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Editorial

Hematology as a career choice for young medical professionals

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WHAT IS HEMATOLOGY?

Hematology, essentially, is the study of blood in health and disease. The diseases included under the umbrella term of hematology affect any of the blood components, e.g., red blood cells (RBCs), white blood cells (WBCs), platelets (thrombocytes), and plasma components (e.g., coagulant factors, von Willebrand factors). It also may include diseases originating from blood-forming organs, e.g., bone marrow, spleen, and blood vessels.

Common disease entities affecting RBCs are anemia, thalassemia, autoimmune hemolytic anemia, sickle cell disease, megaloblastic anemia, and polycythemia. Examples of diseases affecting WBCs are leukemia, lymphoma, and multiple myeloma. Among many disease entities, affecting platelet, are immune thrombocytopenia (ITP), essential thrombocytosis, and thrombotic thrombocytopenic purpura. Examples of, to name a few, blood diseases affecting components of plasma are hemophilia, von Willebrand disease (vWD), and deep vein thrombosis.

COMMON CARREER PATH OF A MEDICAL PROFESSIONAL

In addition to being fulfilling for the individual, a profession in medicine is crucial for the general health and welfare of society. Doctors and other healthcare providers including nurses, pharmacists, and healthcare administrators are the face of healthcare services (primary through tertiary care) and Medical professionals play a crucial role in promoting public health. Anybody interested in a career in medical field typically needs to pass higher secondary or equivalent (10 + 2) course. Among others, biology is still considered the most common major subject for those who want to pursue a medical career, especially aspiring physicians and surgeons. Recently, biochemistry and biotechnology were also included in the common majors list, in place of BIOLOGY. After that, one has to go for the undergraduate (UG) studies and training (in India, its named as MBBS course); as per National Medical Commission (NMC) rules, a minimum of 54 months of studies and training plus a minimum of 1 year of compulsory internship.

AREAS STUDIED UNDER HEMATOLOGY

Classical hematology (earlier termed as "Benign" hematology)

It includes the so-called "non-malignant" or "benign" diseases affecting blood. It encompasses a large number of conditions including RBC/hemoglobin disorders, e.g., anemia, hemochromatosis, thalassemia, sickle cell disease (SCD), and disorders of platelets (ITP) or coagulant proteins (hemophilia, vWD).

Malignant hematology (hemato-oncology)

Among many, the common diseases included under malignant hematology are leukemias (ALL, AML, CML, CLL), lymphomas (Hodgkin lymphoma and non-Hodgkin lymphomas), multiple myeloma (plasma cell dyscrasia), etc.

Consultative hematology (advisory hematology)

The area includes patients having some hematological problems or abnormalities detected while on investigation for some minor or major medical illness or events being evaluated under different medical discipline. The common symptoms for which a hematology consultation is sought for are neutropenia/leukopenia, anemia, bleeding, thrombosis, etc. Excessive bleeding is a very frequent abnormality with some complications of very severe form of disease, e.g., disseminated intravenous coagulation with some underlying medical or surgical condition, for which a hematology advise is taken for by the medical team.

Advanced hematology care

The most recent advances in hematology care include stem cell transplantation (SCT), gene therapy, and chimeric antigen receptor-T (CAR-T) cell therapy. Although presently is not available elsewhere and everywhere and once a dream even in 2000's, many advanced centers in India are now practicing SCT (formerly, bone marrow transplantation) on a regular basis that has revolutionized the care and life of thousands of patients suffering from deadly diseases such as AML and many other hematological malignancies. Gene therapy, another advanced care option is benefiting more number of patients suffering from inherited blood disorders, e.g., hemophilia, thalassemia, and SCD. CAR-T cell therapy uses genetically modified T cells to attack cancer cells and is the new and very attractive alternative treatment option for different hematological malignancies (e.g., ALL, MM) offering hope of cure from many of the so-called incurable diseases.

HEMATOLOGY AS A SUPER-SPECIALTY SUBJECT

Clinical hematology

It is a clinical specialty that primarily focuses on treatment diagnosis and treatment of different hematological disorders. They experts grouped under this superspecialty discipline are trained to analyze test result for a proper diagnosis and then offer remedial and therapeutic options. They may be trained also in the more advanced forms of hematology care, e.g., SCT and CAR-T cell therapy.

Hemato-pathology

The specialists studying under this superspecializes branch are trained to study the cellular components of blood, bone marrow, lymphoid tissues, and blood cells/components in different body fluids. They specialize in analyzing different aspects and techniques of diagnosing hematological disorders, e.g., morphology/histology, immunohistochemistry, flow cytometry, cytogenetics/karyotyping, and polymerase chain reaction (PCR).

Molecular hematology

The newest branch of medicine and a very fast-developing superspecialty disciple under the big umbrella of hematology relates to the studies of blood and it is production the perspective of genetic and molecular levels. Newly advanced techniques studied under molecular hematology include DNA sequencing, next-generation sequencing (NGS), exome- and whole genome sequencing, and ultradeep PCR. Molecular hematology helps us in understanding most different hematolgical disorders at the molecular level widening the range of therapeutic options, e.g., gene therapy and CAR-T cell therapy.

HEMATOLOGY STUDY (POST-DOCTORAL [PD]) COURSES IN INDIA

Under the egis of the NMC, several PD study courses in hematology are available there in the premier tertiary care teaching hospitals in the country. At present, taught hematology courses in India are DM in clinical hematology, Dr. NB in clinical hematology, DM in pediatric hemato-oncology, DM in hematopathology, DM in molecular hematology, PD fellowship (PDF) in hemato-oncology, and PDF in hematopathology. Although the structure of different courses varies across different study courses offered, in practice, all and every student is expected to get trained comprehensive hematology in terms of laboratory, molecular, and clinical hematology including advanced hematology care, e.g., SCT, gene therapy, and CAR-T cell therapy.

HEMATOLOGY FOR THE POSTGRADUATES (PG)

The PG training notably for those from the disciplines of MD (General medicine), MD (pediatric medicine), MD (Pathology), and MD (Biochemistry) has a scope of wide exposure to different hematological disorders from laboratory as well as clinical point of view. The training under the specified courses enables them to develop an up-to-date and advanced understanding of how to diagnose common hematological disorders and treat them at the optimum level.

HEMATOLOGY FOR UG MEDICAL STUDENTS

After passing the MBBS degree in India, one is licensed to practice modern medicine. There is a structured study curriculum and training programs on basic hematology (both

benign and malignant) while teaching pre-clinical (physiology and biochemistry), para-clinical (pathology), and clinical (medicine and pediatrics) subjects during the training in UG course. Competency-based medical education recently introduced in India offers and allows medical students to get exposed to research in basic sciences and clinics (bench to bedside). This kind of training enables them to diagnose and treat common hematological disorders, e.g., anemia, especially, nutritional anemia, thalassemias, and common bleeding conditions and also to provide basic care to a patient suffering from emergencies (hyperuricemia, hyperkalemia, severe anemia, severe thrombocytopenia, sickle pain crisis, neutropenic sepsis, etc.) in common hematological malignancies.

HEMATOLOGY FOR THE GENERAL PRACTITIONERS (GP)

Many of the hematology cases report first to the GPs practicing at the community level. They may suspect some underlying hematology disorder based on one or combinations of the common symptoms – weakness, fatigue, pallor, bleeding, infections, lymph node enlargements, etc. After finding some abnormality on clinical examination, e.g., lymphadenopathy, splenomegaly, or the blood test results, e.g., complete blood counts or basic coagulation reports (prothrombin time [PT], activate partial PT), may suggest some special tests to help proper diagnosis or may refer the case to a specialist doctor trained in hematology. However, essentially, the GPs should be trained in the basics of blood transfusion, especially RBC and platelet transfusion and basic management of acute conditions in hematology, e.g., sickle pain crisis, hyperuricemia, neutropenic sepsis. In India with a high prevalence of iron deficiency anemias (largely, due to worm infestations) across the width of the country, GPs may play a pivotal role in deworming programs and eliminating the burden of iron deficiency anemia (IDA) in the country. Thalassemia group of disorders requiring pre-marital and pre-natal genetic counseling and diagnosis may be much more effective with the help of GPs practicing at the community level. Moreover, they should also be trained about when, where, whom, and how to refer a patient suffering from a hematological disorder.

HEMATOLOGY EDUCATION AND TRAINING

Hematology education and training (in India) has a long path:

- Step 1: UG training/MBBS course (as per NMC; a must 54 months of studies and training) plus a minimum of 1 year of compulsory residential internship.
- Step 2: PG training/MD courses (a complete 3 years of residency) in any of the allied subjects, e.g., general medicine, pediatric medicine, pathology, or biochemistry to train in the respective specialized area.
- Step 3: PD course of complete 3 years of residency involving studies and training. Initially, these courses in India started as DM (Clinical Hematology) in a limited center, followed by a separate course as DM (hematopathology) started. Recently, many centers also had started the similar course of 3 years residency in hematology as Dr. NB (clinical hematology). Very few centers in India now offer similar course of studies in pediatric hematology and molecular hematology.

FACTORS INFLUENCING MEDICAL CAREER

Among many, the following are thought to be there in choosing career of a medical professional: Demand of the particular discipline in the society, emphasis on lifestyle, effective work-hours, work-life balance, and financial considerations – job opportunity and security.

WHY CHOOSE HEMATOLOGY AS A CAREER?

Medical students may choose hematology as a career because of any (and all) of the following reasons:

A journey into the world of blood

Hematology is a super-specialty with a wide spectrum of clinical practice that a wide spectrum of blood-related diseases starting from the so-called benign conditions, e.g., anemia, thalassemias, and hemophilia to malignant conditions including leukemia and lymphomas.

Bench to bedside

Hematology is considered a model subject applying the concept of "bench to bedside," translating science from the lab to clinic.

Dynamic career path

Other than clinical practice, hematologists have the wide opportunity to get involved in education and active research, especially in the evolving areas of hemato-oncology.

Highly demanded workforce

As till today, a less number of doctors practice hematology and with improved awareness among the medical professional across disciplines, there is an increasing demand for hematologists in the community.

An evolving field with exciting breakthroughs

Through the ongoing research in diagnosis and treatment of hematologic disorders especially in the areas of molecular medicine (molecular hematology), hematology continues

to improve patient care across the spectrum of different hematologic diseases. There are tremendous technological developments and advances in molecular hematology, e.g., gene editing and gene therapy. Targeted therapy, once a dream, is now a regular practice in hematology.

An opportunity to change the world

Hematologists get the opportunity to the change the lives of patients suffering from life-threatening illnesses through practice-changing research. Once an incurable disease, is now a curable one, is true in many of the hematological diseases, e.g., ALL in children and acute promyelocytic leukemia.

WHY MANY MEDICAL PROFESSIONALS ARE NOT WILLING TO CHOOSE HEMATOLOGY AS A CAREER?

Like any other specialty or superspecialty in medicine, hematology also has some potential downsides that include:

Very lengthy training

It needs several years of studies and training essentially including many regular laboratory activities, making it undesirable or unacceptable to many medical professionals to choose hematology as a career.

Work-life balance

Few areas of hematology especially treating leukemia involve issues related to critical care and advanced area such as SCT and CAR-T cell therapy by its own right and need a more dedicated professional which may be difficult for one in making a proper work-life balance.

Emotional challenges

Many a time, it is emotionally taxing to deal with the high treatment-related mortality related to the treatment of acute leukemias of SCT.

Lack of exposure

One of the important barriers for residents choosing hematology as a career is the lack of exposure and proper teaching during UG and PG days as compared to other superspecialties.

CAREER IN HEMATOLOGY IN 2025

In 2025, it can be a good decision for an eligible medical professional to choose hematology as a career for several reasons:

Specialization

Hematology being a highly specialized field, there is less competition, which helps to secure a better job.

High impact

Treating cases such as leukemias and lymphomas with promising results favor very high impact among the medical society.

Scope of research

Some of the clinicians aspiring for high-end bench work have to build their careers in the right direction in comparison to many other fields in medicine. Conducting innovative medical research helps to advance the knowledge in medicine, improving existing treatments and also developing new treatment options, thus, contributing to better healthcare practices and outcomes.

Growing demand

With the increasing awareness of many different hematological disorders among medical professionals and advances and availability in diagnostic facilities, there is an growing demand for hematologists in India.

BARRIERS TO ADVANCEMENT IN HEMATOLOGY IN INDIA

Dealing with the many different benign and malignant hematological disorders is related to huge funding for the investigations, procurement of medicines, and research. Advances in care, in terms of molecular diagnostics, use of novel agents where applicable, and advances in supportive care, e.g., use of HEPA filters for prevention of infection are beyond the reach of larger population, even today. The very fast advancing techniques and cutting-edge technologies considered to be essential in many hematological disorders are not freely available in many of the centers involved in hematology care. Breakthroughs in research to understand the complexities of various blood diseases are helpful in innovating solutions to the root cause(s). NGS is the most significant and latest innovations in hematology diagnosis that allows most rapid and comprehensive assessment of genetic defects responsible for or associated with many benign and malignant blood disorders to guide the hematologists for targeted therapies in many cases; substantial proportions of the patients today either have no or limited access to these.

FUTURE OF HEMATOLOGY IN INDIA

Hematology is an expanding and exciting field in medicine at the forefront of many clinical discoveries. There is

an enormous scope of research in hematology; it needs the steady influx of funds to run the state-of-the-art hematology research centers involved in the molecular diagnosis and development of newer agents targeting the different key players in pathogenesis of the molecular diseases. In the earlier days, medical research in India was mostly dependent on Government fundings, especially from Indian Council of Medical Research. The scenario is rapidly changing due to growing interests and cooperation of non-governmental organizations and Institutes actively involved in basic research. In terms of care and cure in hematology, it needs motivation and active involvement of more number of young, energetic, and enthusiastic medical professionals.

The Future of Hematology lies in the hands of young medical residents showing growing interest in hematology: Seeing cancer survivors living a meaningful lives may motivate them to specialize in hematology/oncology. Medical residency programs, especially during the PG tenure, offering both outpatient and inpatient exposure in classical and malignant hematology under the able guidance of a hematologist may motivate them to pursue of hematology as a career and enable them to play the independent leadership roles in hematology.

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