PACIFIC MEDICAL UNIVERSITY, UDAIPUR

Ph.D. Entrance Syllabus: Histo Compatibility and Immunogenetics

Ph.D. Entrance Syllabus – Histo-Compatibility & Immunogenetics

1. Basic Immunology

- Innate immunity
    - Complement system
    - Phagocytosis
    - Cytokines & chemokines
- Adaptive immunity
    - T cell & B cell development
    - Antigen recognition
    - Immunoglobulins
    - Major Histocompatibility Complex (MHC)
- Immune regulation
    - T-reg cells
    - Immune tolerance
    - Autoimmunity
- Hypersensitivity reactions (Types I–IV)

2. HLA System (Human Leukocyte Antigen)

- HLA structure & function
- HLA gene organization
- HLA class I and II molecules
- HLA polymorphism and nomenclature
- HLA typing methods
    - Serological typing
    - Molecular typing (PCR-SSP, PCR-SSO, SBT)
- HLA and disease association
- HLA in transplantation

    - Solid organ
    - Hematopoietic stem cell transplantation
- HLA antibody testing (DSA, PRA, crossmatch)

3. Histocompatibility Testing & Transplant Immunology

- Principles of transplantation immunology
- Graft rejection
    - Hyperacute
    - Acute
    - Chronic
- Immune suppression
    - Induction therapy
    - Maintenance therapy
    - Drug mechanisms & monitoring
- Crossmatch techniques
- Donor selection & matching
- GVHD (Graft vs Host Disease)

4. Immunogenetics

- Genetic basis of immune system
- Gene expression & regulation
- Polymorphism & linkage disequilibrium
- Population genetics & HLA distribution
- Genetic susceptibility to diseases
- Pharmacogenetics in transplantation

5. Laboratory Techniques & Quality Management

- Flow cytometry
- ELISA, Luminex
- PCR, RT-PCR, qPCR
- Next-generation sequencing (NGS) basics

- Cell culture & lymphocyte activation assays
- Immunofluorescence
- Molecular diagnostics
- Laboratory biosafety & biosecurity
- Quality control, QA/QC, accreditation (NABL/ISO)

6. Clinical Applications

- Kidney transplantation
- Liver transplantation
- Heart & lung transplantation
- Bone marrow transplantation
- Stem cell therapy
- Immunotherapy in cancer
- Autoimmune disorders & HLA

7. Research Methodology & Biostatistics

- Research design & protocol writing
- Study designs
- Sample size calculation
- Data analysis
- Statistics relevant to immunogenetics
- Ethics in research
- ICMR guidelines
- Scientific writing & publication ethics

8. Ethical & Legal Aspects

- Consent in transplantation
- Organ donation laws
- Bioethics
- Patient confidentiality
- Regulatory bodies & guidelines