Pathology

Lecture #1

Fundamentals of Pathology

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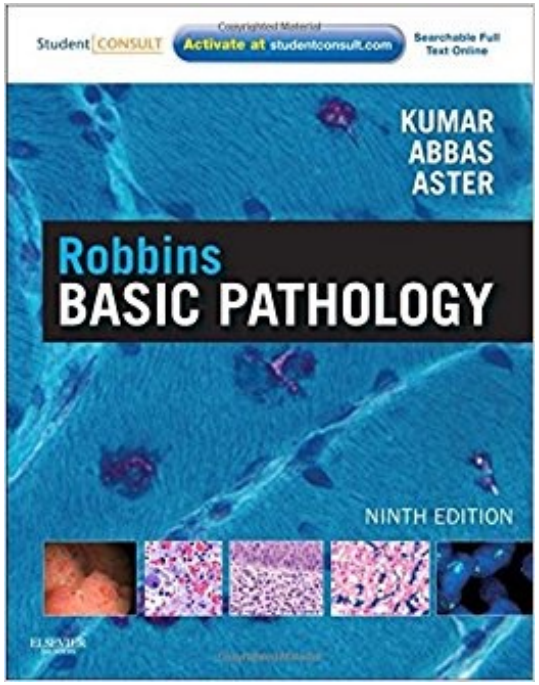
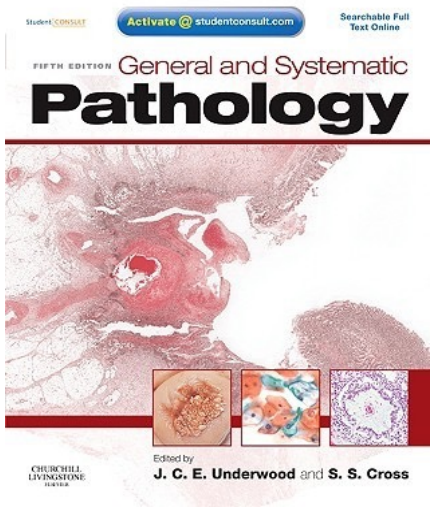
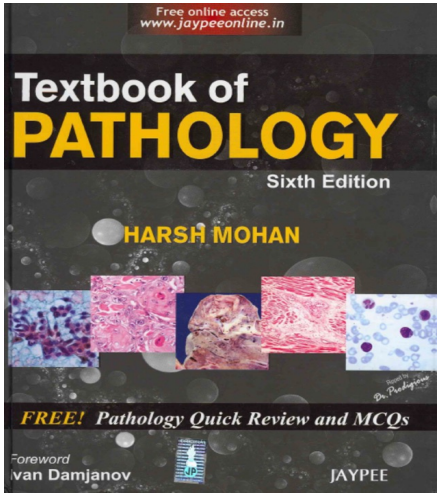
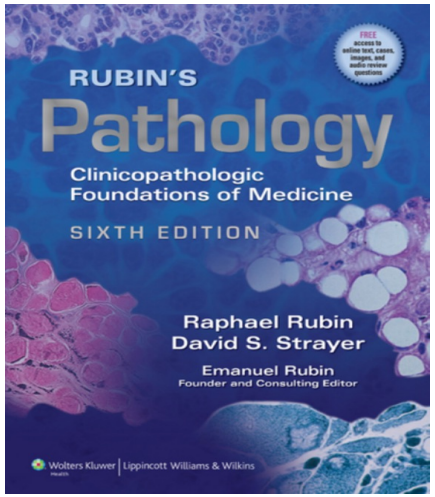
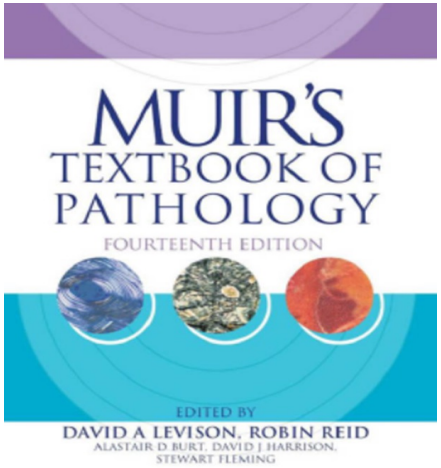
Recommended Reading & Reference Textbooks











Lecture Outline

- Clinical siginificance of Pathology
- Histolical perspectives of Pathology
- Texts and subdivisions of Pathology
- Language of Pathology
- Nomenclature of diseases
- Autopsy

Learning Objectives:

At the end of this lecture, the student is expected to

- Know the siginificance of Pathology to your Profession
- Differentiate/Compare and Contrast the following pairs of terms:
    - Aetiology and Pathogenesis
    - Pathogenesis and Pathology
    - Pathogenesis and Pathophysiology
- Appreciate the different Texts and subdivisions of Pathology
- Understand the Language of Pathology
- Know How diseases are named
- Appreciate the significance of Autopsy

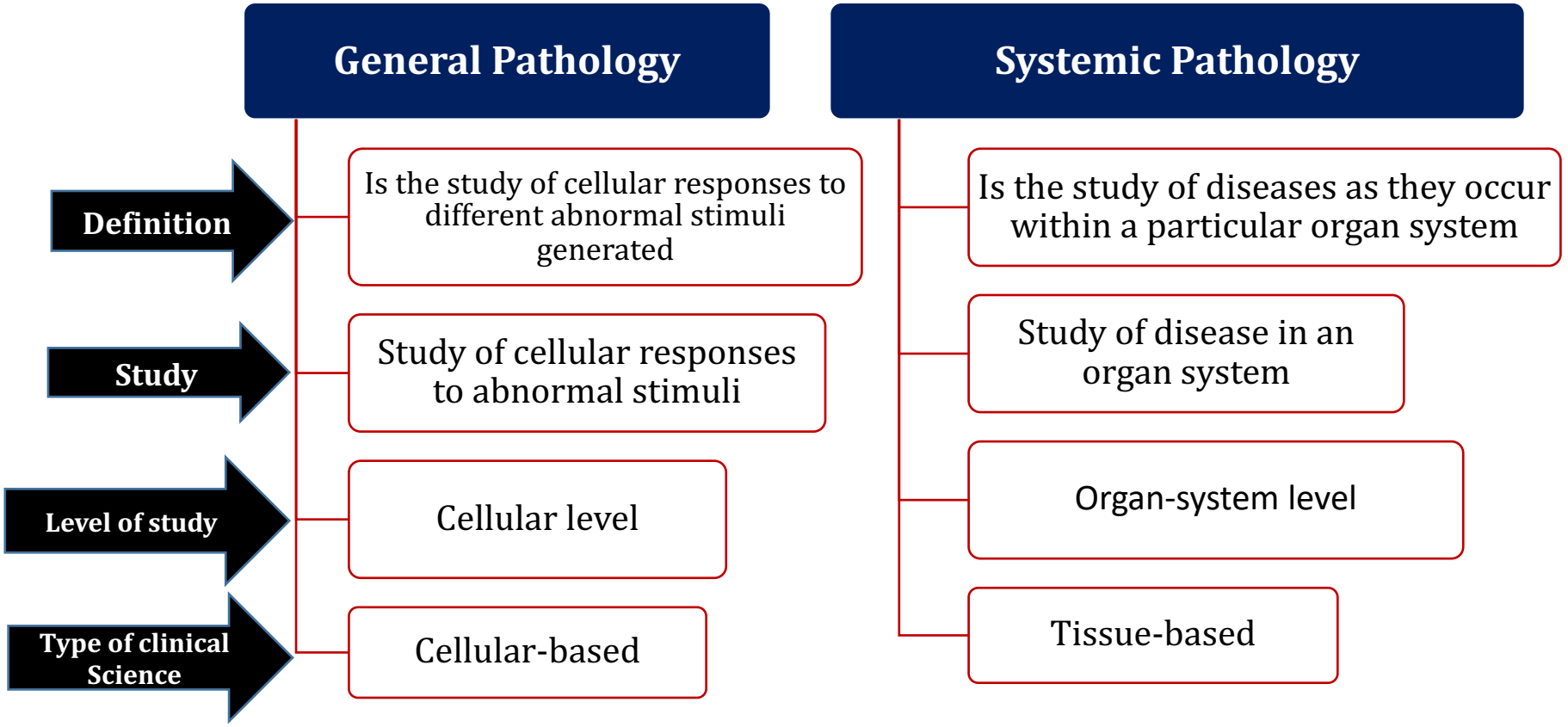
Synopsis

- The word **"Pathology"** is derived from two Greek words ***pathos*** (suffering) and ***logos*** (study)
- It is the Branch of Medicine which deals with the scientific study of the nature of **disease** and its causes, processes, development, and consequences or
- the Study and **diagnosis** of **disease** through examination of **organs**, **tissues**, **body fluids** and whole bodies (**autopsy**).
- Pathology Is a bridging discipline involving both basic science and clinical practice
- Pathology Is the foundation of Medical sciences and practice and without Pathology the practice of Medicine would be reduced to myths and folklore.
- Clinical Medicine cannot be practiced without an understanding of Pathology
- In clinical practice, pathology is one of the most important methods used to diagnose disease.

Historical Perspectives

Hypothetical cause of disease	Techniques supporting causal hypothesis	Period
Animism and Magic	None	Primitive, though the ideas persist in some cultures
Humors (excess or deficiency)	Early autopsies and clinical observations	c. 500 BC to c. 1500 AD
Spontaneous generation (abiogenesis)	Analogies with decomposing matter	Prior to 1800 AD
Environmental	Modern autopsy	1850 to present
	Cellular pathology (e.g. microscopy)	
	Toxicology	
	Microbiology	
	Epidemiology	
Genetic	Molecular pathology (e.g. DNA analysis) and	20^{th} century to present
	clinical observations on inherited defects	

Text of Pathology



Subdivisions of Pathology

- Divided into Experimental and Clinical Pathology

Experimental Pathology

- *Artificial* way of producing lesions to enable to study the course of disease.

Clinical Pathology

- Use of *laboratory methods* to study aspects of a disease in live individuals by examining blood, urine, feaces, skin scrapings and biopsy materials.

Subdivision of Clinical Pathology..,

- **Cellular Pathology** (Histopathology) - the investigation and diagnosis of disease from the examination of tissues
- **Cytopathology** - the investigation and diagnosis of disease from the examination of isolated cells
- **Forensic Pathology** - the use of pathology for legal purposes (e.g. investigation of death in suspicious circumstances).
- **Chemical Pathology** (Clinical Biochemistry) - the study and diagnosis of disease from the chemical changes in tissues and fluids
- **Haematology** - the study of disorders of the cellular and coagulable components of blood
- **Medical Microbiology** - the study of infectious diseases and the organisms responsible for them
- **Medical Genetics -** the study of abnormal chromosomes and genes
- **Immunology** - the study of the specific defense mechanisms of the body
- **Toxicology** - the study of the effects of known or suspected poisons

Language of Pathology

- The four aspects of a disease process that form the core of Pathology are:
  - Aetiology
  - Pathogenesis
  - Morphologic changes
  - Clinical significance

Aspects of Disease.,

- **Aetiology -** The cause of the disease and maybe intrinsic (genetic) or extrinsic (acquired)
- **Pathogenesis -** Mechanism through which the cause operates to produce the pathological and clinical manifestations
- **Pathophysiology -** The disordered physiological processes associated with disease or injury

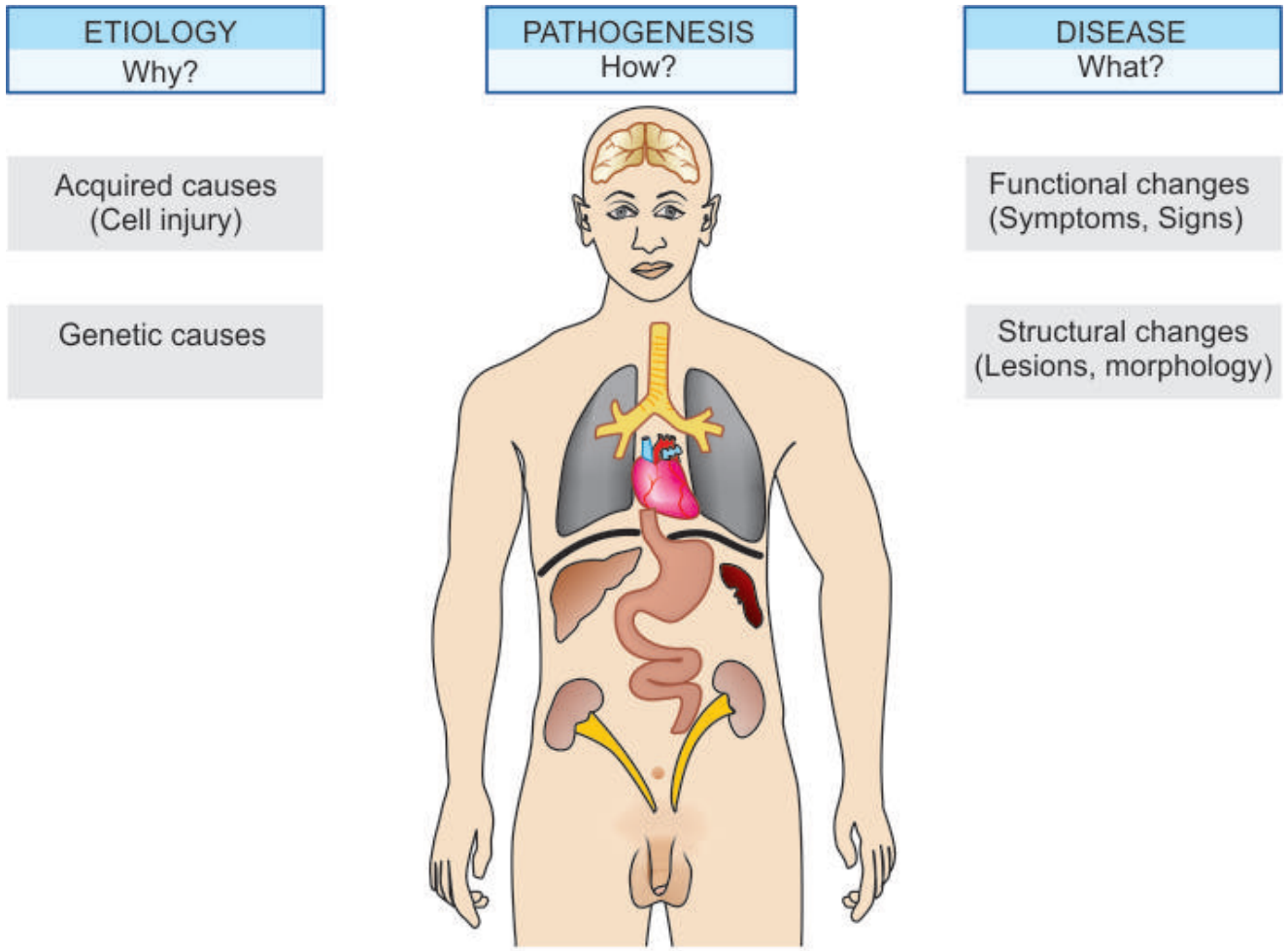


Figure 1.2 Diagrammatic depiction of disease and various terms used in pathology.

Pathogenesis vs. Pathophysiology

Pathophysiology	Pathogenesis
Disordered physiological process associated with a disease or injury	Manner or mechansim of development of a disease
Describe the functional process exerted by the disease in the body	Describe the chains of events leading to the disease
While describing a disease, pathophysiology comes after pathogenesis	While discribing a disease, pathogenesis comes after aetiology

Pathology vs. Pathophysiology

Pathology	Pathophysiology
Is the study of essential nature of the disease	Is the study of disordered physiological processes associated with diseases
Physical conditions of an organsim during the disease are studied	Biochemical changes of the body are studied
Medical discipline	Biological discipline
Direct observation of the symptoms of the disease are studied	Experimental measurements are studied
Gross and microscopic examination of tissues, organs, and whole body is done	Levels of biochemical compounds such as sodium, potasium, glucose, creatinine are examined

Aetiology vs. Pathophysiology

Aetiology	Pathophysiology
The cause, set of causes, or manner of causation of a disease or condition	The disordered physiological processes associated with disease or injury
Studies about the cause of the disease	Studies the symptoms
Describe the initial stages of a disease process	Describe the final stages of a disease process
Studies the associated factors (risk factors) of a disease	Studies the physiological mechansims operating within the organsism with the disease
Helps to prevent the occurance of the disease in a pre-disposed patient	Important to cure of a disease

Aspects of Disease….

Morphologic changes

- *Structural alterations* in cells or tissues that are either characteristic of the disease or diagnostic of the aetiologic process.
- will lead to *functional alteration* & to the clinical signs & symptoms of the disease.
- the structural or functional abnormality responsible for ill health is known as a ***lesion***
- Lesions are the characteristic changes in tissues and cells produced by disease in an individual or experimental animal.

Aspects of Disease....

Pathognomonic Abnormalities

- Are restricted to a single disease, or disease category, and without them the diagnosis is impossible or uncertain. Eg
- Reed-Sternberg cells are said to be pathognomonic of Hodgkin`s lymphoma.
- The presence of *Mycobacterium tuberculosis*, in the appropriate context, is pathognomonic of tuberculosis.

Aspects of Disease.,

Pathogenicity

- Ability of a microorganism to cause disease

Natural history of the disease

- The course of a disease in the absence of any intervention.

Complications and Sequelae

- An aftereffect (prolonged or secondary effect) of a disease is called a Sequelae.

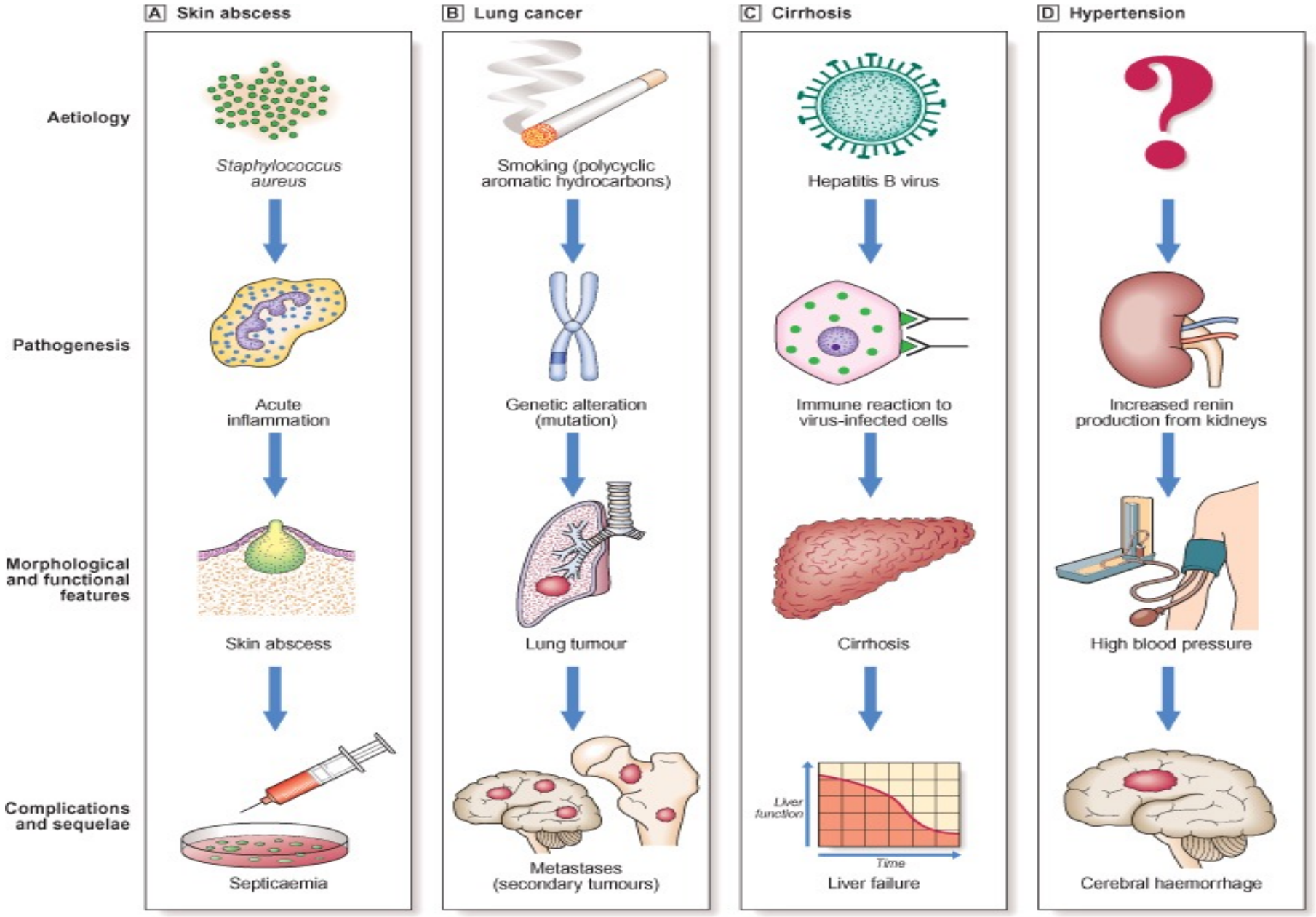
Aspects of Disease….

Clinical Symptoms

- The discomfort or pain due to a disease or injury that is *felt* by the patient

Clinical Signs

- A medical condition that can be *observed* by the Pathologist or Clinician



Aspects of Disease….

Prognosis

- Is the expected *outcome* of the disease ie Will the patient recover or die? Will the organ/tissue return to normal function?

Remission

- Is the process of conversion from active disease to *quiescence*.

Relapse

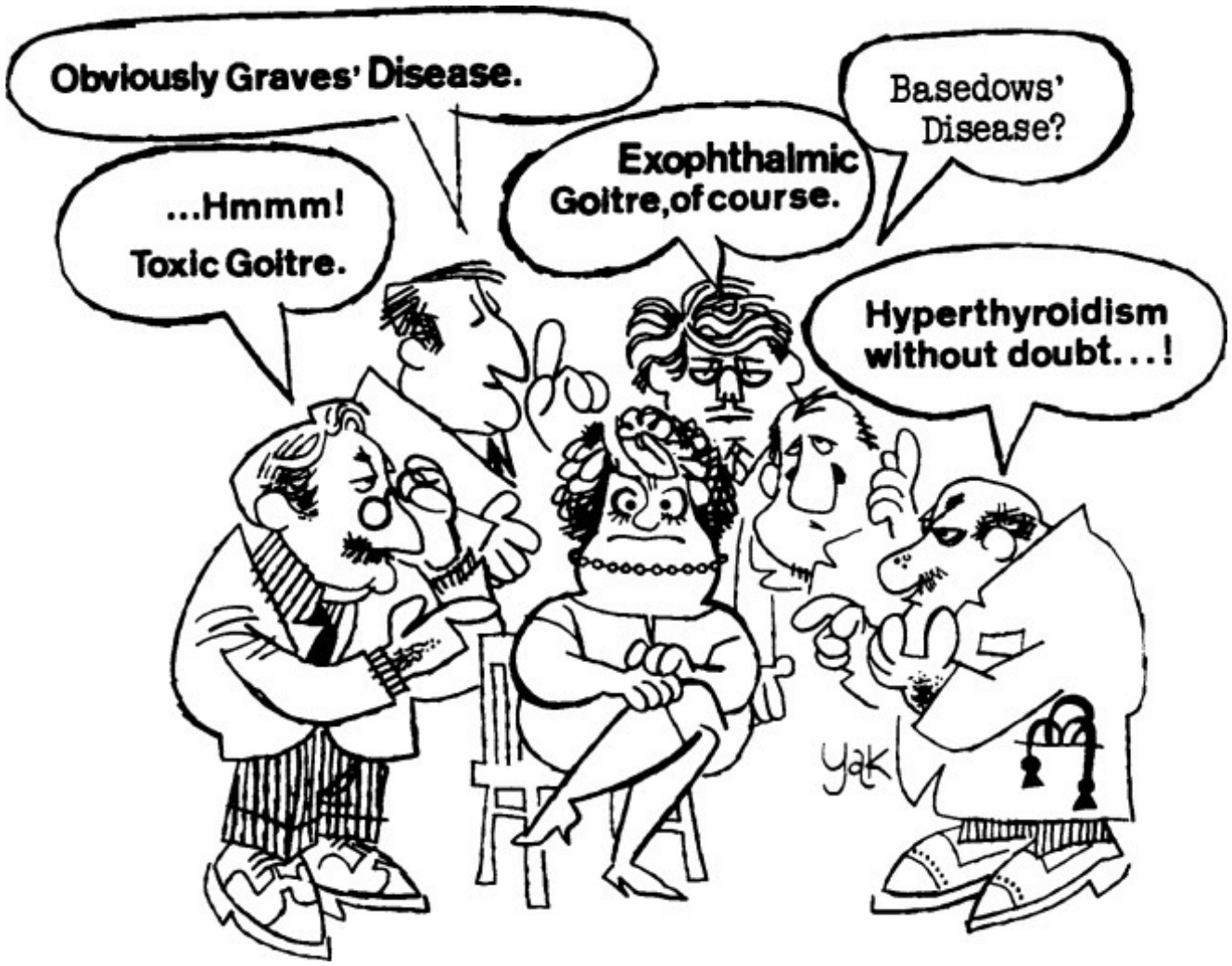
- *Reappearance* of the signs and symptoms

Aspects of Disease….

Diagnosis

- Is the process of *identifying* a disease by its signs, symptoms and results of various diagnostic procedures.
- Diagnosis can be:
  - **Morphological** – naming the lesions
  - **Aetiological** – naming the cause of the disease
  - **Tentative** – temporal diagnosis
  - **Differential** – list of diseases that have similar signs
  - **Definitive** – naming the specific disease entity

Nomenclature of Disease



Nomenclature of Disease.,

- Uniform nomenclature facilitates communication and enables accurate epidermiological studies.
- Many standard conventions are used to derive names of diseases. eg

  - Primary and secondary
  - Acute and chronic
  - Benign and malignant
  - Prefixes and suffixes
  - Eponymous
  - Syndromes

Primary & Secondary

- **These words may be used to describe the *causation* of disease.**
- Primary or essential or idiopathic or cryptogenic in this context means that the disease is without evident antecedent cause.
- Thus, primary hypertension is defined as abnormally high blood pressure without apparent cause.

Acute vs. Chronic

Acute

- Acute is the word used to refer to the sudden onset of a disease that lasts for a short duration.

Chronic

- Chronic illness means the illness lasts for months, usually more than three months.

Acute vs. Chronic

Acute Diseases	Chronic Diseases
1. These diseases are short term diseases.	1. These diseases are long term diseases.
2. These diseases comes fast and recovers quickly .	2. These diseases comes and recovers very slowly.
3. Side effects of these diseases are less.	3. Side effects of these diseases are more.
4. These diseases recover completely.	4. These diseases does not recover completely.

Benign & Malignant

- **Terms used to classify certain diseases according to their likely *outcome*.**
- Benign hypertension is relatively mild elevation of blood pressure that develops gradually and causes insidious injury to the organs of the body.
- Malignant hypertension is when the blood pressure rises rapidly and causes severe symptoms and tissue injury.

Prefixes

Commonly used prefixes and their meanings:

- ***Ana*** – absence eg anaphylaxis
- ***Dys*** – disordered eg dysplasia
- ***Hyper*** - an excess over normal eg hypertension
- ***Hypo*** - a deficiency below normal eg hypotension
- ***Neo*** – new growth eg Neoplasia
- ***Meta*** – a change from one state to another eg metaplasia

condition of an overactive thyroid gland

Suffixes

Commonly used suffixes and their meanings:

- -***itis*** - an inflammatory process eg appendicitis
- -***oma*** – a tumor eg carcinoma
- -***osis*** – state or condition, not necessarily pathological eg osteoarthrosis
- -***oid*** – bearing a resemblance to eg rheumatoid arthritis
- -***cytosis*** – increased number of cells, usually in blood eg leukocytosis
- -***penia*** – lack of eg thrombocytopenia
- -***ectasis*** – dilation eg bronchiectasis
- -***plasia*** – a disorder of growth eg hyperplasia
- -***opathy*** – an abnormal state lacking specific characteristics eg lymphadenopathy

Eponymous Names

- Named after a *person* or *place* associated with it eg Graves' disease, Ebola, etc.
- are used commonly either when the *nature* or *cause* of the disease or lesion is unknown, or
- *long term usage* has resulted in the name becoming part of the language of Medicine eg Malaria or
- to *commemorate* the person who first described the condition eg Crohn`s disease, Hodgkin`s disease, etc

Syndromes

- A syndrome is an *aggregate* of signs and symptoms or a combination of lesions without which the disease cannot be recognized or diagnosed.
- Syndromes often have eponymous titles.
- Eg Renfield`s syndrome.

Autopsy

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Autopsy…,

- AKA a *post-mortem examination or necropsy*
- is a procedure that consists of a thorough examination of a dead body to determine the cause and manner of death and to evaluate any disease or injury that may be present.
- It is usually performed by a **Pathologist**.
- Autopsies are either performed for legal or medical purposes.
  - A forensic autopsy is carried out when the cause of death may be a criminal matter
  - Clinical or academic autopsy is performed to find the medical cause of death and is used in cases of unknown or uncertain death, or for research purposes.

Uses of Autopsy

- Determining the cause of death.
- Audit (assess or check) the accuracy of clinical diagnosis.
- Education of undergraduate students and postgraduate trainees.
- Research.
- Gathering statistical data.

References & Credits

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End of Lecture

Pathology