

**COURSE, CURRICULUM AND GUIDELINES FOR THE TRAINING
PROGRAMME FOR PATHOLOGY FOR MBBS DEGREE,
DELHI UNIVERSITY**

BROAD GOALS

The subject of Pathology is taught to the Undergraduate Students studying for the MBBS degree in the 3rd to 5th semester (each semester being of six months). At the end of the 5th Semester, the students appear for the 2nd Prof. MBBS Examination held at the University level. It is a bridging discipline involving both basic science and clinical practice and devoted to the study of structural and functional changes in cells, tissues and organs that underlie disease. By the use of molecular, immunologic alongwith cytogenetics, **pathology** attempts to explain the whsy and wherefores of the signs and symptoms manifested by patients while providing a sound foundation for rational clinical care and therapy. The following are the broad goals:

- The fundamental and basic principles of Pathogenesis of disease process and the effect that the disease produces on the various organ systems in the body.
- To inculcate in the young minds the logical approach to diagnosis and interpretation of laboratory investigations.
- To introduce newly discovered genes and molecules that have a profound impact on the pathogenesis of disease.
- To facilitates the students to understand the various diseases processes and to correlate morphological diagnostic pathology with immunologic cytogenetics and molecular analysis to assess prognosis and provide a basis for therapy.

LEARNING OBJECTIVE

1. To understand the concept of cell injury, the change produces thereby, in the different tissues and organs and the body capacity for healing.
2. To understand the etiopathogenesis, the pathological effects, and the clinico pathological correlation of common infectious and non-infectious diseases.
3. To understand the concept of neoplasia with respect to etiology, gross and microscopic features, diagnosis and prognosis in different tissues and organs of the body.

4. Correlate normal and altered morphology (gross and microscopy) of different organ systems in different diseases to the extent needed of understanding of the disease processes and their clinical significance.
5. Have an understanding of the common haematological disorders and the investigations necessary to diagnose them and determine their prognosis.
6. To understand normal haemostatic mechanism, the derangements of these mechanism and the effect on human system.
7. Have knowledge of common immunological disorders and their effects on human body.
8. Have a sound knowledge of principles of collection, handling, storage and dispatch of clinical samples from patients, in a proper manner.
9. Perform and interpret in a proper manner some of the basic clinical investigations and correlate them clinically.

COURSE CONTENT

Traditionally the study of pathology is divided into general pathology and special or systemic pathology. The former deals with basic reactions of cells and tissues to abnormal stimuli that underlie all disease while the latter, systemic pathology, examines the specific responses of specialized organs and tissues to more or less well defined stimuli. Overall the course content should address the four aspects of a disease process which form the core of pathology i.e. cause (etiology) mechanisms of its development (pathogenesis), the structural alterations induced in the cells and organs of the body (morphologic changes) and the functional consequences of the morphologic changes (clinical significance) and lastly the diagnostic investigations that are required to conclusively prove the presence of disease. The course is therefore divided as general pathology and systemic pathology.

GENERAL PATHOLOGY

1. Cell Injury and Cell death

- Causes and mechanism of cell injury Ischemic, toxic, apoptosis, free radical and chemical injury,
- Reversible and irreversible cell injury, its types and morphological changes including sub cellular response to cell injury.
- Calcification: Dystrophic and metastatic

- Extracellular accumulation: Amyloidosis, classification, pathogenesis, morphology.

Practicals to include different histopathological slides to demonstrate the various types of cell injury reversible and irreversible cell injury, calcification and extracellular accumulation

2. Inflammation and tissue repair to include wound healing

- Acute inflammation: features, causes, vascular and cellular events, chemical mediators of inflammation.
- Morphologic patterns of acute inflammation
- Chronic inflammation: causes, types, non specific and granulomatous with common examples.
- Systemic effect of inflammation.
- Wound healing by primary and secondary union, factors promoting and delaying the process and complications.

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

3. Immunopathology

- General features of the immune system: cells of immune system, cytokines, regulation of immune responses.
- Mechanism of Immunological tissue injury (hypersensitivity reaction): types and examples, antibodies and cell mediated tissue injury with examples.
- Autoimmune disorders like systemic Lupus Erythematosus
- Organ transplantation: Immunological basic of reaction angraft versus host reaction.
- Immunological deficiency syndrome and acquired immuno deficiency syndrome example: AIDS: etiology, modes of transmission, pathogenesis, pathology, complications, diagnostic procedures and handling of infected materials and health education.

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

4. Infectious diseases

- Mycobacterial disease: tuberculosis and leprosy
- Bacterial disease: pyogenic, typhoid, diptheria, gram-ve infections, bacillary dysentery, syphilis
- Viral: polio, herpes, rabies, measles, rickettsial, chlamydial infections
- Fungal disease and opportunistic infections
- Parasitic disease: malaria, filaria, amoebiasis, kala azar, cysticercosis, hydatid

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

5. Circulatory disturbances

- Oedema: pathogenesis and types
- Chronic venous congestion: lung, liver, spleen
- Thrombosis and embolism: formation, fate and effects
- Infarction: Types, common sites, gangrene
- Shock: pathogenesis, types, morphological changes

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

6. Growth disturbances

- Atrophy, hypertrophy, hyperplasia, hypoplasia, metaplasia, malformation, agenesis, dysplasia
- Neoplasia: causes, classification, histogenesis, biological behaviour benign and malignant, carcinoma and sarcoma
- Malignant neoplasia: grades and stages, local and distant spread
- Carcinogenesis; Environmental carcinogen, chemical, viral, occupational, hereditary and basics of molecular basis of cancer
- Tumour and host interaction: systemic effects including paraneoplastic syndrome, tumour immunology,
- Laboratory diagnosis: cytology, biopsy, tumour markers.
- Tumours and tumour like conditions of soft tissues

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

7. Miscellaneous disorders

- Autosomal and sex-linked disorders with examples
- Protein energy malnutrition and vitamin deficiency disorders
- Radiation injuries
- Disorders of pigments and mineral metabolism such as bilirubin, melanin, haemosiderin

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

8. Haematopathology

- Anaemia: classification and clinical features
- Nutritional anaemia: iron deficiency, folic acid/ vit B12 deficiency anaemia including pernicious anaemia
- Haemolytic anaemia: classification and investigation
- Hereditary haemolytic anaemia: thalassaemia, sickle cell anaemia, hereditary spherocytosis and G 6 P D deficiency
- Acquired Hemolytic anemias: malaria, kala Azar , autoimmune, alloimmune, drug induced, microangiopathic
- Haemostatic disorders: platelet deficiency, ITP, drug induced, secondary
- Coagulopathies: coagulation factor deficiency, hemophilia, DIC and anticoagulant control
- Leucocytic disorders: leucocytosis, leucopenia, leukemoid reaction
- Acute and chronic leukemia: classification and diagnosis
- Multiple myeloma and dysprotenemias
- Blood transfusion: grouping and cross matching untoward reactions, transmissible infections including HIV and hepatitis
- Myelodysplastic syndrome
- Myelo Proliferative disorders: polycythemia, myelofibrosis

Practicals: P/s & BM slides pertaining to different kind of Anemia, Acute and chronic Leukemia, and demonstration of retic count, sickling, PT, PTTK.

9. Cardiovascular Pathology

- Acute Rheumatic fever: etiopathogenesis and morphological changes and complications including rheumatic heart disease.
- Infective endocarditis: etiopathogenesis and morphological changes and complications
- Atherosclerosis and ischemic heart disease: myocardial infarction
- Hypertension and hypertensive heart disease
- Congenital heart disease: ASD, VSD, Fallot's tetralogy, Bicuspid aortic PDA
- Pericarditis
- Cardiomyopathy

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

10. Respiratory Pathology

- Structure of bronchial tree and alveolar walls, normal and altered inflammatory diseases of bronchi: chronic bronchitis, bronchiectasis
- Pneumonias: lobar, broncho, interstitial
- Lung abscess: etiopathogenesis and morphology and complications
- Pulmonary tuberculosis: primary and secondary, morphologic types including pleuritis
- Emphysema: type and pathogenesis
- Tumors: Epithelial Malignant Neoplasms of Lung, Etiopathogenesis. Concepts of obstructive and restrictive lung disorders-Chronic bronchitis, emphysema, Asthma.
- Nasopharyngeal and laryngeal tumors
- Occupational lung disorders: anthracosis, silicosis, asbestosis, mesothelioma
- Atelectasis and hyaline membrane disease

11. Renal & Urinary tract pathology

- Basic of impaired function and urinalysis
- Glomerulonephritis: classification, primary Proliferative and non Proliferative, secondary (SLE, polyarteritis, amyloidosis, diabetes)
- Clinical presentation of renal disorders including nephritic, nephritic syndrome, acute renal failure, recurrent hematuria, CRF.

- Acute renal failure: acute tubular and cortical necrosis
- Pyelonephritis, reflux nephropathy, interstitial nephritis
- Renal cell tumors: renal cell carcinoma, nephroblastoma
- Urinary bladder: cystitis, carcinoma
- Progressive renal failure and end stage renal disease
- Renal vascular disorders
- Urinary tract tuberculosis
- Nephrolithiasis and obstructive nephropathy
- Renal malformation polycystic kidney

Practicals to demonstrate the above changes morphologically by suitable histopathological slides.

12. Pathology of Gastrointestinal tract

- Oral pathology: leukoplakia, carcinoma oral cavity and esophagus
- Peptic ulcer: etiopathogenesis and complications, gastritis types
- Tumors of stomach: benign, polyp, leiomyoma, malignant, adenocarcinoma, other gastric tumors.
- Inflammatory disease of small intestine: typhoid, tuberculosis, Crohn's disease, appendicitis
- Inflammatory disease of large intestine: amoebic colitis, bacillary dysentery, ulcerative colitis
- Large and small intestine tumors: polyps, carcinoid, carcinoma, lymphoma
- Pancreatitis
- Salivary gland tumors
- Ischemic and pseudomembranous enterocolitis, diverticulitis
- Malabsorption-coeliac disease, tropical sprue and other causes
- Pancreatic tumors: endocrine, exocrine and periampullary

13. Liver and Biliary tract pathology

- Jaundice: type, etiopathogenesis and differentiation
- Hepatitis: acute and chronic, etiology, pathogenesis and pathology
- Cirrhotoses; etiology, classification, pathology, complications
- Portal hypertension: types and manifestation

- Diseases of gall bladder: cholecystitis, cholelithiasis, carcinoma
- Tumors of liver: hepatocellular, metastatic, tumor markers

14. Lymphoreticular system

- Lymphadenitis: non-specific, granulomatous, Hodgkin's lymphoma
- Non-Hodgkin's lymphoma, classification, morphology
- Diseases of spleen: splenomegaly and effect.

15. Reproductive system

- Diseases of cervix: cervicitis, cervical carcinoma, etiology, cytological diagnosis
- Hormonal influences and histological appearances of different phases of menstrual cycles and the abnormality associated with it.
- Diseases of uterus; endometrial hyperplasia and carcinoma, adenomyosis, smooth muscle tumours
- Trophoblastic diseases: hydatiform mole and choriocarcinoma
- Diseases of breast; mastitis, abscess, fibrocystic disease, neoplastic lesions, fibroadenoma, carcinoma, phyllodes tumors
- Prostate: nodular hyperplasia, carcinoma
- Ovarian and testicular tumours
- Carcinoma of penis
- Pelvic inflammatory disease including salpingitis
- Genital tuberculosis

16. Osteopathology

- Osteomyelitis; acute, chronic, tuberculosis
- Metabolic disease; rickets/osteomalacia, osteoporosis, hyper parathyroidism
- Tumors: primary, osteosarcoma, osteoclastoma, Ewing's sarcoma, chondro sarcoma, metastatic.
- Arthritis: rheumatoid, osteoid and tuberculosis
- Healing of fractures

17. Endocrine pathology

- Diabetes mellitus: types, pathogenesis, pathology
- Non neoplastic lesion of thyroid: Iodine deficiency goiter, autoimmune thyroiditis, thyrotoxicosis, myxoedema
- Tumors of thyroid: adenoma, carcinoma: papillary, follicular, medullary, anaplastic
- Adrenal disease: cortical hyperplasia, atrophy, tuberculosis, tumors of cortex and medulla
- Parathyroid hyperplasia and tumors

18. Neuropathology

- Inflammatory disorders: pyogenic and tuberculous meningitis, brain abscess, tuberculoma
- CNS tumors-primary glioma and meningioma and metastatic
- CSF and its disturbances: cerebral oedema, raised intracranial pressure
- Cerebrovascular disease: atherosclerosis, thrombosis, embolism, aneurysm, hypoxia, infarction and hemorrhage

19. Dermato-pathology

- Skin tumors: squamous cell, basal cell and melanoma

One third of allotted practical hours to be devoted to

- Identify and interpret gross and microscopic features of acute inflammations in organs such as appendix, lungs, meninges,
- Cellular components of chronic and granulomatous inflammation
- Granulation tissue, callous
- Typhoid, tuberculosis, amoebic ulcers in intestine
- Rhinosporidiosis, actinomycosis, malaria, kala-azar, filarial
- Amoebic liver abscess, malaria liver and spleen, filarial lymphadenitis, cysticercosis
- Fatty liver, amyloidosis of spleen, kidney and liver
- Types of necrosis: caseous, coagulative, liquifactive
- Identify and interpret gross and microscopic features of organs in commonly occurring neoplastic and non-neoplastic diseases

One third of allotted practical hours to be devoted to

- Discussion of case studies (paper) clinical, gross and microscopic features and other parameters wherever applicable to learn clinico pathological correlation inclusive of autopsy studies.

SUGGESTED TOPICS FOR INTEGRATED TEACHING

1. INTEGRATED SEMINARS

- Rheumatic heart disease
- Ischemic heart disease
- Hypertension and Hypertensive disease
- Tuberculosis lung
- Nephrotic syndrome
- Chronic Renal Failure
- Inflammatory disease of small and large bowel
- Cirrhosis
- Metabolic bone disease
- Diabetes mellitus
- HIV/AIDS
- Approach to Diagnosis of Anemia

- Iron deficiency anaemia
- Jaundice
- Malaria, Dengue Chikungunya, Avian Flu
- DIC

PRACTICAL SKILLS

- Be able to collect, store and transport materials for various pathological tests including histopathology, cytopathology, clinical pathology, haematology and biochemistry.
- Interpret abnormal laboratory values of common diseases
- Do complete urine examination including microscopy
- Perform and interpret haemoglobin, TLC, DLC, ESR, PCV, bleeding time, clotting time, blood smears and red cell morphology
- Interpret the peripheral smears of common disease's
- Do blood grouping
- Adopt universal precautions for self protection against HIV and hepatitis.

SUGGESTED DURATION FOR LECTURES AND PRACTICALS: Didactic Lectures should form 1/3 of the total teaching hours available for the subject of pathology. 2/3 of the total learning hours should be devoted to practicals, group discussions (tutorials), Clinico-pathological discussions. The lectures schedule should be prepared to incorporate the course content as detailed in general pathology and systemic pathology. Lectures should incorporate modern teaching methodologies and aids.

PRACTICAL: of the total Practical hours available the suggested distribution is as follows:

1. One-third of allotted practical hours to be devoted to
 - Performing a complete urine examination and detecting abnormalities and correlating with pathological changes.
 - To performs with accuracy and reliability basic Haematological estimations: TLC, DLC, peripheral smear, staining, reporting along with history.
 - deficiency anaemia (acute + chronic), Hemolytic anaemia, Leukemia
2. One-third for histopathological slides
3. One-third for the group discussion, interactive sessions, tutorials etc.

Teaching learning methods:

- Structured interactive sessions
- Small group discussion
- Practicals including demonstrations
- Problem based exercises
- Autopsy case studies
- Self learning tools
- Interactive learning
- E-modules

LEARNING RESOURCE MATERIALS

- Text books
- Reference books
- Lecture notes
- Internet resources

EVALUATION:

There should be regular formative assessment, during the entire teaching period. The formative assessment should be based on the day to day performance should be given greater importance and form the basis of internal assessment which should be based on regular testing preferably at the end of each system, atleast two term examinations and a preliminary examination should be held before the University examination. The internal assessment should be based on all assessments including term examination and preliminary examination. It is desirable that the distribution of marks should be such that 60% of the internal assessment is calculated from the examination conducted at the end of each system and 40% from the term and (preliminary) University examination.

SUMMATIVE EVALUATIONS (2ND PROFESSIONAL MBBS EXAMINATION)

At the end of 5th Semester the university will hold a university examination. The summative examination would consist of two parts theory and practical. The theory would be examined on two separate papers, each of 3 hours duration. **Paper 1** will include questions based on the syllabus from general pathology, hematology and clinical pathology while **Paper 2** will include questions based on the syllabus from Systemic Pathology. Practical examination would be conducted for a maximum of 30 students each day and would cover the following exercise Histopathology slides, slide for DLC , a case history with slide, performing the following tests: Hb/TLC/blood grouping, staining of peripheral smear with Leishman/Giemsa, complete urine examination including microscopy, OSPEs

The distribution of marks is recommended as follows:

DISTRIBUTION OF MARKS FOR SUMMATIVE EVALUATION OF THEORY AND PRACTICLS:

THEORY:

EXISTING	PROPOSED
Total Marks : 150	Total Marks : 300
Theory (Max Marks: 110)	Theory (Max Marks: 200)
Paper 1: General pathology + Hematology + Clinical Pathology (Max marks: 40) (Time: 3hrs)	Paper 1: General pathology + Hematology + Clinical Pathology (Max marks: 65) (Time: 3hrs)
Paper 2: Systemic Pathology (Max Marks: 40) (Time: 3hrs)	Paper 2: Systemic Pathology (Max Marks: 65) (Time: 3hrs)
Internal Assessment (Max. Marks) : 15	Internal Assessment (Max. Marks) : 40
VIVA (Max marks) : 15	VIVA (Max marks) : 30

PRACTICAL:

EXISTING	PROPOSED
Practical (Max marks: 40)	Practical (Max marks: 100)
Practical Examination (Max. Marks): 25	Practical Examination (Max. Marks): 80
Internal assessment (Max. Marks): 15	Internal assessment (Max. Marks): 20

The distribution of Practical examination is as follows:

EXERCISE	EXISTING MARKS (25)	PROPOSED MARKS (80)
Histopathology slides without history (3)	3 x 2 = 6	3 x 5 = 15
1 slide without history for DLC	1	5
1 slide with history for interpretation of smear provided eg IDA, CML, ALL etc.	2	5
Perform Hb/TLC	1+1	5
To make smear and stain it with Leishman/Giemsa	1+1	5
Blood grouping	-	5
Complete urine examination including M/E	4	10
OSPE-to include specimens (at least 3 specimens), instruments, clinical case histories with photographs (at least 4), identification of marrow cells, typical fungal lesions, common parasites	8 x1 = 8	15 x2 = 30