Pathology

-Include studying **etiology , pathogenesis , morphological** and **clinical** manifestations.

-**Bridge (link)** between basic sciences and clinical practice.

→Pathology can be divided into:

General pathology	Systematic Pathology
-Studying general features and mechanisms of pathology. e.g. **inflammation & tissue injury**.	-Studying pathology of specific individual **organs and body systems** . -It should be called "**systematic**" not "**systemic**" pathology as the word "systemic" means the disease has **affected all body systems .**

Branches of pathology

1-Histopathology	-Investigation and diagnosis of disease from **examination of tissues**.
2-Experimental pathology	-Study of pathology using **animal models and cell culture.**
3-Clinical pathology	-Study of causes, mechanisms, patient history ,**effects on body systems and treatment .**
4-Diagnostic pathology	-**Diagnosis** of a disease in a living patient by the **use of biopsy and samples of body fluids .**

→**Diagnosis :** Is the act of **naming a disease** in a patient ,**correct** diagnosis enables **correct treatment** .

→**Biopsy :** Examination of tissue removed from living body to know the cause of disease.

-Therefore techniques used to investigate pathology are:

a)Molecular Pathology. b)Microbiologic pathology.

c)Immunologic pathology . d)Morphologic pathology.

-To explain the whys & therefore the signs & symptoms.

Historical progress in disease examination

→Historically , causes of diseases **were not known** .

→They were attributed to **animism** (Supernatural forces: bad smell ,cold, evil spirit) and magic .

→Autopsy (post – mortem examination):

-Done formerly by **gross examination** by naked eye .

-Autopsy was revolutionized following **microscopical examination** (i.e. **Cellular pathology =Cytopathology).**

-Cytopathology couldn't performed without microscopes.

-Later on , **molecular pathology** was developed to examine **genetic and biochemical pathological changes.**

→Necropsy:

- Is usually used to describe **post –mortem** examination of **dead animals** .

Disease

-Is a condition is which the presence of an **abnormality** of the body causes a loss of **normal health** .

→Types of diseases:

a)Idiopathic:	No **identifiable** causes (Diabetes mellitus).
b)Iatrogenic:	-Occurs as a result from medical treatment (Antibiotic resistance of bacteria).
c)Congenital	Disease existing at **birth or before birth** during fetal development (Down syndrome).
d)Acquired :	Develops post fetaly (AIDS).
e)Nosocomial	: Due to being in a **hospital environment** (surgical wound infection by MRSA).

Syndrome

→An **aggregate of signs and symptoms** or a combination of lesions without which the disease can not **be diagnosed .**

→Example:

-Cushing's syndrome (hyperactivity of adrenal cortex):

1-Hypertension .

2-**Hirsutism** :body and facial **hair** is thicker and more visible in women .

3-Increased incidence of **acne.**

4-Thighs , abdomen , arms and breasts have **purple or pink stretch** marks on the skin .

5-Increase in weight in the **upper back** , between the **shoulders (hump).**

Epidemiology

→The **incidence and population** distribution of a disease .

→It involves the **recording and analysis** of data about disease in **groups** of people rather than in the **individual person** only .

→Epidemiology is sometimes called " **the pathology of population** " and is measured by parameters like incidence , prevalence, remission and mortality rates.

a-Incidence rate :	-Is the number of **new cases** of the disease occurring in a population of defined size during a defined period .
b- Prevalence rate :	-Is the **total number** of cases of the disease found in a defined population at a stated time .
c-Remission rate :	-The proportion of cases of the disease that **recover .**
d-Mortality rate :	-Is the number or percentage **of deaths** due to the disease in a defined population -e.g. Mortality rate of patients with epilepsy is 1% .

Epidemiology of chronic & acute diseases

Chronic (Long lasting diseases)	Acute Diseases
-High **prevalence** . -Low **incidence rate** (of new cases). -The prevalence is **high** because the total number of the cases in the population accumulates.	-High **incidence** rate (i.e. new cases) . -**Low prevalence** rate due to either high remission rate (e.g. chicken pox) or high mortality rate (e.g. lung cancer).

→**Changes in incidence rate** to a **lower** rate reflects **lower exposure** to the causative agent or **proper immunization.**

→**Changes to a lower mortality rate** reflects **success of treatment** .

→**Changes of Prevalence rate to the lower** reflects **treatment of disease or increase Mortality rate.**

→Epidemiological studies can provide **important clues (explanations**) to the causes of the disease.

→**Genetic factors and environmental** factors can be discovered through epidemiological studies .

→Migrant population are useful to epidemiologists enabling them to differentiate between genetic(racial) and environmental factors of diseases:

*a)If a migrant population formerly suffering from a **high incidence of a disease** , moves to a **low incidence area** and their **rate decreases** to the same incidence rate of the new area , this suggests an **environmental factor is responsible** .*

*b)Alternatively , in the same example , if the **incidence rate persists** as **high** in the new area this suggests **genetic factors** are more likely to be responsible .*

Etiology (aetiology)

-The cause of the disease.

→Etiologic agent = Cause may be:

1-Genetic abnormality 2-Infective agent

3-Chemical agent 4-Radiation 5-Mechanical trauma

→When the cause **is unknown** the condition is called **idiopathic or essential** or **cryptogenic** .e.g. essential hypertension ,cryptogenic cirrhosis .

→Remission:

- Conversion from active disease to **quiescence**(i.e. no syndrome).

→Relapse:

-Re-appearance of symptoms .

N.B. Some chronic diseases have periods of remission and relapse e.g. inflammatory bowel syndrome .

Pathogenesis ,clinical manifestations,functional consequences & prognosis

→Pathogenesis:

-The mechanism of development of the disease .

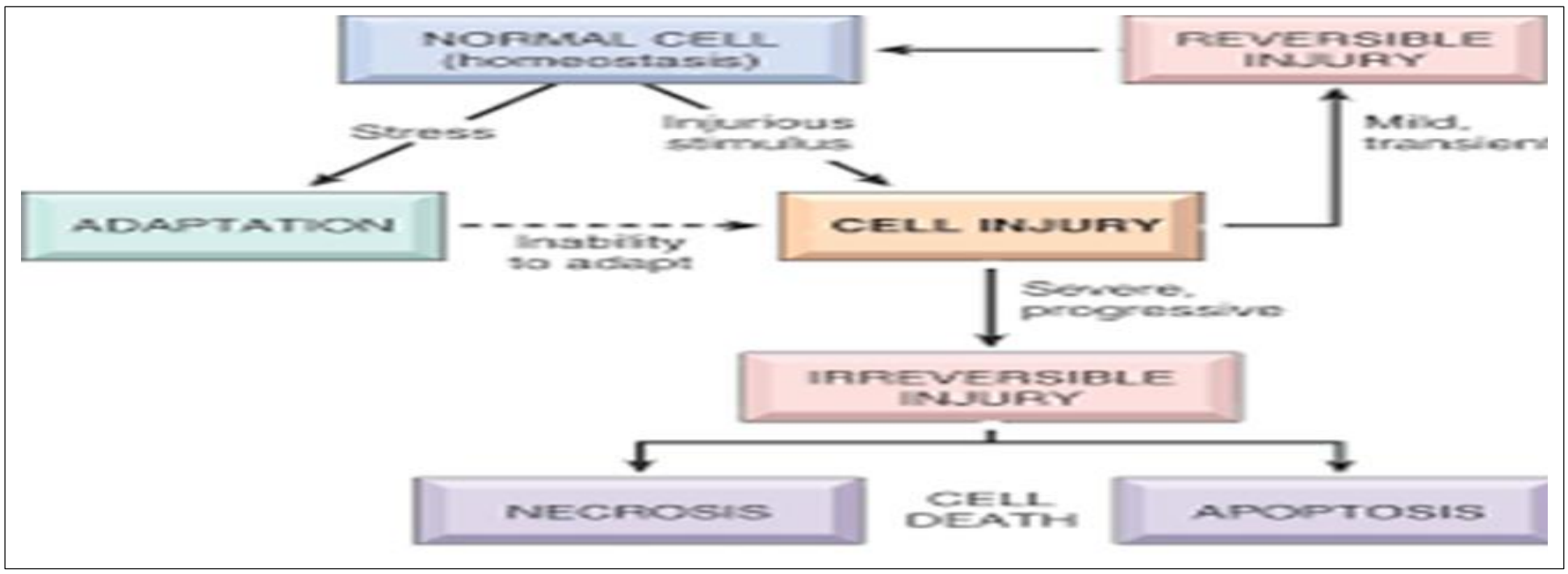
→ Pathological and clinical manifestations :

-The structural and functional features of the disease .

Functional consequences

-Morbidity of the disease :	-Is the sum of the disease effects on the patient, morbidity **may or may not** result in disability of the patient. e.g. **non-fatal cardiac** infraction impairs **heart contractility and predisposes** to heart failure . -This is morbidity patients disability results from breathlessness and restriction on patient's activities.
-Complications and sequel:	The secondary systemic or remote consequences or the disease.
-**Prognosis:**	The anticipated course of the disease in terms of **cure ,remission or fa**te of the patient . -Prognosis is subject to **change by medical or surgical** interventions e.g. a disease with poor or good prognosis.

Cellular adaptations & responses to stress



-Cells tend to maintain their internal environment physiologically stable to maintain **homeostasis.**

-As cells encounter physiologic stresses; they make **adaptation** achieve a new steady state and preserve viability and function .

-**The principal adaptive response are** :

1-Hyperatropy. 2-Hyperplasia .

3-Atrophy . 4-Metaplasia.

-If adaptive capability is exceeded or if the external stress is harmful; cell injury develops within certain limits injury is **reversible** and cells return to a **stable baseline** ; however; **severe or persistent stress** results in irreversible injury and death of the affected cells.

Pathological science:
Pharmacy department; first lecture:
Definition. is the study of disease. It is the bridge between science and medicine. What is mean;
Disease and illness.
Technologies to treat the lesion (disease).
more proper choice of word, "pathophysiology“ the prefix, Pathy, use to indicate a state of disease. while physiology, mean related to function change i.e., “systemic functional changes”.

Subdivisions
Anatomical pathology, clinical pathology, dermatopathology, forensic pathology, hematopathology, histopathology, molecular pathology, surgical pathology

Anatomical pathology: is a medical specialty that is concerned with the diagnosis of disease based on the gross, microscopic, I.e. examination of organs, tissues, and whole bodies. the diagnosis of disease through the laboratory analysis of bodily fluids and tissues.
Goal of the anatomical pathology:
The correct diagnosis by biopsies; (surgical pieces from living tissues for diagnosis). Cytology and autopsies. For **the study of organs and tissues to determine the causes and effects of particular diseases**.

Cytopathology:
is a branch of pathology that studies and diagnoses diseases on the cellular level. used to aid in the diagnosis of cancer, infectious diseases and other inflammatory conditions.

Histopathology:
Mean; microscopic examination of various forms of human tissue. examination of tissues starts with surgery, biopsy, or autopsy. The tissue is removed from the body of an organism and then placed in a fixative that stabilizes the tissues to prevent decay, then examination under microscope.

Pathophysiology.
Patho= deviation from normal, physiology = function of body organ.

So, pathophysiology, mean science study deviation body organs from normal functions to abnormal in functions, causes and results of those deviations.

Disease: Latin phrase, dis = no ease = comfort I.e. no comfort or lack comfort.
Disease, derived from early 14th century, from old French – literally (a lack of ease) assign to the things which make us sick.
Definition of disease: **any harmful deviation from the normal structural or functional state of an organism**, examples; infection, poisons, nutritional deficiency or imbalance, toxicity, or unfavorable environmental factors.
What is infection: is the invasion of tissues by pathogens, (such as a bacteria, protozoans, or viruses) in or on the body of a suitable host.
Their multiplication, and the reaction of host tissues to the infectious agent and the toxins they produce pathogenic changes in structure and function.
What is inflammation: is a protective response to harmful stimuli, such as pathogens, damaged cells, or irritants The function of inflammation is to eliminate the initial cause of cell injury, clear out necrotic cells and tissues damaged.

Tests: All medical diagnostic tests, particular biopsy, blood analysis, dissection, and other applications of medical microscopy.
Biopsy: bio mean living and psy mean study. i.e., study living piece from tissue.
Necropsy:" refers to "dead" and "psy" to study, so necropsy is the "study of the dead." (an animal).

An autopsy is technically a necropsy, but because a "human is performing it on a human it is an autopsy.

In summary:

Specialist: pathologist. specialized training to diagnose medical conditions using laboratory tests and techniques. A pathologist is a medical doctor.

Glossary: glossary of medicine. **glossary** of **medical** terms is a list of **definitions** about **medicine**, its sub-disciplines, and related fields. The *glossary* astutely helps readers in different countries to understand terms used locally, particularly regarding policy issues.

Cells death:
Eliminates potentially harmful cells. There are three major types.
1-apoptosis (type I cell death). physiological process, regulated programming process of autonomous the eliminate unwanted cells, avoids eliciting inflammation.

2-autophagic cell death (type II). process of reusing old and damaged cell parts. cell that removes unnecessary or dysfunctional components through a lysosome-dependent regulated mechanism.

3-necrosis (type III). pathological process, is caused by external agents like toxins, trauma, and infections is an unregulated, random process. Elicited inflammation.

Types of necrosis in **Pathology:**
Liquefactive Necrosis
coagulative Necrosis
Caseous Necrosis.
Fat Necrosis.
Fibrinoid Necrosis.
Gangrenous Necrosis.

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