

**Content in Color: Anatomy, Biochemistry, Cell and Tissue Structure, Epidemiology, Human Behavior, Introduction to Psychiatric Medicine, Microbiology, Molecular & Medical Genetics, Neuroscience, Pathology, Pharmacology, Physiology, Practice of Medicine-1, and Practice of Medicine-2, Social Issues in Medicine**

*Content in Color* is intended as a management tool to identify unwanted redundancies and omissions in the Foundations of Medicine as part of the Curriculum Committee's monitoring of the content and workload in each discipline. *Content in Color* should be reviewed at the time of the Principles of Medicine review of all annual reports with cross-course comparison and generation of a full report every three years.

**Biochemistry**  
**Cell and Tissue Structure**  
**Gross & Developmental Anatomy**  
**Practice of Medicine-1**  
**Molecular & Medical Genetics**  
**Neuroscience**  
**Physiology**  
**Human Behavior**  
**Social Issues in Medicine**

**Microbiology**  
**Pathology**  
**Pharmacology**  
**Practice of Medicine-2**  
**Introduction to Psychiatric Medicine**  
**Epidemiology**

Underlined and in black are content items not claimed by any course

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## General Principles

### Biochemistry and molecular biology

- gene expression: DNA structure, replication, and exchange (**M&MG;Micro**)
  - DNA structure: single- and double-stranded DNA, stabilizing forces, supercoiling (**M&MG**)
  - analysis of DNA: sequencing, restriction analysis, PCR amplification, hybridization (**M&MG**)
  - [DNA replication, mutation, repair], degradation, and inactivation (**M&MG;Micro**)
  - [gene structure and organization; chromosomes]; centromere, telomere (**M&MG;Micro**)
  - recombination, insertion sequences, transposons (**M&MG;Micro**)
  - [mechanisms of genetic exchange, including transformation, transduction, conjugation, crossover, recombination], linkage (**M&MG;Micro**)
  - plasmids and bacteriophages (**Micro**)
- gene expression: transcription, including defects (**M&MG;Micro**)
  - [transcription of DNA into RNA, enzymatic reactions, RNA], RNA degradation (**M&MG;Micro**)
  - [regulation: cis-regulatory elements, transcription factors], enhancers, promoters, silencers, repressants, [splicing] (**M&MG;Micro**)
- gene expression: translation, including defects (**M&MG**)
  - the genetic code (**M&MG**)
  - structure and function of tRNA (**M&MG**)
  - structure and function of ribosomes (**M&MG**)
  - protein synthesis (**M&MG;Micro**)
  - regulation of translation (**M&MG;Micro**)
  - post-translational modifications, including phosphorylation, addition of CHO units (**Biochem;M&MG;Micro**)
  - protein degradation (**Biochem**)
- structure and function of proteins (**Biochem;Micro**)
  - principles of protein structure and folding (**Biochem;Micro**)
  - enzymes: kinetics, reaction mechanisms (**Biochem**)
  - structural and regulatory proteins: ligand binding, self-assembly (**Biochem;Micro**)
  - regulatory properties (**Biochem;Micro**)
- energy metabolism, including metabolic sequences and regulation (**Biochem**)
  - generation of energy from carbohydrates, fatty acids, and essential amino acids; glycolysis, pentose phosphate pathway, tricarboxylic acid cycle, ketogenesis, electron transport and oxidative phosphorylation, glycogenolysis (**Biochem**)
  - storage of energy: gluconeogenesis, glycogenesis, fatty acid and triglyceride synthesis (**Biochem**)
  - thermodynamics: free energy, chemical equilibria and group transfer potential, energetics of ATP and other high-energy compounds (**Biochem**)
- metabolic pathways of small molecules and associated diseases
  - biosynthesis and degradation of amino acids (eg, homocystinuria, maple syrup urine disease) (**Biochem**)
  - biosynthesis and degradation of purine and pyrimidine nucleotides (eg, gout, Lesch-Nyhan syndrome) (**Biochem**)
  - biosynthesis and degradation of lipids (eg, dyslipidemias, carnitine deficiency, adrenogenital syndromes) (**Biochem**)
  - biosynthesis and degradation of porphyrins (**Biochem**)
  - galactosemia and other small sugar disorders (**Biochem**)

- biosynthesis and degradation of other macromolecules and associated abnormalities, complex carbohydrates (eg, lysosomal storage disease), glycoproteins, and proteoglycans (eg, type II glycogen storage disease) (**Biochem**)

### **Biology of cells**

- structure and function of cell components (eg, nucleus, cytoskeleton, endoplasmic reticulum, plasma membrane) (**C&TS; Physiology; Micro**)
- signal transduction (including basic principles, receptors and channels, second messengers, signal transduction pathways) (**Biochem; Physiology; Micro**)
- cell-cell and cell-matrix adhesion (**C&TS**)
- cell motility (**C&TS; Micro**)
- intracellular sorting (eg, trafficking, endocytosis) (**C&TS; Biochem; Micro**)
- cellular homeostasis (eg, turnover, pH maintenance, (**Physiology**) proteasome, ions, soluble proteins (**C&TS; Physiology; Biochem**)
- cell cycle (eg, [mitosis], meiosis, structure of spindle apparatus , [cell cycle regulation]) (**C&TS; M&MG; Micro**)
- structure and function of basic tissue components (including [epithelial cells] (**C&TS; Physiology**), connective tissue cells, muscle cells, nerve cells, and extracellular matrix) (**C&TS**)
- adaptive cell response to injury (**Path**)
- intracellular accumulations (eg, pigments, fats, proteins, carbohydrates, minerals, inclusions, vacuoles) (**C&TS**)
- mechanisms of injury and necrosis (**Path; Micro**)
- apoptosis (**C&TS; Path; Micro**)

### **Human development and genetics**

- **embryogenesis**: programmed gene expression, tissue differentiation and **morphogenesis**, homeotic genes, and developmental regulation of gene expression (**Anatomy; Neuroscience; Micro**)
- congenital abnormalities: principles, patterns of anomalies, dysmorphogenesis (**M&MG; Anatomy**)
- principles of pedigree analysis, including inheritance patterns, occurrence and recurrence risk determination (**M&MG**)
- population genetics: Hardy-Weinberg law, founder effects, mutation-selection equilibrium (**M&MG**)
- genetic mechanisms: chromosomal abnormalities, mendelian inheritance, multifactorial diseases (**M&MG; Micro**)
- clinical genetics, including genetic testing, prenatal diagnosis, newborn screening, [genetic counseling/ ethics], [gene therapy] (**M&MG; Micro; PoM-1**)

### **Biology of tissue response to disease**

- inflammation, including cells and mediators (**Path; PoM-2; Micro**)
  - acute inflammation and mediator systems (**Path; PoM-2; Micro**)
  - vascular response to injury, including mediators (**Path; PoM-2; Micro**)
  - inflammatory cell recruitment, including adherence and cell migration, and phagocytosis (**C&TS; Path; Micro**)

- bactericidal mechanisms and tissue injury (**Path; Micro**)
- clinical manifestations (eg, pain, fever, leukocytosis, leukemoid reaction, and chills) (**Path; PoM-2; Micro**)
- chronic inflammation (**Path; (Path; PoM-2; Micro)**)
- reparative processes (**Path; PoM-2**)
- wound healing, hemostasis, and repair: thrombosis, granulation tissue, angiogenesis, fibrosis, scar/keloid formation (**Path; PoM-2**)
- regenerative processes (**Path**)
- neoplasia (**Path; PoM-2; Micro**)
- classification, histologic diagnosis (**Path**)
- grading and staging of neoplasms (**Path; PoM-2**)
- cell biology, biochemistry, and molecular biology of neoplastic cells: transformation, oncogenes, altered cell differentiation, and proliferation (**Path; Micro**)
- hereditary neoplastic disorders (**Path; PoM-2**)
- invasion and metastasis (**Path; PoM-2**)
- tumor immunology (**Path; Micro**)
- paraneoplastic manifestations of cancer (**Path; PoM-2**)
- cancer epidemiology and prevention (**Path; PoM-2; Micro**)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- progression through the life cycle, including birth through senescence
- cognitive, language, motor skills, and social and interpersonal development (**IntroPsychMed; Human Behavior; PoM-2**)
- sexual development (eg, puberty, menopause) (**IntroPsychMed; Human Behavior; PoM-2**)
- influence of developmental stage on physician-patient interview (**PoM-2**)
- psychologic and social factors influencing patient behavior (**IntroPsychMed; Human Behavior; SIM; PoM-1; PoM-2**)
- personality traits or coping style, including coping mechanisms (**IntroPsychMed; Human Behavior; PoM-1; PoM-2**)
- psychodynamic and behavioral factors, related past experience (**IntroPsychMed; Human Behavior; PoM-1; PoM-2**)
- PoM-1;**
- adaptive and maladaptive behavioral responses to stress and illness (eg, drug-seeking behavior, sleep deprivation) (**IntroPsychMed; Human Behavior; PoM-2**)
- interactions between the patient and the physician or the health care system (eg, transference) (**IntroPsychMed; Human Behavior; SIM; PoM-1; PoM-2**)
- [patient adherence, including general] and adolescent (**IntroPsychMed; Human Behavior; PoM-1; PoM-2**)
- patient interviewing, consultation, and interactions with the family
- establishing and maintaining rapport (**IntroPsychMed; PoM-1; PoM-2**)
- data gathering (**IntroPsychMed; PoM-1; PoM-2**)
- approaches to patient education (**IntroPsychMed; PoM-1; PoM-2**)
- PoM-1;**
- communicating bad news (**IntroPsychMed; PoM-1; PoM-2**)

- “difficult” interviews (eg, anxious or angry patients) (**IntroPsychMed; PoM-1; PoM-2**)
- multicultural ethnic characteristics (**IntroPsychMed; SIM; PoM-1; PoM-2**)
- medical ethics, jurisprudence, and professional behavior (**IntroPsychMed; SIM; PoM-1; PoM-2**)
- consent and informed consent to treatment (**IntroPsychMed; PoM-2**)
- physician-patient relationships (eg, ethical conduct, confidentiality) (**IntroPsychMed; PoM-1; PoM-2**)
- death and dying (**IntroPsychMed; Human Behavior; PoM-2**)
- birth-related issues (**IntroPsychMed; PoM-2**)
- issues related to patient participation in research (**PoM-2**)
- interactions with other health professionals (eg, referral) (**IntroPsychMed; PoM-2**)
- sexuality and the profession; other “boundary” issues (**IntroPsychMed; PoM-1; PoM-2**)
- ethics of managed care (**SIM; PoM-1; PoM-2**)
- organization and cost of health care delivery (**SIM; PoM-1; PoM-2**)

### **Multisystem processes**

- nutrition (**PoM-2**)
  - generation, expenditure, and storage of energy at the whole-body level
  - assessment of nutritional status across the life span, including calories, protein, essential nutrients, hypoalimentation (**Biochem; PoM-2**)
  - functions of nutrients, including essential, trans-fatty acids, cholesterol
  - protein-calorie malnutrition (**Biochem**)
  - vitamin deficiencies and/or toxicities (**Biochem; Path; PoM-2**)
  - mineral deficiencies and toxicities (**Biochem; Path; PoM-2**)
  - eating disorders (eg, obesity, [anorexia], bulimia) (**Biochem; Human Behavior**)
- temperature regulation (**Physiology; PoM-2; Micro**)
- adaptation to environmental extremes, including occupational exposures (**Path; PoM-2**)
  - physical and associated disorders (eg, temperature, radiation, burns, decreased atmospheric pressure (**Biochem; Path**), high-altitude sickness, increased water pressure) (**Path; PoM-2**)
  - chemical (eg, gases, vapors, smoke inhalation, agricultural hazards, volatile organic solvents, heavy metals, principles of poisoning and therapy) (**Path; PoM-2**)
- fluid, electrolyte, and acid-base balance and disorders (eg, dehydration, acidosis, alkalosis) (**Biochem; Physiology; PoM-2; Micro**)

### **Pharmacodynamic and pharmacokinetic processes**

- general principles (**Pharm; IntroPsychMed**)
  - pharmacokinetics: absorption, distribution, metabolism, excretion, dosage intervals (**Pharm; IntroPsychMed**)
  - mechanisms of drug action, structure-activity relationships (**Pharm; IntroPsychMed**)
  - concentration- and dose-effect relationships (eg, efficacy, potency), types of agonists and antagonists and their actions (**Pharm; IntroPsychMed**)
  - individual factors altering pharmacokinetics and pharmacodynamics (eg, age, gender, disease, tolerance, compliance, body weight, metabolic proficiency, pharmacogenetics) (**Pharm; IntroPsychMed; PoM-2**)
  - drug side effects, overdose, toxicology (**Pharm; IntroPsychMed; PoM-2**)
  - drug interactions (**Pharm; IntroPsychMed; PoM-2**)
  - regulatory issues (eg, drug development, approval, scheduling) (**Pharm**)

- general properties of autacoids, including peptides and analogs, biogenic amines, prostanoids and their inhibitors, and smooth muscle/endothelial autacoids (**Pharm**)
- general principles of autonomic pharmacology (**Pharm**)
- general properties of antimicrobials, including mechanisms of action and resistance (**Pharm; PoM-2**)
- general properties of antineoplastic agents and immunosuppressants, including drug effects on rapidly dividing mammalian cells (**Pharm; PoM-2**)

### **Microbial biology and infection**

- microbial classification and its basis (**Micro**)
- bacteria and bacterial diseases (**Micro**)
  - structure and composition (**Micro**)
  - metabolism, physiology, and regulation (**Micro**)
  - genetics (**Micro**)
  - nature and mechanisms of action of virulence factors (**Micro**)
  - pathophysiology of infection (**Micro**)
  - epidemiology and ecology (**Micro**)
  - principles of cultivation, assay, and laboratory diagnosis (**Micro**)
- viruses and viral diseases (**Micro**)
  - physical and chemical properties (**Micro**)
  - replication (**Micro**)
  - genetics (**Micro**)
  - principles of cultivation, assay, and laboratory diagnosis (**Micro**)
  - molecular basis of pathogenesis (**Micro**)
  - pathophysiology of infection (**Micro**)
  - latent and persistent infections (**Micro**)
  - epidemiology (**Micro**)
  - oncogenic viruses (**Micro**)
- fungi and fungal infections (**Micro**)
  - structure, physiology, cultivation, and laboratory diagnosis (**Micro**)
  - pathogenesis and epidemiology (**Micro**)
- parasites and parasitic diseases (**Path**)
  - structure, physiology, and laboratory diagnosis (**Path**)
  - pathogenesis and epidemiology (**Path**)
- principles of sterilization and pure culture technique (**Micro**)

### **Immune responses**

- production and function of granulocytes, natural killer cells, and macrophages (**C&TS; Micro**)
- production and function of T lymphocytes, T-lymphocyte receptors (**PoM-2; Micro**)
- production and function of B lymphocytes and plasma cells; immunoglobulin and antibodies: structure and biologic properties (**Micro**)
- antigenicity and immunogenicity; antigen presentation; cell activation and regulation; tolerance and clonal deletion (**Micro**)
- immunologic mediators: chemistry, function, molecular biology, classic and alternative complement pathways, cytokines, chemokines (**Micro**)
- immunogenetics; MHC structure and function, class I, II molecules; erythrocyte antigens; transplantation (**Micro**)
- immunizations: vaccines, protective immunity (**Micro**)
- alterations in immunologic function (**Micro**)
  - T- or B-lymphocyte deficiencies (eg, DiGeorge syndrome) (**Micro**)
  - deficiencies of phagocytic cells (**Micro**)

- combined immunodeficiency disease (**Micro**)
- HIV infection/AIDS and other acquired disorders of immune responsiveness (**PoM-2;Micro**)
- drug-induced alterations in immune responses, immunopharmacology (**PoM-2;Micro**)
- immunologically mediated disorders (**PoM-2;Micro**)
  - hypersensitivity (types I–IV) (**Micro**)
  - transplant rejection (**PoM-2;Micro**)
  - autoimmune disorders (**PoM-2;Micro**)
  - risks of transplantation, transfusion (eg, graft-versus-host disease) (**PoM-2;Micro**)
  - isoimmunization, hemolytic disease of the newborn (**PoM-2;Micro**)
  - immunopathogenesis (**Micro**)
- immunologic principles underlying diagnostic laboratory tests (eg, ELISA, complement fixation, RIA, agglutination) (**Micro**)
- innate immunity (**Micro**)

### Quantitative methods

- fundamental concepts of measurement (**Epid; Path**)
  - scales of measurement (**Epid; Micro; Path**)
  - distribution, central tendency, variability, probability (**Epid; Path**)
  - disease prevalence and incidence (**Epid; Micro; Path**)
  - disease outcomes (eg, fatality rates) (**Epid; Micro; Path**)
  - associations (eg, correlation and covariance) (**Epid; Path**)
  - health impact (eg, risk differences and ratios) (**Epid; Path**)
  - sensitivity, specificity, predictive values (**Epid; Path**)
- fundamental concepts of study design (**Epid**)
  - types of experimental studies (eg, clinical trials, community intervention trials) (**Epid**)
  - types of observational studies (eg, cohort, case-control, cross-sectional, case series, community surveys) (**Epid**)
  - sampling and sample size (**Epid**)
  - subject selection and exposure allocation (eg, randomization, stratification, self-selection, systematic assignment) (**Epid**)
  - outcome assessment (**Epid**)
  - internal and external validity (**Epid**)
- fundamental concepts of hypothesis testing and statistical inference
  - confidence intervals (**Epid**)
  - statistical significance and Type I error (**Epid**)
  - statistical power and Type II error (**Epid**)

## Hematopoietic and Lymphoreticular Systems

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Path**)
- organ structure and function (**C&TS; Anatomy; Micro**)
- cell/tissue structure and function (**C&TS**)
  - production and [function of erythrocytes, hemoglobin, O<sub>2</sub> and CO<sub>2</sub> transport, transport proteins (**Biochem; Physiology**)
  - production and function of leukocytes and the lymphoreticular system (**C&TS**)
  - production and function of platelets (**Biochem**)
  - production and function of coagulation and fibrinolytic factors (**Biochem**)
- repair, regeneration, and changes associated with stage of life (**Path**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (**Path; PoM-2; Micro**)
  - infections of the blood, reticuloendothelial system, and lymphatics (**Path;PoM-2; Micro**)
  - allergic and anaphylactic reactions and other immunopathologic mechanisms (**Path; PoM-2; Micro**)
  - acquired disorders of immune deficiency (**Path; PoM-2; Micro**)
  - autoimmunity and autoimmune diseases (eg, Coombs positive hemolytic anemia, pernicious anemia, cryoglobulinemias, ITP) (**Path; PoM-2; Micro**)
  - anemia of chronic disease (**Path; PoM-2**)
  - transfusion complications, transplant rejection (**Path;PoM-2; Micro**)
- traumatic and mechanical injury (eg, mechanical injury to erythrocytes, [splenic rupture]) (**Path;Micro**)
- neoplastic disorders (eg, lymphoma, leukemia, multiple myeloma) (**Path;PoM-2; Micro**)
- metabolic and regulatory disorders, including acquired and congenital (**Path;PoM-2**)
  - anemias and cytopenias (eg, iron deficiency anemia, hemoglobinopathies, hereditary spherocytosis) (**Path;PoM-2**)
  - cythemia (**Path;PoM-2**)
  - hemorrhagic and hemostatic disorders (eg, coagulopathies, DIC) (**Path;PoM-2**)
  - bleeding secondary to platelet disorders (eg, von Willebrand) (**Path; PoM-2**)
  - vascular and endothelial disorders (eg, effects and complications of splenectomy, hypersplenism, TTP, hemolytic-uremic syndrome) (**Path; PoM-2; Micro**)
  - systemic disorders affecting the hematopoietic and lymphoreticular system (eg, nutritional deficiencies, systemic lupus erythematosus) (**Path**)
  - idiopathic disorders (**Path**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the hematopoietic system (**Pharm**)
  - blood and blood products (**Pharm; Path;PoM-2; Micro**)
  - treatment of anemia, drugs stimulating erythrocyte production (eg, erythropoietin) (**Pharm; PoM-2**)
  - drugs stimulating leukocyte production (eg, G-CSF, GM-CSF) (**Pharm; PoM-2; Micro**)
  - anticoagulants, thrombolytic drugs (**Pharm;PoM-2**)
  - antiplatelet drugs (**Pharm;PoM-2**)
  - antimicrobials (eg, antimalarials, anti-HIV) (**Pharm; PoM-2; Micro**)

- antineoplastic and immunosuppressive drugs (**Pharm; PoM-2; Micro**)
- drugs used to treat acquired disorders of immune responsiveness (**Pharm; PoM-2; Micro**)
- other therapeutic modalities (eg, splenectomy, chelating agents, radiation therapy for lymphomas, plasmapheresis) (**Path; PoM-2; Micro**)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, diet, depression and immune responses, “blood doping” among athletes) (**PoM-2**)
- influence on person, family, and society (eg, childhood leukemia) (**Human Behavior; PoM-2**)
- occupational and other environmental risk factors (eg, heavy metals, hydrocarbons, lead) (**PoM-2**)
- gender and ethnic factors (eg, herbal treatments with bone marrow depression) (**PoM-2**)

## Central and Peripheral Nervous Systems

### Normal processes (Neuroscience – covers all normal processes)

- embryonic development, fetal maturation, and perinatal changes, including neural tube derivatives, cerebral ventricles, neural crest derivatives (**Neuroscience; Anatomy**)
- organ structure and function (**Anatomy**)
  - spinal cord, including gross anatomy, blood supply, and spinal reflexes
  - brain stem, including cranial nerves and nuclei, reticular formation, gross anatomy, and blood supply (**Neuroscience; Anatomy**)
  - [brain, including gross anatomy and blood supply; cognition, language, memory; hypothalamic function; [limbic system and emotional behavior; circadian rhythms and sleep (**Neuroscience; IntroPsychMed; Human Behavior**) control of eye movement (**Neuroscience; Anatomy; IntroPsychMed**)
  - sensory systems, including proprioception, pain, vision, hearing, balance, taste, and olfaction
  - motor systems, including brain and spinal cord, basal ganglia and cerebellum
  - autonomic nervous system (**Neuroscience; Anatomy**)
  - peripheral nerve (**Neuroscience; Anatomy**)
- cell/tissue structure and function (**Neuroscience; C&TS**)
  - axonal transport (**Neuroscience; C&TS**)
  - [excitable properties of neurons, axons and dendrites, including channels
  - synthesis, storage, release, reuptake, and degradation of neurotransmitters and neuromodulators (**Neuroscience; Physiology; IntroPsychMed**)
  - pre- and postsynaptic receptor interactions, trophic and growth factors (**Neuroscience; IntroPsychMed**)
  - brain metabolism
  - glia, myelin (**Neuroscience; C&TS**)
  - brain homeostasis: blood-brain barrier; cerebrospinal fluid formation and flow; choroid plexus (**Neuroscience**)
- repair, regeneration, and changes associated with stage of life (**Neuroscience**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (eg, meningitis, multiple sclerosis, [myasthenia gravis (**Path; PoM-2; Physiology; Micro**)
- traumatic and mechanical disorders (eg, subdural and epidural hematomas, cord compression, peripheral nerve injury) (**Path; PoM-2; Micro**)
- neoplastic disorders, including primary and metastatic (**Path; PoM-2**)
- acquired metabolic and regulatory disorders (eg, delirium, Reye syndrome) (**Path; PoM-2**)
- vascular disorders (eg, cerebrovascular occlusion, venous sinus thrombosis, arterial aneurysms, hemorrhage) (**Path; PoM-2**)
- systemic disorders affecting the nervous system (eg, lupus, diabetic neuropathy) (**Path; PoM-2; Micro**)
- idiopathic disorders affecting the nervous system (**Path; PoM-2**)
- congenital disorders, including metabolic (eg, [neural tube defects], cerebral palsy, mental retardation, Down syndrome) (**Path; PoM-2; Anatomy**)
- degenerative disorders (eg, peripheral neuropathy, Alzheimer dementia, Parkinson disease, Huntington disease, amyotrophic lateral sclerosis) (**Path; PoM-2**)
- [paroxysmal disorders (eg, epilepsy, headache, pain syndromes, and sleep disorders including narcolepsy, restless legs syndrome/periodic limb movement, circadian rhythm disorders,

parasomnias) (**Human Behavior; Path; PoM-2**)

- disorders of special senses (eg, blindness, deafness) (**PoM-2**)
- psychopathologic disorders, processes and their evaluation (**IntroPsychMed; Human Behavior**)
  - early-onset disorders (eg, learning disorders) (**IntroPsychMed; Human Behavior**)
  - disorders related to substance use (**IntroPsychMed; Human Behavior**)
  - schizophrenia and other psychotic disorders (**IntroPsychMed; Human Behavior**)
  - mood disorders (**IntroPsychMed; Human Behavior**)
  - anxiety disorders (**IntroPsychMed; Human Behavior**)
  - somatoform disorders (**IntroPsychMed; Human Behavior**)
  - personality disorders (**IntroPsychMed; Human Behavior**)
  - physical and sexual abuse of children, adults, and elders (**IntroPsychMed; Human Behavior**)
  - other disorders (eg, dissociative, impulse control, post-traumatic stress disorder) (**IntroPsychMed; Human Behavior**)

### **Principles of therapeutics**

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the nervous system (**Pharm; IntroPsychMed**)
  - anesthetics (**Pharm; IntroPsychMed**)
  - hypnotics (**Pharm; IntroPsychMed**)
  - psychopharmacologic agents (eg, anxiolytics, antidepressants, antipsychotic agents, mood stabilizing agents) (**Pharm; IntroPsychMed**)
  - anticonvulsants (**Pharm; IntroPsychMed; PoM-2**)
  - analgesics (**Pharm; PoM-2**)
  - stimulants, amphetamines (**Pharm; IntroPsychMed**)
  - antiparkinsonian drugs (**Pharm; IntroPsychMed; PoM-2**)
  - skeletal muscle relaxants, botulinum toxin (**Pharm**)
  - neuromuscular junction blocking agents (postsynaptic) (**Pharm**)
  - antiglaucoma drugs (**Pharm**)
  - drugs used to decrease intracranial pressure (eg, mannitol, high-dose glucocorticoids) (**Pharm**)
  - antimigraine agents (**Pharm**)
  - drugs affecting autonomic nervous system (eg, anticholinesterases) (**Pharm**)
- other therapeutic modalities (eg, radiation, CFS shunting, surgery) (**Neuroscience**)

### **Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, drug abuse, dementia, sleep deprivation, accident prevention, pets) (**IntroPsychMed; Human Behavior; PoM-2**)
- influence on person, family, and society (eg, developmental disabilities, dementia, generation reversal, nutrition, seizures, sleep disorders) (**IntroPsychMed; Human Behavior; PoM-2**)
- occupational and other environmental risk factors (eg, boxing, carbon monoxide exposure) (**IntroPsychMed; PoM-2**)
- gender and ethnic factors (**SIM**)

## Skin and Related Connective Tissue

### Normal processes

- **embryonic development, fetal maturation, and perinatal changes**
- **organ structure and function (C&TS)**
- **cell/tissue structure and function, including barrier functions, thermal regulation, eccrine function (C&TS)**
- **repair, regeneration, and changes associated with stage of life or ethnicity (eg, senile purpura, male pattern baldness, postmenopausal hair changes)**
- **skin defense mechanisms and normal flora (Micro)**

### Abnormal processes

- **infectious, inflammatory, and immunologic disorders (Path; PoM-2; Micro)**
  - bacterial infections (eg, acne, cellulitis, carbuncle, abscess, necrotizing fasciitis, gangrene) **(Path; PoM-2; Micro)**
  - viral infections (eg, herpes infections, chickenpox, rubella, measles, roseola, verrucae) **(Path; PoM-2; Micro)**
  - fungal infections, including mycoses, dermatophytosis (eg, tinea) **(Path; PoM-2; Micro)**
  - parasitic infections (eg, scabies, lice) **(Path; PoM-2)**
  - immune and autoimmune disorders (eg, discoid lupus erythematosus, scleroderma, dermatomyositis, alopecia, psoriasis, urticaria, allergic dermatosis) **(Path; PoM-2; Micro)**
- **traumatic and mechanical disorders (eg, thermal injury, decubitus ulcers, effects of ultraviolet light and radiation) (Path; PoM-2)**
- **neoplastic disorders (Path; PoM-2)**
  - keratinocytes (eg, seborrheic keratosis, actinic keratosis, basal cell carcinoma, squamous cell carcinoma, and ichthyosis) **(Path; PoM-2)**
  - melanocytes (eg, nevi, melanoma) **(Path; PoM-2; Micro)**
  - vascular neoplasms (eg, hemangiomas, Kaposi sarcoma) **(Path; PoM-2)**
  - other (eg, T-cell lymphoma, skin appendage tumors) **(Path; PoM-2)**
- **metabolic, regulatory, and structural disorders (eg, vitamin deficiencies, hypervitaminosis, hyperhidrosis) (Path; PoM-2)**
- **vascular disorders (eg, vasculitis, Raynaud disease) (Path; PoM-2)**
- **systemic disorders affecting the skin (eg, Ehlers-Danlos syndrome, Marfan syndrome) (Path; PoM-2)**

### Principles of therapeutics

- **mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the skin and [connective tissue, including anti-inflammatory agents (eg, corticosteroids, antihistamines) emollients, sunscreen, retinoids, [antimicrobial agents, cytotoxic and immunologic therapy] (eg, methotrexate, PUVA, keratinolytics) (Pharm; PoM-2; Micro)**
- **other therapeutic modalities (eg, laser, tattoo removal, cryotherapy)**

### Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental

- **emotional and behavioral factors (eg, sun exposure, acne) (PoM-2)**
- **influence on person, family, and society (eg, psoriasis) (PoM-2)**
- **occupational and other environmental risk factors (PoM-2)**
- **gender and ethnic factors (eg, keloid) (PoM-2)**

## Musculoskeletal System

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Anatomy**)
- organ structure and function (**Anatomy**)
- cell/tissue structure and function (**C&TS**)
- biology of bones, joints, tendons, skeletal muscle (**C&TS; Anatomy**)
- exercise and physical conditioning (**Physiology**)
- repair, regeneration, and changes associated with stage of life (**Path**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (**Path; PoM-2; Micro**)
- infectious disorders (eg, septic arthritis, Lyme disease, osteomyelitis) (**Path; PoM-2; Micro**)
- inflammatory disorders (eg, fibrositis, synovitis, tenosynovitis) (**Path; PoM-2; Micro**)
- immunologic disorders (eg, rheumatoid arthritis, ankylosing spondylitis, polymyositis, systemic lupus erythematosus, dermatomyositis, polymyalgia rheumatica) (**Path; PoM-2; Micro**)
- traumatic and mechanical disorders (eg, fractures, sprains, strains, dislocations, repetitive motion injuries) (**Path; Anatomy**)
- neoplastic disorders (eg, osteosarcoma, metastatic disease) (**Path; PoM-2**)
- metabolic, regulatory, and structural disorders (eg, dwarfism, osteogenesis imperfecta, osteomalacia, osteoporosis, osteodystrophy, gout, muscular dystrophy) (**Path; PoM-2**)
- vascular disorders (eg, polyarteritis nodosa, bone infarcts) (**Path; PoM-2**)
- systemic disorders affecting the musculoskeletal system (eg, diabetes mellitus) (**Path; PoM-2; Micro**)
- idiopathic disorders (eg, Dupuytren contracture, scoliosis, Paget disease) (**Path; PoM-2**)
- degenerative disorders (eg, disc disease, osteoarthritis) (**Path; PoM-2**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the musculoskeletal system (**Pharm; PoM-2**)
- nonsteroidal anti-inflammatory drugs and analgesics (**Pharm; PoM-2; Micro**)
- muscle relaxants (**Pharm**)
- antigout therapy (eg, allopurinol, colchicine, uricosuric drugs) (**Pharm; PoM-2**)
- immunosuppressive drugs (eg, glucocorticoids, gold, cytotoxic agents) (**Pharm; PoM-2; Micro**)
- drugs affecting bone mineralization (eg, bisphosphonates, calcitonin, estrogen analogs) (**Pharm**)
- other therapeutic modalities (eg, radiation, surgery, casts, rehabilitation)

### Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental

- emotional and behavioral factors (eg, diet, exercise, seat belts, bicycle helmets) (**PoM-2**)
- influence on person, family, and society (eg, osteoporosis, fractures in elderly, alcohol abuse, and fractures) (**PoM-2**)
- occupational and other environmental risk factors (eg, athletes, musicians) (**PoM-2**)
- gender and ethnic factors (eg, bone mass) (**PoM-2**)

## Respiratory System

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Anatomy**)
- organ structure and function (**Anatomy; PoM-2**)
  - airways, including mechanics and regulation of breathing (**Physiology; PoM-2**)
  - [lung parenchyma], including ventilation, perfusion, gas exchange (**Anatomy; Physiology; PoM-2**)
  - pleura (**Anatomy; Physiology; PoM-2**)
  - nasopharynx and sinuses (**PoM-2**)
- cell/tissue structure and function, including surfactant formation, alveolar structure (**C&TS**)
- repair, regeneration, and changes associated with stage of life (**Path**)
- pulmonary defense mechanisms and normal flora (**Micro**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (**Path; PoM-2; Micro**)
  - infectious diseases (**Path; PoM-2; Micro**)
  - infectious diseases of the upper respiratory tract (eg, sinusitis, pharyngitis) (**Path; PoM-2; Micro**)
  - acute infectious diseases of the lower respiratory tract and pleura and their complications (eg, pneumonia, bronchiectasis, abscess, empyema) (**Path; PoM-2; Micro**)
  - chronic infectious diseases of the lower respiratory tract (eg, Mycobacterium, endemic fungal infections, Nocardia/Actinomyces) (**Path; PoM-2; Micro**)
  - immunologic disorders (**Path; PoM-2; Micro**)
  - allergic and hypersensitivity disorders (eg, asthma) (**Path; PoM-2; Micro**)
  - autoimmune disorders (eg, Wegener granulomatosis, Goodpasture syndrome) (**Path; PoM-2; Micro**)
  - inflammatory disorders (**Path; PoM-2; Micro**)
  - pneumoconiosis (**Path; PoM-2**)
  - acute and chronic alveolar injury (eg, acute respiratory distress syndrome, chlorine gas/smoke inhalation) (**Path; PoM-2**)
  - obstructive pulmonary disease (**Path; Physiology; PoM-2**)
  - restrictive pulmonary disease (eg, sarcoidosis, idiopathic fibrosis) (**Path; PoM-2**)
- traumatic and mechanical disorders (eg, foreign body aspiration, pneumothorax, (**Path; Anatomy**) atelectasis, sleep apnea) (**Path; PoM-2**)
- neoplastic disorders (eg, polyps, bronchogenic carcinoma, mesothelioma, metastatic tumors) (**Path; PoM-2**)
- metabolic, regulatory, and structural disorders (eg, hypoventilation, disorders of gas exchange, ventilation-perfusion imbalance, neonatal respiratory distress syndrome) (**Path; Physiology; PoM-2**)
- vascular and circulatory disorders (eg, thromboembolic disease, pulmonary hypertension, pulmonary edema, pleural effusion) (**Path; PoM-2**)
- systemic disorders affecting the respiratory system (**Path; PoM-2**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the respiratory system (eg, decongestants, cough suppressants, expectorants, mucolytics; bronchodilator drugs; anti-inflammatory and cytotoxic drugs; [antimicrobial agents]; antineoplastic agents) (**Pharm; PoM-2; Micro**)

- other therapeutic modalities (eg, oxygen therapy, nasal CPAP, mechanical ventilation, physical therapy, surgical procedures, including transplantation) (**Pharm; Physiology; PoM-2**)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, smoking, substance abuse, pets, and allergies) (**PoM-2**)
- influence on person, family, and society (eg, tuberculosis, asthma, chronic obstructive pulmonary disease, school issues, protective parents, family smoking) (**SIM; PoM-2**)
- occupational and other environmental risk factors (**PoM-2**)
- gender and ethnic factors (eg, sarcoidosis, lung cancer) (**SIM; PoM-2**)

## Cardiovascular System

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Anatomy**)
- organ structure and function (**Anatomy**; **PoM-2**)
  - chambers, valves (**Anatomy**; **Physiology**; **PoM-2**)
  - cardiac cycle, mechanics, heart sounds, cardiac conduction (**Physiology**)
  - hemodynamics, including systemic, pulmonary, coronary, and blood volume (**Physiology**; **PoM-2**)
  - circulation in specific vascular beds (**Physiology**; **PoM-2**)
- cell/tissue structure and function (**C&TS**; **Physiology**)
  - [heart muscle], metabolism, oxygen consumption, biochemistry, and secretory function (eg, atrial natriuretic peptide) (**Physiology**; **C&TS**)
  - endothelium and secretory function, [vascular smooth muscle], microcirculation, and lymph flow (**Physiology**; **C&TS**)
  - mechanisms of atherosclerosis (**Biochem**; **Path**; **Physiology**; **PoM-2**)
  - neural and hormonal regulation of the heart, blood vessels, and blood volume, including responses to change in posture, exercise, and tissue metabolism (**Physiology**; **PoM-2**)
- repair, regeneration, and changes associated with stage of life (**Path**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (**Path**; **PoM-2**; **Micro**)
  - infectious disorders (eg, endocarditis, myocarditis, pericarditis) (**Path**; **PoM-2**; **Micro**)
  - inflammatory and immunologic disorders (eg, acute rheumatic fever, systemic lupus erythematosus, transplant rejection, vasculitis, temporal arteritis) (**Path**; **PoM-2**; **Micro**)
- traumatic and mechanical disorders (eg, tamponade, valvular disease, obstructive cardiomyopathy) (**Path**; **PoM-2**)
- neoplastic disorders (**Path**; **PoM-2**)
- metabolic and regulatory disorders (eg, dysrhythmias, systolic and diastolic dysfunction, low- and high-output heart failure, cor pulmonale, systemic hypertension, ischemic heart disease, myocardial infarction, systemic hypotension, and shock) (**Physiology**; **Path**; **PoM-2**)
- vascular disorders (eg, aneurysms, occlusions, varicosities, atherosclerosis) (**Path**; **PoM-2**)
- systemic diseases affecting the cardiovascular system (eg, amyloidosis, aortic dissection with Marfan syndrome, scleroderma) (**Path**; **PoM-2**)
- congenital disorders of the heart and central vessels (**Path**; **Anatomy**; **PoM-2**; **Micro**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the cardiovascular system (**Pharm**; **PoM-2**)
  - coronary and peripheral vasodilators (**Pharm**; **PoM-2**)
  - antiarrhythmic drugs (**Pharm**; **PoM-2**)
  - antihypertensive drugs (**Pharm**; **PoM-2**)
  - measures used to combat hypotension and shock (**Pharm**; **PoM-2**)
  - drugs affecting cholesterol and lipid metabolism (**Pharm**; **PoM-2**)
  - drugs affecting blood coagulation, thrombolytic agents (**Pharm**; **PoM-2**)

- inotropic agents and treatment of heart failure (**Pharm; PoM-2**)
- immunosuppressive and antimicrobial drugs (**Pharm; PoM-2; Micro**)
- drugs to treat peripheral arterial disease (**Pharm; PoM-2**)
- other therapeutic modalities (eg, pacemakers, angioplasty, valves, grafts, other surgical procedures) (**PoM-2**)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, smoking, alcohol, ischemic heart disease, obesity, exercise, diet) (**PoM-2**)
- influence on person, family, and society (eg, altered lifestyle) (**PoM-2**)
- occupational and other environmental risk factors (eg, stress) (**PoM-2**)
- gender and ethnic factors (eg, hypertension) (**SIM; PoM-2**)

## Gastrointestinal System

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Anatomy**)
- [organ structure and function (**Physiology**), including alimentary canal, liver and biliary system, salivary glands and exocrine pancreas (**Biochem; Anatomy**), motility, and digestion and absorption (**Biochem; Anatomy; Physiology**)
- cell/tissue structure and function (**C&TS; Physiology**)
  - endocrine and neural regulatory functions, including GI hormones (**Physiology**)
  - salivary, gastrointestinal, pancreatic, hepatic secretory products, including enzymes, proteins, bile salts, and processes (**Biochem; Anatomy; Physiology**)
  - synthetic and metabolic functions of hepatocytes (**Physiology**)
- repair, regeneration, and changes associated with stage of life (**Path**)
- gastrointestinal defense mechanisms and normal flora (**Micro**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (**Path; PoM-2; Micro**)
  - infectious disorders (eg, peritonitis, hepatitis, gingivostomatitis, peptic ulcer, gastritis, esophagitis, traveler's diarrhea, food poisoning) (**Path; PoM-2; Micro**)
  - inflammatory disorders (eg, cholecystitis, pancreatitis) (**Path; PoM-2; Micro**)
  - immunologic disorders (eg, Crohn disease, ulcerative colitis) (**Path; PoM-2; Micro**)
- traumatic and mechanical disorders (**Path**)
  - malocclusion (**Path**)
  - hiatus hernia (**Path; PoM-2**)
  - obstruction (eg, volvulus, intussusception, [esophageal atresia, annular pancreas (**Path; Anatomy**), postsurgical obstruction) (**Path; PoM-2**)
  - perforation of hollow viscus and blunt trauma (**Path; PoM-2**)
  - inguinal, femoral, and abdominal wall hernias (**Path; Anatomy; PoM-2**)
  - esophageal and intestinal diverticula (eg, Meckel diverticulum) (**Path; Anatomy; PoM-2**)
- neoplastic disorders, including benign and malignant (**Path; PoM-2**)
- metabolic and regulatory disorders (eg, motility disorders, malabsorption, hepatic failure, cholelithiasis) (**Path; Physiology**)
- vascular disorders (eg, [portal hypertension, hemorrhoids, (**Path; Anatomy**) ischemia, angiodyplasia) (**Path; PoM-2**)
- systemic disorders affecting the gastrointestinal system (**Path; PoM-2**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the gastrointestinal system (**Pharm**)
  - treatment and prophylaxis of peptic ulcer disease and gastroesophageal reflux (eg, antacids, antisecretory drugs, motility drugs, mucosal protective agents, [antibiotics]) (**Pharm; PoM-2; Micro**)
  - drugs to alter gastrointestinal motility (eg, cathartics, antidiarrheal drugs, antiemetic drugs, prokinetic drugs) (**Pharm; PoM-2**)
  - fluid replacement (eg, oral rehydration) (**PoM-2; Micro**)
  - pancreatic replacement therapy and treatment of pancreatitis (**Physiology; PoM-2**)

- drugs for treatment of hepatic failure (eg, lactulose) and biliary disease (eg, drugs to dissolve gallstones) (**Pharm; PoM-2**)
- [anti-inflammatory, immunosuppressive], antineoplastic, and [antimicrobial drugs] (**Pharm; PoM-2; Micro**)
- other therapeutic modalities (eg, **surgical procedures** (**Anatomy**), stents, feeding tubes)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, peptic ulcer, encopresis, Monday morning stomach) (**PoM-2**)
- influence on person, family, and society (eg, inflammatory bowel disease, irritable bowel disease, pancreatitis and alcohol, chronic laxative abuse) (**PoM-2**)
- occupational and other environmental risk factors (**PoM-2**)
- gender and ethnic factors (eg, diets) (**SIM; PoM-2**)

## Renal/urinary System

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Anatomy**)
- organ [structure] and function (**Anatomy; Physiology; C&TS**)
  - kidneys, ureters, bladder, urethra (**Anatomy; Physiology; C&TS**)
  - glomerular filtration and hemodynamics (**Physiology**)
  - tubular reabsorption and secretion, including transport processes and proteins (**Physiology**)
  - urinary concentration and dilution (**Physiology**)
  - renal mechanisms in acid-base balance (**Physiology**)
  - renal mechanisms in body fluid homeostasis (**Physiology**)
  - micturition (**Physiology**)
- [cell/tissue structure and function], including renal metabolism and oxygen consumption, hormones produced by or acting on the kidney (**Physiology; C&TS**)
- repair, regeneration, and changes associated with stage of life (**Path**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (**Path; PoM-2; Micro**)
  - infectious disorders (**Path; PoM-2; Micro**)
  - upper urinary tract (eg, pyelonephritis, papillary necrosis) (**Path; PoM-2; Micro**)
  - lower urinary tract (eg, cystitis, urethritis) (**Path; PoM-2; Micro**)
  - inflammatory and immunologic disorders (**Path; PoM-2; Micro**)
  - glomerular disorders (eg, glomerulonephritis, nephrotic syndrome, and IgA nephropathy) (**Path; PoM-2**)
  - tubular interstitial disease (eg, interstitial nephritis, transplant rejection) (**Path; PoM-2**)
- traumatic and mechanical disorders (eg, obstructive uropathy) (**Path; PoM-2**)
- neoplastic disorders, including primary (eg, renal, urinary bladder and collecting system) and metastases (**Path; PoM-2**)
- metabolic and regulatory disorders (**Path; PoM-2**)
  - renal failure, acute and chronic (eg, acute tubular necrosis) (**Path; PoM-2**)
  - tubular and collecting duct disorders (eg, Fanconi syndrome, renal tubular acidosis, nephrogenic diabetes insipidus, polycystic kidney disease) (**Path; PoM-2; Physiology**)
  - renal calculi (**Path; PoM-2; Physiology**)
- vascular disorders (eg, renal artery stenosis) (**Path; PoM-2; Physiology**)
- systemic diseases affecting the renal system (eg, [diabetes mellitus, hepatitis], amyloidosis, [systemic lupus erythematosus, Wegener granulomatosis]) (**Path; PoM-2; Micro**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the renal and urinary system (**Pharm; PoM-2**)
  - diuretics, antidiuretic drugs (**Pharm; PoM-2; Physiology**)
  - drugs and fluids used to treat volume, electrolyte, and acid-base disorders (**Pharm; PoM-2**)
  - drugs used to enhance renal perfusion (eg, dopamine) (**Pharm; PoM-2**)
  - [anti-inflammatory, antimicrobial, immunosuppressive], and antineoplastic drugs (**Pharm; PoM-2; Micro**)
  - drugs used to treat lower urinary tract system (eg, incontinence, bladder function, benign prostatic hyperplasia) (**Pharm; PoM-2**)

- other therapeutic modalities (eg, dialysis, [renal transplantation](#)) (Pharm)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, drug-induced interstitial nephritis, diet) (**PoM-2**)
- influence on person, family, and society (eg, hemodialysis, living related kidney donation, transplants) (**SIM; PoM-2**)
- occupational and other environmental risk factors (eg, heavy metals) (**PoM-2**)
- gender and ethnic factors (eg, disease progression, urinary tract infections) (**PoM-2**)

## Reproductive System

### Normal processes

- embryonic development, fetal maturation, and perinatal changes (**Anatomy**)
- organ structure and function (**Anatomy; Physiology**)
  - female structure, including breast (**Anatomy; Physiology**)
  - female function (eg, menstrual cycle, puberty, menopause)
  - male structure (**Anatomy; Physiology**)
  - male function (eg, spermatogenesis, puberty) (**Physiology**)
  - intercourse, orgasm (**Physiology**)
  - pregnancy, including labor and delivery, the puerperium, lactation, gestational uterus, placenta (**Physiology**)
- [cell/tissue structure and function, including hypothalamic-pituitary-gonadal axis ], sex steroids, and gestational hormones (**Physiology; C&TS**)
- reproductive system defense mechanisms and normal flora (**Micro**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (eg, toxic shock syndrome, breast abscess, orchitis, sexually transmitted diseases, autoimmune hypogonadism, cystic mastitis) (**Path; PoM-2; Micro**)
- traumatic and mechanical disorders (eg, female incontinence, torsion of testis, varicocele) (**Path; PoM-2**)
- neoplastic disorders (eg, female reproductive, male reproductive, breast [including fibrocystic changes], trophoblastic disease) (**Path; PoM-2**)
- metabolic and regulatory processes (**Path; PoM-2**)
  - female (eg, anovulation, infertility, polycystic ovaries, endometriosis, orgasmic dysfunction, delayed and premature puberty) (**Path; PoM-2**)
  - menopausal syndrome (**Path; PoM-2**)
  - male (eg, infertility, impotence, gynecomastia, delayed and premature puberty) (**Path; PoM-2**)
  - benign prostatic hyperplasia (**Path; PoM-2**)
- systemic disorders affecting reproductive function (eg, obesity, myotonic dystrophy, cirrhosis, renal failure) (**Path; PoM-2**)
- disorders relating to pregnancy, the puerperium, and the postpartum period (**Path; PoM-2**)
  - obstetric problems (eg, ectopic pregnancy, third-trimester bleeding) (**Path; PoM-2**)
  - complications affecting other organ systems (eg, eclampsia, gestational diabetes, thyroid disorders) (**Path; PoM-2**)
  - disorders associated with the puerperium (eg, postpartum hemorrhage, sepsis, depression) (**Path; PoM-2**)
  - antepartum, intrapartum, postpartum disorders of the fetus (eg, prematurity, postmaturity, cord compression, macrosomia) (**Path; PoM-2**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the reproductive system and management of normal reproductive function (**Pharm**)
  - female reproductive tract (**Pharm**)
  - fertility drugs v
  - oral contraception, other methods of contraception (eg, condoms) (**Pharm**)
  - estrogen, progestogen replacement, treatment of menopause (**Pharm;PoM-2**)
  - stimulants and inhibitors of labor (**Pharm**)

- estrogen and progesterone antagonists (**Pharm**)
- stimulators and inhibitors of lactation (**Pharm**)
- male reproductive tract (**Pharm**)
- fertility drugs (**Pharm**)
- androgen replacement and antagonists (**Pharm**)
- gonadotropin-releasing hormone and gonadotropin replacement (**Pharm**)
- abortifacients (**Pharm**)
- antimicrobials (**Pharm**; **Micro**)
- antineoplastics (**Pharm**)
- restoration of potency (**Pharm**)
- other therapeutic modalities affecting the reproductive system (eg, tampons) (**Micro**)

**Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental**

- emotional and behavioral factors (eg, sexually transmitted diseases) (**PoM-1**; **PoM-2**)
- influence on person, family, and society (eg, infertility) (**PoM-2**)
- occupational and other environmental risk factors (eg, radiation) (**PoM-2**)
- family planning and pregnancy (eg, unwanted) (**PoM-2**)
- gender identity, sexual orientation, sexuality, libido (**Human Behavior**; **PoM-1**; **PoM-2**)
- effects of traumatic stress syndrome, violence, rape, child abuse (**PoM-1**; **PoM-2**)

## Endocrine System

### Normal processes

- **embryonic development**, fetal maturation, and perinatal changes (**Anatomy**)
- **organ structure and function** (**Anatomy; Physiology**)
  - hypothalamus, posterior and anterior pituitary gland
  - thyroid gland (**Anatomy; Physiology**)
  - parathyroid glands (**Anatomy; Physiology**)
  - adrenal cortex, adrenal medulla (**Physiology**)
  - pancreatic islets (**Physiology**)
  - ovary and testis (**Anatomy; Physiology**)
  - adipose tissue (**Physiology**)
- [cell/tissue structure and function], including hormone synthesis, secretion, action, and metabolism (**Biochem; Physiology; C&TS**)
  - peptide hormones v
  - steroid hormones, including vitamin D (**Biochem; Physiology**)
  - thyroid hormones (**Biochem; Physiology**)
  - catecholamine hormones (**Biochem; Physiology**)
  - renin-angiotensin system (**Physiology**)
- repair, regeneration, and changes associated with stage of life (**Path**)

### Abnormal processes

- infectious, inflammatory, and immunologic disorders (eg, subacute thyroiditis, Graves disease, sarcoidosis) (**Path; PoM-2; Micro**)
- traumatic and mechanical disorders (**Path; PoM-2**)
- neoplastic disorders (eg, pituitary, thyroid, parathyroid, adrenal cortex, pancreatic islets, neural crest, pheochromocytoma) (**Path; PoM-2**)
- metabolic and regulatory processes (eg, diabetes mellitus, pituitary, hypothalamus, thyroid, parathyroid, pancreatic islet disorders, adrenal disorders) (**Path; PoM-2; Physiology**)
- vascular disorders (eg, pituitary apoplexy) (**Path; PoM-2**)
- systemic disorders affecting the endocrine system (**Path; PoM-2**)
- idiopathic disorders (eg, hirsutism) (**Path; PoM-2**)

### Principles of therapeutics

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the endocrine system (**Pharm; PoM-2**)
  - hormones and hormone analogs (**Pharm; PoM-2**)
  - stimulators of hormone production (eg, sulfonylureas) (**Pharm; PoM-2**)
  - inhibitors of hormone production (eg, thiouracils) (**Pharm; PoM-2**)
  - hormone antagonists (**Pharm; PoM-2**)
  - potentiators of hormone action (eg, thiazolidinediones)(**Pharm; PoM-2**)
  - antiobesity agents (**Pharm; PoM-2**)
- other therapeutic modalities (eg, surgery, radiation) (**Pharm;PoM-2**)

### Gender, ethnic, and behavioral considerations affecting disease treatment and prevention, including psychosocial, cultural, occupational, and environmental

- emotional and behavioral factors (eg, compliance in diabetes mellitus, factitious use of insulin, psychogenic polydipsia) (**PoM-2**)
- influence on person, family, and society (**PoM-2**)

- occupational and other environmental risk factors (eg, radiation exposure, iodine deficiency) (**PoM-2**)
- gender and ethnic factors (**PoM-2**)

## NOTES:

July, 2006

Don - looking over the list I think the pharmacology course covers everything pretty well. The only possible exceptions are:

Cytokines when used as immune stimulants. We do discuss some cytokines that are influenced by immunosuppressants, so maybe this is OK. I just don't remember putting much emphasis, if any, on using cytokines as drugs per se. We have focussed more on the small molecules that influence their production - such as cyclosporin. I think the cytokines as a class get well described in immunology.

We haven't done emollients and sunscreen, nor PUVA (psoralen and UV irradiation). In dermatology we focus on the retinoids.

I don't think we mention lactulose specifically, but we do describe osmotic diuretics so in that sense it is covered. We could add it.

We don't do agents to dissolve gallstones - although looking at Goodman and Gilman this seems to be bile acids. As a natural product, I don't think we have covered this application.

I'll be happy to look into these issues more if you think it is important.

Carl

August 21, 2006 Comments from course directors on GAP items:

Carl Creutz:

Bob - we do not cover most of the black-listed items - although we do make a contribution to transplantation in the sense that we do cover the immunosuppressive drugs used in this context. We do not, however, discuss indications for transplantation nor techniques nor followup, and I don't think these would be appropriate for us. I do think most of the items listed should be covered in the curriculum - and many may already be covered in other courses. Maintenance of pH and developmental gene expression strike me as important topics to cover in CTS and in genetics respectively.

Carl

Bloodgood comments:

Developmental gene expression really needs to be covered in the Curriculum...sorta falls in the cracks among CTS, Gross, Biochemistry and MMG. Development is covered pretty much only in Gross; gene expression is covered in Biochem and MMG, but not in the context of development. The cell biology part of CTS covers the organelles (nucleus, RER, etc.) involved.

From Melanie McCollum:

I think anatomy can claim a few of the unclaimed objectives. If Barry hasn't already responded to you then I'm sure you'll hear from him soon.

I am a bit concerned about the currently unclaimed status of embryonic patterning and developmental genetics. I'm not sure who should be responsible for covering these objectives, but in this day and age it should be covered at some level. At Case Western it was covered in bits

and pieces by a variety of disciplines including embryology. At Mercer this was my responsibility and the topic was included in the "Genetics and Developmental Basis of Medicine" phase of the curriculum. Someone definitely needs to claim this objective here. Anatomy? Genetics? Biochemistry? Perhaps a mix of all three? It really is an interdisciplinary topic.

Please keep me apprised of the status of this objective and let me know if I can be of any help in integrating it into the curriculum.

From: Melanie McCollum and Barry Hinton:

Skin and Related Connective Tissue: embryonic development of skin might fall under Gross Anatomy, but only at an extremely superficial level, i.e., mentioning the existence of somitic dermatomes. Fetal maturation and perinatal changes of the skin are sometimes covered in an embryology course, but I do not believe that we cover such topics, nor do I believe we need to.

Musculoskeletal system: fetal maturation and perinatal changes should probably be dropped. We do cover some function of the ms system so that can be assigned to us.

Respiratory System: fetal maturation and perinatal changes can be assigned to anatomy.

GI: anatomy probably should cover surgical procedures, stents and feeding tubes, though I'm not sure that we do at this time. Go ahead and assign them to us.

Renal: NA to Anatomy

Endocrine: fetal maturation and perinatal changes are not covered in Anatomy, nor should they be.

John Gazewood:

Does all of this material need to be addressed in the first two years (18 months) of the curriculum?  
Some of the content area would appear to be addressed more effectively during the clerkship year.  
[Depends on whether the specs are for the USMLE Part I - RAB]

Julie Turner:

Alright, we actually assume several of these topics are already mastered in the Second Year, and now I realize why they don't seem to know anything about them!

Here is the list, along with the specifics of where we cover them:  
--Hu Development/Embryogenesis -- IMMUNOLOGY covers applications of gene expression, activation of gene expression (differentiation-specific and activation-induced), and regulation of gene expression for lineage commitments of myeloid and lymphoid progenitors. Recombination is a particular focus of lymphoid development in IMM-4 (<http://www.med-ed.virginia.edu/courseSites/display.cfm?keyID=439>). That said, the majority of our discussions center on immune activation and regulation in IMM-8, IMM-9, and IMM-11.

--Skin -- Briefly reviewed in the FIRST HOUR of IMMUNOLOGY, innate immunity (IMM-1, <http://www.med-ed.virginia.edu/courseSites/display.cfm?keyID=423>); Revisited in discussing Infections of Skin and Soft Tissue (BACT-9, see below).

-- Normal flora is introduced in BACTERIOLOGY (BACT-9,  
<http://www.med-ed.virginia.edu/courseSites/display.cfm?keyID=573>)

--Gastrointestinal -- Significant application of material during discussion of bacterial and viral diarrhea (BACT-10, BACT-11, and VIR-8 Clin Correlate)

<http://www.med-ed.virginia.edu/courseSites/display.cfm?keyID=576>

<http://www.med-ed.virginia.edu/courseSites/display.cfm?keyID=578>

<http://www.med-ed.virginia.edu/courseSites/display.cfm?keyID=684&click=0>

--Endocrine -- we cover some here, but coverage is patchy to fulfill proper introduction and applications in Immunology.

Steve Heim says:

The control of development through gene expression seems like a topic that could be skipped for medical school and those physicians who need to know it will learn it along the way.

Howard Kutchai writes:

I am incline to add some new stuff about cell pH regulation to my lecture on membrane transport processes. Do you concur that this is a good idea?

Howard Kutchai writes:

bob and don--

this is no longer an orphan topic. i have added it to my lecture next week on membrane transport processes in CTS/Phys.

Mary Kate Worden writes:

Bob,

In MedNeuro we have a lecture on neurodevelopment that covers "programmed gene expression, tissue differentiation and morphogenesis, homeotic genes, and developmental regulation of gene expression". This is all in the context of the development of the brain and spinal cord.

Mary Kate