Learning Objectives

- Define:
  - Disease
  - Lesions
  - Organic and functional disease
  - Symptomatic and asymptomatic disease
  - Etiology
  - Pathogenesis
- Categories of human disease
- Types of diagnostic tests and procedures

Characteristics of Disease (1 of 3)

- **Disease**: disturbance of body structure or function
- **Lesions**: well-defined, characteristic structural changes in organs and tissues as a result of disease
- Organic disease
  - Associated with structural changes
  - Gross examination
  - Histologic examination
- Functional disease
  - No morphological abnormalities yet body functions are profoundly disturbed

Characteristics of Disease (2 of 3)

- **Pathology**: study of disease
  - Pathologist: physician who specializes in diagnosing and classifying diseases by studying the morphology of cells and tissues
  - Clinician: physician/health care professional that cares for patients
- **Symptoms**: subjective manifestations such as pain or weakness
- **Signs**: physical findings or objective manifestations such as swelling or redness

Characteristics of Disease (3 of 3)

- Symptomatic disease: with symptoms and/or signs
- Asymptomatic disease: no signs or symptoms
  - Distinction between asymptomatic and symptomatic depends on extent
  - Early stages of disease, usually asymptomatic
  - If not treated, progresses to symptomatic
- Etiology: cause of disease
- Etiologic agent: agent responsible for causing disease
- Pathogenesis: process of development of disease
- Pathogen: any microorganism that causes disease

Classifications of Disease (1 of 3)

- Congenital and hereditary diseases
  - Developmental disturbances
  - Causes: genetic abnormalities; abnormalities in chromosome number or distribution; intrauterine injury; interaction of genetic and environmental factors
  - Hemophilia (hereditary), German measles (congenital)
Classifications of Disease (2 of 3)

• Inflammatory diseases: Body reacts to injury through an inflammatory process
  – Bacteria or microbiologic agents: sore throat
  – Allergic reaction: hay fever
  – Autoimmune diseases: SLE, diabetes type 1
  – Unknown etiology

• Degenerative diseases
  – Tissue or organ degeneration as a result of aging or breakdown
  – Arthritis, atherosclerosis

Classifications of Disease (3 of 3)

• Metabolic diseases: Disturbance in metabolic process in body
  – Diabetes, hyper- or hypothyroidism, fluid and electrolyte imbalance

• Neoplastic diseases: Uncontrolled cell growth
  – Benign: lipoma
  – Malignant: Lung cancer

• Basis of classification
  – 1. Similarity of lesions
  – 2. Similarity of pathogenesis

• Diseases with similarities may not necessarily be closely related

Health and Disease

– Good health: more than the absence of disease
– Condition in which body and mind function efficiently and harmoniously as an integrated unit

• Traditional medicine: goal is to cure or ameliorate disease.
• Modern medicine: advances relieve suffering and advance human welfare but do not guarantee good health.

Continuum of Health and Disease

Good Health  Serious Illness

• Everyone is somewhere between the midpoint and good health
• Good health requires active participation, assuming responsibility for one’s health
  – Eat properly, exercise, avoid harmful excesses such as overeating, smoking, heavy drinking, or using drugs
  – Use one’s mind constructively, express emotions appropriately, nurture a positive mental attitude

Principles of Diagnosis

• Diagnosis: determination of nature and cause of illness
  – Clinical history
  – Physical examination
  – Differential diagnosis

• Prognosis: eventual outcome of disease

• Treatment
  – Specific treatment – directed at underlying cause
  – Symptomatic treatment – alleviates symptoms but does not influence course of disease

Clinical History (1 of 2)

• History of current illness
  – Severity, time of onset, and character of patient’s symptoms

• Medical history
  – Details of general health and previous illnesses that may shed light on current problems

• Family history
  – Health of patient’s parents and family members; diseases that run in families
Clinical History (2 of 2)

• Social history
  – Patient’s occupation, habits, alcohol and tobacco consumption, general health, current problems
• Review of symptoms
  – Symptoms other than disclosed in history of present illness, suggesting other parts of the body affected by disease

Physical Examination

• Physical examination
  – Systematic examination of patient, with emphasis on parts of body affected by illness
  – Abnormalities noted correlated with clinical history
• Differential diagnosis
  – Consideration of various diseases or conditions that may also explain patient’s symptoms and signs
  – Diagnostic possibilities narrowed by selected laboratory tests or other diagnostic procedures
  – Opinion of medical consultant may be sought

Screening Tests

• Screening tests for detection of disease
  – Detect early asymptomatic diseases amenable to treatment to prevent or minimize late-stage organ damage
• Screening for some genetic diseases
  – Screen for carriers of some genetic diseases transmitted from parent to child as either dominant or recessive trait
  – Identifying carriers allows affected persons to make decisions on future childbearing or management of current pregnancy
  – Example: recessive gene for sickle cell anemia in 8% of Black population

Requirements for Effective Screening

• A significant number of persons must be at risk for the disease in the group being screened.
• A relatively inexpensive noninvasive test must be available to screen for the disease that does not yield a high number of false-positive or false-negative results
• Early identification and treatment of the disease will favorably influence course of disease.

Diagnostic Tests and Procedures (1 of 8)

• Clinical laboratory tests
• Tests of electrical activity to measure electrical impulses associated with bodily functions and activities
  – ECG: measures serial changes in electrical activity of the heart in various phases of the cardiac cycle
  – EEG: measures electrical activity of brain; brain waves
  – EMG: measures electrical activity of skeletal muscle during contraction and at rest

Diagnostic Tests and Procedures (2 of 8)

• Radioisotope (radionuclide) studies: evaluate organ function by determining rate of uptake and excretion of substances labeled with a radioisotope
• Endoscopy
  – To examine interior of body using rigid or flexible tubular instruments equipped with lens and light source
  – To perform surgery formerly done through large abdominal incisions
Diagnostic Tests and Procedures (3 of 8)

• Ultrasound
  – Mapping echoes produced by high-frequency sound waves transmitted into body; echoes reflect change in tissue density, producing images

Diagnostic Tests and Procedures (4 of 8)

• X-ray
  – Principle: use of high-energy radiation waves at lower doses to produce images to help diagnose disease
  – Can penetrate through tissues at varying degrees depending on tissue density
  – Act on a photographic film or plate (roentgenogram) as the rays leave the body

X-ray of gallbladder; gallstones appear as radiolucent (dark) within a radiopaque bile (white)

Opened gallbladder, same patient
Diagnostic Tests and Procedures (5 of 8)

• Computed tomographic (CT) scans
  – Principle: radiation detectors record amount of X-rays or ionizing radiation absorbed by body and feed data into a computer that reconstructs the data into an image

Computed tomographic scan, CT scan
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CT scan, chest, white nodule on left lung indicates tumor
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CT scan, abdomen at level of kidneys, fluid-filled cysts, right kidney
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Diagnostic Tests and Procedures (6 of 8)

• Magnetic resonance imaging (MRI)
  – Principle: computer-constructed images of body based on response of hydrogen protons in water molecules when placed in a strong magnetic field

MRI, brain, with malformation within brain stem
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Diagnostic Tests and Procedures (6 of 7)

- MRI: advantages over CT scan
  - Does not use ionizing radiation
  - Can detect abnormalities in tissues surrounded by bone, such as spinal cord, orbit, skull
  - Bone interferes with scanning because of its density but does not produce an image in MRI because of its low water content

Diagnostic Tests and Procedures (6 of 6)

- Cytologic and histologic examinations
  - Papanicolau (Pap) smear: identifies abnormal cells in fluids or secretions; for recognizing early changes that may be associated with cervical and other cancers
  - Biopsy: tissue samples obtained for histologic examination to determine abnormal structural and cellular patterns accompanying disease

Discussion

- Explain the requirements for an effective screening.
- Differentiate:
  - Symptomatic versus specific treatment
  - Sign versus symptom
  - Symptomatic versus asymptomatic disease
  - Diagnosis versus prognosis