

Pathology is the science which deals with the study of diseases (abnormalities in structure & function). It is the study of abnormal anatomy, abnormal histology, abnormal biochemistry and abnormal physiology

Pathology comprises the study of:

1. Definition and epidemiology: name of the disease, its incidence, prevalence in a population and its geographic distribution
2. Etiology(**cause**) and Pathogenesis(**mechanism**)

Etiology means the causes of the disease. The aetiology includes:

(a) *Predisposing factors*: Factors which help the development of the disease.

(b) *Exciting factor*: Is the direct cause of the disease.

(c) *Pathogenesis*: The mechanism by which the causative agent produces the pathological changes in the tissues.

3. Manifestations:

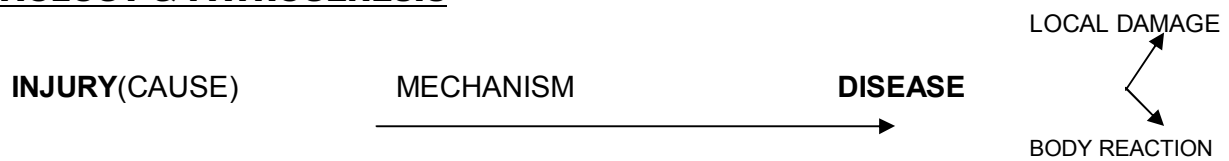
Pathology entails the description of any deviation from normal on the tissue as well as the body level:

a) Organ morphology (**gross pathology and microscopic pathology**): deals with changes in the appearance of an organ (gross or macroscopic) and on the level of the tissue forming that organ (microscopic).

b) Body reaction: Is the effect of damage in a particular organ affecting other body systems which are also involved in the process and this includes the clinical picture

- *Gross picture (macroscopic picture)*: These are the changes in the tissues and organs detected on naked-eye examination.
- *Microscopic picture (histopathology)*: These are the changes in the tissues and organs detected on light microscopic examination.
- Electron microscopic, immunohistochemical, cytogenetic and molecular are modes of study of diseased tissues and organs

4. Sequelae (**course or progress of the disease**)
5. fate is the disease outcome or end result, which may be **recovery** with return to normal or **complications** (**unhealthy effects**). These are additional pathological changes which may occur during or after the termination of the usual course of the disease) at the site of disease & away from the site (**spread to other organs**).
6. Prognosis(prediction of the course of a disease)

ETIOLOGY & PATHOGENESIS**A) ENVIRONMENTAL**

- Physical & chemical
- Microbial
- Hormonal
- Mechanical
- Vascular & circulatory
- Immunological(antibodies cell-mediated)
- Nutritional

B) GENETIC

- Normal genes--Susceptibility genes
Blood group genes
- Abnormal genes-Mutations
Congenital: at birth
Hereditary: passed on from parents

C) MULTIFACTORIAL (A + B)**1) CELL INJURY:****Intracellular:**

Reversible: -Adaptations-Metabolic accumulation-Degeneration

Irreversible: Necrosis -Apoptosis

Extracellular: abnormal deposits & pigmentation

2) INFLAMMATION-Repair-Infection

Infection = *inflammation* + *organism*

3) CIRCULATORY DISTURBANCE**4) GROWTH DISTURBANCES**

Malformations (Hereditary & congenital)

Adaptations

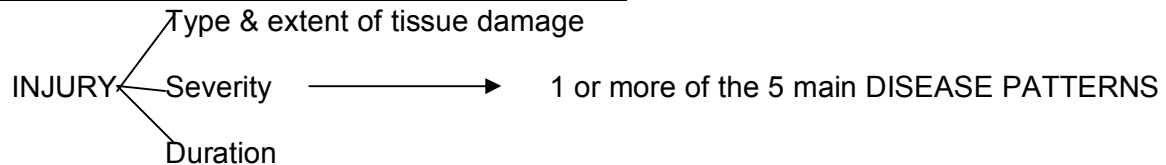
Neoplasia (tumors)

5) IMMUNOPATHOLOGY

BASIC OR GENERAL PATHOLOGY(The above items 1-5)

SPECIAL/SYSTEMIC PATHOLOGY: 5 main disease patterns but discussed in each organ. The disease in any system has the same basic reaction (i.e. picture) but the difference is in the function according to the site.

MANIFESTATIONS OF DISEASE-LESIONS



❖ **Very mild/short duration** → No change (body can overcome injury) OR
Just functional disturbance e.g. pain

❖ **Mild + long duration** → Functional abnormality +/- ultrastructural change

Moderate injury + short duration

Or severe but very early (at start)

❖ **Severe + short duration** → **Functional & Morphological**

Mild or moderate + prolonged

↓
Reversible i.e. degenerated cells (**sick**)
Irreversible i.e. necrosis (**cell death**)

PHASES OF A DISEASE PROCESS

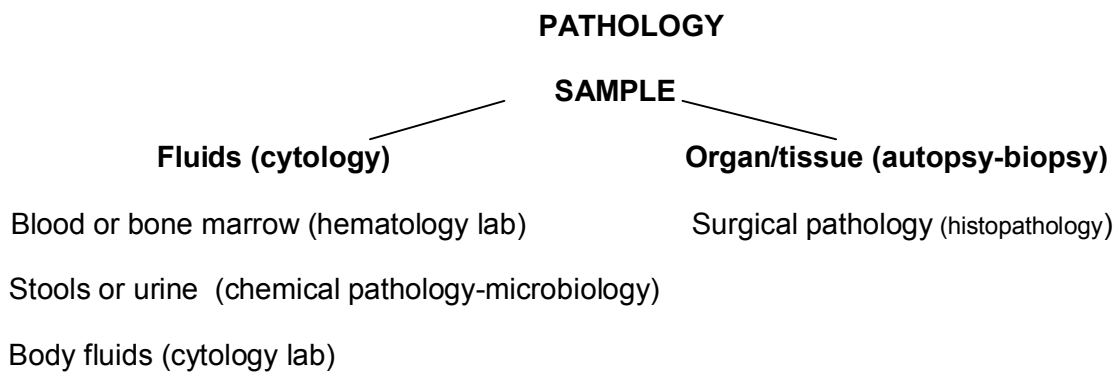
- Phase I: Functional disturbance stage: At this level of affection, samples obtained from body fluids reveal mostly functional changes, which can be diagnosed by hematology, chemical pathology or by molecular and genetic methods
- Phase II: Functional and early morphologic changes: At this level, cellular changes may be diagnosed from body fluids by hematology, chemical pathology and cytology or in tissue by biopsy and submitted for molecular and genetic methods as well as electron microscopy
- Phase III: Functional and morphologic changes diagnosed from body fluids submitted to hematological, cytological, molecular and genetic evaluation or tissue biopsy, to be evaluated like phase II of diseases, by microscopic examination in addition to gross organ or tissue evaluation

DOCTOR'S APPROACH TO PATIENT1) CLINICIAN

- History taking = to determine epidemiological data and symptoms of the patient
- Clinical examination = to determine signs of the disease discovered on examination
- Provisional diagnosis & differential diagnosis are based on signs & symptoms
- Final diagnosis usually after requesting special investigations or sample taking

2) PATHOLOGIST/other specialties:

- Investigations: -----x-ray, ultrasound, CT scan etc...
- Laboratory work out -----pathologists



ROLE OF PATHOLOGIST:

Making the final diagnosis, monitoring of treatment and follow up of patients

N.B.:

BIOPSY: tissue removed during surgery from living patient

CYTOLOGY: study of cells derived from body fluids

AUTOPSY: tissue removed after death i.e. during a post mortem

IF diagnosis is difficult, pathologists resort to special staining:

- ❖ *cyto/histochemistry*
- ❖ *Immuno cyto/histochemistry*
- ❖ *Molecular pathology & Cytogenetics*

CLINICIAN RECEIVES REPORT & STARTS TREATMENT BASED ON FINAL DIAGNOSIS

TREATMENT is either curative (cures) or palliative (can't cure but helps symptom relief)
Treatment depends on diagnosis & prognosis and follow up may be required in some cases even after recovery e.g. recurrent tumour

