

Metabolism & Reproduction Goals & Objectives 12-May-09

I. Clinical Medicine

- 1) To be able to read growth charts and assess normal vs. abnormal growth.
- 2) Describe indications for rectal exam; demonstrate proficiency in performing a rectal exam.
- 3) To recognize indications for obtaining laboratory values for the following:
 - a) Glucose
 - b) Hemoglobin A1c
 - c) LDL, HDL and ratio thereof
 - d) Triglycerides
 - e) Hepatic synthetic values (PT/PTT)
 - f) Hepatic function values (AST/ALT/GGT/Alk Phos/Direct and indirect bilirubin)
 - g) Pancreatic enzymes (amylase, lipase)
- 4) To describe the healthcare maintenance recommendations for outpatient diabetes management.
 - a) Recognize primary and secondary preventive strategies in the management of diabetic complications.
 - b) Identify appropriate members and their role in a multidisciplinary team for diabetic management.
- 5) Identify laboratory tests that would be helpful for identification of thyroid dysfunction; perform a clinical thyroid exam.
- 6) Evaluate common structural and functional thyroid abnormalities.
- 7) To describe the healthcare maintenance recommendations for healthy women (including breast exams and screening, pap smears, etc.)
 - i) Describe indications for and appropriately perform a breast, pelvic, prostate and testicular exam.
- 8) To be able to take a sexual history, including screening for risk of unplanned pregnancy, STIs and domestic violence.
- 9) To be able to obtain an appropriate history and physical exam for a patient who presents with abdominal pain.

II. Medical Arts (This needs work; consider re-doing in the format presented by Jan)

- 1) Recognize appropriate and inappropriate ways of interacting with obese patients.
- 2) Appraise ethical and legal issues relevant to reproduction, family planning and pregnancy.
- 3) Analyze professional guidelines, legal requirements and ethical debates regarding:
 - a) Legal status of an embryo and/or fetus
 - b) Abortion: professional guidelines, legal requirements and ethical debates about the use of tissue from aborted fetuses.
 - c) Assisted conception: legal boundaries and ethical disputes
 - d) Sterilization ethical and legal issues.
 - e) Pre- and post-natal screening and testing: ethical issues concerning informed consent and the determination of the interests of the future child.
 - f) Maternal-fetal relationship
 - g) Sexual assault
 - h) Gender and sexuality
- 4) Create a framework for addressing issues of sexuality and gender in the care of patients, including recognition of emotional and behavioral factors.
- 5) Science of Medicine: evaluate Hormone Replacement Therapy literature

III. Medical Science-

1) Recognize normal and abnormal processes of nutrient digestion, absorption and distribution

2 weeks

- a) Describe the gross and histological structure, function and development of each organ and accessory organ associated with digestion and absorption.
 - i) Illustrate the embryonic gut regions, relevant blood supply and parasympathetic innervation, as well as the organs supplied by each of these regions/ arteries
 - (1) Gastroschisis
 - (2) Omphalocele
 - ii) Explain how the anatomy of blood supply to each segment of the bowel is redundant
- b) Locate the organs, tissues and vessels essential for micro- and macronutrient digestion, absorption and distribution
 - i) Trace the process of carbohydrate, fat, and protein digestion through the GI tract
 - ii) Describe the structural modifications of the wall of the stomach and small intestine that enhance digestive processes in these regions.
 - (1) Brunner's glands
- c) Describe the histological composition and general function of each layer of the gastrointestinal tract.
 - i) Recognize the role of the enteric nerve plexi
 - ii) Identify each of the following GI hormones or secretory products based upon source (including anatomic location of source cells), action, and regulation
 - (1) Gastrin
 - (2) Cholecystokinin
 - (3) Secretin
 - (4) Somatostatin
 - (5) GIP
 - (6) VIP
 - (7) Nitric Oxide
 - (8) Motilin
 - (9) Intrinsic factor
 - (10) Gastric Acid
 - (11) Pepsin
 - (12) Bicarbonate
- d) Illustrate the interactions of enteroendocrine and neurogenic function on eating, nutrient absorption, and defecation.
- e) State the roles of bile and of pancreatic enzymes in digestion.
- f) Describe the mechanisms of chewing and swallowing.
 - i) Describe the composition and functions of saliva, and explain how salivation is regulated
 - ii) Identify common salivary gland tumors in terms of etiology, frequency, and malignancy
 - (1) Pleomorphic adenoma
 - (2) Warthin's tumor
 - (3) Mucoepidermoid carcinoma
 - iii) List the most common causes of dysphagia.
 - (1) Describe the physiologic basis for achalasia
 - (2) Define Zenker's diverticulum
- g) Describe the anatomy of the esophagus with particular attention to the muscular composition of the various segments

- h) Identify common esophageal pathologies and their typical presentation
 - i) GERD
 - ii) Esophageal varices
 - iii) Mallory-Weiss syndrome
 - iv) Boerhaave syndrome
 - v) Esophageal stricture
 - vi) Esophagitis
 - vii) Plummer-Vinson syndrome
- i) Recognize the clinical features and causes of gastroesophageal reflux disease
 - i) Provide an overview of the pathophysiology of Barrett's Esophagus.
 - ii) Contrast GERD with allergic esophagitis
- j) Recognize the symptoms of the most common esophageal motility disorders.
- k) Describe the composition of gastric juice and cell types responsible for secreting its various components, and describe the importance of each component in the stomach.
- l) Identify the clinical features, etiologies and mechanisms of therapies for gastric and duodenal ulcer disease.
 - i) Describe the relationship of gastritis to gastric ulcer disease
- m) Identify the intestine as a significant immune organ.
 - i) Describe the oral tonsils and their role
 - ii) Describe Peyer's Patches and their role
 - iii) Describe the principles of bacterial translocation
- n) Recognize the varied forms of malabsorption
 - i) Describe diagnostic tests for identifying the causes of malabsorption.
 - ii) Distinguish the clinical implications of nutrient malabsorption based upon different types of major GI resections
 - iii) Hypothesize about how damage to digestive tissues will affect nutrient absorption and distribution
 - iv) Describe common absorption issues related to senescence.
 - v) Compare and contrast the following malabsorption syndromes:
 - (1) Celiac sprue
 - (2) Tropical sprue
 - (3) Whipple's disease
 - (4) Disaccharidase deficiency
 - (5) Pancreatic insufficiency
 - (6) Cystic fibrosis
 - (a) Vitamin E deficiency, etc.
- o) Compare and contrast the features (gross and microscopic), clinical manifestations and management for Crohn's disease and ulcerative colitis (Inflammatory bowel disease)
- p) Be able to distinguish clinical presentation, causes, relevant histopathology, and common associations of the following intestinal disorders:
 - i) Appendicitis
 - ii) Meckel's diverticulum
 - iii) Intussusception
 - iv) Volvulus
 - v) Hirschsprung's disease
 - vi) Duodenal atresia
 - vii) Meconium ileus
 - viii) Necrotizing enterocolitis
 - ix) Ischemic colitis

- x) Adhesions
- xi) Angiodysplasia
- xii) Carcinoid tumor
- q) Review the principle of referred pain with regards to abdominal organs
- r) Recognize the role intrinsic flora play in digestion and elimination in the large intestine.
- s) Define diverticulum. Distinguish between diverticulosis and diverticulitis.
- t) Describe colorectal cancer risks, pathogenesis, and associations
 - i) Trace the relationship between colon polyps and colon cancer
 - ii) Describe the involvement of mutations in APC, DNA repair genes, K-RAS and p53 in colorectal carcinogenesis
 - iii) Recognize familial forms of colorectal cancer
 - (1) FAP
 - (2) HNPCC/ Lynch Syndrome
 - (3) Peutz-Jeghers Syndrome
- u) Recognize the anatomic and physiologic basis for common anorectal clinical conditions
 - i) Hemorrhoids (internal and external)
 - ii) Adenocarcinoma
 - iii) Squamous cell carcinoma
- v) Understand disorders of GI elimination
 - i) Define constipation and recognize common pediatric and adult causes; identify appropriate therapies for each cause
 - (1) Hirschsprung's Disease
 - (2) Meconium Ileus
 - (3) Iatrogenic constipation
 - (4) Motility disorders
 - (5) Functional constipation
 - ii) Compare and contrast the major causes and common treatments of acute and chronic diarrhea
- w) Describe the location and function of the peritoneum, peritoneal cavity and retroperitoneal organs.
- x) Provide an overview of the fed and fasted states of the various body organs.
- y) Recognize presentations of common disorders of digestion and absorption.
 - i) Demonstrate the processes of micro- & macronutrient digestion, absorption and distribution.
- z) Be familiar with the clinical presentation, method of diagnosis for infection, and treatment for each of the following parasites:
 - i) *Giardia lamblia*
 - ii) *T. cruzi*
 - iii) *Cryptosporidium*
 - iv) *Entamoeba histolytica*
 - v) *E. vermicularis*
 - vi) *Ascaris lumbricoides*
 - vii) *Strongyloides stercoralis*
 - viii) Hookworms
 - (1) *Ancylostoma duodenale*
 - (2) *necator americanus*
 - ix) *Taenia solium*
 - x) *Echinococcus granulosus*
 - xi) *Clonorchis sinensis*

aa) Propose appropriate pharmacotherapy for common disorders of digestion and absorption; recognize mechanism of action and describe side-effects of proposed pharmacotherapies

- i) H2 blockers
- ii) Proton Pump Inhibitors
- iii) Bismuth/ Sucralfate (?)
- iv) Misoprostol
- v) Muscarinic antagonists
- vi) Antacids
- vii) Infliximab
- viii) Sulfasalazine
- ix) Ondansetron
- x) Metoclopramide

bb) Understand general principles of nutrition as they relate to growth, development, and homeostasis

~~xii~~i) Explain normal growth patterns in infants and children.

~~xii~~ii) Define failure to thrive and recognize the symptoms of failure-to-thrive in an infant and child.

(1) Define protein-calorie malnutrition. Differentiate between marasmus and kwashiorkor.

~~xiii~~iii) Recognize psychosocial aspects of eating, including pediatric and geriatric considerations.

~~xiv~~iv) Illustrate appropriate consultation opportunities for a clinical dietitian.

~~xv~~v) Review basic clinical nutrition assessment

~~xvi~~vi) Describe metabolic abnormalities commonly associated with eating disorders such as:

- (1) Bulimia, anorexia, binge-eating
- (2) Alcoholism
- (3) Re-feeding syndrome

~~xvii~~vii) Construct evaluation plans for common disorders associated with:

- (1) Diarrhea
- (2) Constipation/obstruction complaints
- (3) Nausea
- (4) Vomiting
- (5) Rectal bleeding

2) **Comprehend hepatopancreatobiliary (HPB) function and pathophysiology**

1.5 weeks

a) Describe the normal and abnormal anatomy and histology of the liver, pancreas and gallbladder.

i) Illustrate the flow of blood and bile through the liver, pancreas and gallbladder on the anatomic and microanatomic scales.

ii) Explain the major clinical consequences of portal hypertension; describe the portal-caval anastomoses

iii) Compare and contrast the normal and pathologic gross and microanatomy of the liver, pancreas and gallbladder (for conditions including, but not limited to: cirrhosis, fatty liver, hepatitis, liver & pancreatic tumors, inflammatory conditions of the gall bladder)

(1) Liver tumors to include, but not limited to HCC, hepatoblastoma, metastases

b) Explain the role of the liver in the metabolism of each of the following:

- i) Amino acids/urea cycle
 - ii) Glycogen
 - iii) Gluconeogenesis, regulation of blood glucose
 - iv) Pentose phosphate, fructose and galactose
 - v) Bilirubin & jaundice
 - vi) Fat synthesis; VLDL's
 - vii) Fatty acid oxidation & ketone synthesis
 - viii) Cholesterol synthesis, uptake and regulation
 - ix) Synthesis and secretion of plasma proteins
 - x) Ethanol/drugs
- c) Identify metabolic abnormalities of the liver and their clinical consequences.
- i) Recognize inborn errors of metabolism.
 - (1) Hereditary hyperbilirubinemias- Explain causes, consequences, and therapies
 - (a) Gilbert's syndrome
 - (b) Crigler-Najjar syndrome, Type I
 - (c) Dubin-Johnson syndrome
 - (d) Rotor's syndrome
 - (2) Glycogen storage diseases
 - (3) Galactosemia
 - (4) Urea cycle defects
 - (5) Disorders of fatty acid oxidation (MCAD deficiency)
 - ii) Interpret the symptoms of patients or experimental animals with defects in liver metabolic pathways.
 - iii) Describe newborn screening programs in Utah to identify in-born errors of metabolism.
 - iv) Formulate hypotheses about why fat accumulates both in the livers of people who consume excessive alcohol and who have insulin resistance.
- d) Describe indications for obtaining LDL, HDL, and triglyceride laboratory values .
- i) Recognize normal and abnormal values of these labs.
 - ii) Illustrate the major regulatory mechanisms for these blood lipids.
 - iii) Propose reasons for abnormal blood lipids in patients.
 - iv) Describe management options for patients with abnormal lipid panel results.
 - iv)v) Explain the mechanisms of action for pharmacologic interventions used to treat dyslipidemias.
- e) Describe the common etiologies of liver insufficiency/ failure.
- i) List the major causes of liver disease in children and adults, including drug-induced; understand the pathophysiologic basis for each.
 - (1) Reye's syndrome
 - (2) Alcoholic liver disease
 - (3) Budd-Chiari syndrome
 - (4) Alpha-1 antitrypsin deficiency
 - (5) Wilson's disease
 - (6) Hemochromatosis
 - (7) Primary sclerosing cholangitis
 - (8) Biliary cirrhosis
 - ii) Describe the pathologic progression from hepatic steatosis to alcoholic hepatitis to alcoholic cirrhosis
 - iii) Explain the pathophysiology and effects of portal hypertension
 - iv) Differentiate between macronodular and micronodular cirrhosis

- v) Identify laboratory investigations that will be helpful with diagnosis and monitoring of liver disease
- f) Describe the causes and consequences of cholestasis
 - i) Differentiate between hepatocellular, obstructive, and hemolytic jaundice.
- g) Describe the prevalence, causes and consequences of cholelithiasis.
 - i) Define cholelithiasis, cholecystitis, and cholangitis
- h) Describe the diagnosis and disease progression patterns of viral hepatitis.
- i) Recognize risk factors for hepatocellular carcinoma/ hepatoma
- j) Identify the major functions of the pancreas and effects of pancreatic abnormalities.
 - i) Describe the endocrine and exocrine functions of the pancreas, including descriptions of pancreatic cell types
 - ii) Describe the pathophysiology behind abnormal pancreatic enzyme values.
 - iii) Describe the major causes, consequences and treatment options for acute and chronic pancreatitis.
 - iv) Describe the transport abnormalities and GI clinical manifestations of CF
 - v) Recognize the pathophysiology of Zollinger-Ellison syndrome.
 - vi) Illustrate the clinical progression of pancreatic cancer.
 - vii) Recognize potential treatment options for the management of pancreatic cancer.

3) **Recognize the causes and implications of obesity and metabolic syndrome.**

.5 weeks

- a) Discuss the role of insulin and other hormones in regulation of metabolism.
 - i) Recognize the structure of the insulin molecule.
 - ii) Describe how metabolism is regulated in the fed and fasted states.
 - iii) Distinguish signaling of insulin in liver, muscle, and adipose tissue.
 - iv) Describe the regulation of insulin release.
 - v) Hypothesize about how the mutations in MODY genes result in the genetic defects of beta cell function.
 - vi) Illustrate the sequence of metabolic derangements that occur in diabetic ketoacidosis.
- b) Distinguish between the physiology and clinical features of Type 1 and Type 2 Diabetes.
 - i) Contrast the mechanisms of hyperglycemia, common characteristics, and acute clinical presentations of Type 1 and Type 2 diabetes.
 - (1) Delineate pathophysiology, signs/ symptoms, lab values, potential complications, and treatment of DKA
 - ii) Recall diagnostic criteria for diabetes and DKA according to established criteria in adults and children.
 - iii) Select appropriate laboratory tests for diagnosis of diabetes.
 - (a) Fasting blood glucose
 - (b) Glucose tolerance test
 - (c) Hemoglobin A1c
 - iv) Identify common microvascular and macrovascular complications associated with diabetes and describe the physiologic basis for these derangements.
 - (1) Nonenzymatic glycosylation
 - (a) Small-vessel disease
 - (i) Retinopathy
 - (ii) Glaucoma
 - (iii) Nephropathy
 - (b) Large-vessel disease
 - (i) Atherosclerosis

- (ii) CAD
- (iii) Peripheral vascular disease/ gangrene
- (iv) Cerebrovascular disease
- (2) Osmotic damage
 - (a) Neuropathy
 - (b) Cataracts
- (3) Discuss cardiovascular risk factors commonly associated with Type 2 diabetes.
- (4) Describe the pathogenesis of diabetic dyslipidemia.
- v) Formulate predictions about how insulin resistance will affect metabolism in various tissues.
- vi) Examine the evidence linking poor diet and exercise with insulin resistance.
- c) Describe the implications of these differences between Types 1 and 2 Diabetes for chronic disease management.
 - i) Identify ideal ranges for serum glucose laboratory values.
 - ii) Recall normal values for hemoglobin A1c.
 - iii) Discuss use of urine microalbumin monitoring.
 - iv) Describe the lifestyle, dietary, and pharmacologic management of diabetes.
- d) Compare the mechanisms of action, clinical use, and toxicities of insulins to those of various classes of oral hypoglycemic agents.
 - i) Short-, intermediate-, and long-acting insulin
 - ii) Sulfonylureas
 - iii) Biguanides
 - iv) Glitazones
 - v) Alpha-glucosidase inhibitors
 - vi) Mimetics
 - vii) GLP-1 mimetics
- e) Catalog diabetes of other types besides Type 1 and Type 2.
 - i) Genetic defects
 - ii) Pancreatic diseases
 - iii) Endocrine/ metabolic
 - iv) Drugs/ chemicals/ infections
 - v) Surgically-induced
 - vi) Gestational diabetes
- f) Appraise the epidemiologic basis for the obesity epidemic in North America.
 - i) Discuss exogenous and endogenous causes of obesity.
 - ii) Describe the clinical significance of the increase in childhood obesity.
 - iii) Recognize gross and microscopic pathologic findings associated with obesity.
 - iv) Provide evidence demonstrating that nutrition and exercise are most effective at healthy weight maintenance as opposed to weight loss.
 - v) Explain the negative impact dietary fads frequently have on people hoping to lose weight.
- g) List modalities of treatment for obesity (behavioral, pharmacologic, and surgical interventions).
 - i) Describe the mechanisms of action and common side effects for anti-obesity therapies.
 - (1) Orlistat
 - (2) Sibutramine
 - ii) Contrast the advantages and disadvantages of anorectic drugs and surgery for the treatment of obesity.
- h) Identify clinical conditions associated with metabolic syndrome.
 - i) Define metabolic syndrome.
 - ii) Interpret experimental evidence linking insulin resistance to the metabolic syndrome.

- iii) Propose mechanisms to explain the relationship between muscle metabolism and the metabolic syndrome.
- i) Formulate a management plan for the long-term management of obesity.
 - i) Assess risk of morbidity and mortality based upon age at onset, duration, weight gain after age 18, amount of central adiposity, gender.
 - ii) Demonstrate the measurement of a waist to hip ratio.
 - iii) Calculate BMI and interpret clinical relevance in children and adults.
 - iv) Determine presence of co-morbid conditions that mandate medical management based upon clinical signs and laboratory values.
 - v) Identify patients who require investigation for neuroendocrine causes of obesity.

4) Understand the interactions between the hypothalamus, pituitary, adrenal and thyroid, as well as the clinical implications of their dysfunction. Understand the role of the parathyroid glands in homeostasis.

1.5 weeks (Thanksgiving week)

- a) Describe the interaction of steroid hormones with nuclear hormone receptors.
 - i) Recognize the major structural elements of steroid hormones.
 - ii) Compare and contrast the mechanisms of steroid hormones with those of peptide hormones.
 - iii) List endocrine hormones subject to each of the common signaling pathways
 - (1) cAMP
 - (2) cGMP
 - (3) IP3
 - (4) Steroid receptor
 - (5) Tyrosine Kinase
- b) Explain anatomy, function, and pathophysiology of the pituitary gland.
 - i) Identify the pituitary gland, its lobes, location and vascular supply.
 - ii) List major hormones produced by the pituitary gland including their target and function and feedback-loops.
 - iii) Describe the regulation of hypothalamic and pituitary hormones.
 - iv) Recognize the existence and manifestations of hyper- and hypo-pituitarism.
 - (1) Acromegaly
 - (2) Pituitary adenoma
 - v) Recognize typical clinical uses of hypothalamic/ pituitary-related drugs
 - (1) GH
 - (2) Somatostatin
 - (3) Oxytocin
 - (4) ADH
- c) Explain anatomy, function, and pathophysiology of the thyroid gland.
 - i) Identify the thyroid gland, its lobes, location and vascular supply.
 - ii) Explain the regulation of thyroid hormone production, secretion, targets, actions and feedback-loops.
 - (1) Describe the effect of thyroid hormone on metabolic rate.
 - iii) Recognize the clinical features of hyper- and hypothyroidism in children and adults.
 - (1) Define the mechanism of toxic multinodular goiter
 - (2) Describe the clinical features and clinical basis for cretinism
 - iv) Describe the continuum of autoimmune and inflammatory disorders of the thyroid.
 - (1) Hashimoto's Thyroiditis
 - (2) deQuervain's Thyroiditis
 - (3) Riedel's Thyroiditis

- (4) Graves' Disease
- v) List the common forms of thyroid cancer and their associated prognoses
 - (1) Papillary
 - (2) Follicular
 - (3) Medullary
 - (4) Undifferentiated
 - (5) Lymphoma
- vi) Recognize the histopathology of the major disorders and neoplasms of the thyroid gland.
- vii) Explain the mechanisms of the treatments for disorders of thyroid hormone production and action
 - (1) PTU/ methimazole
 - (2) Levothyroxine
- d) Explain anatomy, function, and pathophysiology of the parathyroid glands.
 - i) Identify the parathyroid glands, location and vascular supply.
 - ii) Explain the regulation of parathyroid hormone production, secretion, targets, action and feedback-loops.
 - (1) Calcium homeostasis
 - (2) Phosphate homeostasis
 - iii) Recognize the source, function, and regulation of calcitonin
 - iv) Differentiate primary from secondary hyperparathyroidism.
 - v) Distinguish causes of and findings associated with hypoparathyroidism from those of pseudohypoparathyroidism
 - vi) Describe the common causes of hyper- and hypocalcaemia in children and adults.
 - (1) Discuss the source, function, and regulation of Vitamin D
- e) Explain anatomy, function, and pathophysiology of the adrenal glands.
 - i) Identify the adrenal gland, its cortex, medulla, topography, vascular supply and drainage, and innervation.
 - ii) Explain the regulation of adrenal hormone production, secretion, targets, action and feedback-loops.
 - (1) Illustrate the source, function, and regulation of cortisol
 - iii) Describe the common causes of hypercortisolism, including primary clinical features and the role of the dexamethasone suppression test in diagnosis
 - (1) Cushing's disease
 - (2) Adrenal hyperplasia/ neoplasia
 - (3) Ectopic ACTH production
 - (4) Iatrogenic
 - iv) Recognize the symptoms of adrenal cortical insufficiency.
 - v) Recognize the causes and effects of excessive and deficient aldosterone secretion.
 - (1) Conn's Syndrome
 - (2) Secondary hyperaldosteronism
 - (3) Addison's disease
 - vi) Describe the synthetic defect and clinical consequences of each of the following congenital adrenal hyperplasias
 - (a) 17 alpha-hydroxylase deficiency
 - (b) 21 alpha-hydroxylase deficiency
 - (c) 11 beta-hydroxylase deficiency
 - vii) Recognize the common clinical features of the most common adrenal medullary tumors in children and adults
 - (1) Neuroblastoma (children)

- (2) Pheochromocytoma (adults)
- viii) Describe corticosteroid pharmacology with attention to mechanisms of action, clinical uses, and toxicity.
- ix) Employ understanding of the role of corticosteroids in homeostasis in order to diagnose and manage abnormalities of adrenal cortical function.
- f) Recognize clinical features of and describe the genetic basis for multi-organ genetic endocrinopathies.
 - i) MEN 1 (Wermer's syndrome)
 - ii) MEN 2A (Sipple's syndrome)
 - iii) MEN 2B
- g) Describe endocrine hypertension and paraneoplastic syndromes.

5) Recognize normal and abnormal components of the reproductive process and systems

- a) Recognize male and female reproductive and urinary anatomy.
 - i) Demonstrate an understanding of the location, structure and function of each organ of the male and female reproductive systems.
 - (1) Describe the location of the perineum and distinguish between the UG and anal triangles.
 - ii) Illustrate the sequence of events that occur from ovulation to ejaculation, to fertilization to implantation.
 - iii) Outline the changes that occur during sexual excitement and intercourse.
- b) Interpret puberty and normal development processes
 - i) Embryology
 - (1) describe the origin of human gametes (including regulation of spermatogenesis and oogenesis) and how the process of fertilization results in the formation of a genetically distinct human individual
 - (2) describe the events occurring prior to implantation, including the cleavage of the one-cell embryo (the zygote), progression through the morula and blastula stages, and the differentiation of the first two embryonic cell types: inner cell mass and trophectoderm
 - (3) describe the events that occur following implantation, including how the process of gastrulation establishes the body plan and forms the three primary germ layers that subsequently generate embryonic organ systems and structures
 - (4) Describe the embryonic processes forming the male and female reproductive systems
 - ii) Differentiate the control hormones have on reproductive organs and in the development of secondary sex characteristics.
 - (1) Androgens
 - (2) Estrogens
 - (3) Progesterone
 - iii) Identify the mechanism, clinical uses, and toxicities of the following reproductive-related drugs:
 - (1) Antiandrogens
 - (a) Finasteride
 - (b) Flutamide
 - (c) Ketoconazole
 - (d) Sprinolactone
 - (2) Leuprolide
 - (3) Sildenafil/ vardenafil

- (4) Mifepristone
 - (5) Testosterone
 - (6) Estrogens
 - (7) Progestins
 - (8) Estrogen partial agonists
 - (a) Clomiphene
 - (b) Tamoxifen
 - (c) Raloxifene
- iv) Describe significant events of puberty.
- c) Review the menstrual cycle and ovarian life cycle.
- i) Detail events and regulation of the ovarian and menstrual cycles.
 - ii) Examine the mechanism, advantages, and disadvantages of oral contraceptive agents
 - iii) Distinguish between normal and abnormal cycles as they relate to fertility and contraception.
 - iv) Recognize the roles drugs play in the treatment of infertility, STD's and menstrual cycle.
 - v) Describe contraception and the way various methods manipulate the menstrual cycle (non-contraceptive benefits) and interfere with fertilization.
- d) Explain the physiology of pregnancy, parturition, and lactation
- i) Identify the source and function of hCG
 - ii) List common causes of recurrent miscarriages
 - (1) Low progesterone levels
 - (2) Chromosomal abnormalities
 - (3) Bicornuate uterus
 - iii) indicate the relative importance, depending on the trimester, of each of the following as causes of perinatal morbidity and mortality:
 - (1) chromosomal abnormalities
 - (2) infection
 - (3) maternal-placental factors
 - (4) nutrition
 - iv) Describe preventative measures in improving pregnancy outcomes (preconception planning, smoking cessation, folic acid, gestational diabetes screening, Rh immunoglobulin to Rh negative women, maternal thrombophilia evaluation).
 - v) Identify physiologic changes characteristic of pregnancy in the first, second and third trimester.
 - vi) Outline maternal cardiovascular, endocrine and metabolic adaptation during pregnancy.
 - vii) Determine whether pregnancy is progressing satisfactorily or if complications are present that are consistent with one of the following pathologic states.
 - (1) Hydatidiform mole (complete v. partial)
 - (2) Pregnancy-induced hypertension (preeclampsia/ eclampsia)
 - (a) HELLP syndrome
 - (3) Abruptio placentae
 - (4) Placenta accreta
 - (5) Placenta previa
 - (6) Ectopic pregnancy
 - (7) Amniotic fluid abnormalities
 - (a) Polyhydramnios
 - (b) Oligohydramnios

- viii) Diagnose onset of labor and describe progression to parturition; define shoulder dystocia and describe risk factors.
 - ix) Identify indications and contraindications of active management of labor with oxytocin.
 - x) Describe signs of placental separation and normal duration of third stage of labor
 - xi) List components of Apgar score.
 - xii) Demonstrate an understanding of C-sections, forceps, vacuum extraction, and episiotomies, including complications of each.
 - xiii) Outline the events leading to the first breath of a newborn.
 - xiv) Describe risk factors for Group B Streptococcal infection in the newborn, including treatments.
 - xv) Identify infections commonly transmitted in utero or during vaginal birth
 - (1) Toxoplasma gondii
 - (2) Rubella
 - (3) CMV
 - (4) HIV
 - (5) HSV2
 - (6) Syphilis
 - (7) Listeria
 - (8) E. coli
 - (9) Group B Strep
 - xvi) Review techniques for pain relief in labor including epidurals and pudendal blocks.
 - xvii) Describe the physiology of lactation.
 - xviii) Outline the risk factors and management of postpartum depression.
 - xix) Review common environmental and pharmacologic teratogens
 - (1) Alcohol
 - (a) Fetal alcohol syndrome
 - (2) ACE inhibitors
 - (3) Cocaine
 - (4) DES
 - (5) Iodide
 - (6) Vitamin A
 - (7) Thalidomide
 - (8) Smoking
 - (9) X-rays, anticonvulsants
 - (10) Warfarin
 - (11) Tetracyclines
 - (12) Alkylating agents
 - (13) Aminoglycosides
 - (14) Folate antagonists
- e) Placenta
- i) recognize the gross appearance of a normal placenta, including the appearance of the umbilical cord and blood vessels, fetal membranes, chorionic plate, maternal surface, and cut surface of the umbilical cord and placental disk
 - ii) recognize and describe the clinical significance of the following gross findings of the placenta: single umbilical artery, long or short umbilical artery, hyper- or hypocoiled umbilical artery, velamentous umbilical artery, nuchal cord, opaque fetal membranes, green fetal membranes, nodules on the fetal surface, incomplete maternal surface, depressed maternal surface, mass of placental disk parenchyma

- iii) recognize and describe the clinical significance of the following microscopic findings of the placenta: necrotizing funisitis, peripheral funisitis, acute chorioamnionitis, squamous metaplasia, amnion nodosum, villous maturity, acute villitis, chronic villitis, infarction
- f) Twinning
 - i) define monozygotic twin and dizygotic twin
 - ii) describe the gross and microscopic features and clinical significance of (1) dichorionic, diamniotic, (2) monochorionic diamniotic and (3) monochorionic monoamniotic placentation
 - iii) understand the pathophysiology of complications of twinning, including (1) conjoined twins and (2) twin transfusion syndrome
- g) Discuss nutrition in pregnancy and lactation.
 - i) Describe the importance of maternal-fetal nutrition.
 - ii) Recognize the nutritional and psychosocial importance of breast feeding.
 - iii) Demonstrate understanding of a nutritional assessment in pregnancy and lactation.
- h) Congenital abnormalities
 - i) classify single congenital abnormalities as a malformation, deformation, or a disruption and determine the etiology and recurrence risk
 - ii) classify multiple congenital abnormalities as a syndrome, sequence, or association, and determine the etiology and recurrence risk
 - iii) indicate the most likely consequences of injury to the developing embryo or fetus during (1) 0-3 weeks post fertilization, (2) 3-9 weeks post fertilization and (3) 10 weeks post-fertilization to birth
 - iv) list 3 categories of genetic and environmental factors that may cause developmental abnormalities
 - v) Recognize the features and understand the genetic basis of the most common sex chromosome disorders
 - (1) Klinefelter's syndrome
 - (2) Turner's syndrome
 - (3) YY males
 - vi) Differentiate between hermaphroditism and pseudo-hermaphroditism. Explain the pathophysiology responsible for each
 - (1) Female pseudohermaphroditism
 - (2) Male pseudo hermaphroditism
 - (3) Androgen insensitivity syndrome
 - (4) 5-alpha reductase deficiency
- i) Explain transmission, clinical presentation, treatment, and consequences of sexually transmitted infections.
 - i) Compare and contrast contraceptives and how they prevent pregnancy and/or STD's.
 - ii) Describe the infectious agents and modes of transmission and clinical features for STD's
 - (1) Gonorrhoea
 - (2) Syphilis
 - (3) Genital herpes
 - (4) Chlamydia
 - (5) LGV
 - (6) Trichomoniasis
 - (7) AIDS/HIV
 - (8) Condyloma acuminata
 - (9) Hepatitis B/ Hepatitis C

- (10) Chancroid
- (11) Bacterial vaginosis
- iii) Identify common etiologies for and clinical features of pelvic inflammatory disease. Recognize complications resulting from PID.
- j) Describe the characteristics, epidemiology, and key features of the following breast conditions:
 - i) Benign breast tumors
 - (1) Fibroadenoma
 - (2) Intraductal papilloma
 - (3) Phylloides tumor
 - ii) Malignant breast tumors
 - (1) Ductal carcinoma in situ
 - (2) Invasive ductal
 - (3) Invasive lobular
 - (4) Medullary
 - (5) Comedocarcinoma
 - (6) Inflammatory
 - (7) Paget's disease
 - iii) Other common conditions
 - (1) Fibrocystic changes
 - (2) Acute mastitis
 - (3) Fat necrosis
 - (4) Gynecomastia
- k) Recognize the basis for and clinical and histopathologic features of the following gynecologic pathologies
 - i) Cervical dysplasia/ CIS/ Carcinoma
 - ii) Endometriosis
 - iii) Endometrial proliferation
 - (1) Endometrial hyperplasia
 - (2) Endometrial carcinoma
 - iv) Myometrial tumors
 - (1) Leiomyoma/ fibroid
 - (2) Leiomyosarcoma
 - v) Polycystic ovarian syndrome
 - vi) Ovarian cysts
 - (1) Follicular
 - (2) Corpus luteum
 - (3) Theca-lutein
 - (4) "Chocolate" cyst
 - vii) Ovarian germ cell tumors
 - (1) Dysgerminoma
 - (2) Choriocarcinoma
 - (3) Yolk sac (endodermal sinus tumor)
 - (4) Teratoma
 - viii) Ovarian non-germ cell tumors
 - (1) Serous cystadenoma
 - (2) Serous cystadenocarcinoma
 - (3) Mucinous cystadenoma
 - (4) Mucinous cystadenocarcinoma
 - (5) Brenner tumor

- (6) Fibromas
- (7) Granulosa cell tumor
- (8) Krukenberg tumor
- ix) Vaginal carcinoma
 - (1) Squamous cell carcinoma
 - (2) Clear cell adenocarcinoma
 - (3) Sarcoma botryoides
- l) Recognize the basis for and clinical and histopathologic features of the following male reproductive pathologies
 - i) Prostatitis
 - ii) Benign prostatic hyperplasia
 - iii) Prostatic adenocarcinoma
 - iv) Cryptorchidism
 - v) Testicular germ cell tumors
 - (1) Seminoma
 - (2) Embryonal carcinoma
 - (3) Yolk sac (endodermal sinus) tumor
 - (4) Choriocarcinoma
 - (5) Teratoma
 - vi) Testicular non-germ cell tumors
 - (1) Leydig cell
 - (2) Sertoli cell
 - (3) Testicular lymphoma
 - vii) Tunica vaginalis lesions
 - (1) Varicocele
 - (2) Hydrocele
 - (3) Spermatocele
 - viii) Penile lesions
 - (1) CIS
 - (a) Bowen's disease
 - (b) Erythroplasia of Queyrat
 - (c) Bowenoid papulosis
 - (2) Squamous cell carcinoma
 - (3) Peyronie's disease
- m) Formulate diagnostic plans and describe mechanisms of treatment for common abnormalities of both male and female reproductive systems.
 - i) Define infertility and analyze factors resulting in infertility.
 - (1) Outline the therapeutic options for couples with infertility.
 - ii) Define and describe vesico-uretral reflux, enuresis, circumcision, hypospadias, imperforate hymen, chordee, cryptorchidism, testicular torsion.
 - iii) Define sexual dysfunction, and the medications used in its treatment.
- n) Describe the physiologic basis for menopause
 - i) Define premature ovarian failure. Identify the associated hormonal patterns
 - ii) Review risks and benefits of hormone replacement therapy

- 6) **Identify common causes of abdominal pain based upon integration of clinical and scientific knowledge bases.**
- a) Demonstrate understanding of the anatomy, pathophysiology, and management of common etiologies of abdominal pain
 - b) In children
 - i) List common causes of localized and generalized abdominal pain
 - ii) Use physical examination skills to elicit clinical findings
 - iii) Differentiate acute and chronic abdominal pain
 - iv) Differentiate organic and functional abdominal pain
 - v) Interpret clinical and lab findings to identify patients who require emergent treatment of abdominal pain
 - vi) Outline a plan of management for common etiologies of abdominal pain in children
 - c) Acute abdominal pain
 - i) Sketch the neurologic basis of abdominal pain
 - ii) Discuss why the localization of abdominal pain is often imprecise
 - iii) Distinguish intra-abdominal from extra-abdominal (and metabolic) causes of abdominal pain
 - iv) Use history-taking skills to establish the key characteristics of abdominal pain
 - v) Interpret clinical and lab findings that are helpful in the process of inclusion or exclusion of a diagnosis
 - vi) Identify patients who require emergent evaluation and management of acute abdominal pain
 - vii) Outline a plan of management for common causes of abdominal pain
 - d) Chronic abdominal pain
 - i) Contrast various causes of chronic abdominal pain
 - ii) Demonstrate understanding of pathophysiology as applied to management of GERD and PUD
 - iii) Describe the rationale for the use of medical, surgical, nutritional, and/ or psychological management of chronic abdominal pain
 - iv) Identify patients with chronic abdominal pain who might benefit from subspecialist care
 - e) Use focused data-gathering skills to assess a patient who presents with abdominal pain, then develop a differential diagnosis