

**Paper II: Technical Subject**

**1. General Pathology**

- 1.1 **Cellular adaptation, injury and death:** cellular response to injury, growth and differentiation, Morphology of cell injury and necrosis, apoptosis, intracellular accumulations, calcification
- 1.2 **Acute and chronic inflammation:** general features, cells and chemical mediators involved, events, outcome
- 1.3 **Tissue repair and renewal:** Normal cell proliferation and tissue growth, their control, mechanism of tissue regeneration, repair by healing, scar and fibrosis, healing by first and second intention, factors effecting wound healing,
- 1.4 **Hemodynamic disorders:** Normal hemostasis, thrombosis and embolism, Infarction, Shock, Disseminated intravascular coagulation
- 1.5 **Genetic diseases:** Mutations, Mendelian disorders, Karyotyping, Diagnosis of genetic diseases
- 1.6 **Diseases of immunity:** Types of immunity, cell involved, cytokines, Histocompatibility molecules, Hypersensitivity reaction and types, Autoimmune diseases, Immunological immunodeficiency syndromes, AIDS, Amyloidosis
- 1.7 **Neoplasia:** Definition, nomenclature, biology of tumor growth, cell cycle, Molecular basis of cancer, Carcinogenic agents, paraneoplastic syndrome, tumor markers, clinical features of tumors, grading and staging, laboratory diagnosis of cancer
- 1.8 **Environmental and nutritional pathology:** Common environmental and occupational hazards, food safety, nutrition deficiencies.
- 1.9 **Infectious disease:** General principle of microbial pathogenesis, Agents of bioterrorism, Infections in immunocompromised host, Special techniques in diagnosing infectious agent

**2. Surgical Pathology**

- 2.1 Components Surgical pathology Report, Limitation of Histological diagnosis
- 2.2 Information system in surgical pathology, Digital pathology and Telepathology
- 2.3 Automated surgical pathology
- 2.4 Legal aspects of surgical pathology
- 2.5 Gross techniques in surgical pathology: Gross room, handling of specimens, general principles, photography, radiography, Guidelines for handling common specimens
- 2.6 WHO classification of tumors of various systems, their grading and staging
- 2.7 Synoptic reporting system

**3. Systemic pathology:**

- 3.1 Gross anatomy, relevant physiology and histology of specimens and tissues of gastrointestinal, cardiovascular, respiratory systems, genitourinary system, male and female reproductive system, Endocrine system, central nervous system, peripheral nervous system, Musculoskeletal system and neurosensory system

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- 3.2 **Skin:** Inflammatory diseases, dermatoses, vesiculobullous diseases, degenerative diseases, tumors and tumor like conditions
- 3.3 **Oral cavity and oropharynx:** Congenital anomalies, inflammatory and non neoplastic diseases, Tumors and tumor like conditions of surface epithelium, odontogenic epithelium , disease of temporomandibular joints. Tumors and tumor like lesions of salivary gland of Salivary gland
- 3.4 **Respiratory system & mediastinum:** Inflammations, cysts, neoplastic diseases of larynx and trachea. Pleuritis, tumors of pleura, Non neoplastic diseases of lung. Lung tumors. Cyst in mediastinum, mediastinal tumors
- 3.5 **Endocrine system;** Congenital anomalies, inflammatory lesions, tumors and tumor like conditions of thyroid, parathyroid, adrenal glands and paraganglia, pituitary , hypothalamus
- 3.6 **Urinary tract:** Congenital anomalies, cystic diseases of kidney, Glomerular lesion associated with nephrotic and nephritic syndrome, vascular lesions, Hereditary diseases, , pyelonephritis, interstitial nephritis, Renal transplant rejection , lithiasis. tumors, tumor like conditions
- 3.7 **Male Reproductive system:** Congenital anomalies, cryptorchidism, atrophy and infertility, Tumors of testes and paratesticular tissue, hydrocele, Prostatitis, Prostatic hyperplasia, Tumors of prostate
- 3.8 **Female reproductive system:** Inflammatory and other non neoplastic disease of vulva and vagina, Pelvic inflammatory diseases, Lesions of cervix. Cervical intraepithelial neoplasia, Tumors of cervix, Menstrual cycle, Endometrial dating, Non neoplastic and neoplastic lesions of uterus. Abortion, ectopic pregnancy, endometriosis Lesion of ovary, polycystic ovarian diseases, ovarian tumors, Gestational trophoblastic diseases, lesions of placenta, Neoplastic and non neoplastic disease of fallopian tubes, Inflammatory, other non neoplastic and neoplastic disease of breast
- 3.9 **Gastrointestinal tract:** Congenital anomalies of GIT, Reflux and other esophagitis, tumors and tumor like conditions of esophagus Gastritis and Peptic ulcers, Polyps of stomach and intestine, tumors and tumor like conditions of stomach , Gastrointestinal stromal tumors, Malabsorption, Diseases associated with malabsorption, inflammatory bowel disease, Intestinal obstruction, AIDS related inflammatory diseases of intestine, tumors and tumor like conditions of intestine , Infections, hemorrhoids, rectal prolapse, diseases of peritoneum and retroperitoneum
- 3.10 **Hepatobiliary System:** Viral hepatitis, Cirrhosis, Alcohol, drug and toxin induced liver injury, Cholestasis, disorders of metabolism, vascular disorders, Liver diseases in pregnancy , Liver involvement in systemic illness, Liver pathology in organ transplant, tumors and tumor like conditions of liver, Cholelithiasis, cholecystitis, Tumors of gall bladder and intra as well as extrahepatic bile ducts, Pancreatitis, tumors and tumor like conditions pancreas, Ampullary carcinoma
- 3.11 **Cardiovascular system:** congenital anomalies, Myocardial infarction, atherosclerosis, vasculitis and other vascular disorders, Hypertension, Tumors of

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heart and pericardium, Rheumatic heart diseases, infective endocarditis, valvular anomalies, myocarditis and cardiomyopathies, blood vessels tumors,

- 3.12 **Musculoskeletal system:** Histochemistry of Muscle biopsy, Muscle diseases, atrophies, neuromuscular junction disorders, myopathies Fractures, Osteomyelitis, Pagets disease, osteopetrosis, tumors and tumor like lesions of bone Non neoplastic diseases of joints, gout, rheumatoid arthritis, osteoarthritis, tumors and tumor like lesions of joints, histopathological evolution of bonemaro biopsies
- 3.13 **Neurosensory system;** Congenital anomalies, cerebrovascular accidents, inflammatory and infectious diseases of CNS, meningitis, Tumors of brain and meninges, Neuropathies, Diseases of peripheral nerves, Inflammatory and infectious disease of eye and ear, tumors and tumor like lesions of eye and ear
- 3.14 **Lymphoreticular system:** Lymph node evaluation, patterns of hyperplasia, Inflammatory/hyperplastic disease of lymph node, Malignant lymphomas, metastatic tumors, Congenital anomalies of spleen, neoplastic and nonneoplastic diseases of spleen, Hypersplenism

## 4. Cytopathology

- 4.1 Role of Diagnostic Cytology
- 4.2 Structure and function of cells, morphological features of dysplasia
- 4.3 Basic Cytogenetics and the Role of Genetics in Cancer Development
- 4.4 Chromosomal aberration in cancer
- 4.5 Clinical application of conventional cytogenetics and molecular methods in cytology
- 4.6 Evaluation of various samples in conventional smears and liquid based preparations
- 4.7 Cell blocks and its use in cytological diagnosis
- 4.8 Immunocytochemistry and Molecular Biology in Cytological Diagnosis
- 4.9 Digital Analysis of Cells and Tissues
- 4.10 Flow Cytometry
- 4.11 Advanced techniques in diagnostic cytopathology

## 5. Gynecological Cytopathology

- 5.1 Anatomy, Histology and Cytology
- 5.2 Normal Female Genital Tract
- 5.3 Bethesda system for reporting cervical cytology
- 5.4 Inflammations, bacterial and viral infections of cervix
- 5.5 Benign proliferative reaction, intraepithelial neoplasia and invasive cancers
- 5.6 Cytologic Evaluation of Menstrual Disorders and Hormonal Abnormalities
- 5.7 Proliferative Disorders and Carcinoma of the Endometrium
- 5.8 Diseases of the Vagina, Vulva, Perineum
- 5.9 Tumors of the Ovary and Fallopian Tube
- 5.10 Effects of Therapeutic Procedures on cytology of the Female Genital Tract
- 5.11 Effects of Therapeutic Procedures on the Epithelia of the Female Genital Tract

**6. Nongynecological cytopathology:**

- 6.1 Normal findings in different cytological specimens of upper and lower respiratory tract
- 6.2 Cytology of bronchogenic carcinomas in sputum, bronchial brushing and bronchoalveolar lavage
- 6.3 Sampling of Oral Cavity, Larynx, Trachea, Nasopharynx, and Paranasal Sinuses
- 6.4 Benign, reactive and malignant lesion of Oral Cavity, Larynx, Trachea, Nasopharynx, and Paranasal Sinuses
- 6.5 Different cytology samples of upper and lower urinary tract and normal findings in them
- 6.6 Nipple discharge cytology
- 6.7 Tumors of the Urinary Tract in Urine and Brushings
- 6.8 Noneoplastic findings in samples of urinary tract
- 6.9 Different cytology samples of gastrointestinal tract, including hepatobiliary tract and pancreas and normal their cytological findings
- 6.10 Cytology non neoplastic lesion of gastrointestinal tract, hepatobiliary tract and pancreas
- 6.11 Cytology of tumors of gastrointestinal tract, hepatobiliary tract and pancreas
- 6.12 Various types of effusions and their normal findings
- 6.13 Non neoplastic lesions in effusions
- 6.14 Neoplastic lesions in effusion, including cytology of CSF in leukemias
- 6.15 Cytology of central nervous system tumors in squash preparation
- 6.16 Circulating cancer cells

**7. Fine needle aspiration cytology:**

- 7.1 Techniques of Fine-Needle Aspiration, Smear Preparation, and Principles of Interpretation
- 7.2 Imaging methods for guidance of aspiration cytology
- 7.3 Diagnostic pitfalls in FNA diagnosis of various lesions
- 7.4 FNAC diagnosis and differential diagnosis of different lesions of head and neck, including salivary gland
- 7.5 FNAC diagnosis and differential diagnosis of different lesions in lymph node. FNAC findings of different lymphomas
- 7.6 Reporting FNAC of thyroid nodules. FNAC findings in various thyroid lesions.
- 7.7 Cytology reporting categories of breast nodules. FNAC diagnosis of various non neoplastic and neoplastic lesions of breast
- 7.8 FNAC diagnosis of various lesions of lung, mediastinum, chest wall pleura
- 7.9 FNAC diagnosis of various lesions of kidney, adrenal and retroperitoneum
- 7.10 FNAC diagnosis of bone and soft tissue lesions
- 7.11 Evaluation of FNAC of testes for male infertility
- 7.12 FNAC diagnosis and differential diagnosis of testicular tumors and other lesions of male genital tract

**8. Autopsy**

- 8.1 Types of autopsy, its purpose, procedure of various types of autopsy
- 8.2 Collection of various organs and specimens for forensic pathology
- 8.3 Use of Conventional and special stains and immunohistochemical procedure in forensic pathology
- 8.4 Gross and microscopy of organs in alcoholism and drug abuse
- 8.5 Pathological investigations of hypothermia induced changes in the human body
- 8.6 Thrombosis and embolism
- 8.7 Gross and microscopic findings in aspiration and inhalation of various substances
- 8.8 Evaluation of atherosclerosis, aneurysm, Myocardial Infarction, Myocarditis, Cardiomyopathy, Coronary Anomalies, other cardiac vascular anomalies as cause of death
- 8.9 Post mortem findings in Lethal Infections, Sepsis, and Shock
- 8.10 Forensic pathology findings in Endocrine organ dysfunction
- 8.11 Forensic evaluation of Pregnancy-Related Death, Death in Newborns, and Sudden Infant
- 8.12 Death Syndrome
- 8.13 Forensic Neuropathology
- 8.14 Cytological diagnosis in sexual offenses
- 8.15 Histothanatology: Autolysis, Putrefaction, Mummification
- 8.16 Forensic-Histological Diagnosis of Species, Gender, Age, and Identity

**9. Histo/cyto techniques:**

- 9.1 Organisation of Histopathology/cytopathology Laboratory
- 9.2 Various Histological equipments, their uses and care
- 9.3 Reception and recording of specimen
- 9.4 Theory of routine (H/E, Pap) and special stains and their practical implication
- 9.5 Preparation, reagent preparation, procedure and quality control of all routine and special stains used in Histopathology/cytopathology
- 9.6 Grossing technique of various surgical specimens
- 9.7 Technique of processing various tissues including bone for histological studies, Errors in sectioning and remedies
- 9.8 Frozen section and their uses, processing tissue for frozen section and its interpretation
- 9.9 Demonstration of pigments and minerals (malarial, mercury, bile, lipofuscin, calcium, iron, copper)
- 9.10 Demonstration of neuron, neuroglia, myelin and axon
- 9.11 Stains for bacteria, AFB, fungi, amoeba in tissue
- 9.12 Preparation of cell blocks and their interpretation
- 9.13 Mailing of slides
- 9.14 Fine needle aspiration techniques involved in preparation of smear and staining
- 9.15 Different types of cytology specimens, their preservation and transport, Processing of various cytology specimen, smear preparation and staining

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- 9.16 Liquid based cytology; principle, instruments, procedure advantage, disadvantage
- 9.17 Cyto centrifuge and its uses in diagnostic cytopathology
- 9.18 Immunochemistry: Principle, procedure, uses, quality control, Immunohistochemical markers of various neoplasms
- 9.19 Use of microwaves in histopathology/cytopathology
- 9.20 Principle and use of flow cytometry in cytopathology
- 9.21 Preparation and Quality control of various stains, reagents and methods used in histopathology/ cytology
- 9.22 Molecular methods in histopathology and cytopathology
- 9.23 Principle, method and use of In-situ Hybridization, recent methods in hybridization techniques
- 9.24 Enzyme histochemistry: principle, reagent and specimen preparation, procedure and application
- 9.25 Electron microscopy
- 9.26 Histometry, analysis of proliferation
- 9.27 Tissue culture techniques, HLA typing
- 9.28 X ray microanalysis

**10. Laboratory management:**

- 10.1 Fundamental of Total Quality management
  - 10.2 Statistical process in quality control
  - 10.3 Element of quality assurance program
  - 10.4 Concept of Evidence based medical practice
  - 10.5 Concept of critical values and alert values in laboratory practice
  - 10.6 The laboratory information system
  - 10.7 Concept of reference laboratory
  - 10.8 Implementation of reference system in laboratory medicine
  - 10.9 Standard operating procedure and their preparation
  - 10.10 Errors and identification of the source of error in hematology laboratory
  - 10.11 Internal and External quality control and proficiency testing
  - 10.12 Preparation of quality policy manual
  - 10.13 Laboratory Accreditation, Key component of accreditation, ISO 15189 and others laboratory related accrediting bodies
  - 10.14 Quality control in procedure, equipments, NEQAS, EQAS
  - 10.15 Ethics in medicine
  - 10.16 Health and Safety measures (Physical/Chemical/Biological/Radiation)
  - 10.17 Waste disposal
  - 10.18 Management of under resourced laboratory
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