ZOH551- BIOLOGY OF IMMUNE SYSTEM

Teaching Hours 10 /Unit

COURSE OUTCOME

1. It is an important course as students are trained to understand the basics of immunology .
2. Evolution of immune cells and organs in vertebrates and invertebrates is discussed.
3. To know about antigen, immunogen, epitopes and their properties.
4. Development of immune responses, organs and molecules involved in it are also dealt in detail.
5. Howour immune system fights different pathogens and evasive mechanisms developed by the microbes.
6. The discussion also includes autoimmunity and applied aspects like immunological basis of organ transplantation, development and applications of vaccines.

UNIT I

Overview of the immune system: Historical perspectives and important concepts.
Cells, organs and micro environments of immune system: Cells of immune system, Primary lymphoid organs, Secondary lymphoid organs, Tertiary lymphoid organs
Innate immunity: Components of innate immunity, Interactions between innate and adaptive immunity systems.The complement system: Major pathways of complement activation, diverse functions, Regulation of complement activation, Complement deficiencies and microbial evasion strategies.

UNIT II

Antigens and Immunogens: Immunogens and immunogenicity, Properties of immunogens, Epitopes and their characteristic properties, Adjuvants, Haptens.
Major histocompatibility complex: Structure and function of MHC molecules, General organization and Inheritance of the MHC, Role of MHC and Expression patterns,
MHC and immune responsiveness, MHC alleles and suceptiblity to diseases.
Processing and presentation of antigens: Endogenous and Exogenous pathway of antigen processing and presentation of antigens, Cross presentation of exogenous antigens, presentation of nonpeptide antigens.

UNIT III

Structure and function of antibodies: Structure of Antibodies, Antibody binding site, Antibody mediated effector functions, Antibody classes and biological activities, Antigenic determinants on antibodies, B-Cell receptor, Immunoglobulin super family and monoclonal antibodies, abzymes.
B – cell development: Development in bone marrow, Development of B-1 and marginal-zone B cells, B cell activation, Differentiation and Memory generation.
Receptor and signaling: Receptor ligand interactions, Common strategies used in many signaling pathways, Signal transduction in B cells.

UNIT IV

T – cell development : Early thymocyte development, T-cell activation differentiation and memory .T- cell receptor and co-receptor complex, accessory molecules and signaling.
Cell mediated effector responses , Experimental assessment of cell –mediated cytotoxicity.
T-cell responses to tumors, regulatory T-cell responses an memory, T-cell responses.
Immune cell behaviour- before antigen is introduced, during innate immune response, during adaptive immune response and in peripheral tissues.

UNIT V

Tolerance: Establishment and maintenance of tolerance; Immunosuppression and induction of immunosuppression.
Autoimmunity: autoimmune diseases, factors responsible for induction, mechanisms of induction and treatment.
Infectious diseases; Bacterial, Viral, Protozoan and Fungal infections and evasive mechanisms developed by microbes.
Vaccines: Active and passive immunization, Vaccine strategies, Types of vaccines advantages and challenges
Transplantation immunology: Types of transplants, Graft rejection, Tissue typing Immune tolerance to allografts, clinical transplantations.

REFERENCES

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2) Coleman, R.M., Lombard M.F., and Sicard R.E. (2014) Fundamental Immunology, 2nd 3dition, McGraw Hill Education (India) Private Limited, New Delhi.
3) Delves, P.J., Martin S.J., Burton D.R., and Roitt I.M. (2011) Roitt's Essential Immunology. John Wiley and Sons Ltd, U.K.
4) Elgert, K. D. (2009) Immunology, 2nd edition, Wiley Blackwell, Johm Wiley and sons, New Jersey.
5) Gangal, S. and Sontakke, S. (2013) Textbook of basic and Clinical Immunology, University press(India) Private Limited, Hyderabad.
6) Janeway, C.A., Travers P., Walport M., and Shlomchik M.J. (2005) Immunobiology, 6th edition, Garland Science Publications, New York.
7) Kumar, A. (2013) Textbook of Immunology, The Energy and Resources Institute (TERI), New Delhi.
8) Male, D., Brostof F. J., Roth D.B., and Roitt I.M. (2013) Immunology, 8th edition, Elsevier Saunders, United States.
9) Owen, J A, Punt J. and Stanford S. A. (2013) Kuby Immunology Seventh Edn. Macmillan Higher Education International edition, England.