



Mazumdar Shaw  
Cancer Center

Unit of Narayana Health



# DEPARTMENT OF **BONE MARROW AND STEM CELL TRANSPLANT**

# DEPARTMENT OF BONE MARROW TRANSPLANT

## About Narayana Health City

Headquartered in Bangalore, Narayana Health has a network of hospitals across India with a strong presence in Southern & Eastern India and has a capacity of 5442 beds (Jan'16). From a 225 bed hospital to 5442 beds we have a network of 23 hospitals, 8 Heart Centres, 24 Primary Care Facilities across 32 cities.

NH Health City houses Narayana Institute of Cardiac Sciences and Mazumdar Shaw Medical Center. Located near Electronic City in Bangalore, the health city today is a healing splendour with over 2000 beds distributed among distinct flagship hospitals in the campus.

Narayana Institute of Cardiac Sciences, is one of the world's largest cardiac hospitals successfully treating adults and children from across the world. Also, on the forefront is the Mazumdar Shaw Medical Center which houses one of India's most advanced cancer facilities – Mazumdar Shaw Cancer Center, for treatment of and research in various types of cancers.

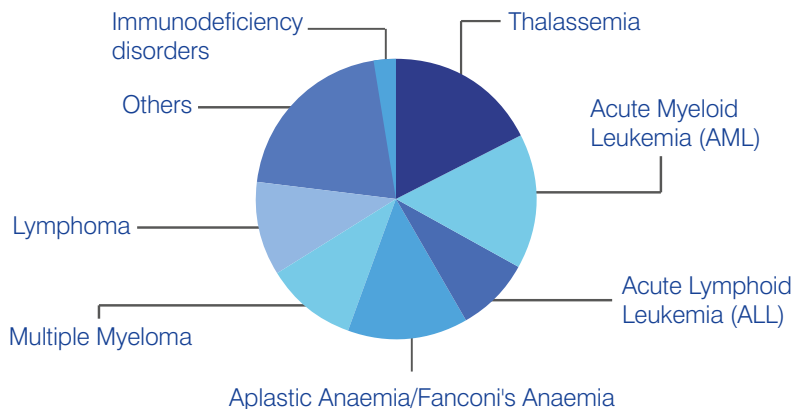
Mazumdar Shaw Medical Center (MSMC) offers treatment in more than 30 different clinical departments, with key specialities including Neurosciences, Gastrointestinal and General Surgery, Urology, Nephrology and a comprehensive Birthing Centre. Situated alongside are a super-speciality Orthopaedic and Trauma Centre as well as an Eye Hospital both of which form an integral part of NH Health City.

## About the Department of Bone Marrow Transplant

MSMC has a state-of-the-art 14 bed bone marrow transplant (BMT) unit. The BMT unit, has carried out more than 500 bone marrow transplants (Jan'16), which is the largest number in Karnataka and one of the largest in the country. This unit has emerged as a referral centre for national and international patients for both autologous and allogeneic stem cell transplants. Patients have been referred from Oman, Iraq, Yemen, Afghanistan, Sri Lanka, Nigeria, Bangladesh, Nepal and Pakistan for stem cell transplant procedures.

A cord blood banking facility has been recently established in collaboration with Rotary International, which functions both as a public and private cord blood facility. With a large number of cord blood units being available in our country, cord blood transplants can be offered to a large number of patients who do not have HLA matched sibling donors.

## Bone Marrow Transplant at MSMC



# ABOUT BONE MARROW TRANSPLANT

## About Bone Marrow

Bone marrow is the soft and spongy tissue found within bones which is rich in stem cells. The most primitive of these stem cells are the pluripotent stem cells, which are different from the other cells in the following aspects:

- They produce cells identical to themselves
- They have the capacity to produce one or more subsets of mature cells

These stem cells are of prime importance in bone marrow transplants.

Other sources of stem cells have gained popularity in the last decade, because their harvesting is better tolerated by patient while delivering almost identical success rates when compared to bone marrow transplants. These include peripheral blood stem cells and cord blood stem cells.

## Some conditions which require Bone Marrow Transplant (BMT)

The conditions which necessitate a BMT can be broadly classified into 2 groups:

### Cancerous Conditions

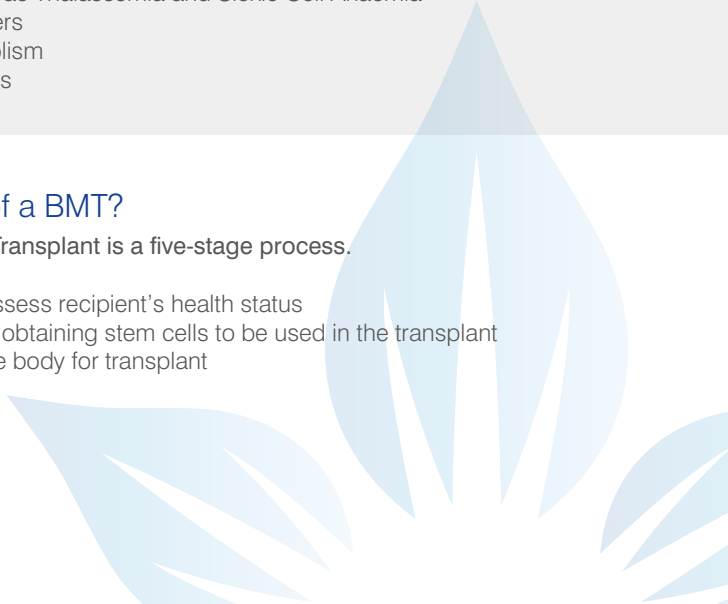
- Acute Myeloid and Lymphoblastic Leukemia
- Chronic Myeloid and Lymphoblastic Leukemia
- Hodgkin's and Non-hodgkin's Lymphoma
- Myelodysplastic Syndrome
- Myeloproliferative Neoplasms, Primary Myelofibrosis, etc
- Multiple Myeloma

### Non-Cancerous Conditions

- Aplastic Anaemia
- Haemoglobinopathies such as Thalassemia and Sickle Cell Anaemia
- Immunodeficiencies disorders
- Congenital errors of metabolism
- Congenital storage disorders

## What Are The Stages of a BMT?

Undergoing a Bone Marrow Transplant is a five-stage process.

- Physical examination – to assess recipient's health status
  - Harvesting – the process of obtaining stem cells to be used in the transplant
  - Conditioning – preparing the body for transplant
  - Transplanting the stem cells
  - Recovery period
- 

# ABOUT BONE MARROW TRANSPLANT

## Physical Examination

Routine diagnostic tests such as complete haemogram, X-ray, and urinalysis are performed. Also Human Leukocyte Antigen(HLA) typing and blood grouping are done to assess recipient/donor compatibility. **This assessment of compatibility is essential to reduce risk of rejection of transplant.**

## Harvesting the Cells from the Donor

**Autologous Bone Marrow Transplant:** The donor is the patient himself. Stem cells are taken from the patient either by bone marrow harvest or apheresis (a process of collecting peripheral blood stem cells), frozen, and then given back to the patient after intensive treatment.

**Allogeneic Bone Marrow Transplant:** The donor shares the same HLA type as the patient. Stem cells are taken either by bone marrow harvest or apheresis from a genetically matched donor, usually a brother or sister. Other donors for allogeneic bone marrow transplants may include the following:

- A parent/relative. A haplo-identical match is when the donor is a parent and the genetic match is at least half identical to the recipient
- Unrelated bone marrow transplants. The genetically matched marrow or stem cells are from an unrelated donor. Unrelated donors are found through national bone marrow registries

**Peripheral Blood Stem Cell Transplant:** The process of peripheral blood stem cell transplant is routinely performed when compared to the bone marrow harvest method has this procedure is less invasive and easy to perform. Some studies even suggest that the stem cell yield by this method is higher when compared to bone marrow harvest. The process takes 4-6 hours after administering necessary medication for 4 days.

Donors are injected with Granulocyte Colony Stimulating Factor (GCSF) for a duration of 4 days to stimulate stem cell proliferation.

The donor stem cells are collected by a process of apheresis and administered intravenously to the patient. The donor stem cells have the property of stem cell homing whereby they migrate to the patient's bone marrow and override his defective stem cells. This restores the ability of the patient's bone marrow to produce blood elements.

**Umbilical Cord Blood Transplant:** Umbilical cord blood is a rich source of stem cells. After delivery or birth of the infant, cord blood can be collected from the umbilical cord (which is a waste, by-product of child birth) and preserved for later use. Cord blood possesses a higher concentration of stem cells than the adult blood. Around 80-100 ml of cord blood is collected and these stem cells are ideally suited for transplants in children. Before storage and preservation, the cord blood stem cells are typed, counted and tested. Cord blood cells are frozen until necessary for transplant.

# ABOUT BONE MARROW TRANSPLANT

## Conditioning of the Patient

The conditioning process involves high doses of chemotherapy and sometimes radiation. It is carried out for three reasons:

- Destruction of the existing bone marrow cells to make room for the transplanted stem cells
- Destroy any existing cancer cells
- Suppression of activity of the immune system to decrease chances of rejection of donor stem cells

## Transplanting the Stem Cells

The process of Bone Marrow Transplant does not involve the physical insertion of the marrow stem cells into the marrow of the recipient, but is more of an intricate and delicate blood transfusion method. The harvested stem cells are administered via a central venous catheter into the bloodstream from where they find their way to the marrow by a property of stem cells known as stem cell homing.

**Recovery:** The patient is constantly monitored to assess the success of the transplant. However, the procedure does involve a few risks, these include:

### 1. Graft versus host disease (GvHD)

In this disease, the transplanted stem cells ("graft") attack the recipients cells ("host") as they are considered alien to the body.

There are two types of GvHD:

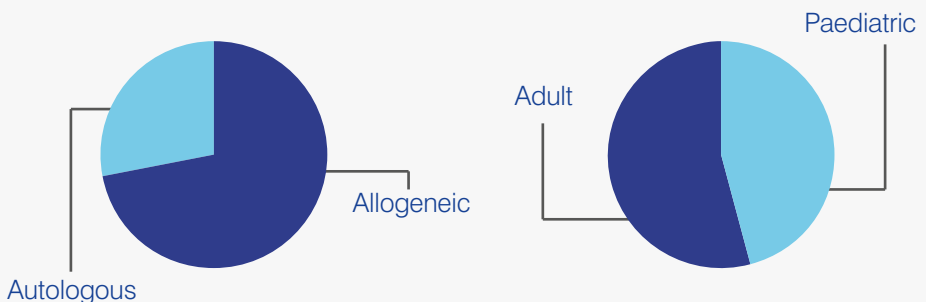
**Acute GvHD** – Occurs during the first three months following the transplant.

**Chronic GvHD** – Develops from acute GvHD and can cause symptoms for many years.

### 2. Infections

As a consequence of chemotherapy and bone marrow suppression, the body is transiently unable to produce cells to combat infections.

## Types of Transplant and Age Group of the Patients



## OUR FACULTY



### Dr. Sharat Damodar

MD, DNB, DM

Dr. Sharat Damodar is the Chief of Haematology and Transplant Services. He has a immense experience in treating patients with leukemia, lymphomas and stem cell transplantation. He is a graduate from St. John's Medical College, Bangalore and has an MD in Internal Medicine from St. John's Medical College, Bangalore. He underwent training in Haematology and Stem Cell Transplantation in Christian Medical College, Vellore and has multiple papers in peer reviewed journals. Time and again, he has been invited by multiple institutes nationally and internationally for delivering lectures and sharing his experiences. He is the Chairman of the Hospital Transfusion Committee and is a member of multiple committees that devise guidelines in the hospital.

#### Areas of expertise

Bone Marrow  
Stem Cell  
Cord Blood Transplantation



### Dr. Nataraj KS

MBBS, MD, DM

Dr. Nataraj is a Consultant Haemato-oncologist and Transplant Physician. He is a graduate from Sri Devaraj Urs Medical College, Kolar, and has an MD in Internal Medicine from Kasturba Medical College, Manipal. He then received his training in Haematology from Nil Ratan Sircar Medical College and Hospital, Kolkata and underwent further training in blood and marrow stem cell transplantation from AIIMS, New Delhi.

He currently deals with cases predominantly involving adult patients with haematological diseases and adult patients undergoing stem cell transplantation. He has authored numerous research papers that have been published in peer-reviewed national and international journals.

#### Areas of expertise

Leukemia  
Lymphoma  
Multiple Myeloma  
Stem Cell Transplantation

## OUR FACULTY



### Dr. Shobha Badiger

MD, DNB, DM

Dr. Shobha is a Consultant Paediatric Haematologist and Oncologist. She has pursued her graduation from Karnataka Medical College, Hubli and a Masters in Paediatric Medicine from Bangalore Medical College, Bangalore. She has undergone training in Paediatric Haematology and Oncology from Narayana Health, Bangalore and is working as a consultant in the department. She manages paediatric patients with haematological diseases and those undergoing stem cell transplantations.

#### Areas of expertise

Paediatric Benign Haematological Conditions

Paediatric Malignancies

Bone Marrow Transplant



### Dr. Sunil Bhat

MBBS, MD

Dr. Sunil Bhat is a Consultant in Paediatric Haematology, Oncology and Bone Marrow Transplantation Service at Mazumdar Shaw Medical Center of Narayana Health City, Bangalore. He is a graduate in Medicine and Paediatric Medicine from Jammu University and has undergone training in Paediatric Haematology, Oncology and BMT from Sir Ganga Ram Hospital at Delhi. He was further trained at the Children's Hospital at Westmead, Sydney Australia, in Paediatric Oncology and earned a specialisation in Bone Marrow Transplantation.

#### Areas of expertise

Graft Versus Host Disease

Virus Specific T-Cell Therapy

Infections Post Transplant



### Dr. Prathip Kumar

MBBS, MD, DM

Dr. Kumar is the Head of Blood Bank and Stem Cell Laboratory at Narayana Health City, Bangalore. He completed his MD in Blood Transfusion Medicine from AFMC, Pune and is responsible for overseeing all activities of the blood bank and stem cell processing laboratory.

#### Area of expertise

Transfusion Medicine

## RESEARCH

- Customised treatment for acute leukaemias
- Characterisation of leukaemic stem cell for treatment interventions
- Study of mesenchymal stem cell interactions in leukaemic cells
- Haploidentical bone marrow transplant using newer modalities

## FACILITIES

- Cord blood banking
- Stem cell cryopreservation
- HLA typing
- Unrelated donor searches

## WHY CHOOSE NH FOR BONE MARROW TRANSPLANT?

- The department is one of the leading centres for Bone Marrow Transplant and has performed over 500 transplantations (Jan'16)
- Non-myeloblastic or mini-transplants for older patients or patients with multiple health problems allows for transplants in patients otherwise not suitable for stem cell transplant
- Cord blood transplants and haplo-identical transplants
- Significant reduction in post transplant complication making way for increased survival rates



Department of Bone Marrow  
and Stem Cell Transplant

For information call

☎ **Phone: +91 80 7122 2358**



Cardiac and Brain Stroke  
Emergency Toll Free Number  
**1800 4250 4250**



OPD Timings: **9:00 am to 5:00 pm**, Monday to Saturday