



INTRODUCTION TO HUMAN DISEASE

An Introduction to Pathology

Fb/Nurse-Info

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DISEASE

Fb/Nurse-Info

WHAT IS DISEASE

- Disease – structural or functional change in the body that is harmful to the organism
- Occurs when cellular environment changes to such a degree that tissues are no longer able to perform their function optimally



Child with measles



CATARACTS

- Crystalline lens of the eye undergoes degenerative changes, becomes cloudy, obstructs the passage of light and causes decreased visual acuity
- Occurs over time



Example of a Cataract

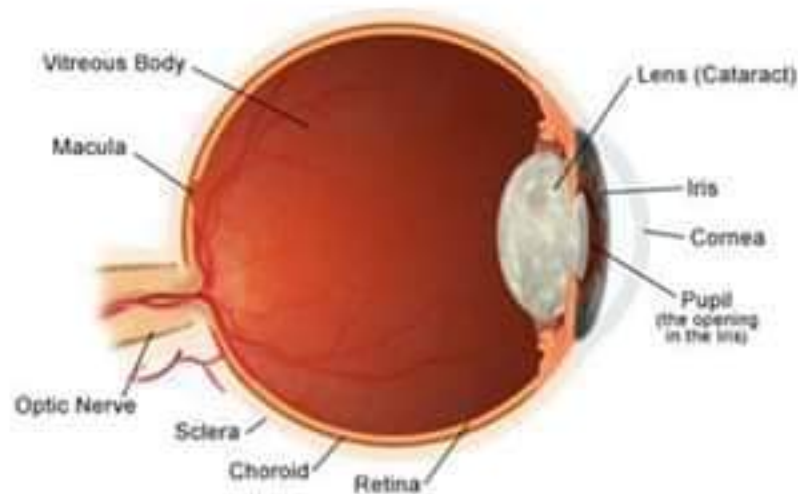


Fig. 2 A cataract interferes with vision because it obstructs the lens of the eye through which light passes, causing light to refract differently than in a healthy eye.



CANCER

- Mutations accumulate in the nucleic acids of cells which result in the distorted function and structure of proteins
- This affects the way the cells interact with or react to other cells, growth factors, hormones, and the extracellular matrix of the environment

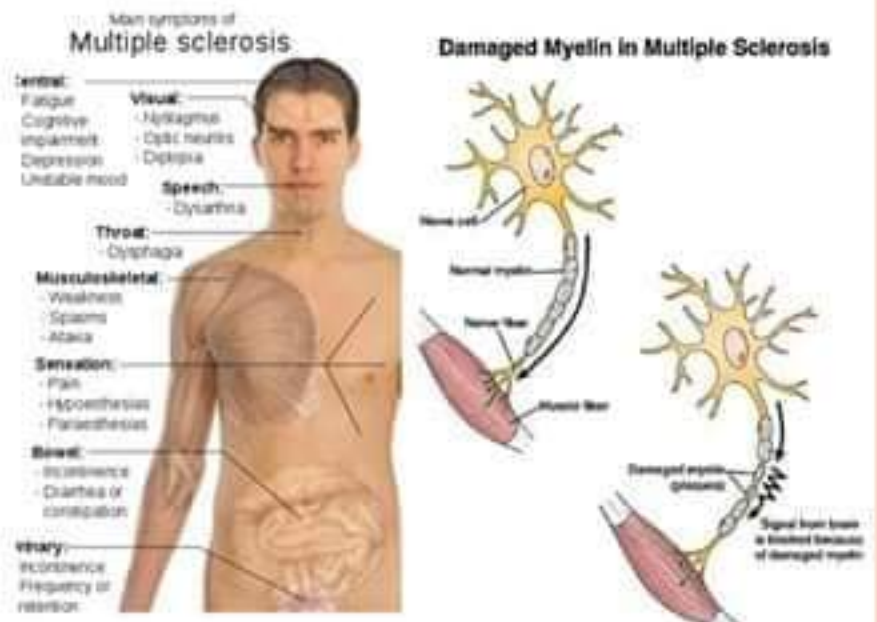
○

Pancreatic
• Cancer



MULTIPLE SCLEROSIS

- Destruction of the protective myelin sheath around axons in the brain which results in decreased electrical conduction
- Signs and symptoms include weakness, double vision and incoordination



CELLULAR BASIS FOR DISEASE

- With the Enlightenment, people began to look at workings of the body in a scientific manner
- Scientifically oriented doctors formed idea that disease is not caused by an external force that takes possession of the body, but arises from organs and tissues and leaves visible traces there



CLINICOPATHOLOGIC OBSERVATIONS

- Physicians gained insights by closely observing the course of disease on a patient's body
- Concluded that diseases can be traced to deranged structures or functions of organs, tissues, or cells (has been extended to molecular level of proteins and genes)
- Called allopathic medicine, biomedicine, Western medicine



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PATHOLOGY

PATHOLOGY

- Definition – the study of disease
 - Includes:
 - the basic structural and functional changes associated with disease
 - The study of causes that leads to these changes
 - Sequence of events that leads from structural and functional abnormalities to clinical manifestations

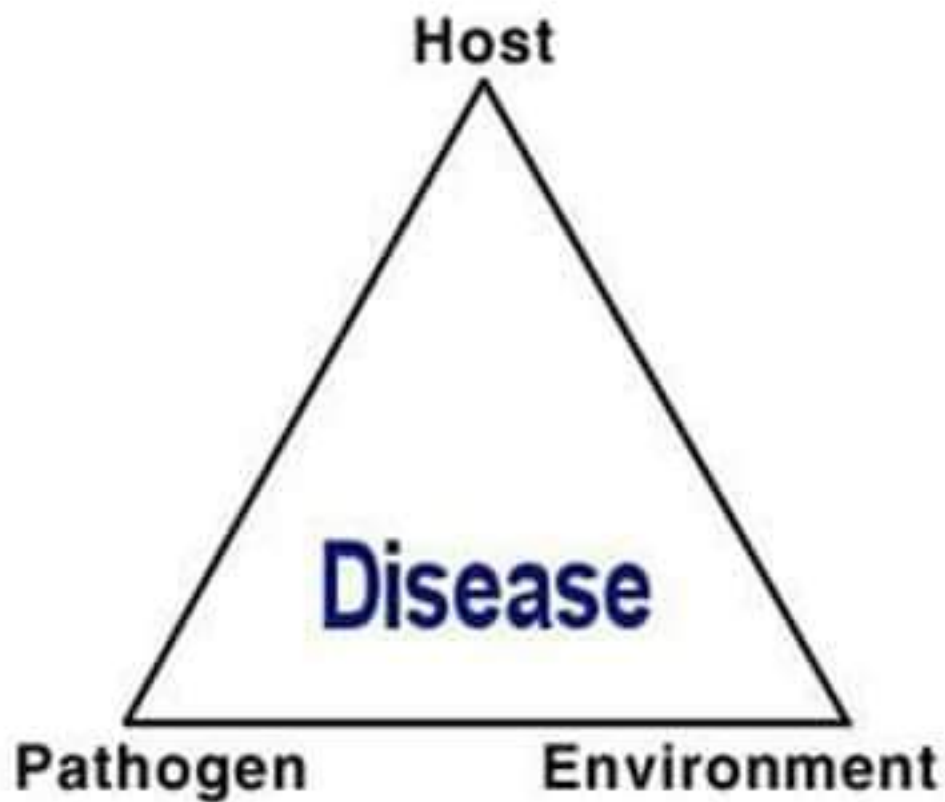


ETIOLOGY

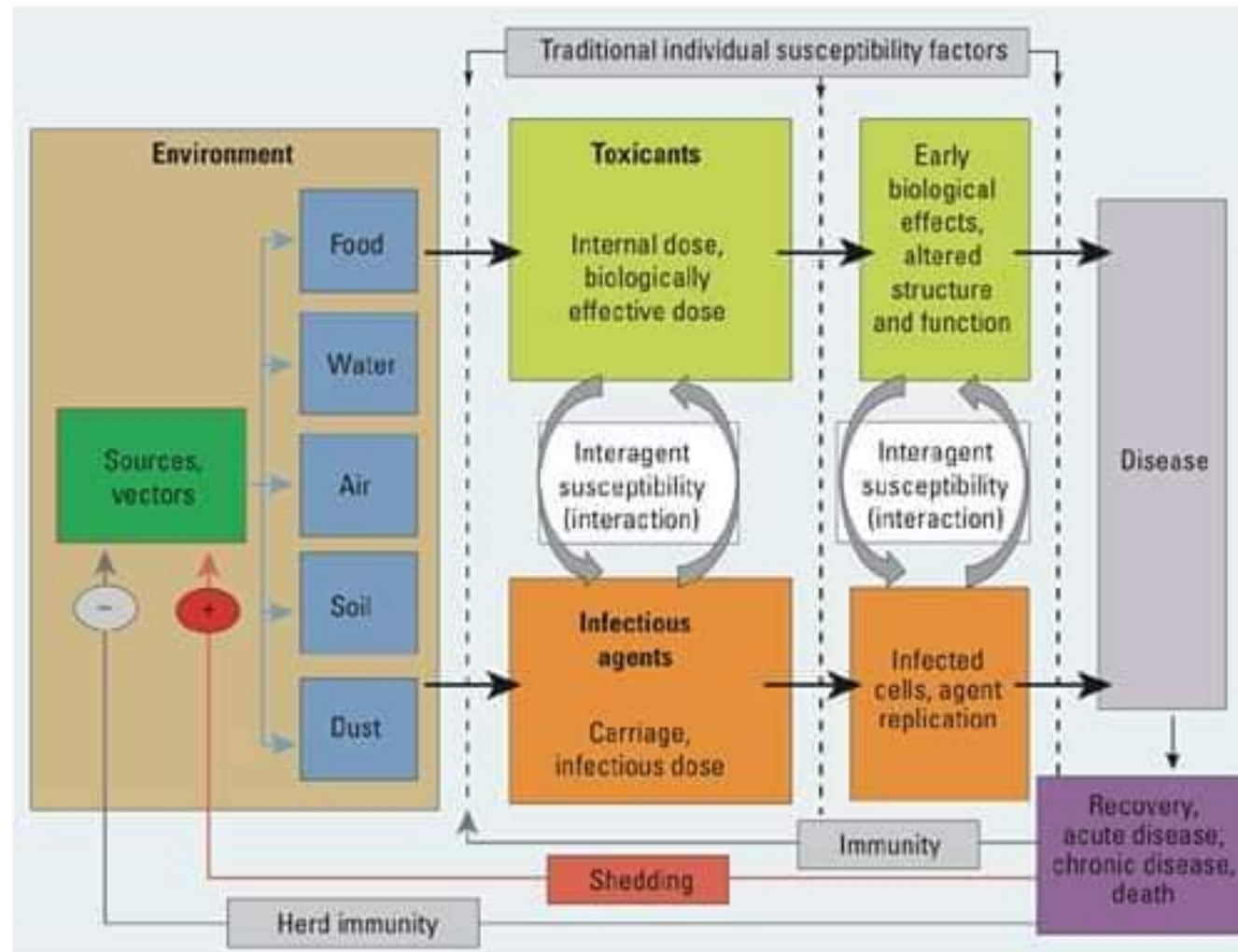
- Definition – the study of causes, the cause of disease
 - Involves – environment, vectors (host), pathogen



THE DISEASE PARADIGM (SIMPLIFIED)



THE DISEASE PARADIGM (COMPLEX)



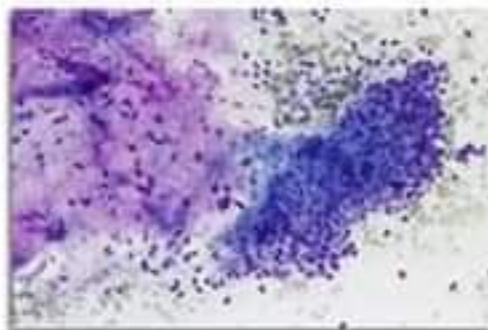
SUBDIVISION OF PATHOLOGISTS

- Experimental pathologists – scientists spending most of their time in research
 - Investigate cause and mechanisms of disease
 - Jobs include – research and teaching



ANATOMIC PATHOLOGISTS

- Perform autopsies, examine all tissues removed from live patients, and examine cell preparations to look for cancer cells
 - Includes:
 - Autopsy pathology
 - Surgical pathology
 - Cytopathology
 - Molecular (DNA, RNA) diagnosis



CLINICAL PATHOLOGISTS

- Analyze various specimens removed from patients, such as blood, urine, feces, spinal fluid, or sputum for chemical substances, microorganism, antigens and antibodies, nucleic acids, atypical blood cells, and coagulation factors
 - Includes:
 - Chemistry
 - Microbiology
 - Hematology
 - Blood Banking
 - Immunopathy
 - Molecular Diagnosis



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MANIFESTATIONS OF DISEASE

SYMPTOMS

- Evidence of disease perceived by patients
 - i.e. pain, lump, diarrhea
- Health practitioners elicit these during an interview with the patient and record them in the patient's chart as the history



SIGNS

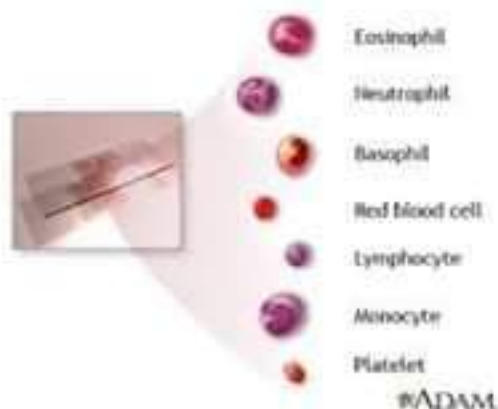
- Physical observations made by the person who examines the patient
 - i.e tenderness, a mass, abnormal heart sounds
- Elicited and observed during the physical examination
- Results are recorded in the patient's chart.



LABORATORY FINDINGS



- Observations made by the application of tests or special procedures
 - X-rays, blood counts, biopsies



Normal Blood Count	
Haemoglobin (Hb)	M 13.5 - 17.5g/dl F 11.5 - 15.5g/dl
Red cells (RBC; erythrocytes)	M 4.5 - 6.0 x 10 ¹² /l F 3.9 - 5.6 x 10 ¹² /l
PCV (haematocrit)	M 40 - 52% F 36 - 48%
MCV	80 - 95fl
MCH	27 - 34pg
MCHC	30 - 35g/dl
Reticulocytes	0.5 - 20%
White cells (WBC; leucocytes)	
total	4.0 - 11.0 x 10 ⁹ /l
neutrophils	2.5 - 7.5 x 10 ⁹ /l
lymphocytes	1.5 - 3.5 x 10 ⁹ /l
monocytes	0.2 - 0.8 x 10 ⁹ /l
eosinophils	0.04 - 0.44 x 10 ⁹ /l
basophils	0.01 - 0.1 x 10 ⁹ /l
Platelets	150 - 400 x 10 ⁹ /l

M=Males F=Females



DIAGNOSIS

- Assimilating the information from patient's history, physical examination, and laboratory findings to identify the condition causing the disease.
- Also refers to the name given to the disease
 - i.e. Diabetes, multiple sclerosis



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STRUCTURAL VS. FUNCTIONAL DISEASE

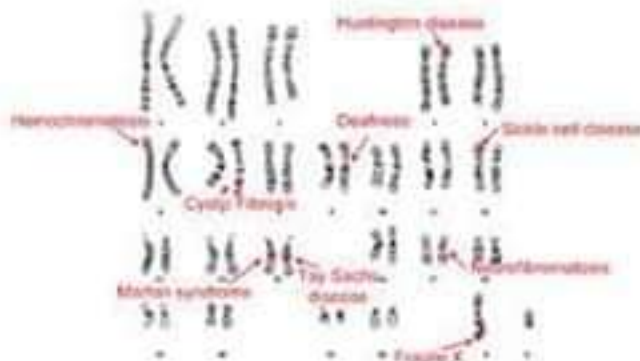
STRUCTURAL DISEASES

- Also called organic disease
- Characterized by structural changes within the body, called lesions
- Lesions can be visually identified
- With molecular medicine and technology, they can also now be identified at the molecular level of proteins and genes
- Three broad categories:
 - Genetic diseases
 - Degenerative and Inflammatory diseases
 - Hyperplastic and Neoplastic diseases



GENETIC DISEASES

- Caused by abnormalities in the genetic makeup at the chromosomal or genetic (gene) level
- Developmental diseases develop during embryonic or fetal development
- Range of abnormalities very broad
 - Deformities can be preset at birth (congenital abnormalities)
 - Biochemical changes caused by genes but influenced by the environment can appear later on (i.e diabetes)



DEGENERATIVE AND INFLAMMATORY DISEASE

- Caused by forces or agents that destroy cells, or intercellular substances, deposit abnormal substances in tissues or cells, or cause the body to injure itself by means of the inflammatory process
- External agents of injury
 - Chemical substances and microbes
- Internal mechanisms of injury
 - Vascular insufficiency, immunologic reactions, metabolic disturbances



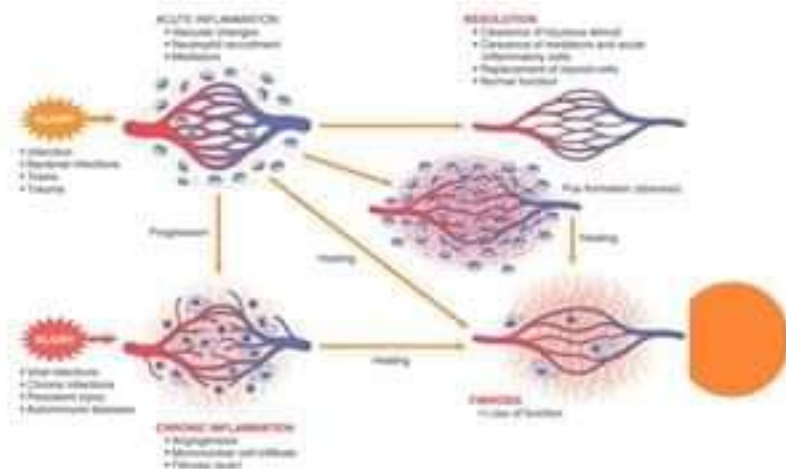
DIRECT EFFECTS OF INJURY

- Necrosis – if cells are killed in injured area
- Sublethal cell injury – if injured cells are capable of recovery



GENERAL REACTIONS TO INJURY

- Inflammation – a vascular and cellular reaction
 - Attempts to localize the injury, destroy the offending agent, remove damaged cells and other materials
- Repair- replacement of damaged tissue by new tissue
 - Greatly influenced by the type of tissue or organ that has been injured



HYPERPLASTIC AND NEOPLASTIC DISEASES

- Basic abnormality is an increase in cell populations
- Hyperplasia – proliferation (division and reproduction) of cells with exposure to a prolonged stimulus. Regresses or stops when stimulus is removed
- Neoplasia – results from genetic changes that favor the growth of a single population of cells
 - Two groups – benign and malignant (ability to localize or spread)



FUNCTIONAL DISEASES

- Diseases in which there are no visible lesions, at least not at the onset of the disease
- The basic change away from homeostasis is a physiologic or functional one
- More common functional disorders:
 - Tension headache
 - Functional bowel syndrome
 - Hypertension
 - Mental illnesses



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CAUSES OF DISEASE

EXOGENOUS – AGENTS CAUSING INJURY ACTING FROM OUTSIDE THE BODY

- Direct Physical injury is called TRAUMA
 - Physical agents causing disease include:
 - Heat and cold
 - Electricity
 - Atmospheric Pressure changes
 - Radiation (electromagnetic and particulate)



CHEMICAL INJURIES

- Subdivided into the manner of injury
- Poisoning (accidental, homicidal, or suicidal)
- Drug Reactions
 - Toxic effects of prescription or proprietary drugs taken to treat disease)



MICROBIOLOGIC INJURIES

- Usually classified by the type of offending organism
 - Bacteria
 - Fungi
 - Protozoa
 - Viruses
- These are called infections and diseases caused are infectious diseases



ENDOGENOUS DISEASES – ACTING FROM WITHIN THE BODY

○ Vascular Diseases

- Obstruction to blood supply to an organ or tissue (myocardial ischemia caused by arteriosclerosis)
- Hemorrhage (ruptured abdominal aortic aneurysm)
- Altered blood flow (microvascular changes in diabetes or hypertension)



IMMUNOLOGIC DISEASES

- Caused by aberrations to the immune system
- Failure of the immune system to work = immunodeficiency disease
- Overreaction of the immune system causes allergic or hypersensitivity diseases
- Abnormal reaction of the immune system to substances that the body produces = autoimmune diseases



CLASS TIME

- Work on the Body Systems Poster – due Monday, February 9th (no exceptions)
- When finished work on....
- Emergency Room Report in your Medical Terminology Packet – due Monday

