Curriculum

FNB Fellowship

Paediatric Hemato-Oncology

- Introduction
- Programme Goal & Objectives
- Teaching and Training Activities
- Syllabus
- Competencies
- Log Book
- Recommended Text Books and Journals

This page has been intentionally kept blank.

INDEX

This page has been intentionally kept blank.

I. INTRODUCTION

The discipline of Pediatric Hematology/Oncology has continued to expand in both the clinical and basic science arenas over the last several decades. Discoveries of dominant oncogenes, tumor suppressor genes, gene transfer technology and hematopoietic growth factors have opened new areas of clinical and basic research, as well as provided new potential therapies for patients. Both the demonstrated improvement in care for pediatric patients with hematologic-oncologic disorders as well as the scientific excitement generated through research directed toward understanding of these disorders ensures that the discipline of Pediatric Hematology/Oncology will continue to be an exciting part of pediatric medicine and science in the future.

The field of Pediatric Hematology-Oncology encompasses a broad array of disorders of children and adolescents with Primary immunodeficiency disorders, solid tumors, hematological cancers and non-malignant disorders of the blood and blood-forming tissues. The intent of the Pediatric Hematology-Oncology fellowship Program is to train physician scientists, with the following attributes:

1) Skill in the prevention, diagnosis and management of disease so as to provide comprehensive, compassionate care for children and adolescents
2) Ability to contribute to the progress of the field through research
3) Ability to understand and interpret the research of others, and to integrate that understanding into their own practice
4) Excellence in teaching of medical students, residents and colleagues

Pediatric Hematology-Oncology Fellowship Training Program provides trainees with the necessary knowledge, skills, experience and mentorship to develop into independent physician-scientists or clinical/ translational investigators who will lead the field forward.

II. PROGRAMME GOAL & OBJECTIVES

1. Programme Goal

The main goals of Pediatric Hemato Oncology fellowship are

- Provide the clinical experience and educational opportunities necessary to build a solid foundation of medical knowledge, critical thinking abilities, literature review, diagnostic acumen and technical skills.

- Develop well-rounded, empathetic clinicians with the skills to successfully communicate and give counsel to patients and families.
- Provide academic pediatricians the research training and experience to develop careers as physician-scientists.
- Impart the skills necessary to become lifelong learners, teachers, and leaders who can work effectively with team members.
- Teach professionalism via mentorship with emphasis on the critical roles of personal ethics, responsibility, respect, compassion, communication and self- awareness.

2. Programme Objectives

- Acquisition of a fundamental knowledge base in Pediatric Hematology, Oncology and BMT
- Development of clinical skills in Pediatric Hematology, Oncology and BMT
- Development of skills in interpreting basic laboratory tests pertinent to Pediatric Hematology, Oncology and BMT
- Development of skills in preparing clinical presentations, discussions of cases, and case reports
- Development of skills in process improvement
- Initiation of research interests

III. TEACHING AND TRAINING ACTIVITIES

The fundamental components of the teaching programme should include:

1. Case presentations & discussion- once a week
2. Seminar – Once a week
3. Journal club- Once a week
4. Grand round presentation (by rotation departments and subspecialties)- once a week
5. Faculty lecture teaching- once a month
6. Clinical Audit-Once a Month
7. A poster presentation and one oral presentation at least once during their training period in a recognized conference.

The rounds should include bedside sessions, file rounds & documentation of case history and examination, progress notes, round discussions, investigations and management plan) interesting and difficult case unit discussions.

The training program would focus on knowledge, skills and attitudes (behavior), all essential components of education. It is being divided into theoretical, clinical and practical in all aspects of the delivery of the patient care, including methodology of research and teaching.

Theoretical: The theoretical knowledge would be imparted to the candidates through discussions, journal clubs, symposia and seminars. The students are exposed to recent advances through discussions in journal clubs. These are considered necessary in view of an inadequate exposure to the subject in the undergraduate curriculum.

Symposia: Trainees would be required to present a minimum of 20 topics based on the curriculum in a period of three years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

Clinical: The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice.

Bedside: The trainee would work up cases, learn management of cases by discussion with faculty of the department.

Journal Clubs: This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and limitations, if any, will be highlighted.

Research:. He/ she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

Seminars and journal clubs: Seminars and journal clubs will be held once a week. Candidates are required to present 1 seminar and 2 journal clubs per month.
Therapeutic case and problem discussions: This will be held every week and each student is expected to present every week after the first 3 months. Experts from related specialties will be present for these discussions.

Patient care, teaching and research: It is expected that the fellowship candidates will contribute to patient care in the hematology department in all aspects i.e. management of indoor patients, OPDs, emergencies, as well as the laboratory work up of the patients. They are also required to give lectures on selected topics to the postgraduate medical students of Pediatrics.

Attending conferences: The candidate will attend the Annual conference of the Pediatric Hematology Oncology Chapter or any other similar conference and present a paper (oral)/ poster on the work carried out during the fellowship tenure. Candidates will also be encouraged to participate in other related, CMEs etc. organized in the city.

Schedule for Postings

- Inpatient hematology and oncology
- Outpatient hematology and oncology
- Hematology rotation (including transfusion medicine, hematopathology, special coagulation, adult hematology)
- Bone marrow transplant
- Radiation Oncology
- Research Exploration

IV. SYLLABUS

Hematology

- Physiology of Hemostasis and Hematopoiesis
- Classification & Diagnosis of Anemia during Childhood
- Anemia During the Neonatal Period
- Erythroblastosis Fetalis
- Iron-Deficiency Anemia

- Magaloblastic Anemia
- Hematologic Manifestations of Systemic Illness
- Bone Marrow Failure syndromes including Acquired Marrow failure
- Hemolytic Anemia due to Membrane & Enzyme Defects
- Hemoglobinopathies…. Sickle Cell Disease/ Thalassemia
- Extracorpuscular Hemolytic Disease (AIHA etc)
- Polycythemia
- Disorders of White Blood Cell
- Disorders of Platelets
- Hemostatic Disorders
- Thrombotic Disorders
- Lymphadenopathy and Splenomegaly
- Porphyrias
- Diagnostic Methodologies in Pediatric Hematology
- Various National Health Programme in Anemia

Transfusion Medicine

- Indications for transfusion of various components
- Methods of preparation of components
- Cryopreservation of Stem Cells
- Transfusion Reactions
- Transfusion Transmitted Diseases

Oncology

- Main Objective: To understand the epidemiology, molecular and cellular biology of various tumors.

Chemotherapy

- Main objective: To know the mechanism of action, indications, toxicities and management of chemotherapeutic agents used in patients with malignancies.

i. Principles of chemotherapy

a) Principles of combination chemotherapy
b) Principles of drug resistance
c) Specific agents

ii. Immunologic Abnormalities

Main Objective: To know the management of infections in immuno compromised patients.

- Bacterial Prophylaxis
- Fungal Prophylaxis
- Viral Prophylaxis
- Treatment of infection in immunocompromised patients
- Early Warning Signs of Cancer in Children/ Models for Early Diagnosis
- Procedures in Pediatric Oncology: Practical Guidelines

iii. Cancer

- Etio-pathogenesis of cancer
- Epidemiology of cancer
    - Age-related incidence
    - Race-related incidence
    - Genetic factors
    - Chemical-related factors
    - Environmental factors
    - Immunologic factors

- Tumor molecular and cellular biology factors
- Oncogenesis and cell growth regulation factors
    - Lymphoproliferative Disorders
    - Myelodysplastic Syndromes
    - Myeloproliferative Disorders
    - Leukemias
    - Histiocytosis Syndromes
    - Hodgkin's Disease
    - Non-Hodgkin Lymphoma
    - Central Nervous System Malignancies
    - Neuroblastoma
    - Wilms' Tumor
    - Rhabdomyosarcoma & Other Soft Tissue Sarcomas
    - Malignant Bone Tumors and Osteosarcoma
    - Retinoblastoma

- Germ Cell Tumors
- Primary Hepatic Tumors
- Gonadal/ Germ cell tumors
- Rare Tumors
- Tumors in adolescents and young adult
- HLH
- Hematopoietic Stem Cell Transplantation

iv. Rationale, principles, procedures of Hematopoietic stem cell transplant

- Oncological, hematological, Immunological, metabolic and autoimmune diseases which are correctable with transplant procedure
- Rationale for transplant for a given disease or disease status, such as for high-risk malignant disease
- Urgency of the workup of a patient with diagnosis of severe aplastic anemia, and the identification of a suitable histocompatible sibling donor so that transplant procedure can be undertaken as soon as possible, before multiple transfusions are given
- Pre-transplant evaluation process (to evaluate organ function) to determine the suitability of an individual patient to undergo transplant procedure
- Methods in which transplant recipients are conditioned for the transplant procedure, as well as rationale for the specific transplant conditioning regimen and design of the conditioning regimen
- Sources of hematopoietic stem/progenitor cells available for the procedure of stem cell transplant, as well as the rationale for the selection of a particular source of stem cell product
- Process of acquisition and procurement of stem cells, as well as the rationale and the procedures utilized for the processing of the stem cells prior to transplant procedure
- Immunosuppressive therapy for the prevention of graft versus host disease, graft rejection the mode of administration of these agents, as well as their respective benefits and side effects
- Acute, delayed and chronic complications associated with the transplant procedure and management of these complications, i.e. acute and chronic GvHD, veno-occlusive disease, immunodeficiency, infections, bleeding complications, acute organ failure, delayed organ dysfunctions including

growth and development, endocrine functions, and effect on neurocognitive function

- Management of patients undergoing hematopoietic stem cell transplant and immunocompromised patients hematological and immunological recovery, prevention of management of graft versus host disease, effects of chronic GVHD and other late effects of procedure of transplantation. Clinical and histolopathological changes with GVHD and use of drugs and procedures appropriate for the treatment of CGvHD.
- Implementation of all the guideline for the care of immunocompromised patients including limiting environmental exposures to micro organisms by proper isolation measures, maintenance of the patients in proper air handled environment, and administration of prophylactic antimicrobial therapy.
- The knowledge of Stem cell procurement process, which includes the evaluation of the patient for suitability for the procedure, consenting process for the procedure, collection of the product (Bone Marrow harvest under general anesthesia or collection of the peripheral blood stem cells by apheresis procedure) and evaluation of the product collected

v. Gene Therapy
vi. Monoclonal Antibodies in Pediatric Hematology and Oncology
vii. Biological Response Modifiers
viii. Management of Oncologic Emergencies
ix. Supportive Care of Patients with Cancer
x. Nutritional Assessment and Intervention
xi. Palliative and Supportive Care
xii. Evaluation, Investigations & Management of Late Effects of Childhood Cancer
xiii. Psycho-Social Aspects of Managing Oncologic Patients
xiv. Childhood Cancer in Low-Income and Middle-Income Countries in the Twenty-First Century
xv. Cancer Registries and the Descriptive Epidemiology of Pediatric Cancer in Low-and Middle-Income Countries
xvi. The Role of International Organizations on Collaboration for Global Pediatric Cancer Control
xvii. The Role of Twinning Programs and Telemedicine in Pediatric Oncology
xviii. Paediatric Radiotherapy
xix. Central Venous Catheters

xx. Management of Fever in the Child with Cancer
xxi. Acute Pain Management in the Inpatient Setting
xxii. Palliative Care
xxiii. Chemotherapy Basics
xxiv. Guide to Procedures
xxv. Treatment of Chemotherapy Extravasations
xxvi. Biostatistics, Research Methodology and Clinical Epidemiology
xxvii. Ethics
xxviii. Medico legal aspects relevant to the discipline
xxix. Health Policy issues as may be applicable to the discipline

V. COMPETENCIES

1) Clinical Hematology – Oncology

a) **Leukemias: Acute and chronic leukemias:** Clinical evaluation, diagnostic confirmation by morphology, immunophenotyping, special stains, cytogenetics and electron microscopy. The trainee must be familiar with the principles of leukemia management and the various protocols available. He/She should be familiar with the statistical tools used to evaluate therapy protocols, survival curves etc. He/she should also be familiar with the pharmacology of antimitotic drugs and their toxicity and well versed in the supportive management of patients with all types of leukemia.

b) **Myeloproliferatie disorders:** Classification, systemic diagnostic evaluation of erythrocytosis, including polycythemia vera; interpretation of blood volume studies; with radionuclides, familiarity with current management strategies of MPD including the use of interferon.

c) **Lymphoma:** Classification of lymphomas, principles of staging and management of different types of lymphomas. The trainee must be familiar with the principles of lymphoma management and the various protocols available.

d) **Miscellaneous disorders** like Histiocytosis, Splenic disorders and systemic diseases affecting the haemopoietic system, etc.

e) **Chemotherapy:** Various chemotherapy related protocols, practical training in giving the chemotherapy; recognition and management of complications related to chemotherapy. The trainee must be familiar with the principles of hematooncology management and the various protocols available.

f) **Transfusion Medicine:**

i. Blood component preparation and their clinical use Collection of blood, correct techniques of venepuncture, plastic systems, anticoagulants and additives, and their effect of storage stability, centrifugation, preparation of platelets, fresh frozen plasma and cryoprecipitate, storage of components, principles of fractionation. Quality control. A thorough understanding of the clinical indications for proper use of specific blood components.

ii. Diagnosis & Management of Transfusion related complications: Febrile transfusion reactions- laboratory investigations, diagnosis, management and prevention. Diagnosis and management of hemolytic transfusion reactions. Infections transmitted by transfusion, physical and clinical complications of transfusion.

iii. Cell separation principles: The trainee must be able to perform cell separation and apheresis. Principles of cell separators; continuous versus intermittent flow techniques, replacement fluids for plasmapheresis, current status and indications in various diseases should be known and understood.

iv. Techniques of leuco-depletion: Problems related to white cells in donor blood and techniques of removal. Principles of filter design and use.

v. Irradiation of blood and components: Biology of irradiation of blood and components, transfusion graft versus host disease (GVHD) Indications for irradiation of blood and protocols. Use of equipment.

vi. Management of alloimmunization in relation to transfusion Techniques for prevention of alloimmunization, role of ultraviolet radiation and photosensitizers, management of patients with red cell and platelet alloantibodies.

2) Practical Laboratory Training

a) General Hematology

- Proper use and care of common instruments such as light microscope, centrifuge, water baths, freezers, weighing balance, etc.
- Blood collection samples – venepuncture and finger prick methods of sample collection, types of anticoagulants, containers and the effects of delay in processing and storage.
- Determination of peripheral blood counts (Hemoglobin, Hematocrit,
- Total WBC and platelets) manually and calculation of red cell indices.
- Use of automated blood cell counters including principles and practice.
- Interpretation of peripheral blood counts and abnormal flags.
- Preparation of blood films and, staining of peripheral blood films and cytospin slides with Romanowsky and other dyes.
- Review of normal and abnormal blood films with emphasis on morphology of red cells, white cells and platelets.
- Performance of WBC differential counts; subjective assessment of platelet counts and diagnostic interpretation of abnormal counts.
- Preparation and staining of thick and thin blood films for malarial parasites.
- Measurement and significance of ESR and plasma viscosity
- Supravital staining of reticulocytes, counting of reticulocytes.
- Performance of bone marrow aspiration; trephine needle biopsy, splenic aspiration.
- Preparation of smears of bone marrow aspirates and biopsy (touch) imprints.
- Staining and diagnostic evaluation of bone marrow aspirates.

3) Lab Based Skills

a) **Cytochemistry:** Performance of the following staining procedures, Sudan Black, Myeloperoxidase, specific and nonspecific esterases, acid phosphatase. PAS and 'Iron Staining'.

b) **Cytogenetics:** Familiarisation with cytogenetics, understanding the principles of cytogenetics and appreciating the relevance and significance of

chromosomes in diagnostic hematology, interpreting the results of chromosome preparation of hemapoietic cells.

c) **Flow Cytometry:** A working knowledge of the principle and practice of flowcytometry and interpretation of the clinical significance of common leukocyte immunophenotypes.

d) Histocompatibility laboratory, Stem Cell processing Laboratory and Clinical immunology Laboratory experience

4) Teaching scheme :

- Total periods and periods allotted to each topic
- Didactic lectures: These will be held once a week and will be delivered either by a faculty member or by a specialist in the area from hemato-oncology and allied disciplines.

VI. LOG BOOK

A candidate shall maintain a log book of operations (assisted/ performed) during the training period, certified by the concerned post graduate teacher/ Head of the department/ senior consultant.

This log book shall be made available to the board of examiners for their perusal at the time of the final examination.

The log book should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s) The candidate will maintain the record of all academic activities undertaken by him/her in log book.

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories
4. Procedures learnt
5. Record of case Demonstration/ Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should

be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.

7. In the absence of production of log book, the result will not be declared.

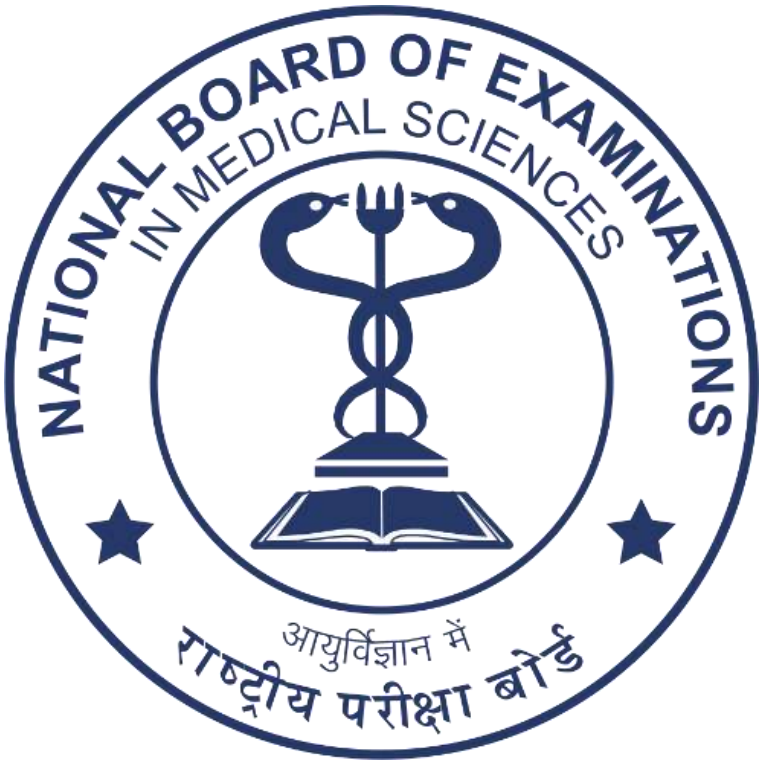
VII. RECOMMENDED TEXT BOOKS AND JOURNALS

Textbooks & Reference Books

- William's Haematology [Beutler, Lichtman, Coller & Kipps]
- Wintrobe's Clinical Haematology [Lee, Boggs, Bithell, Foerster, Athens, Lukins]
- Haematology-Basic Principles & Practice [Hoffman, Benz, Shattil,
- Furie, Cohen & Silberstein
- Blood – [Jandl]
- Practical Haematology [Dacie & Lewis]
- Thalassaemia Syndromes – [Weatherall & Clegg]
- Haemostasis & Thrombosis – Basic Principle & Clinical Practice (Coleman, Hirsch, Marder & Salzman)
- Blood Banking (Mollison)
- Modern Blood banking & transfusion Practices (Denese M Hannening)
- Bone Marrow Transplantation, (Forman, Blume & Thomas)
- The molecular basis of Blood Diseases (Stamatoyannopoulos, Neinhuis, Leder & Majerus)
- Paediatric Haematology by (Nathan & Oskie)
- Lanzkowsky's Manual of Pediatric Hematology and Oncology
- Textbook Of Pediatric Hematology & Hemato-Oncology Paperback – 2016 by Lokeshwar
- Pediatric Hematology/Oncology Secrets Paperback – 31 Aug 2001 by Weiner
- Rudolph's Textbook of Pediatrics, 21st Edition, McGraw-Hill 2003
- Nelson Textbook of Pediatrics. 17th Edition Saunders 2004
- Pizzo and Poplack Principles and Practice of Pediatric Oncology. Fourth Edition.
- Lippincott 2002
- Nathan and Oski's Hematology of Infancy and Childhood. Sixth Edition. Saunders 2003

Journals

- Blood
- British J. Hematology
- Seminars in Haematology
- Haematology & Oncology clinics
- Transfusion
- Indian J. Hematology & Blood Transfusion
- Hemostasis & Thrombosis
- Bone Marrow Transplantation
- Lancet
- New England Journal of Medicine
- Iranian journal of pediatric hematology oncology
- Journal of Pediatric Hematology/Oncology
- Pediatric Oncology |
- The Japanese Journal of Pediatric Hematology / Oncology



आयुर्विज्ञान में राष्ट्रीय परीक्षा बोर्ड

स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार

मेडिकल एन्क्लेव, अंसारी नगर, नई दिल्ली – 110029

NATIONAL BOARD OF EXAMINATIONS IN MEDICAL SCIENCES

Ministry of Health & Family Welfare, Govt. of India

Medical Enclave, Ansari Nagar, New Delhi- 110029