BTS 503 IMMUNOTECHNOLOGY (SOFT CORE COURSE) Hours: 40

Course outcome

Students will be able to:

CO 1. Understand the structure, components and functioning of the immune system, including toxins and toxin resistance

CO 2. Understand the molecules related to immune system such as immunoglobulins, antigens and the genes associated with diversity and specificity, tissue histocompatibility

CO 3. Learn reactions and concepts and various techniques associated with immunoglobulins such as in diagnostics and research, vaccine development etc.

CO 4. Learn about advances in the field for application in therapeutics

UNIT I (13 hrs)

History and scope of immunology. Types of immunity – humoral and cell-mediated. Innate and adaptive immunity. Specificity and memory. Primary and secondary lymphoid organs; immunization. Cells involved in immune response-T-cells, B-cells. Clonal selection theory. Lymphocyte activation, clonal proliferation, differentiation. Effector mechanisms in immunity-macrophage activation. Lymphokines – Interleukins and their role in immune regulation. Toxin and Toxin resistance.

UNIT II (13 hrs)

Antigens and haptens, determinants; types of immunoglobulins: structure, distribution and function. Antigen-antibody reactions – Antigen equilibrium, dialysis, precipitation reactions, immunodiffusion. Affinity and Avidity. Immunization and antibody response. Antibody diversity - V, D, J, gene segments and DNA rearrangements, molecular biology of antibody synthesis. Complement system. Human and mouse, MHC, Transplantation immunology. HLA in human health and disease HLA tissue typing. Immune-suppression in transplantation.

UNIT III (14hrs)

Hypersensitivity reaction, treatment approaches. Immunological tolerance. Autoimmune diseases. Thyrotoxicosis, Systemic Lupus Erythematosus, Antinuclear antibodies. Tumor immunology – tumor antigens, immuno-surveillance, immunological escape. Immune deficiency diseases – AIDS; Immunological tolerance. Production, purification and characterization of monoclonal antibodies. Polyclonal antibodies versus monoclonal antibodies. T-cell cloning and their applications. ELISA, RIA, Western blotting, Fluorescent techniques, Fluorescent activated cell sorter (FACS). Concepts in vaccine development. Types of vaccines. Immunotherapeutic approaches to disease treatment-immunotoxins, Lymphokine- activated killer cells.

References

1. Cellular and Molecular Immunology. Abbas, A.K. et al., Elsevier Saunders Co., 2015
2. Essential Immunology. Riott, I.M., Blackwell Scientific Publications, 1994
3. Handbook of Experiments in Immunology, Vol. 1 & 2, Weir D.M., Wiley, 1997
4. Kuby Immunology. Kindt T.J. et at., W.H. Freeman & Co. 2007
5. Immunology. Riott, I.M., BrostoffJ., Male, D. Mosby Pub., 2001
6. Immunobiology. Janeway C.A. and Travers, P. Churchill Livingstone Pub., 1996
7. Practical Immunology. Hudson L. and Hay F.C., Blackwell Scientific Pub., 1989