

Department of Pathology



Study Guide 2nd Year BDS

Sharif Medical & Dental College,
Lahore



PREFACE

Study guide plays a pivotal role in enhancing students' understanding and grasp of a subject. It acquaints the students about the course outline, teaching modules, and methodology. It also briefs about the assessment and evaluation policies in an academic session. This study guide aims to promote self-regulated learning among students. It gives an overview of course outcomes & learning objective.

This study guide has been carefully planned to keep in view the mission of UHS, Lahore, and the vision of our institute. It is tailored according to the students' needs. This would hopefully enable our young inquisitive minds to develop a good understanding of this subject and adequately prepare for the examination.

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VISION & MISSION OF UHS

Qualitative and Quantitative Revolution in Medical Education and Research through Evolution and thereby improve Health Care delivery to Populace.

UHS shall be innovative global center of excellence in learning and research, supporting a community of scholars and professionals committed to serving society, promoting the development of students to reach their true potential in becoming competent, ethical, caring, and inquiring health professionals for the benefit of the country and the wider world.

MISSION OF SMDC

Sharif Medical & Dental College is dedicated to best serve the nation through preservation and dissemination of advanced knowledge and educating the students by latest trends in learning and research reaching levels pars excellence.

The Institution is committed to provide standardized quality medical education to its students by inculcating professional knowledge, skills and responsibilities in them with the aim of:

- Preparing them as modern physicians having initiative to act as future leaders in their respective fields and becoming lifelong learners.
- Encouraging the spirit of critical thinking through research and publication.
- Building up an understanding of the ethical values compatible with our religion, culture and social norms.
- Developing a sense of being responsible citizens of the society possessing professional competence and instilling in them the values of hard work and dedication thus preparing them to be accountable to the stakeholders and the state.

The Institution is devoted to keep abreast its faculty with the latest trends in Medical Education encompassing teaching/learning methodologies, assessment tools, research opportunities and professionalism to facilitate their professional development, competencies and commitment towards continues learning.

Our patient-centered mission is achieved by outstanding medical care & services in professional practice with due emphasis and focus on our local health needs.

Our mission further elaborate upon establishing academic and research facilities in areas of local demand under global gold standards and leading advancement in research, education & patient care.

VISION OF SMDC

To be recognized for the provision of a safe and functional environment conducive to collaborative teaching & learning, comfortable working atmosphere, and conducting world class research through professionalism and excellence.



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TEACHING AND LEARNING STRATEGIES

a) Modes of Information Transfer

PMC has allocated 200 hours of teaching in the subject of General Pathology & Microbiology for the 2nd Year BDS course. Following teaching modules have been planned to impart core knowledge of General Pathology & Microbiology so that student can grasp the subject fully and is adequately prepared for university examinations.

Large Group Interactive Session (LGIS)

A total of 170-180 LGIS are planned for the entire year. The session will be conducted by the Professor, associate professors, and assistant professors. The session will be interactive and students should actively participate in them. At the start of each session, the learning outcome will be displayed.

Practical Classes, Demonstration & Individual Performance

One practical class has been planned per week. The class will be divided into 02 batches to conduct the practicals effectively and one batch will be entertained once a week for these sessions. Practical classes will be conducted by demonstrators under the active supervision of senior faculty members. Students are required to enter their work in their practical notebooks and get them checked by the instructors regularly. It will comprise of practical on microscopic & gross appearance of the various organs & tissues. Practical classes for the identification of various microbial organisms and laboratory safety procedures will also be conducted.

Small-Group Discussion (SGD) & Case-based Learning

The class will be divided into 02 batches. The batch will be further divided into smaller groups for effective learning. Topics for the SGD will be notified at the start of the month. Case-based learning and small group discussion will be conducted throughout the academic year. Clinical problems will be notified at least one week before the session. A senior demonstrator will be interactively facilitating the session and students are required to generate the discussion amongst themselves & the facilitator in line with the learning objectives of the topic.

Students' presentation

Presentations by the students were scheduled after the completion of the course. Topics will be allocated to students and each presentation will be of 10-15 minutes duration with a Question & Answer session after it. This will help to increase student's engagement in their learning.

b) Venue for Learning Outcomes

- Lecture Halls
- Practical Laboratory
- Tutorial rooms
- Skill Laboratory
- Libraries including audio visual
- Online classes- Zoom/Google class room



LIST OF LECTURES

2nd Year BDS

Cell Injury

Sr. No.	Topic	Doctor Name
1	Cell Injury: Infarction and gangrene oncosis and autolysis, sequence of the ultrastructural and biochemical changes	Prof. M. Tahir Saeed
2	Cell Injury: Causes of cell injury, reversible & irreversible injury	Prof. M. Tahir Saeed
3	Cell Injury: Mechanisms of cell injury	Prof. M. Tahir Saeed
4	Cell Injury: Cellular adaptations	Prof. M. Tahir Saeed
5	Cell Injury: Necrosis & its types	Prof. M. Tahir Saeed
6	Cell Injury: Apoptosis	Prof. M. Tahir Saeed
7	Cell Injury: Intracellular accumulations	Prof. M. Tahir Saeed
8	Cell Injury: Calcification	Prof. M. Tahir Saeed
9	Cell Injury: Metabolic disorders	Prof. M. Tahir Saeed

Inflammation and Mediators of Inflammation

Sr. No.	Topic	Doctor Name
1	Inflammation: Role of inflammation, acute inflammation	Prof. Maria Aslam
2	Inflammation: Vascular changes of acute inflammation	Prof. Maria Aslam
3	Inflammation: Cellular events of acute inflammation	Prof. Maria Aslam
4	Inflammation: Chemical mediators of inflammation & arachidonic acid metabolism in inflammation	Prof. Maria Aslam
5	Inflammation: Exogenous and endogenous pyrogens & morphological patterns of acute inflammation	Prof. Maria Aslam
6	Inflammation: Chronic inflammation	Prof. Maria Aslam
7	Inflammation: Systemic effects of acute and chronic inflammation	Prof. Maria Aslam

Healing & Repair

Sr. No.	Topic	Doctor Name
1	Wound Healing: Repair and regeneration	Prof. Maria Aslam
2	Wound Healing: Wound healing by first and second intention.	Prof. Maria Aslam
3	Wound Healing: Complications of wound healing	Prof. Maria Aslam

Disorders of Circulation

Sr. No.	Topic	Doctor Name
1	Disorders of Circulation: Edema	Prof. Maria Aslam
2	Disorders of Circulation: Hyperemia, congestion & role of endothelium	Prof. Maria Aslam
3	Disorders of Circulation: Hemostasis and coagulation	Prof. Maria Aslam
4	Disorders of Circulation: Thrombosis & embolism	Prof. Maria Aslam
5	Disorders of Circulation: Infarction	Prof. Maria Aslam
6	Disorders of Circulation: Shock	Prof. Maria Aslam



Genetics

Sr. No.	Topic	Doctor Name
1	Introduction	Prof. M. Tahir Saeed
2	Common sex linked, autosomal recessive and autosomal dominant disorders	Prof. M. Tahir Saeed
3	Common genetic mutations	Prof. M. Tahir Saeed
4	Diseases associated with consanguineous marriages	Prof. M. Tahir Saeed
5	Molecular biology techniques	Prof. M. Tahir Saeed

Immunology

Sr. No.	Topic	Doctor Name
1	Immunology: Innate & acquired Immunity, Antigen, antibody, epitope, hapten	Prof. M. Tahir Saeed
2	Immunology: Structure and function of major histocompatibility complex (MHC)	Prof. M. Tahir Saeed
3	Immunology: Cytokines	Prof. M. Tahir Saeed
4	Immunology: Mechanism of humoral and cell mediated immunity & Cells of Immune System	Prof. M. Tahir Saeed
5	Immunology: Hypersensitivity reactions, Type I & Type II	Prof. M. Tahir Saeed
6	Immunology: Hypersensitivity reactions, Type III, Type IV	Prof. M. Tahir Saeed
7	Immunology: Autograft, homograft, allograft and xenograft, Immunotolerance and immunoparalysis	Prof. M. Tahir Saeed
8	Immunology: Classification of Immunodeficiency disorders, Basis of autoimmunity & Tissue Immunology: transplantation	Prof. M. Tahir Saeed
9	Immunology: Pathology and pathogenesis of AIDS	Prof. M. Tahir Saeed
10	Immunology: Lab diagnosis of immunological diseases	Prof. M. Tahir Saeed

Neoplasia

Sr. No.	Topic	Doctor Name
1	Agenesis, Dysgenesis, Aplasia, Hypoplasia, Metaplasia, Dysplasia, Neoplasia, Anaplasia, Cell cycle and cell types	Prof. Maria Aslam
2	Classification of tumors: Characteristics of benign and malignant tumors with examples, Nomenclature of tumours. Difference between Carcinoma and Sarcoma	Prof. Maria Aslam
3	Oncogenes, proto oncogenes with examples	Prof. Maria Aslam
4	Mechanism of carcinogenesis & Carcinogenic agents (Radiation, Viral, Chemical & Physical)	Prof. Maria Aslam
5	Routes/Methods of spread of malignant tumours, Importance of sentinel lymph node biopsy	Prof. Maria Aslam
6	Local & systemic effects of tumours, Paraneoplastic syndrome	Dr. Usman Nasir
7	Tumour markers used in diagnosis & management of cancer	Dr. Usman Nasir
8	Grading & staging of tumours	Dr. Usman Nasir
9	Epidemiology of common cancers in Pakistan & premalignant conditions	Dr. Usman Nasir
10	Cancer screening and diagnosis of cancer & Host defense against tumours	Dr. Usman Nasir



Parasitology

Sr. No.	Topic	Doctor Name
1	General Parasitology & classification of parasites	Dr. Sadaf Munir
2	Intestinal & urogenital protozoa	Dr. Sadaf Munir
3	Blood and tissue protozoa	Dr. Sadaf Munir
4	Blood and tissue protozoa	Dr. Sadaf Munir
5	Cestodes	Dr. Sadaf Munir
6	Cestodes	Dr. Sadaf Munir
7	Trematodes	Dr. Sadaf Munir
8	Trematodes	Dr. Sadaf Munir
9	Nematodes	Dr. Sadaf Munir
10	Nematodes	

Virology

Sr. No.	Topic	Doctor Name
1	General Virology	Dr. Sadaf Munir
2	Mumps, measles, rubella	Dr. Sadaf Munir
3	Hepatitis A, B, C, D, E	Dr. Sadaf Munir
4	Influenza, parainfluenz, RVS	Dr. Sadaf Munir
5	Herpes	Dr. Sadaf Munir
6	CMV, EBV	Dr. Sadaf Munir
7	Rota, rabies	Dr. Sadaf Munir
8	Chicken pox	Dr. Sadaf Munir
9	HIV	Dr. Sadaf Munir

General Bacteriology

Sr. No.	Topic	Doctor Name
1	History of microbiology, general characteristics of microorganisms	Dr. Saima Inam
2	Morphology of bacteria, gram staining	Dr. Saima Inam
3	Bacterial classification & structure of bacteria	Dr. Saima Inam
4	Structure of bacteria	Dr. Saima Inam
5	Bacterial Genetics: Bacterial genome and its expression, mutation, definition and types	Dr. Saima Inam
6	Bacterial Genetics: Methods of DNA transfer within bacterial cells and between various bacteria	Dr. Saima Inam
7	Bacterial growth including phases of growth & growth curve, classification of bacteria according to temperature & oxygen requirement	Dr. Saima Inam
8	Culture media (definition & their classification with examples & composition, preparation of culture media)	Dr. Saima Inam
9	Culture inoculation technique and interpretation of culture report	Dr. Saima Inam
10	Normal flora, pathogenesis including definitions of communicable disease, epidemic, endemic & pandemic diseases, carriers, pathogens, opportunists, commensals and colonizers, determinants of bacterial pathogenesis, stages of infection	Dr. Saima Inam

11	Pathogenesis: Microbial mechanisms of invasion & resistance, MOA and differences between exotoxin & endotoxin, biofilms, pathogenicity islands	Dr. Saima Inam
12	Antibiotics, selective toxicity, bacteriostatic & bactericidal, host determinants in relation to selection of an antimicrobial drug for therapy	Dr. Sadaf Munir
13	Mode of action of various antimicrobial drug groups, superinfection & cross sensitivity	Dr. Sadaf Munir
14	MIC & MBC, Bacterial resistance & the mechanisms involved in acquiring bacterial resistance, Mechanisms involved in transfer of drug resistance to bacterial resistance	Dr. Sadaf Munir
15	Genetics & non-genetic basis of drug resistance	Dr. Sadaf Munir
16	Sterilization & disinfection: Definition, difference, methods of sterilization	Dr. Saima Inam
17	Sterilization & disinfection: Methods of disinfection (Facility where the doctor practices, Examination table, Any spillage e.g. sputum, vomitus, stool, urine, blood, Examination tools, e.g., thermometer, nasal and ear specula and spatula	Dr. Saima Inam
18	Sterilization & disinfection: Principles of aseptic techniques such as Venepuncture, urinary catheterization, bandaging, suturing and lumbar puncture	Dr. Saima Inam

Clinical Bacteriology

Sr. No.	Topic	Doctor Name
1	Gram positive cocci: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Staphylococcus	Dr. Saima Inam
2	Gram positive cocci: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Staphylococcus	Dr. Saima Inam
3	Gram positive cocci: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Streptococcus	Dr. Saima Inam
4	Gram positive cocci: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Streptococcus	Dr. Saima Inam
5	Gram negative cocci: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Neisseria	Dr. Saima Inam
6	Gram positive rods: Classification, Pathogenesis, Treatment, Epidemiology, Prevention and Control of Bacillus	Dr. Saima Inam
7	Gram positive rods: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Clostridium	Dr. Saima Inam
8	Gram positive rods: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Clostridium	Dr. Saima Inam
9	Gram positive rods: Pathogenesis, Treatment, Epidemiology, Prevention and Control of Crynebacterium, Listeria, Gardenella	Dr. Saima Inam
10	Pathogenesis, Treatment, Epidemiology, Prevention and Control of Actinomycetes	Dr. Saima Inam

11	Gram negative rods of Respiratory tract Pathogenesis, Treatment, Epidemiology, Prevention and Control of Haemophilus, Beordetella, Legionella, Mycoplasma	Dr. Saima Inam
12	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Mycobacterium tuberculosis	Dr. Saima Inam
13	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Mycobacterium leprae & atypical mycobacteria	Dr. Saima Inam
14	Salient features, lab diagnosis including culture & biochemical tests	Dr. Saima Inam
15	Epidemiology, Pathogenesis, Treatment, Prevention & Control of E.coli	Dr. Saima Inam
16	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Klebsiella & Enterobacter	Dr. Saima Inam
17	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Proteus, Morganella & Providencia	Dr. Saima Inam
18	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Salmonella & Shigella	Dr. Saima Inam
19	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Pseudomonas	Dr. Saima Inam
20	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Vibrio cholera, Vibrio parahemolyticus, Campylobacter jejuni & Helicobacter pylori	Dr. Saima Inam
21	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Chlamydia & Rickettsia	Dr. Sadaf Munir
22	Epidemiology, Pathogenesis, Treatment, Prevention & Control of Treponema palladium, Leptospira & Borrelia	Dr. Sadaf Munir
23	Zoonosis	Dr. Sadaf Munir
24	Principles of proper collection and submission of specimens for laboratory investigations, and processing of microbiological specimens	Dr. Saima Inam
25	Microorganisms responsible for infection of Central Nervous System, Processing of CSF	Dr. Saima Inam
26	Microorganisms responsible for infection of Respiratory System, Infections of Bones and Joints & Infection of the Skin, Processing of Sputum, Throat Swab & Pus	Dr. Saima Inam
27	Microorganisms responsible for infection of Gastrointestinal System & Hepatic Infections	Dr. Sadaf Munir
28	Microorganisms responsible for infection of Genital System & Urinary System	Dr. Sadaf Munir



LIST OF PRACTICALS & TUTORIALS (SGDs)

2nd Year BDS

Cell Injury

Sr. No.	Topic	Name
Practicals		
1	Cellular adaptations	Dr. Sameen Hassan
2	Caseous, liquefactive gangrenous necrosis	Dr. Sameen Hassan
3	Caseous, fat & fibrinoid necrosis	Dr. Sameen Hassan
4	Calcification & pigmentation	Dr. Sameen Hassan
Tutorials (SGDs)		
5	Mechanisms of cell injury & reversible & irreversible injury	Prof. M. Tahir Saeed Dr. Usman Nasir
6	Cellular adaptation	Prof. M. Tahir Saeed Dr. Usman Nasir
7	Necrosis & apoptosis	Prof. M. Tahir Saeed Dr. Usman Nasir
8	Calcification and pigmentation	Prof. M. Tahir Saeed Dr. Usman Nasir

Inflammation and Mediators of Inflammation

Sr. No.	Topic	Name
Practicals		
1	Acute Inflammation	Dr. Sameen Hassan
2	Chronic Inflammation	Dr. Sameen Hassan
3	Granulomatous Inflammation	Dr. Sameen Hassan
Tutorials (SGDs)		
4	Vascular & Cellular events of acute inflammation	Prof. Maria Aslam Dr. Usman Nasir
5	Morphological patterns of acute inflammation	Prof. Maria Aslam Dr. Usman Nasir
6	Chronic & Granulomatous Inflammation	Prof. Maria Aslam Dr. Usman Nasir

Healing & Repair

Sr. No.	Topic	Name
Tutorial (SGDs)		
1	Wound healing by primary and secondary intention & complications of wound healing	Prof. Maria Aslam Dr. Usman Nasir



Disorders of Circulation

Sr. No.	Topic	Name
Practicals		
1	Hyperemia & congestion	Dr. Sameen Hassan
2	Thrombosis	Dr. Sameen Hassan
3	Infarction	Dr. Sameen Hassan
Tutorials (SGDs)		
4	Edema, hyperemia & congestion	Prof. Maria Aslam Dr. Usman Nasir
5	Thrombosis, embolism	Prof. Maria Aslam Dr. Usman Nasir
6	Infarction & shock	Prof. Maria Aslam Dr. Usman Nasir

Immunology

Sr. No.	Topic	Name
Practicals		
1	Lab Diagnosis	Dr. Sameen Hassan
2	Lab Diagnosis	Dr. Sameen Hassan
Tutorials (SGDs)		
3	Cell of immune System, MHC, cellular & Humoral Immunity	Prof. M. Tahir Saeed Dr. Usman Nasir
4	Hypersensitivity Reactions	Prof. M. Tahir Saeed Dr. Usman Nasir

Neoplasia

Sr. No.	Topic	Name
Practicals		
1	Benign epithelial tumours: Fibroadenoma breast Thyroid adenoma Papilloma Cyst adenomas	Dr. Sameen Hassan
2	Benign mesenchymal tumors Leiomyoma Lipoma Teratoma/dermoid cyst Haemangioma	Dr. Sameen Hassan
Tutorials (SGDs)		
3	Malignant tumours: Squamous cell carcinoma Basal cell carcinoma	Prof. Maria Aslam Dr. Usman Nasir
4	Malignant tumours: Carcinoma breast Papillary carcinoma thyroid	Prof. Maria Aslam Dr. Usman Nasir



Parasitology

Sr. No.	Topic	Name
	Practical	
1	Lab diagnosis of viral diseases	Dr. Sameen Hassan
	Tutorials (SGDs)	
1	Protozoa	Dr. Sadaf Munir Dr. Navin Bilal
2	Cestodes	Dr. Sadaf Munir Dr. Navin Bilal
3	Trematodes	Dr. Sadaf Munir Dr. Navin Bilal
4	Nematodes	Dr. Sadaf Munir Dr. Navin Bilal

Virology

Sr. No.	Topic	Name
	Practical	
1	Lab diagnosis of parasitic infestation	Dr. Sameen Hassan
	Tutorials (SGDs)	
1	DNA enveloped	Dr. Sadaf Munir Dr. Navin Bilal
2	DNA non-enveloped	Dr. Sadaf Munir Dr. Navin Bilal
3	RNA enveloped	Dr. Sadaf Munir Dr. Navin Bilal
4	RNA non-enveloped	Dr. Sadaf Munir Dr. Navin Bilal
5	Hepatitis	Dr. Sadaf Munir Dr. Navin Bilal

Microbiology

Sr. No.	Topic	Name
	Practicals	
1	Study of microscope	Dr. Saleha Maqsood
2	Gram staining	Dr. Saleha Maqsood
3	Culture media	Dr. Saleha Maqsood
4	Sterilization, disinfection & aseptic techniques	Dr. Saleha Maqsood
5	ZN staining and safe processing of sputum sample	Dr. Saleha Maqsood
6	Catalase test, coagulase test	Dr. Saleha Maqsood
7	DNase test, oxidase test	Dr. Saleha Maqsood
8	Biochemical tests-1: TSI, citrate, utilization test	Dr. Saleha Maqsood
9	Biochemical tests-2: Motility, indole, urease test	Dr. Saleha Maqsood
10	Hospital infection prevention & control: Spill management, hand hygiene, prevention of needle stick injury	Dr. Saleha Maqsood
11	Stool examination	Dr. Saleha Maqsood
12	Urine examination	Dr. Saleha Maqsood



	Bacteriology - Tutorials (SGDs)	
1	Bacterial morphology and structure	Dr. Saima Inam Dr. Navin Bilal
2	Bacterial classification and growth curve	Dr. Saima Inam Dr. Navin Bilal
3	Normal flora & pathogenesis	Dr. Saima Inam Dr. Navin Bilal
4	Bacterial genetics	Dr. Saima Inam Dr. Navin Bilal
5	Sterilization & disinfection	Dr. Saima Inam Dr. Navin Bilal
6	Antimicrobials and resistance to antimicrobials	Dr. Sadaf Munir Dr. Navin Bilal
7	Gram positive cocci: Staphylococci	Dr. Saima Inam Dr. Navin Bilal
8	Gram positive cocci: Streptococci	Dr. Saima Inam Dr. Navin Bilal
9	Gram negative cocci: Neisseria, moranella	Dr. Saima Inam Dr. Navin Bilal
10	Mycobacteria	Dr. Saima Inam Dr. Navin Bilal
11	Gram positive rods-1	Dr. Saima Inam Dr. Navin Bilal
12	Gram positive rods-2	Dr. Saima Inam Dr. Navin Bilal
13	Gram negative rods: Enterobacteriaceae-1	Dr. Saima Inam Dr. Navin Bilal
14	Gram negative rods: Enterobacteriaceae-2	Dr. Saima Inam Dr. Navin Bilal
15	Gram negative rods: Non-fermenters	Dr. Saima Inam Dr. Navin Bilal
16	Respiratory tract & actinomycetes	Dr. Saima Inam Dr. Navin Bilal
17	Spirochetes and zoonosis	Dr. Sadaf Munir Dr. Navin Bilal



LEARNING OBJECTIVES

GENERAL PATHOLOGY:

CELLULAR RESPONSES TO STRESS AND TOXIC INSULTS: ADAPTATION, INJURY & DEATH

By the end of this topic, the students will be able to

1. Describe the sequence of ultra structural and biochemical changes which occur in the cell in response to ischemia, immunological injury, anaphylactic reaction, physical agents, genetic defects, nutritional deficiency and infectious agents / organisms.
2. Explain the reversible & irreversible cell injury.
3. Describe free radical and chemical injury.
4. Describe necrosis, list of its types with examples.
5. Describe apoptosis & its significance, and explain mechanism of apoptosis.
6. Enlist intracellular & extracellular accumulations.
7. Enlist exogenous & endogenous pigments.
8. Explain pathological calcification with its types and examples.
9. Identify cell swelling, necrosis, types of calcification, intracellular accumulations and cellular adaptations including atrophy, metaplasia, hypertrophy & hyperplasia on microscopic and gross examination.

INFLAMMATION AND REPAIR

By the end of this topic, the students will be able to

1. Describe the role of inflammation in the defense mechanisms of the body.
2. Describe the vascular changes of acute inflammation and relate these to the morphological and tissue effects.
3. Describe the process of chemotaxis, opsonization and phagocytosis.
4. Describe the role of cellular components in inflammatory exudates.
5. Differentiate between exudates and transudate.
6. List the important chemical mediators of inflammation.
7. Describe the pathway of arachidonic acid metabolism.
8. Discuss the role of products of arachidonic acid metabolism in inflammation.
9. Describe the mechanism for development of fever, with reference to exogenous and endogenous pyrogens.
10. Describe chronic inflammation.
11. Describe granuloma and list its type along with causes.
12. Describe the systemic effects of acute and chronic inflammation and their possible outcomes.
13. Describe the significance of ESR.
14. Give two examples of induced hypothermia in medicine.
15. Describe healing in specialized tissue.
16. Describe the differences between repair and regeneration.



17. Describe wound healing by first and second intention.
18. Discuss the factors that influence the inflammatory reparative response.
19. Compare wound contraction with cicatrization.
20. Describe the formation of granulation tissue.
21. Describe the complications of wound healing.
22. Identify the following on microscopic and gross examination:
 - Acute appendicitis
 - Chronic cholecystitis
 - Chronic granulomatous inflammation
 - Morphological patterns of inflammation
23. Draw labeled diagrams of all the inflammatory cells.

HEMODYNAMIC DISORDERS, THROMBOEMBOLIC DISEASE & SHOCK

By the end of this topic, the students will be able to

1. Explain the pathogenesis of thrombosis.
2. Describe the possible consequences of thrombosis.
3. Define and classify emboli according to their composition.
4. Describe the difference between arterial and venous emboli.
5. Define edema, ascites, hydrothorax and anasarca.
6. Describe the pathophysiology of edema with special emphasis on chronic heart failure.
7. Describe the pathogenesis of four major types of shock (hypovolemic, cardiogenic, vasovagal & septic) and list their causes.
8. Describe the compensatory mechanisms involved in shock.
9. Identify the following on microscopic and gross examination:
 - Thrombus and clot
 - Hemorrhage
 - Embolus
 - Infarction

NEOPLASIA

By the end of this topic, the students will be able to

1. Define agenesis, dysgenesis, aplasia, hypoplasia, hyperplasia, metaplasia, dysplasia, neoplasia, anaplasia, atrophy and hypertrophy.
2. Describe the cell cycle and list cell types (stable, labile, permanent).
3. Explain the mechanisms controlling cell growth.
4. Describe the classification systems of tumors.
5. Compare the characteristics of benign and malignant tumors and the difference between carcinoma and sarcoma.
6. Describe the grading and staging system of tumors.
7. Describe the biology of tumor growth.
8. Discuss the process of carcinogenesis.
9. Describe host defense against tumors.
10. Discuss the mechanism of local and distant spread of tumor.
11. Discuss the local and systemic effects of tumors.



12. List tumor markers used in the diagnosis and management of cancers.
13. List common chemical, physical agents and viruses.
14. Microscopic and gross identification of:
 - Malignant cell
 - Benign epithelial tumors
 - Benign mesenchymal tumors
 - Malignant epithelial tumors
 - Malignant mesenchymal tumors

GENETICS

By the end of this topic, the students will be able to

1. List the common sex linked, autosomal recessive and autosomal dominant disorders.
2. Describe and give examples of common genetic mutations.
3. Describe diseases associated with consanguineous marriages.
4. Describe molecular biology techniques.

IMMUNOLOGY

By the end of this topic, the students will be able to

1. Define antigen, antibody, epitope, hapten and adhesion molecules.
2. Differentiate between innate and acquired immunity.
3. Describe the structure and function at major histocompatibility complex (MHC).
4. Describe Cytokines.
5. Describe the mechanism of humoral and cell mediated immunity.
6. Describe type I, Type II, Type III, and type IV hypersensitivity reactions giving relevant examples.
7. Define autograft, homograft, allograft and xenograft.
8. Describe immunotolerance and immunoparalysis.
9. Discuss the mechanism involved in allograft rejection and steps that can be taken to combat rejection.
10. Classify the immunodeficiency disorders.
11. Describe the basis of autoimmunity.
12. Describe tissue transplantation.
13. Describe the pathology and pathogenesis of AIDS.
14. Describe the lab diagnosis of immunological diseases.
15. Discuss various serological diagnostics techniques.

MICROBIOLOGY

General Bacteriology

By the end of general bacteriology, the students will be able to

1. Differentiate between prokaryotes and eukaryotes.
2. Describe general characteristics, morphology, growth of bacteria and culture media.
3. Describe classification & taxonomy of bacteria.



4. Define the terms: communicable, endemic, epidemic, pandemic diseases, carriers, pathogens, opportunists, commensals, colonizers, normal flora, pathogenicity, virulence etc.
5. Explain microbial mechanisms of invasion and virulence.
6. Differentiate between sterilization & disinfection and explain the methods of sterilization & disinfection.
7. Explain hospital acquired or nosocomial infections.
8. Give universal precautions for infection control.
9. Define antibiotic, selective toxicity, broad spectrum & narrow spectrum antibiotic, bacteriostatic and bactericidal drugs, MIC, MBC, superinfection, cross- sensitivity.
10. Describe mode of action of various antimicrobial drugs.
11. Explain bacterial resistance and mechanisms involved in acquiring bacterial resistance.
12. Explain various mechanisms of gene transfer in bacteria and their application.
13. Describe various serological diagnostic techniques for infectious diseases.
14. Disinfect and sterilize the following:
 - Facility where the doctor practices
 - Examination table
 - Any spillage e.g. sputum, vomitus, stool, urine, blood
 - Examination tools, e.g., thermometer, nasal and ear specula and spatula
15. Prepare area for aseptic techniques like:
 - Venepuncture
 - Catheterization
16. Prepare smears from specimens and from culture plates.
17. Perform gram staining and Z.N staining and interpret results.
18. Discuss the procedure of sample collection and transport.
19. Perform complete urine examination: physical, chemical and microscopy and interpret results.

Special Bacteriology

By the end of special bacteriology the students will be able to

1. Describe morphology, cultural characteristics, virulence factors, pathogenesis, epidemiology, treatment, prevention and control of all bacteria that have been listed below:
 - Staphylococcus
 - Streptococcus
 - Neisseria
 - E. coli
 - Klebsiella
 - Salmonella
 - Shigella
 - Enterobacter
 - Citrobacter
 - Proteus
 - Bacillus



- *Corynebacterium diphtheriae*
 - Clostridia
 - *Listeria monocytogenes*
 - Actinomycetes
 - *Vibrio*
 - *Campylobacter*
 - *Helicobacter*
 - *Hemophilus*
 - *Bordetella*
 - *Legionella*
 - *Pseudomonas*
 - *Acinetobacter*
 - *Mycobacteria*
 - Anaerobes
 - Spirochetes
 - *Mycoplasma*, *Chlamydia*, *Rickettsia*
 - Zoonosis
2. List the microorganisms responsible for the infection of the following organ systems:
- Central Nervous System
 - Respiratory System
 - Gastrointestinal System
 - Genital System
 - Urinary System
 - Bones and Joints
 - Zoonosis
 - Skin
 - Liver
3. Perform the biochemical tests that have been listed and interpret positive and negative results:
- Catalase test
 - Coagulase test
 - DNase test
 - Bile solubility test
 - Bile esculin hydrolysis test
 - Oxidase test
 - TSI
 - Indole test
 - Citrate utilization test
 - Motility test
 - Urease test
4. Identification of AFB in Sputum.
5. Identification of Culture on Lowenstein–Jensen medium.
6. Identification of α & β hemolysis on blood agar plate.



7. Differentiation of LF and NLF on MacConkey and CLED agar plate.

PARASITOLOGY

By the end of parasitology the students will be able to

1. Classify parasites.
2. Explain life cycle, mode of transmission, pathogenesis, clinical findings, treatment, prevention and control of the following parasites:
 - Giardia lamblia
 - Entamoeba histolytica
 - Cryptosporidium
 - Trichomonas vaginalis
 - Plasmodium species
 - Leishmania species
 - Naegleria species
 - Toxoplasma gondii
 - Pneumocystis carinii
 - Ascaris lumbricoides
 - Ancylostoma duodenale
 - Necator americanus
 - Trichuris trichuria
 - Enterobius vermicularis
 - Filaria species
 - Strongyloides stercoralis
 - Schistosoma species
 - Echinococcus species
 - Taenia Solium
 - Taenia saginata
 - Diphyllbothrium latum
 - Hymenolepis nana
 - Wuchereia
3. Perform stool analysis including physical and microscopic examination and identify cysts / ova.

VIROLOGY

By the end of virology the students will be able to

1. Classify viruses.
2. Describe mode of replication of viruses.
3. Describe diagnostic techniques of various viral infections.
4. Explain morphology general characteristics, pathogenesis, clinical findings, epidemiology, treatment and prevention / control of following viruses:
 - Mumps
 - Herpes
 - Measles
 - Influenza



- Parainfluenza
- RSV
- Hepatitis A, B, C, D, E
- Rota
- CMV
- EBV
- Rubella
- Chicken Pox
- HIV
- Rabies
- Dengue
- Ebola
- Zika



ASSESSMENT PLAN

Formative Assessment:

It will be carried out throughout the academic year to provide timely feedback to the students and help them to identify learning gaps. It includes surprise quizzes, tests during SGDs and LGIS. They may be graded so that students can judge themselves in comparison with their peers.



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RECOMMENDED BOOKS & REFERENCES

RECOMMENDED READING

1. Kumar, Cortan, Robbins. Pathological Basis of Disease. 9thEd. W.B. Saunders.
2. Levinson, Jawetz. Medical Microbiology and Immunology. 9th Ed. McGraw-Hill.
3. Jorde. Medical Genetics. 3rdEd. Mosby.
4. AH Nagi. Clinical Pathology Interpretations.

REFERENCE BOOKS

1. James CE Underwood, Simon S Cross. General and Systematic Pathology: with STUDENT CONSULT Access. 5th Ed.
2. JB Walter, MS Israel. General Pathology. 7th Ed.
3. David Lowe. General Pathology: Vivas- Questions You Will be Asked.
4. Nicholas P. Money. Microbiology: A Very Short Introduction (Very Short Introductions)
5. Monica Cheesbrough. Medical Laboratory Manual for Tropical Countries: v.2: Microbiology.