CENTRE OF EXCELLENCE FOR
HAPLOIDENTICAL BLOOD & MARROW STEM CELL TRANSPLANT (BMT)
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A WORLD-CLASS FACILITY FOR BLOOD AND MARROW STEM CELL TRANSPLANTATION AND TREATMENT OF BLOOD DISORDERS.

The BMT Centre at Dharamshila Narayana Superspeciality Hospital offers treatment for all blood related disorders including Blood and Marrow Stem Cell Transplantation for patients. The Centre is known for its path breaking research in half-matched HLA family donors (haploidentical transplants). It offers holistic care for a broad range of malignant and non-malignant haematological diseases among children and adults. The centre is equipped with state-of-the-art technology and adheres to stringent International quality standards of infection control, cleanliness, hygiene, and patient safety.
**TYPES OF BONE MARROW TRANSPLANTS OFFERED:**

- **Autologous BMT** – The patient's own harvested cells are transfused back into the body after treatment.

- **Allogeneic BMT** – Cells from a related or unrelated donor are transplanted to the patient after treatment.

Donors for Allogeneic Bone Marrow Transplants include the following:
- Haploidentical: Half matched related donor
- Matched Related Donor
- Matched Unrelated Donor
- Umbilical Cord Blood Transplant: A Cord blood transplant uses cells collected from the blood of a newborn’s umbilical cord

**OUTDOOR CLINICS**

- Lymphoma-Leukaemia Clinic
- Aplastic Anaemia Clinic
- Thalassemia & Sickle Cell Clinic
- Pre BMT Clinic
- Post BMT Clinic
- Long Term Follow up Clinic

**IN-PATIENT FACILITY**

The BMT Centre is a 21-bed facility located on the top floor of the hospital, which is accessible only to patients of Haematological disorders and hospital staff. BMT Centre has a unit with four isolated clean rooms and 17-bedded step down isolation ward, which provides isolation and barrier nursing to protect patients from bacterial, fungal and viral infections.
BMT UNIT

The BMT unit is the only unit in India which has been made as per class 1000 clean room standards prescribed internationally and has the following unique features:

**Air Handling Unit (AHU):** Each room of the BMT Unit, has its own dedicated Air Handling Unit (AHU) to provide 60 Hepa-filtered fresh air changes per hour.

**Automatic and Selective Control System:** Automatic and selective control system provides positive air pressure in the BMT room to ensure that no outside air from BMT Corridor can enter the patient's room.

**Stainless steel doors, vinyl flooring and cladding of walls:** Stainless steel doors and vinyl surfaces are most practical to clean with disinfectants to maintain and protect patients from infections.

**Equipments:** BMT Unit is equipped with a dedicated X-ray machine, ultrasound scan, dialysis machine and a ventilator so that patients requiring these services don't need to go outside the BMT unit.

**Furniture and furnishing of BMT room - Each BMT room is furnished like an ICU with following facilities:**
- Centralised oxygen and state-of-the-art suction system with double outlets, six parameter monitors for monitoring heart rate, breathing rate, blood pressure, oxygen saturation, central venous pressure and ECG.
- Infusion pumps
- Syringe pumps
- CCTV monitoring system for 24x7 vigilance of the patient
- Television
- Telephone & Wi-Fi
- Patient bed, bedside locker and desk
- Attendant bed
- Two trolleys for medicines/dressing etc.

**BMT Research Lab:** The BMT Research Lab has the following facilities for preservation of the donated stem cells:
- Magnetic Separation of Cells using MACS Technology
- Long term cryopreservation of stem cells at -196°C liquid nitrogen freezer in vapour phase
- HLA typing, NK cell genotyping and CD34+ stem cell estimation
- Comprehensive donor selection for Haploidentical BMT based on immunogenetic and cellular profiling
- NK cell and mesenchymal cell cultures and cell therapy
- Molecular diagnosis for leukaemia
- Flow cytometry based diagnostics for leukemia, lymphoma and aplastic anaemia
- Detection of Minimal Residual Disease (MRD)
- Conventional and Real Time PCR for viral pathogens
The centre has excellent pathology services for routine and special tests like drug levels, bacterial and fungal cultures, viral PCR, and immunohistochemistry. **Total Body Irradiation:** With VMAT technology, our Radiation Oncologists can target the entire bone marrow at much higher doses without exposing other organs to radiation.

**Transfusion Medicine:** A state-of-the-art blood bank has been set up with facilities like advanced blood transfusion services including automated component extraction, leukoreduction, apheresis and red cell serology.

**MULTIDISCIPLINARY TEAM APPROACH**

At DNSH’s BMT Centre, a dedicated and extensively experienced team of BMT Physicians and Haemato-Oncologists, Haemato-Pathologists, Paediatric Oncologists, Trained Transplant Nurses, Medical Oncologists, Radiation Oncologists, Surgical Oncologists, Microbiologists (Infection Control Specialists), Research Scientists, Technicians, Clinical Coordinators, Pharmacists, Dieticians, Physiotherapists and Counsellors work together across a range of specialty areas. They ensure that each and every patient’s journey from diagnosis, treatment and long term follow-up is integrated, personalised and seamlessly coordinated for the best possible treatment outcome.
RESEARCH AND TRAINING
The Unit has an active research program in the field of Haploidentical BMT & Cellular theraphy. It runs a fellowship program for doctors & CME for nurses.

CONDITIONS TREATED WITH BMT IN ADULTS AND CHILDREN

Malignant Conditions
- Leukemias (Acute Myeloid Leukemia and Acute Lymphoblastic Leukemia)
- Relapsed Hodgkin's and Non-Hodgkin's Lymphoma
- Multiple Myeloma
- Solid-Tumours (Cancers) such as high-risk Neuroblastomas, relapsed Ewing Tumours and relapsed Testicular Tumours

Non-malignant Conditions
- Thalassemia Major
- Severe Aplastic Anaemia
- Immune Deficiency Disorders
- Autoimmune Diseases

HOW ARE THE STEM CELLS COLLECTED?
A bone marrow transplant is done by transferring stem cells from one person to another. Stem cells can either be collected from the circulating cells in the blood (the peripheral system) or from the bone marrow.

Peripheral blood stem cells: Peripheral blood stem cells (PBSCs) are collected by Apheresis; a process in which the donor is connected to a special cell separation machine via a needle inserted in donor’s veins. It might require several sessions and administration of medication to the donor to stimulate the production of new stem cells.

Bone marrow harvest: Bone marrow harvesting involves collecting stem cells with a needle placed into the soft center of the bone, the marrow. The sites mostly used for bone marrow harvesting are located in the hip bones and the sternum.
PROCESS OF BONE MARROW TRANSPLANT (BMT)

Stage 1: Evaluating the patients for BMT (work-up)
Duration: 14 - 30 days
Patient undergoes complete medical check-up and detailed counselling to evaluate suitability to go through the BMT procedure. The check-up includes:
- Blood Tests
- Chest X-ray and CT Scans
- Tests to assess the condition of heart and lungs
- Bone Marrow Tests

Stage 2: Preparing the patient for BMT (conditioning)
Duration: 2 - 10 days
A high dose of chemotherapy or radiotherapy is given to destroy the diseased marrow and cancer cells. This is needed to create space for new blood stem cell and ensure that they are not rejected.

The actual process of transplantation: The stem cells or bone marrow cells to be transplanted are given through the Central Venous Line (CVL), just like in a blood transfusion. But the following precautions need to be taken care of:
- Before the infusion of new bone marrow, the patient may be given medication to avoid any allergic reactions.
- A monitor is used to check breathing, heart rate and blood pressure throughout the procedure.
- The doctor and his team are available in the unit to check on the patient and are fully prepared to handle any issues.

Stage 3: Pre-engraftment (before the transplanted blood stem cells start working)
Duration: 2 - 3 weeks
After high dose chemo-radiotherapy, the patient needs to be kept in a clean room within the BMT unit in strict isolation. They'll need a lot of blood and platelet transfusion. Any major infection may require treatment with antibiotics.

Stage 4: Post-engraftment (after the transplanted blood stem cells start working)
Early Phase (first 3 months)
Once the neutrophil count is above the critical value of 500 cells per microlitre, the patient can come out of critical isolation. When the neutrophils increase to normal levels and there are no other complications, the patient can be discharged. However, regular check-ups and blood tests (2-3 times a week) are required.

Late Phase (3rd - 12th month)
Before the patient redevelops complete immunity, they are still at risk of catching infections, more so if they are being treated for Graft-Versus-Host Disease (GVHD). Thus, proper care and precautions are needed. If the patient stays well, the frequency of check-ups and blood tests can reduce.
OUR EXPERTS

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B.Sc., MBBS, MD, Fellowship in Critical Care Medicine
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PATIENT HELPLINE
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