

# Contenido para el Exámen Nacional de Residencias Universitarias - Ciencias Médicas Básicas

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(Versión del contenido en inglés)

## General Principles

### Biochemistry and molecular biology

- # gene expression: DNA structure, replication, and exchange
  - DNA structure: single- and double-stranded DNA, stabilizing forces, supercoiling
  - analysis of DNA: sequencing, restriction analysis, PCR amplification, hybridization
  - DNA replication, mutation, repair, degradation, and inactivation
  - gene structure and organization; chromosomes; centromere, telomere
  - recombination, insertion sequences, transposons
  - mechanisms of genetic exchange (transformation, transduction, conjugation) cross-over, recombination, linkage
  - plasmids and bacteriophages
- # gene expression: transcription (including defects)
  - transcription of DNA into RNA, enzymatic reactions, RNA, RNA degradation
  - regulation: cis-regulatory elements, transcription factors, enhancers, promoters, silencers, repressants, splicing
- # gene expression: translation (including defects)
  - the genetic code
  - structure and function of tRNA
  - structure and function of ribosomes
  - protein synthesis
  - regulation of translation
  - post-translational modifications (phosphorylation, addition of CHO units)
  - protein degradation
- # structure and function of proteins
  - principles of protein structure and folding
  - enzymes: kinetics, reaction mechanisms
  - structural and regulatory proteins: ligand binding, self-assembly
  - regulatory properties
- # energy metabolism (metabolic sequences and regulation) and disorders
  - 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
  - storage of energy: gluconeogenesis, glycogenesis, fatty acid and triglyceride synthesis
  - thermodynamics: free energy, chemical equilibria and group transfer potential, energetics of ATP and other high-energy compounds
- # metabolic pathways of small molecules and associated diseases
  - biosynthesis and degradation of amino acids (eg, homocystinuria)
  - biosynthesis and degradation of purine and pyrimidine nucleotides (eg, gout, Lesch-Nyhan syndrome)
  - biosynthesis and degradation of lipids (eg, dyslipidemias, carnitine deficiency, adrenogenital syndromes)
  - biosynthesis and degradation of porphyrins
- # biosynthesis and degradation of other macromolecules and associated abnormalities, complex carbohydrates (eg, lysosomal storage disease), glycoproteins, and proteoglycans

### Biology of cells

- # signal transduction: second messenger systems – voltage- and ligand-gated channels and receptors
- # cell components (eg, endoplasmic reticulum, plasma membrane, nucleus)
- # cytoskeleton (including cell movement and intracellular transport)

- # secretion and exocytosis, endocytosis, transcytosis
- # cell cycle, mitosis, meiosis, structure and regulation of spindle apparatus, control points
- # epithelial cells (including surface specialization, intercellular junctions, gap junctions, and desmosomes)
- # fibroblasts, endothelial cells, and mesenchymal cells: basement membrane, extracellular matrix, proteoglycans, fibronectins, adhesion molecules, annexins
- # muscle cells (cardiac, smooth, skeletal): structure and regulation of contractile elements, excitation-contraction coupling
- # adaptive cell response to injury (eg, hypertrophy, metaplasia).7
- # mechanisms of cell injury and necrosis (including free radical mediated cell injury)
- # apoptosis (programmed cell death)

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

- # inflammation (cells and mediators)
  - acute inflammation and mediator systems
  - vascular response to injury (including mediators)
  - inflammatory cell recruitment (adherence and cell migration) and phagocytosis
  - bactericidal mechanisms and tissue injury
  - clinical manifestations (including pain, fever, leukocytosis, leukemoid reaction, and chills)
  - chronic inflammation
- # reparative processes
  - wound healing, hemostasis, and repair: thrombosis, granulation tissue, angiogenesis, fibrosis, scar/keloid formation
  - regenerative processes
- # neoplasia
  - classification, histologic diagnosis
  - grading, and staging of neoplasms
  - cell biology, biochemistry, and molecular biology of neoplastic cells: transformation, oncogenes, altered cell differentiation, and proliferation
  - hereditary neoplastic disorders
  - invasion and metastasis
  - tumor immunology
  - paraneoplastic manifestations of cancer
  - cancer epidemiology and prevention

### **Multisystem processes**

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

### **Pharmacodynamic and pharmacokinetic processes**

- # general principles
  - pharmacokinetics: absorption, distribution, metabolism, excretion, dosage intervals

- mechanisms of drug action, structure-activity relationships, receptors, signal transduction
- concentration- and dose-effect relationships (eg, efficacy, potency), types of agonists and antagonists and their actions
- individual factors altering pharmacokinetics and pharmacodynamics (eg, age, gender, disease, tolerance, compliance, body weight, metabolic proficiency, pharmacogenetics)
- drug side effects, overdose, toxicology
- drug interactions
- regulatory issues (eg, drug development, approval, scheduling)
- # general properties of autacoids (including peptides and analogs, biogenic amines, prostanooids and their inhibitors, and smooth muscle/endothelial autacoids)
- # general principles of autonomic pharmacology
- # general properties of antimicrobials (including mechanisms of action and resistance)
- # general properties of antineoplastic agents and immunosuppressants, drug effects on rapidly dividing mammalian cells

### **Microbial biology and infection**

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

### **Immune responses**

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

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

## **Hematopoietic and lymphoreticular systems**

### **Normal processes**

- # embryonic development, fetal maturation, and perinatal changes
- # organ structure and function
- # cell/tissue structure and function
- production and function of erythrocytes, hemoglobin, O<sub>2</sub> and CO<sub>2</sub> transport, transport proteins
- production and function of leukocytes and the lymphoreticular system
- production and function of platelets
- production and function of coagulation and fibrinolytic factors
- # repair, regeneration, and changes associated with stage of life

### **Abnormal processes**

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

### **Principles of therapeutics**

- # mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the hematopoietic system
- blood and blood products
- treatment of anemia, drugs stimulating erythrocyte production (eg, erythropoietin)
- drugs stimulating leukocyte production (eg, G-CSF, GM-CSF)
- anticoagulants, thrombolytic drugs
- antiplatelet drugs
- antimicrobials (eg, antimalarials, anti-HIV)
- antineoplastic and immunosuppressive drugs

- drugs used to treat acquired disorders of immune responsiveness
- # other therapeutic modalities (eg, splenectomy, chelating agents, radiation therapy for lymphomas, plasmapheresis)

### **Central and peripheral nervous systems**

#### **Normal processes**

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

#### **Abnormal processes**

- # infectious, inflammatory, and immunologic disorders (eg, meningitis, multiple sclerosis, myasthenia gravis)
- # traumatic and mechanical disorders (subdural and epidural hematomas, cord compression, peripheral nerve injury)
- # neoplastic disorders (primary and metastatic)
- # acquired metabolic and regulatory disorders (eg, delirium, Reye's syndrome)
- # vascular disorders (eg, cerebrovascular occlusion, venous sinus thrombosis, arterial aneurysms, hemorrhage)
- # systemic disorders affecting the nervous system (eg, lupus, diabetic neuropathy)
- # idiopathic disorders affecting the nervous system
- # congenital disorders, including metabolic (eg, neural tube defects, cerebral palsy, mental retardation, Down's syndrome)
- # degenerative disorders (eg, peripheral neuropathy, Alzheimer's dementia, Parkinson's disease, Huntington's disease, amyotrophic lateral sclerosis)
- # paroxysmal disorders (eg, epilepsy, headache, pain syndromes, and sleep disorders including narcolepsy, restless legs syndrome/periodic limb movement, circadian rhythm disorders, parasomnias)
- # disorders of special senses (eg, blindness, deafness)
- # psychopathologic disorders, processes and their evaluation
  - early-onset disorders (eg, learning disorders)
  - disorders related to substance use
  - schizophrenia and other psychotic disorders
  - mood disorders
  - anxiety disorders
  - somatoform disorders
  - personality disorders
  - physical and sexual abuse of children, adults, and elders

- other disorders (eg, dissociative, impulse control, posttraumatic stress disorder).12

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### **Principles of therapeutics**

# mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the nervous system

- anesthetics
  - hypnotics
  - psychopharmacologic agents (eg, anxiolytics, antidepressants, antipsychotic agents, mood-stabilizing agents)
  - anticonvulsants
  - analgesics
  - stimulants, amphetamines
  - antiparkinsonian drugs
  - skeletal muscle relaxants, botulinum toxin
  - neuromuscular junction blocking agents
  - antiglaucoma drugs
  - drugs used to decrease intracranial pressure (eg, mannitol, high-dose glucocorticoids)
  - antimigraine agents
  - drugs affecting autonomic nervous system (eg, anticholinesterases)
- # other therapeutic modalities (eg, radiation, CFS shunting, surgery)

### **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)

# influence on person, family, and society (eg, developmental disabilities, dementia, generational reversal, nutrition, seizures, sleep disorders)

# occupational and other environmental risk factors (eg, boxing, carbon monoxide exposure)

# gender and ethnic factors

### **Skin and related connective tissue**

#### **Normal processes**

# embryonic development, fetal maturation, and perinatal changes

# organ structure and function

# cell/tissue structure and function (eg, barrier functions, thermal regulation, eccrine function)

# 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

#### **Abnormal processes**

# infectious, inflammatory, and immunologic disorders

– bacterial infections, (eg, acne, cellulitis, carbuncle, abscess, necrotizing fasciitis, gangrene)

– viral infections (eg, herpes infections, chickenpox, rubella, measles, roseola, verrucae)

– fungal infections, including mycoses, dermatophytosis (eg, tinea)

– parasitic infections (eg, scabies, lice)

– immune and autoimmune disorders (eg, discoid lupus erythematosus, scleroderma, dermatomyositis, alopecia, psoriasis, urticaria, allergic dermatosis)

# traumatic and mechanical disorders (eg, thermal injury, decubitus ulcers, effects of ultraviolet light and radiation)

# neoplastic disorders

– keratinocytes (eg, seborrheic keratosis, actinic keratosis, basal cell carcinoma, squamous cell carcinoma)

– melanocytes (eg, nevi, melanoma, ichthyosis)

– vascular neoplasms (eg, hemangiomas, Kaposi's sarcoma)

– other (eg, T-cell lymphoma, skin appendage tumors)

- # metabolic, regulatory, and structural disorders (eg, vitamin deficiencies, hypervitaminosis, hyperhidrosis)
- # vascular disorders (eg, vasculitis, Raynaud's disease)
- # systemic disorders affecting the skin (eg, Ehlers-Danlos syndrome, Marfan's syndrome)

### **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, steroids, antihistamines), emollients, sunscreen, retin-A, antimicrobial agents, cytotoxic therapy (eg, methotrexate, PUVA, keratinolytics)
- # 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)
- # influence on person, family, and society (eg, psoriasis)
- # occupational and other environmental risk factors
- # gender and ethnic factors (eg, keloid)

### **Musculoskeletal system**

#### **Normal processes**

- # embryonic development, fetal maturation, and perinatal changes
- # organ structure and function
- # cell/tissue structure and function
  - biology of bones, joints, tendons, skeletal muscle
  - exercise and physical conditioning
- # repair, regeneration, and changes associated with stage of life

#### **Abnormal processes**

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

### **Principles of therapeutics**

- # mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the musculoskeletal system
  - nonsteroidal anti-inflammatory drugs
  - muscle relaxants
  - antigout therapy (eg, allopurinol, colchicine, uricosuric drugs)
  - immunosuppressive drugs (eg, glucocorticoids, gold, cytotoxic agents)
  - drugs affecting bone mineralization (eg, diphosphonates, calcitonin, estrogen analogs)
- # 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)
- # influence on person, family, and society (eg, osteoporosis, fractures in elderly, alcohol abuse, fractures)
- # occupational and other environmental risk factors (eg, athletes, musicians)
- # gender and ethnic factors (eg, bone mass)

## **Respiratory system**

### **Normal processes**

- # embryonic development, fetal maturation, and perinatal changes
- # organ structure and function.<sup>14</sup>
  - airways (eg, mechanics and regulation of breathing)
  - lung parenchyma (eg, ventilation, perfusion, gas exchange)
  - pleura
- # cell/tissue structure and function (eg, surfactant formation, alveolar structure)
- # repair, regeneration, and changes associated with stage of life
- # pulmonary defense mechanisms and normal flora

### **Abnormal processes**

- # infectious, inflammatory, and immunologic disorders
  - infectious diseases of the upper and lower respiratory tract and pleura and their complications (eg, bronchiectasis, abscess, empyema)
  - immunologic disorders
  - allergic and hypersensitivity disorders (eg, asthma)
  - autoimmune disorders (eg, Wegener’s granulomatosis, Goodpasture’s syndrome)
  - inflammatory disorders
  - pneumoconioses
  - acute and chronic alveolar injury (eg, adult respiratory distress syndrome, chlorine gas/smoke inhalation)
  - obstructive pulmonary disease
  - restrictive pulmonary disease (eg, sarcoidosis, idiopathic fibrosis)
- # traumatic and mechanical disorders (eg, aspiration, pneumothorax, atelectasis, sleep apnea)
- # neoplastic disorders (eg, polyps, bronchogenic carcinoma, mesothelioma, metastatic tumors)
- # metabolic, regulatory, and structural disorders (eg, hypoventilation, disorders of gas exchange, ventilation-perfusion imbalance, neonatal respiratory distress syndrome)
- # vascular and circulatory disorders (eg, thromboembolic disease, pulmonary hypertension, pulmonary edema, pleural effusion)
- # systemic disorders affecting the respiratory system

### **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)
- # other therapeutic modalities (eg, oxygen therapy, nasal CPAP, mechanical ventilation, physical therapy, surgical procedures, including transplantation)

### **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, allergies)
- # influence on person, family, and society (eg, tuberculosis, asthma, chronic obstructive pulmonary disease, school issues, protective parents, family smoking)
- # occupational and other environmental risk factors
- # gender and ethnic factors (eg, sarcoidosis, lung cancer)

## **Cardiovascular system**

### **Normal processes**

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

### **Abnormal processes**

- # infectious, inflammatory, and immunologic disorders
  - infectious disorders (eg, endocarditis, myocarditis, pericarditis )
  - inflammatory and immunologic disorders (eg, acute rheumatic fever, systemic lupus erythematosus, transplant rejection, vasculitis, temporal arteritis)
- # traumatic and mechanical disorders (eg, tamponade, valvular disease, subaortic stenosis)
- # neoplastic disorders
- # 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, shock)
- # vascular disorders (eg, aneurysms, occlusions, varicosities, atherosclerosis)
- # systemic diseases affecting the cardiovascular system (eg, amyloidosis, aortic dissection with Marfan syndrome, hemochromatosis, scleroderma)
- # congenital disorders of the heart and central vessels

### **Principles of therapeutics**

- # mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the cardiovascular system
  - coronary and peripheral vasodilators
  - antiarrhythmic drugs
  - antihypertensive drugs
  - measures used to combat hypotension and shock
  - drugs affecting cholesterol and lipid metabolism
  - drugs affecting blood coagulation, thrombolytic agents
  - inotropic agents and treatment of heart failure
  - immunosuppressive and antimicrobial drugs
  - drugs to treat peripheral arterial disease
- # other therapeutic modalities (eg, pacemakers, angioplasty, valves, grafts, other surgical procedures)

### **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)
- # influence on person, family, and society (eg, altered lifestyle)
- # occupational and other environmental risk factors (eg, stress)
- # gender and ethnic factors (eg, hypertension)

### **Gastrointestinal system**

#### **Normal processes**

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

### **Abnormal processes**

- # infectious, inflammatory, and immunologic disorders
  - infectious disorders (eg, peritonitis, hepatitis, gingivostomatitis, peptic ulcer, gastritis, esophagitis, traveler's diarrhea, food poisoning)
  - inflammatory disorders (eg, cholecystitis, pancreatitis).16
  - immunologic disorders (eg, Crohn's disease, ulcerative colitis)
- # traumatic and mechanical disorders
  - malocclusion
  - hiatus hernia
  - obstruction (eg, volvulus, intussusception, esophageal atresia, annular pancreas, post-surgical obstruction)
  - perforation of hollow viscus and blunt trauma
  - inguinal, femoral, and abdominal wall hernias
  - esophageal and colonic diverticula (eg, Meckel's diverticulum)
- # neoplastic disorders (benign and malignant)
- # metabolic and regulatory disorders (eg, motility disorders, malabsorption, hepatic failure, cholelithiasis)
- # vascular disorders (eg, portal hypertension, hemorrhoids, ischemia, angiodysplasia)
- # systemic disorders affecting the gastrointestinal system

### **Principles of therapeutics**

- # mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the gastrointestinal system
  - treatment and prophylaxis of peptic ulcer disease and gastroesophageal reflux (eg, antacids, antisecretory drugs, motility drugs, mucosal protective agents, antibiotics)
  - drugs to alter gastrointestinal motility (eg, cathartics, antidiarrheal drugs, antiemetic drugs, prokinetic drugs)
  - fluid replacement (eg, oral rehydration)
  - pancreatic replacement therapy and treatment of pancreatitis
  - drugs for treatment of hepatic failure (eg, lactulose) and biliary disease (eg, drugs to dissolve gallstones)
  - anti-inflammatory, immunosuppressive, antineoplastic, and antimicrobial drugs
- # other therapeutic modalities (eg, surgical procedures, 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)
- # influence on person, family, and society (eg, inflammatory bowel disease, irritable bowel disease, pancreatitis and alcohol, chronic laxative abuse)
- # occupational and other environmental risk factors
- # gender and ethnic factors (eg, diets)

### **Renal/urinary system**

#### **Normal processes**

- # embryonic development, fetal maturation, and perinatal changes

# organ structure and function

- kidneys, ureters, bladder, urethra
- glomerular filtration and hemodynamics
- tubular reabsorption and secretion, including transport processes and proteins
- urinary concentration and dilution
- renal mechanisms in acid-base balance
- renal mechanisms in body fluid homeostasis
- micturition

# cell/tissue structure and function (eg, renal metabolism and oxygen consumption, hormones produced by or acting on the kidney)

# repair, regeneration, and changes associated with stage of life

### **Abnormal processes**

# infectious, inflammatory, and immunologic disorders

- infectious disorders
- upper urinary tract (eg, pyelonephritis, papillary necrosis)
- lower urinary tract (eg, cystitis, urethritis)
- inflammatory and immunologic disorders.17
- glomerular disorders (eg, glomerulonephritis, nephrotic syndrome)
- tubular interstitial disease (eg, interstitial nephritis, transplant rejection, IgA nephropathy)

# traumatic and mechanical disorders (eg, obstructive uropathy)

# neoplastic disorders (eg, renal, urinary bladder and collecting system, metastases)

# metabolic and regulatory disorders

- renal failure, acute and chronic (acute tubular necrosis)
- tubular and collecting duct disorders (eg, Fanconi's syndrome, renal tubular acidosis, nephrogenic diabetes insipidus)
- renal calculi

# vascular disorders (eg, renal artery stenosis)

# systemic diseases affecting the renal system (eg, diabetes mellitus, hepatitis, amyloidosis, systemic lupus erythematosus, Wegener's granulomatosis)

### **Principles of therapeutics**

# mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the renal and urinary system

- diuretics, antidiuretic drugs
- drugs and fluids used to treat volume, electrolyte, and acid-base disorders
- drugs used to enhance renal perfusion (eg, dopamine)
- anti-inflammatory, antimicrobial, immunosuppressive, and antineoplastic drugs

# other therapeutic modalities (eg, dialysis, renal transplantation)

**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)

# influence on person, family, and society (eg, hemodialysis, living related kidney donation, transplants)

# occupational and other environmental risk factors (eg, heavy metals)

# gender and ethnic factors (eg, disease progression, urinary tract infections)

### **Reproductive system**

#### **Normal processes**

# embryonic development, fetal maturation, and perinatal changes

# organ structure and function

- female structure (including breast)
- female function (eg, menstrual cycle, puberty, menopause)
- male structure

- male function (eg, spermatogenesis, puberty)
- intercourse, orgasm (male and female)
- pregnancy (including labor and delivery, the puerperium, lactation, gestational uterus, placenta)
- # cell/tissue structure and function (including hypothalamic-pituitary-gonadal axis, sex steroids, and gestational hormones)
- # reproductive system defense mechanisms and normal flora

### **Abnormal processes**

- # infectious, inflammatory, and immunologic disorders (eg, toxic shock syndrome, breast abscess, orchitis, sexually transmitted diseases, autoimmune hypogonadism, cystic mastitis)
- # traumatic and mechanical disorders (eg, female incontinence, torsion of testis, varicocele)
- # neoplastic disorders (eg, female reproductive, male reproductive, breast [male and female, including fibrocystic disease], trophoblastic disease)
- # metabolic and regulatory processes
  - female (eg, anovulation, infertility, polycystic ovaries, endometriosis, orgasmic dysfunction, delayed and premature puberty)
  - menopausal syndrome
  - male (eg, infertility, impotence, gynecomastia, delayed and premature puberty)
  - benign prostatic hyperplasia
- # systemic disorders affecting reproductive function (eg, obesity, myotonic dystrophy, cirrhosis, renal failure).<sup>18</sup>
- # disorders relating to pregnancy, the puerperium, and the postpartum period
  - obstetric problems (eg, ectopic pregnancy, third trimester bleeding)
  - complications affecting other organ systems (eg, eclampsia, gestational diabetes, thyroid disorders)
  - disorders associated with the puerperium (eg, postpartum hemorrhage, sepsis, depression)
  - antepartum, intrapartum, postpartum disorders of the fetus (eg, prematurity, postmaturity, cord compression, macrosomia,)

### **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
  - female reproductive tract
    - fertility drugs
    - oral contraception, other methods of contraception (eg, condoms)
    - estrogen, progestogen replacement
    - stimulants and inhibitors of labor
    - estrogen and progesterone antagonists, treatment of menopause
    - stimulators and inhibitors of lactation
  - male reproductive tract
    - fertility drugs
    - androgen replacement and antagonists
    - gonadotropin-releasing hormone and gonadotropin replacement
    - abortifacients
    - antimicrobials
    - antineoplastics
    - restoration of potency
- # other therapeutic modalities affecting the reproductive system (eg, tampons, anabolic steroids)

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

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

## **Endocrine system**

### **Normal processes**

- # embryonic development, fetal maturation, and perinatal changes
- # organ structure and function
  - hypothalamus, posterior and anterior pituitary gland
  - thyroid gland
  - parathyroid glands
  - adrenal cortex, adrenal medulla
  - pancreatic islets
  - ovary and testis
  - adipose tissue
- # cell/tissue structure and function (eg, hormone synthesis, secretion, action, and metabolism)
  - peptide hormones
  - steroid hormones, including vitamin D
  - thyroid hormones
  - catecholamine hormones
  - renin-angiotensin system
- # repair, regeneration, and changes associated with stage of life

### **Abnormal processes**

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

### **Principles of therapeutics**

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

### **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)
- # influence on person, family, and society
- # occupational and other environmental risk factors (eg, radiation exposure, iodine deficiency)
- # gender and ethnic factors