

# Goals and Objectives

## Goals

*Integrate Clinical Medicine skills, Medical Sciences (Foundations of Medicine) knowledge, and Medical Arts understanding to propose rational differential diagnoses and diagnostic and treatment strategies for clinical problems affecting Circulation, Respiration, and Elimination.*

### Clinical Medicine Goals

*Develop skills in History Taking, Physical Examination, and Biomedical Informatics pertinent to clinical problems affecting Circulation, Respiration, and Elimination.*

### Medical Sciences (Foundations of Medicine) Goals

*Know the Normal and Abnormal Processes and Therapeutic Principles of Circulation, Respiration, and Elimination.*

### Medical Arts Goals

*Understand the potential impact of Emotional and Behavioral factors, Gender and Ethnicity, and Occupational and Environmental exposure on the prevention, development and progression, and treatment of clinical problems affecting Circulation, Respiration, and Elimination.*

*Understand the potential impact on the person, family, and society of clinical problems affecting Circulation, Respiration, and Elimination.*

## Objectives

Integrate Clinical Medicine skills, Medical Sciences (Foundations of Medicine) knowledge, and Medical Arts understanding to propose rational differential diagnoses and diagnostic and treatment strategies for clinical problems affecting Circulation, Respiration, and Elimination. Roughly organized by system, the clinical problems include:

- Amyloidosis
- Hematopoietic and Lymphoreticular System
  - anemia
  - bleeding tendency/bruising
  - hypercoagulable state
  - polycythemia/elevated hemoglobin
- Cardiovascular System
  - cardiac arrest
  - chest discomfort/pain/angina pectoris
  - heart sounds/pathologic/diastolic murmur/systolic murmur (adults/children)
  - pulse abnormalities/diminished/absent/bruits
  - hypertension (adults/children)/malignant
  - edema/generalized/unilateral/local
  - palpitations (abnormal ecg-arrhythmia)
  - abnormal serum lipids
  - vascular injuries
  - chest injuries
  - hypotension/shock
  - fainting (syncope/pre-syncope/loss of consciousness)
  - weight gain/obesity
- Respiratory System
  - dyspnea/respiratory distress/acute/chronic (adults/children)
  - cough/acute/chronic (adults/children)
  - cyanosis/hypoxemia/hypoxia (adults/children)
  - blood in sputum (hemoptysis)
  - upper respiratory tract disorders
  - lower respiratory tract disorders
  - pleural abnormalities/effusion
- Renal/Urinary System
  - renal failure (acute/chronic)
  - urinary incontinence (adults/children) (not currently covered in nephrology—visited in neuro)
  - dysuria/pyuria
  - hematuria
  - proteinuria
  - urinary tract injuries (not currently covered—not too important)
  - urinary obstruction/hesitancy/prostatic cancer

(\*\*\*Effectively communicated in detailed written H&P/SOAP and oral presentation. Correctly answer higher order MCQ's during assessment and on USMLE)

## Clinical Medicine Objectives

Develop skills in History Taking, Physical Examination, and Biomedical Informatics pertinent to clinical problems affecting Circulation, Respiration, and Elimination.

### History Taking

Expand History Taking skills developed during Phase I to include demonstrating obtaining a more developed History of Present Illness and Review of Systems targeted at defining and narrowing the Differential Diagnosis for clinical problems affecting Circulation, Respiration, and Elimination.

Roughly organized by organ system, the pertinent patient information includes:

- Hematopoietic and Lymphoreticular System
  -
- Cardiovascular System
  -
- Respiratory System
  -
- Renal/Urinary System
  -

(\*\*\*Continue to hone interview techniques learned in Phase I: listening, questioning, redirecting, efficiency, etc.)

### Physical Examination

Expand Physical Examination skills developed during Phase I to include demonstrating the elucidation or exclusion of abnormal findings targeted at defining and narrowing the Differential Diagnosis for clinical problems affecting Circulation, Respiration, and Elimination. Roughly organized by organ system, the pertinent exam maneuvers include:

- Hematopoietic and Lymphoreticular System
  -
- Cardiovascular System
  -
- Respiratory System
  -
- Renal/Urinary System
  -

(\*\*\*Continue to hone exam techniques learned in Phase I: systematic approach, elucidation/discrimination of findings, privacy, etc.)

### Biomedical Informatics

Expand Biomedical Examination skills developed during Phase I to include demonstrating patient specific and clinical problem oriented Access and Evaluation of Medical Literature, Access and Navigation of Medical Records, and Interpretation of Clinical, Laboratory, and Diagnostic Test results targeted at defining and narrowing the Differential Diagnosis for clinical problems affecting Circulation, Respiration, and Elimination.

#### *Accessing and Evaluating Medical Literature*

Use database search strategies targeted at defining and narrowing the Differential Diagnosis for clinical problems affecting Circulation, Respiration, and Elimination to retrieve and download adequate and relevant information from appropriate health care specific resources.

### *Accessing and Navigating Medical Records*

Retrieve patient specific information from the medical record system targeted at defining and narrowing the Differential Diagnosis for clinical problems affecting Circulation, Respiration, and Elimination.

### *Interpreting Clinical, Laboratory, and Diagnostic Test Results*

Integrate patient specific clinical, laboratory, and diagnostic findings to help define and narrow the Differential Diagnosis for clinical problems affecting Circulation, Respiration, and Elimination (toolbox here as well--ABG's, PFT's, CXR/imaging/US, BAL, cardiac enzymes, thoracentesis, cystometrogram, post-void residuals, VCUG, UA, microscopy, FENa, retrograde urethrograms, renal US).

## Medical Sciences (Foundations of Medicine) Objectives

Know the Normal and Abnormal Processes and Therapeutic Principles of Circulation, Respiration, and Elimination. Roughly organized by organ system, the pertinent medical sciences knowledge includes:

### Hematopoietic System

#### *NORMAL PROCESSES of the Hematopoietic System*

Describe the NORMAL Processes of the Hematopoietic System including:

- organ system development
  - ■ embryonic development
  - fetal maturation
  - perinatal changes
- I organ structure and function
- cell/tissue structure and function
  - B production and function of erythrocytes
    - hemoglobin (including iron regulation)
    - O<sub>2</sub> and CO<sub>2</sub> transport
    - transport proteins
  - production and function of platelets
  - production and function of coagulation and fibrinolytic factors
- ■ repair, regeneration, and changes associated with stage of life

#### *ABNORMAL PROCESSES affecting the Hematopoietic System*

Describe the ABNORMAL Processes affecting the Hematopoietic System

- ■ infectious disorders
  - Review the microbiologic properties of microbes that may infect the hematopoietic (blood and reticuloendothelial) system.
  - Describe the pathogenesis and clinical manifestations of infections of the hematopoietic system.
- inflammatory, and immunologic disorders
  - allergic and anaphylactic reactions and other immunopathologic mechanisms
  - acquired disorders of immune deficiency
- autoimmunity and autoimmune diseases (eg, Coombs positive hemolytic 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, including acquired and congenital
- anemias and cytopenias (eg, iron deficiency anemia, hemoglobinopathies, hereditary spherocytosis, glucose 6-phosphate dehydrogenase deficiency & hemolytic anemia)
  - cythemia
  - hemorrhagic and hemostatic disorders (eg, coagulopathies, DIC)
  - bleeding secondary to platelet disorders (eg, von Willebrand)
- vascular and endothelial disorders (eg, effects and complications of splenectomy, hypersplenism, TTP, hemolytic uremic syndrome)
- systemic disorders affecting the hematopoietic system (eg, nutritional deficiencies,

- systemic lupus erythematosus)
- idiopathic disorders

#### *THERAPEUTIC PRINCIPLES for clinical problems affecting the Hematopoietic System*

Describe the THERAPEUTIC PRINCIPLES for clinical problems affecting the Hematopoietic System including:

- 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) (out to MCC or H&D)
  - anticoagulants, thrombolytic drugs
  - antiplatelet drugs
  - antimicrobials (eg, antimalarials)
  - antineoplastic and immunosuppressive drugs (out to MCC or H&D)
  - drugs used to treat acquired disorders of immune responsiveness (out to H&D)
- other therapeutic modalities (eg, splenectomy, chelating agents, plasmapheresis)

#### **Cardiovascular System**

##### *NORMAL PROCESSES of the Cardiovascular System*

Describe the NORMAL PROCESSES of the Cardiovascular System, including:

- organ system development
  - ■embryonic development
  - fetal maturation
  - perinatal changes
- organ structure and function
  - chambers, valves, *great vessels, coronary arteries*
  - cardiac cycle, mechanics, heart sounds, cardiac conduction
  - hemodynamics, including 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
  - *production and function of blood lipids, cholesterol metabolism*
  - 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 affecting the Cardiovascular System*

Describe the ABNORMAL PROCESSES affecting the Cardiovascular system, including:

- ■infectious, inflammatory, and immunologic disorders
  - infectious disorders (eg, endocarditis, myocarditis, pericarditis)

- inflammatory and immunologic disorders (eg, acute rheumatic fever, systemic lupus erythematosus, vasculitis, temporal arteritis)
- traumatic and mechanical disorders (eg, tamponade, valvular disease, obstructive cardiomyopathy)
- ■neoplastic disorders
- metabolic and regulatory disorders
  - dyslipidemias
  - mechanisms of atherosclerosis (also related to inflammatory processes)
  - dysrhythmias
  - systolic and diastolic dysfunction
  - low- and high-output heart failure
  - cor pulmonale
  - systemic hypertension
  - ischemic heart disease
  - myocardial infarction
  - systemic hypotension and shock
- vascular disorders (eg, aneurysms, occlusions, varicosities, atherosclerosis)
- systemic diseases affecting the cardiovascular system (eg, amyloidosis, aortic dissection with Marfan syndrome, scleroderma)
- congenital disorders of the heart and central vessels

#### *THERAPEUTIC PRINCIPLES for diseases affecting the Cardiovascular System*

Describe the THERAPEUTIC PRINCIPLES for diseases affecting the Cardiovascular System, including:

- 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, antithrombotics
  - inotropic agents and treatment of heart failure
  - immunosuppressive and antimicrobial drugs
  - drugs to treat peripheral arterial disease
  - prostaglandins (chd), COX-2's
- other therapeutic modalities (eg, pacemakers, angioplasty, valves, grafts, other surgical procedures, nutritional)

### **Respiratory System**

#### *NORMAL PROCESSES of the Respiratory System*

Describe the NORMAL PROCESSES of the Respiratory system, including:

- organ system development
  - ■embryonic development
  - fetal maturation
  - perinatal changes
- organ structure and function (put toolbox here)
  - airways, including mechanics and regulation of breathing
  - lung parenchyma, including ventilation, perfusion, gas exchange
  - pleura
  - nasopharynx and sinuses
  - larynx

- cell/tissue structure and function, including surfactant formation, alveolar structure
- pulmonary defense mechanisms and normal flora
- ■ repair, regeneration, and changes associated with stage of life

#### *ABNORMAL PROCESSES affecting the Respiratory System*

Describe the ABNORMAL PROCESSES affecting the Respiratory System, including:

- ■ infectious disorders
  - infectious diseases of the upper respiratory tract (eg, sinusitis, pharyngitis, croup/epiglottis/foreign body aspiration)
  - acute infectious diseases of the lower respiratory tract and pleura and their complications (eg, pneumonia, bronchiectasis, abscess, empyema)
  - chronic infectious diseases of the lower respiratory tract (eg, Mycobacterium, endemic fungal infections, Nocardia/Actinomyces)
- inflammatory and immunologic disorders
  - allergic and hypersensitivity disorders (eg, asthma)
  - autoimmune disorders (eg, Wegener granulomatosis-also renal, Goodpasture syndrome-also renal)
  - pneumoconioses
  - acute and chronic alveolar injury (eg, acute respiratory distress syndrome, chlorine gas/smoke inhalation)
  - obstructive pulmonary disease (eg chronic bronchitis, emphysema)
  - restrictive pulmonary disease (eg, sarcoidosis, idiopathic fibrosis)
- traumatic and mechanical disorders (eg, foreign body 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, neonatal ventilatory drive)
- vascular and circulatory disorders (eg, thromboembolic disease, pulmonary hypertension, pulmonary edema, pleural effusion)
- systemic disorders affecting the respiratory system
- congenital malformations (TEF, Diaphragmatic Hernia, cystic lesions)
- genetic (e.g. CF, ciliary disorders, alpha-1 antitrypsin)

#### *THERAPEUTIC PRINCIPLES for diseases affecting the Respiratory System*

Describe the THERAPEUTIC PRINCIPLES for diseases affecting the Respiratory system, including:

- mechanisms of action, use, and adverse effects of drugs for treatment of disorders of the respiratory system
  - decongestants
  - cough suppressants
  - expectorants
  - mucolytics
  - bronchodilators
  - anti inflammatory agents
  - cytotoxic drugs
  - antimicrobial agents
  - antineoplastic agents
  - surfactant
- other therapeutic modalities (eg, oxygen therapy, nasal CPAP, mechanical ventilation, physical therapy/exercise, surgical procedures, including

transplantation, smoking cessation)

## Renal/Urinary System

### *NORMAL PROCESSES of the Renal/Urinary System*

Describe the NORMAL PROCESSES of the Renal/Urinary system, including:

- ■ 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/enuresis (not currently covered)
- cell/tissue structure and function, including renal metabolism and oxygen consumption, hormones produced by or acting on the kidney (detailed biochemical process involving HIF and induction of erythropoietin synthesis)
- ■ repair, regeneration, and changes associated with stage of life (changes in renal function with aging—peds to aging, micturation through the ages)

### *ABNORMAL PROCESSES affecting the Renal/Urinary System*

Describe the ABNORMAL PROCESSES affecting the Renal/Urinary system, including:

- ■ infectious, inflammatory, and immunologic disorders
  - infectious disorders (eg, hemolytic uremic syndrome especially in pediatric patients)
  - upper urinary tract (eg, pyelonephritis, papillary necrosis)
  - ■ lower urinary tract (eg, cystitis, urethritis)
  - inflammatory and immunologic disorders
  - glomerular disorders (eg, glomerulonephritis, nephrotic syndrome—one example IgA nephropathy)
  - tubular interstitial disease (eg, interstitial nephritis, transplant rejection)
- traumatic and mechanical disorders (eg, obstructive uropathy, pediatric urinary reflux)
- ■ neoplastic disorders, including primary (eg, renal, urinary bladder and collecting system) and metastatic
- metabolic and regulatory disorders
  - renal failure, acute and chronic, pediatric and adult (eg, acute tubular necrosis)
  - tubular and collecting duct disorders (eg, Fanconi syndrome, renal tubular acidosis, nephrogenic diabetes insipidus, polycystic kidney disease) (congenital/developmental abnormalities and genetic)
  - renal calculi
- vascular disorders (eg, renal artery stenosis)
- systemic diseases affecting the renal system (eg, diabetes mellitus, hepatitis, amyloidosis, systemic lupus erythematosus, Wegener granulomatosis)

### *THERAPEUTIC PRINCIPLES for diseases affecting the Renal/Urinary System*

Describe the THERAPEUTIC PRINCIPLES for diseases affecting the Renal/Urinary system, including:

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

- diuretic and antidiuretic drugs
- drugs and fluids used to treat volume, electrolyte, and acid-base disorders
- drugs used to enhance renal perfusion (eg, dopamine, dopexamine)
- anti-inflammatory, antimicrobial, immunosuppressive, and antineoplastic drugs
- ■ drugs used to treat lower urinary tract system (eg, incontinence, bladder function, benign prostatic hyperplasia)
- other therapeutic modalities (eg, dialysis, renal transplantation)

## Medical Arts Objectives

Understand the potential impact of Emotional and Behavioral factors, Gender and Ethnicity, and Occupational and Environmental exposure on the prevention, development and progression, and treatment of clinical problems affecting Circulation, Respiration, and Elimination.

Understand the potential impact on the person, family, and society of clinical problems affecting Circulation, Respiration, and Elimination.

### Emotional and Behavioral Factors

Describe the potential impact that Emotional and Behavioral factors have on the prevention, development and progression, and treatment of clinical problems affecting Circulation, Respiration, and Elimination, including:

- diet and anemia, herbal treatments with bone marrow depression, depression and immune responses, “blood doping” among athletes
- smoking, alcohol, obesity, exercise, and diet effect on ischemic heart disease
- smoking, substance abuse, pets, allergen effect on pulmonary disease
- drug-induced interstitial nephritis and impact of diet and renal disease

### Gender and Ethnic Factors

Describe the potential impact that Gender and Ethnic factors have on the prevention, development and progression, and treatment of clinical problems affecting Circulation, Respiration, and Elimination, including:

- hypertension
- sarcoidosis, lung cancer
- urinary tract infections

### Occupational and Environmental Exposures

Describe the potential impact that Occupational and Environmental exposures have on the development and progression of clinical problems affecting Circulation, Respiration, and Elimination, including:

- heavy metals, hydrocarbons, lead, asbestos
- stress

### Personal, Familial, and Societal Impacts

Describe the potential impact that clinical problems affecting Circulation, Respiration, and Elimination have on the Person, Family, and Society, including:

- altered lifestyle
- childhood leukemia
- tuberculosis
- asthma and school issues, protective parents, family smoking
- chronic obstructive pulmonary disease
- hemodialysis, living related kidney donation, transplants

