Clinical Chemistry (7 modules)

Carbohydrates (2 CEU)

- Carbohydrate structure, digestion & absorption, metabolic pathways, hormones involved in regulation; differentiation of hyperglycemia, diabetes insipidus and hypoglycemia based on definition, causes, signs and symptoms, complications, lab findings, and disease classifications; glycogen storage disease; disorders of galactose metabolism
- Methods of glucose measurement including specimen collection and handling; reference ranges; glucose oxidase, hexokinase and Clinitest reactions; oral glucose tolerance test – patient preparations, procedure and interpretation; other tolerance tests – 2 hour post-prandial, I.V. glucose and insulin tolerance tests, hydrogen breath test, and D-xylose; glycosylated hemoglobin; ketones; lactate; ADA guidelines for diagnosis of diabetes; monitoring diabetic control – glycosylated hemoglobin and albumin & urinary microalbumin

Lipids and Lipoproteins (2 CEU)

- Lipid (cholesterol, triglycerides, phospholipid and glycolipid) and lipoprotein (VLDL, LDL, HDL and chylomicrons) characteristics, functions, and sources; differentiation of lipoprotein fractions by mobility rate, density, composition; lipoprotein biosynthesis and metabolism- exogenous and endogenous
- Specimen requirements and visual assessment; laboratory measurement of cholesterol, triglycerides, HDL, LDL and lipid profile; reference ranges and risk factors of developing coronary heart disease; abnormal lipid levels; lipid storage disorders – Inherited metabolic defect, Tay-Sachs, Gaucher's, and Niemann-Pick

Proteins (2 CEU)

- Protein structure, classification, function and clinical significance
- Characteristics of , functions, and factors that affect total serum protein
- Laboratory measurement of proteins in serum, urine and CSF, including specimen collection and handling
- Proteins of significance, including acute phase reactants, prealbumin, albumin, alpha-1-antitrypsin, alpha-2-macroglobulin, haptoglobin, ceruloplasmin, transferrin, LDL, complement C_3 and C_4, C-reactive protein, and immunoglobulins
- Albumin/globulin ratio and methods of protein measurement, including Kjeldahl, Biuret, Bromocresol Green, and precipitation techniques

Nonprotein Nitrogen Compounds (2 CEU)

- Renal structure, components, function and pathophysiology and urine formation
- Nonprotein nitrogen compounds biosynthesis and excretion, clinical applications and specimen collection and handling concerns: urea, creatinine, creatine, uric acid, and ammonia
- Methods of measurement, including enzymatic, chemical and calculation methods

- Clearance tests: creatinine, inulin, urea
- BUN/creatinine ratio and estimated glomerular filtration rate (GFR)
- Correlation of test results to renal disease

Cardiac Function (1 CEU)

- Heart anatomy and function; types and symptoms of heart disease
- Current cardiac markers for acute myocardial infarction and congestive heart failure: myoglobin, CK-MB, troponin T or I, and BNP
- The rise, peak and fall time sequence of each marker and advantages and disadvantages of each
- Cardiac ischemia and acute coronary syndrome (ACS) and use of the ischemia modified albumin (IMA) test
- CRP, hs-CRP and homocysteine

Liver Function (3 CEU)

- Liver anatomy and function
- Bilirubin metabolism, laboratory analysis, expected values and clinical applications; pre-hepatic, hepatic and post-hepatic alterations; urine bilirubin and urobilinogen
- Liver enzymes: AST, ALT, LD, ALP. GGT
- Evaluation of hepatic synthetic function: proteins, coagulation proteins, ammonia
- Overview of heme synthesis and porphyrins
- Causes, epidemiology, clinical symptoms and significance of serologic markers for Hepatitis A, B, C, D, E, F, and G
- Acute vs. Chronic hepatitis symptoms and laboratory findings

Major Electrolytes (2.5 CEU)

- Overview of electric potential, physiologic function of electrolytes, water homeostasis, osmotic pressure, regulation of osmolarity and osmolality, ADH and aldosterone
- Regulation of major electrolytes: sodium, potassium, chloride and bicarbonate; significance of increased and decreased levels of each
- Calculation and significance of anion gap
- Specimen requirements, reference ranges, sources of error, good practices
- Measurement of electrolytes