism, vomiting, diarrhea, pancreatitis

Chloride (Cl)

- Normally 97-107 mEq/L
- Collect in tiger top tube
- Increased: Diarrhea, hyperalimentation
- Decreased: Vomiting, renal disease, diabetic ketoacidosis

Potassium (K)

- Normally 3.5-5 mEq/L
- Collect in red or tiger top tube
- Hemolysis may falsely elevate level
- Increased: Renal failure, Addison's disease, dehydration, ACE inhibitors, Spironolactone
- Decreased: Diuretics, NG suctioning, vomiting, diarrhea, metabolic alkalosis

Carbon Dixoide (CO2)

- Normally 23-29 mmol/L
- Collect in tiger tube top; don't expose to air
- CO2 excreted into blood as bicarbonate
- Increased: COPD, severe vomiting
- Decreased: Starvation, diabetic ketoacidosis, diarrhea, dehydration

Blood Urea Nitrogen

- Normally 5-20 mg/dl
- Collect in tiger top tube
- Increased: Renal failure, CHF, aminoglycosides
- Decreased: Starvation, liver failure
- BUN:Creatinine >20 suggests dehydration
- BUN:Creatinine >30 suggests GI bleed

Creatinine

- Normally <1.1 mg/dl
- Collect in tiger or red top tube
- Measures blood flow through kidneys
- Increased: Renal failure, false positive seen in diabetic ketoacidosis
- Decreased: Muscle wasting, liver disease

Glucose

- Normally 80-140 mg/dl
- Collect in red or tiger top tube
- Slight increase normal with aging
- Increased: DM, Cushing's syndrome, pancreatitis, thiazide diuretics
- Decreased: Liver disease, malnutrition, sepsis, endocrine tumors

AST/ALT

- Aspartate Aminotransferase:
  - Normally 7-42 IU/L
  - Increased: Liver disease, muscle trauma, burns
  - Decreased: Vitamin B6 deficiency, dialysis
  - AST>ALT in alcoholic hepatitis

- Alanine Aminotransferase:
  - Normally 1-45 IU/L
  - Increased: Liver disease, billary obstruction
  - ALT>AST in viral hepatitis

Albumin

- Normally 3.5-5 g/dl
- Collect in tiger top tube
- Best lab test for measuring protein
- Decreased: Malnutrition, nephrotic syndrome, alcoholic cirrhosis, inflammatory bowel disease, metastatic cancer, leukemia, Hodgkin's disease

Bilirubin

- Normally 0.3-1 mg/dl
- Collect in tiger top tube
- Increased: Liver damage, hemolysis, billary obstruction

Alkaline Phosphatase

- Normally 25-160 IU/L
- Collect in tiger top tube
- Increased: Liver disease, billary obstruction, bone tumors, healing fracture, hyperparathyroidism, hyperthyroidism
- Decreased: Malnutrition, excessive vitamin D intake, pernicious anemia, zinc deficiency

Complete Blood Count

- WBC, H&H, Platelets most important
- Collect in purple top tube
- Capillary sample will decrease hematocrit
- Platelets normally 150,000-450,000 uL

White Blood Count

- Normally 4500-11,000
- Differential provides more clues to cause than overall count does
- Increased: Infection, inflammation, leukemia
- Decreased: Bone marrow failure, vitamin B12 deficiency

Cause of Increased Differentials

- Basophils: Leukemia, s/p spleenectomy
- Eosnophils: Allergies, asthma, parasites
- Lymphocytes: Viral infections, leukemia
- Monocytes: Bacterial infections, protozoan infections, ulcerative colitis
- Neutophils: Bacterial infection, noninfectious tissue damage, metabolic disorders

H & H

- Hematocrit: ~40-50% (lower in women, higher in men)
- The percentage of blood that is RBCs
- Decreased with anemia and blood loss
- Hemoglobin: ~12-16 g/dl (lower in women, higher in men)
- Does not acurately reflect acute bleeding because plasma and RBC lost at same rate

Coagulation Studies

- Collect in blue top tube
- PT: 11.5-13.5 second
- INR: 0.8-1.4
- Higher with mechanical heart valves or history of thromboembolitic disease or atrial fibrillation
- INR is now the standard measure reported

Causes of Positive Values on UA

- Bilirubin: Jaundice, hepatitis, fecal contamination of sample
- Blood: Stones, BPH, infection, Foley cath
- Glucose: DM, pancreatitis, steroids
- Ketones: Starvation, high fat diet, diabetic ketoacidosis, vomiting, diarrhea, asprin overdose

Causes of Positive Values on UA

- Leukoesterase: UTI
  - Leukoesterase plus nitrates: 75% of UTI
  - Neither LE or nitrates: 92% not UTI
- Protein: Renal failure, CHF

Questions?