

## Applied Immunology Internship

### Advanced Focused Areas for Interns in Applied Immunology Internships

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## **1. Immune System Development**

Focuses on the processes by which the immune system develops from early embryonic stages to maturity, including the formation and maturation of immune cells.

## **2. Immune Response Mechanisms**

Studies the various mechanisms through which the immune system recognizes and responds to pathogens, including the activation of immune cells and the production of antibodies.

## **3. Antigen Presentation Pathways**

Focuses on the pathways by which antigens are processed and presented to T cells, a critical step in the initiation of adaptive immune responses.

## **4. T Cell Biology**

Studies the development, differentiation, and functions of T cells, which play a central role in the adaptive immune response.

## **5. B Cell Biology**

Focuses on the biology of B cells, including their role in antibody production, memory formation, and interaction with other immune cells.

## **6. Innate Immunity**

Studies the components and mechanisms of the innate immune system, the body's first line

of defense against infections.

## 7. **Adaptive Immunity**

Focuses on the adaptive immune system, which provides a targeted and long-lasting response to specific pathogens through the actions of T and B cells.

## 8. **Autoimmunity**

Studies the mechanisms that lead to autoimmune diseases, where the immune system mistakenly attacks the body's own tissues.

## 9. **Immunotherapy**

Focuses on treatments that harness and enhance the immune system to fight diseases, including cancer and chronic infections.

## 10. **Vaccine Development**

Studies the design, development, and testing of vaccines to prevent infectious diseases and other health conditions by inducing an immune response.

## 11. **Allergy and Hypersensitivity**

Focuses on the immune mechanisms underlying allergic reactions and hypersensitivity disorders, including the role of IgE antibodies and mast cells.

## 12. **Transplant Immunology**

Studies the immune response to transplanted organs and tissues, including the mechanisms of rejection and the development of immunosuppressive therapies.

## 13. **Immunogenetics**

Focuses on the genetic basis of immune system function and its role in disease susceptibility, transplant compatibility, and response to therapies.

## 14. **Immune Signaling Pathways**

Studies the signaling pathways that regulate immune cell activation, proliferation, and differentiation, critical for coordinating immune responses.

## 15. **Immunological Tolerance**

Focuses on the mechanisms that prevent the immune system from attacking the body's own tissues, maintaining self-tolerance and preventing autoimmunity.

**16. Immuno-Oncology**

Studies the interaction between the immune system and cancer, including the development of immunotherapies that target tumors.

**17. Mucosal Immunology**

Focuses on the immune responses that occur at mucosal surfaces, such as the gut, respiratory tract, and urogenital tract, which are primary entry points for pathogens.

**18. Immunodeficiency Disorders**

Studies the genetic and acquired conditions that result in a weakened immune system, increasing susceptibility to infections.

**19. Neuroimmunology**

Focuses on the interactions between the nervous system and the immune system, including the role of inflammation in neurological diseases.

**20. Immunometabolism**

Studies the metabolic processes within immune cells that influence their function and the overall immune response, with implications for disease and therapy.

**21. Immunoengineering**

Focuses on the application of engineering principles to modify and enhance immune system function for therapeutic purposes, including the design of biomaterials and drug delivery systems.

**22. Immune Cell Therapy**

Studies the therapeutic use of immune cells, such as T cells and natural killer cells, to treat cancer and other diseases.

**23. Tumor Immunology**

Focuses on the immune system's response to tumors, including the mechanisms of immune evasion by cancer cells and the development of immunotherapies.

**24. Immunodermatology**

Studies the role of the immune system in skin diseases, including autoimmune skin disorders and the immune response to skin infections.

## **Immunotoxicology**

Focuses on the effects of toxic substances on the immune system, including the identification of immunotoxic agents and their impact on health.

### **26. Cytokine Storm**

Studies the excessive and uncontrolled release of cytokines, often seen in severe infections and immune disorders, leading to tissue damage and organ failure.

### **27. Immunobiomarkers**

Focuses on the identification and use of biomarkers to assess immune function, disease progression, and response to therapies.

### **28. Computational Immunology**

Studies the use of computational models and bioinformatics tools to understand immune system dynamics, predict immune responses, and develop new immunotherapies.

### **29. Immune Receptor Signaling**

Focuses on the signaling pathways triggered by the binding of antigens to immune receptors, leading to the activation of immune responses.

### **30. Pathogen-Host Interactions**

Studies the complex interactions between pathogens and the host immune system, including strategies used by pathogens to evade or manipulate the immune response.

### **31. Immunogenomics**

Focuses on the genomic analysis of immune system genes to understand their role in disease susceptibility, immune diversity, and response to treatments.

### **32. Immunoinformatics**

Studies the application of bioinformatics tools to analyze immunological data, including the prediction of epitopes, vaccine design, and immune system modeling.

### **33. Therapeutic Antibodies**

Focuses on the development and use of monoclonal antibodies and other engineered antibodies as treatments for diseases such as cancer, autoimmune disorders, and infectious diseases.

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## **Immunoassay Development**

Studies the design and optimization of immunoassays for detecting and quantifying antigens, antibodies, and other immune-related molecules in biological samples.

### **35. Vaccine Adjuvants**

Focuses on substances added to vaccines to enhance the immune response, improving the efficacy and durability of vaccination.

### **36. Immunosuppressive Therapies**

Studies the use of drugs and other treatments to suppress the immune system, used in conditions like autoimmune diseases and organ transplantation.

### **37. Immunological Memory**

Focuses on the mechanisms by which the immune system "remembers" previous encounters with pathogens, enabling a faster and more robust response upon re-exposure.

### **38. Immunotherapy in Autoimmune Diseases**

Studies the development and application of immunotherapies to modulate the immune response in autoimmune conditions, aiming to restore immune tolerance.

### **39. Immunotherapy in Cancer**

Focuses on harnessing the immune system to target and destroy cancer cells, including the use of checkpoint inhibitors, CAR-T cells, and cancer vaccines.

### **40. Immune Checkpoint Inhibitors**

Studies the development and use of drugs that block immune checkpoint proteins, unleashing the immune system to attack cancer cells.

### **41. Immune Cell Differentiation**

Focuses on the processes by which immune cells develop and differentiate into specialized cell types, such as T cells, B cells, and macrophages.

### **42. Gut Immunology**

Studies the immune system of the gastrointestinal tract, including the role of gut-associated lymphoid tissue (GALT) and the interaction between the immune system and gut microbiota.

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## **Immune System and Aging**

Focuses on how aging affects the immune system, leading to a decline in immune function and an increased susceptibility to infections, cancer, and autoimmune diseases.

### **44. Immunoproteomics**

Studies the proteomic aspects of the immune system, including the identification of immune-related proteins and their roles in health and disease.

### **45. Immunotherapy in Infectious Diseases**

Focuses on the use of immunotherapies to enhance the immune response against infectious diseases, including the development of novel vaccines and immune-modulating treatments.

### **46. Immune Evasion Strategies by Pathogens**

Studies how pathogens evade detection and destruction by the immune system, including mechanisms like antigenic variation, immune suppression, and molecular mimicry.

### **47. Immune System Regulation**

Focuses on the complex regulatory networks that control immune responses, maintaining a balance between immunity and tolerance to prevent overreaction or autoimmunity.

### **48. Immunodiagnostics**

Studies the development and application of diagnostic tools based on immune system components, such as antibodies and cytokines, for detecting diseases.

### **49. Systems Immunology**

Focuses on the integration of high-throughput data, computational models, and systems biology approaches to understand the immune system as a whole, its dynamics, and its interactions with other biological systems.

## **Other Categories**

### **• Fundamentals of Immunology**

- Components of the Immune System
- Innate and Adaptive Immunity
- Antigen Processing and Presentation
- Cell-Mediated and Humoral Immunity
- Cytokines and Immune Signaling
- Immune Response Regulation
- Immunological Memory and Vaccination
- Allergies and Hypersensitivity Reactions
- Autoimmunity and Tolerance

- Immune System Disorders
- **Immunological Techniques and Assays**
  - Flow Cytometry and Immunophenotyping
  - ELISA and Other Immunoassays
  - Western Blotting and Protein Analysis
  - Immunohistochemistry and Tissue Staining
  - Fluorescence-Activated Cell Sorting (FACS)
  - In Vivo and In Vitro Immunological Assays
  - Single-Cell Immunology Techniques
  - Use of Animal Models in Immunology
  - High-Throughput Screening and Immunomics
  - Advancements in Immunological Technologies
- **Applications in Clinical Immunology**
  - Diagnostics of Immunological Disorders
  - Immunotherapy and Cancer Treatment
  - Autoimmune Disease Management
  - Allergy Testing and Treatment
  - Infectious Disease Immunology
  - Vaccine Development and Immunization
  - Immunomodulatory Drugs and Therapies
  - Transplant Immunology and Tolerance Induction
  - Monoclonal Antibodies in Therapy
  - Gene Therapy and Immune System Engineering
- **Research and Innovations in Immunology**
  - Immunogenetics and Genomic Studies
  - Immunoinformatics and Computational Immunology
  - Systems Immunology and Network Analysis
  - Immunometabolism and Disease
  - Microbiome and Immune Interactions
  - Immune Checkpoints and Cancer
  - Development of Immunological Reagents
  - Cellular Immunotherapy Techniques
  - Emerging Infectious Diseases and Immunity
  - Frontiers in Immunology Research
- **Regulatory and Ethical Considerations**
  - Regulation of Immunological Diagnostics and Therapeutics
  - Ethical Issues in Immunology Research
  - Clinical Trials and Regulatory Approval
  - Patient Consent and Data Privacy
  - Use of Animals in Immunology Research
  - Intellectual Property and Immunological Innovations
  - Quality Control and Assurance in Immunology Labs
  - Public Health and Immunization Policies
  - Environmental and Societal Impacts of Immunology
  - Future Trends in Immunological Ethics
- **Future Directions and Emerging Trends**



## NTHRYS OPC PVT LTD Applied Immunology Internship

- Advancements in Immunotherapy
- Role of Immunology in Precision Medicine
- Emerging Technologies in Immunological Research
- Global Initiatives in Immunology
- Future of Immunological Diagnostics and Therapeutics
- Education and Training in Immunology
- Future Research Priorities in Immunology
- Impact of Biotechnology on Immunological Studies
- Next-Generation Immunology Techniques
- Public Engagement and Immunology Awareness

**Contact Via WhatsApp on +91-7993084748 for Fee Details**