

V SEMESTER
COURSE 12 A: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

credits -3

I Course outcomes:

By the Completion of the course the learner should able to–

1. Describe the key concepts in Immunology and how the immune system is able to discriminate self vs. non-self
2. Explain how the innate and adaptive immune systems work together to generate an effective immune response against a specific pathogen.
3. Explain how the immune system is able to respond to so many diverse antigens.
4. To understand the importance of pathogenic microorganisms in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract etc
5. To understand and able to correlate disease symptoms with causative agent, isolate and identify pathogens.

Unit - 1: Immune System

No. of Hours:9

1. Concept of Innate and Adaptive immunity
2. Primary and secondary organs of immune system - thymus, bursa fabricius, bone marrow, spleen, lymph nodes and lymphoid tissues
3. Cells of immune system- Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils Components of innate immunity; Complement system (in brief)

Unit - 2: Immune response

No. of Hours 9

1. Characteristics of antigen (Foreignness, Molecular size, Heterogeneity and solubility) haptens.
2. Antibodies - basic structure and types.
3. **Generation of Immune Response - Primary and Secondary Generation of Humoral Immune Response (Plasma and Memory cells), MHC Generation of Cell Mediated Immune Response**
4. Immune complex formation and elimination -Agglutination, Precipitation, Neutralisation, Complement fixation, Phagocytosis
5. Hypersensitivity- definition and types (in brief)

Unit - 3: Microbes in Health and Disease

No. of Hours:9

1. Normal flora of human body.
2. Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections.

3. General account on microbial diseases - causal organism, pathogenesis, epidemiology, diagnosis, prevention and control of the following
Bacterial diseases - Tuberculosis, Typhoid, Botulism Fungal diseases - Candidiasis.
Viral Diseases - Hepatitis- A and AIDS

Unit - 4: Principles of Diagnosis

No. of Hours:9

1. General principles of diagnostic microbiology- Collection, transport of clinical samples
2. Identification by culturing
3. Identification by biochemical/physiological properties
4. Identification by molecular assays (PCR, DNA probes)
5. Identification by serological tests (ELISA, Immunofluorescence, Agglutination based tests, Complement fixation)

Unit - 5: Prevention and Treatment

No. of Hours:9

1. Vaccines - Active (Natural and recombinant) and passive
2. Antimicrobial agents- General modes of action of antibacterial (Penicillin, Streptomycin), antifungal (Amphotericin and Griseofulvin), antiviral (Amantadine, Acyclovir)agents
3. Interferons
4. Antibiotic resistance -Tests for antimicrobial susceptibility (Disc diffusion)

II Skill Outcomes:

By the completion of the course the learner should able to– 1.Perform some of the ag-ab reactions

2. Carry out the biochemical tests useful for identification of bacteria
3. Perform antibiotic sensitivity test
4. Identify some common symptoms and relate them to etiology
5. Prepare some differential media routinely used for identification of bacteria

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credits -1

1. Identification of human blood groups.
2. Separate serum from the blood sample (demonstration).
3. Immunodiffusion by Ouchterlony method.
4. Identification of any of the bacteria (E. coli, Pseudomonas, Staphylococcus, Bacillus) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease production and catalase tests
5. Study of composition and use of important differential media for identification of

6. bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS Isolation of bacterial flora of skin by swab method.
7. Antibacterial sensitivity by Kirby-Bauer method
8. Determination of minimal inhibitory concentration of an antibiotic
9. Study symptoms of the diseases with the help of photographs: Anthrax, Polio, Herpes, chicken pox, HPV warts, Dermatomycoses (ring worms)
10. Isolation of Normal flora of human body (Hands, Feet, Nostrils, Teeth Surface) by swab method.

III References

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
3. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.
4. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
5. Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
6. Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Microbiology. 4th edition. Elsevier Publication.
7. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education Practical microbiology-M.N.Reddy Practical microbiology-M.N.Reddy
8. Microbiology: a laboratory manual / James G. Cappuccino, Natalie.
9. Plant pathology and Microbiology-K.R.Aneja
10. Mackie & McCartney Practical Medical Microbiology,

VI. Co-Curricular Activities:

1. Screening of Blood groups
2. Visit to Diagnostic /Laboratory
3. Competition on composition and sterile media preparation
4. Competition on Isolation and Identification of bacteria from a sample