Paper No- 16
Immunology

THEORY

1. **Cells and organs of the immune system** **(4 lectures)**
   Hematopoiesis, cells of the immune system, primary and secondary lymphoid organs and tissues (MALT).
   [*Kuby: Immunology (2007) Kindt et al., p23- 26, p30-49*]

2. **Innate immunity and leukocyte extravasation** **(6 lectures)**
   Anatomical barriers, cell types of innate immunity, soluble molecules and membrane associated receptors (PRR), connections between innate and adaptive immunity, cell adhesion molecules, chemokines, leukocyte extravasation, localized and systemic response.
   [*Kuby: Immunology (2007) Kindt et al., p52-69, p327-334, p340-344]*

3. **Immunogens and antigens** **(2 lectures)**
   Antigens and haptens, factors that dictate immunogenicity, B and T cell epitopes.
   [*Kuby: Immunology (2007) Kindt et al., p77-84]*

4. **Antibody structure and function** **(4 lectures)**
   Structure and distribution of classes and subclasses of immunoglobulins (Ig), Ig fold, effector functions of antibody, antigenic determinants on Ig and Ig super family**.**
   [*Immunology: A Short Course (2009) Coico and Sunshine, p41-57]*

5. **Generation of receptor diversity** **(4 lectures)**
   Dreyer-Bennett hypothesis, multigene organization of Ig locus, mechanism of V region DNA rearrangement, ways of antibody diversification.
   [*Kuby: Immunology (2007) Kindt et al., p111-130]*

6. **Biology of the B lymphocyte** **(5 lectures)**
   Antigen independent phase of B cell maturation and selection, humoral response – T-dependent and T-independent response, anatomical distribution of B cell populations.
   [*Immunology: A Short Course (2009) Coico and Sunshine, p93-104]*

7. **Complement system** **(3 lectures)**
   Complement activation by classical, alternate and MB lectin pathway, biological consequences of complement activation, regulation and complement deficiencies.
   [*Immunology: A Short Course (2009) Coico and Sunshine, p205-217]*

8. **MHC complex and antigen presentation** **(4 lectures)**
   General organization and inheritance of MHC, structure, distribution and role of MHC class I and class II proteins, linkage disequilibrium, pathways of antigen processing and presentation.
   [*Immunology: A Short Course (2009) Coico and Sunshine, p107-121*]

9. Biology of the T lymphocyte (3 lectures)

Structure and role of T cell receptor, and co-receptor, T cell development, generation of receptor diversity, selection and differentiation.

[*Immunology: A Short Course (2009) Coico and Sunshine, p125-136]*

10. Cell mediated cytotoxic responses (3 lectures)

General properties of effector T cells, cytotoxic T cells (Tc), natural killer cells; NKT cells and antibody dependent cellular cytotoxicity (ADCC).

[*Kuby: Immunology (2007) Kindt et al., p351-366]*

11. Tolerance, autoimmunity and hypersensitivity (6 lectures)

Organ specific and systemic autoimmune diseases, possible mechanisms of induction of autoimmunity, Gell and Coombs classification, IgE mediated (Type I) hypersensitivity, antibody mediated cytotoxic (Type II) hypersensitivity, immune complex mediated (type III) hypersensitivity and delayed type (Type IV) hypersensitivity.

[Immunology: A Short Course (2009) Coico and Sunshine , p183-201, p221-229, p237-241, p247-25]

12. Transplantation immunology and vaccines (4 lectures)

Immunological basis of graft rejection, clinical manifestations, immunosuppressive therapy and privileged sites. Vaccines - active and passive immunization, types of vaccines.

[*Immunology: A Short Course (2009) Coico and Sunshine, p285-295, p321-332*]

Essential Readings

1. Kuby Immunology (2007) 6th ed., Kindt, T.L., Goldsby, R.A. and Osborne, B.A., W.H Freeman and Company (New York), ISBN:13: 978-0-7167-8590-3 / ISBN: 10:0-7617-8590-0.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7.
3. Janeway's Immunobiology (2012) 8th ed., Murphy, K., Mowat, A., and Weaver, C.T., Garland Science (London & New York), ISBN: 978-0-8153-4243-4.

PRACTICALS

1. Isolation of lymphocytes from blood and macrophages from peritoneal cavity or spleen.
2. Purification of immunoglobulins.
3. Assays based on precipitation reactions - Ouchterlony double diffusion (ODD) and Mancini radial immunodiffusion.
4. Assays based on agglutination reactions - Blood typing (active) & passive agglutination.
5. Enzyme linked immune-sorbent assay (ELISA).