Hematopoietic cell transplantation (bone marrow transplantation) BMT, HSCT,…

Infusion of concentrate of hematopoietic progenitor cells (graft) into the patient (host) after finished pretransplant preparative regimen (conditioning)

Transplants results in replacement of patient hematopoiesis and immune system by donor ones.

Basic condition for successful outcome of BMT:
Histocompatibility (HLA match) between recipient and donor.
Class I. (HLA A,B,C) + Class II. (DRB1, DQB1, DPB1) antigens
(Donor can be blood group and sex mismatch)

Goals of BMT (1)

1) Recovery of hematopoiesis irreversibly damaged by myeloablative chemo / chemoradiotherapy
2) Replacement of acquired or inborn absent or defective hematopoietic progenitor cells (aplastic anemia, Fanconi anemia, sickle cell dis., thallassemia)
3) Engraftment of donor cells, that by delivering of normal enzymes, absent or defective in some inborn errors of metabolism (storage diseases), can improve clinical outcome of some types of mucopolysacharidoses - Hurler- MPS IH, or lysosomal leukodystrophies - Krabbe –GLD, MLD- metachromatic cell leukodystrophy

Goals of BMT (2)

4) replacement of immune system in some types of inborn defects of immune system (SCID, WAS) or aquired defect in some severe autoimmune diseases. (sclerosis multiplex, SLE, Scleroderma, progressive polyartritis).

5) Induction of GVL effect in sensitive diseases (CLL, CML, NHL..)

Transplantation

- **Autologous**

(graft from the patient).

treatment of malignant

or autoimmune dis.

- **Alogeneic**

(graft from the donor)

- twin (syngeneic)

- sibling (30-40%)

- family donor (- 10%)

- unrelated –registries, BMDW (8/8-70%, 7/8- 90%)

- haploidentical (parents, children, siblings)

Autologous BMT

- **Advantage:**

-recovery of patients own hematopoiesis and immune system.

-no GVHD

-no immunosuppression post transplant

-lower morbidity and mortality

-higher age limit (70 years)

- **Disadvantage:**

-need for cryopreservation

-higher risk of relapse (because of tumor contamination of the graft and no GVL).

Allogeneic BMT

- **Advantage:**

- no risk of graft contamination

-presence of GVL

- **Disadvantage:**

- GVHD acute- (skin, liver, GI tract), chronic- (autoimmune type)

- immunosupressive treatment

- higher morbidity, mortality

- lower age limit (55-60 let)

-risk of decreased quality of life (cGVHD)

Graft

- **Bone marrow: (harvest from posterior illiac crest) (10-15 ml/kg bw). Optimal dose: 3-4 x 10(8) NC/kg b.w.**

- **Peripheral blood progenitor cells (PBPC):**

Collection after mobilisation (chemotherapy + G-CSF, or G-CSF alone). 4-6 x10(6) CD 34+ cells/ kg b.w.

- **Cord blood: > 2 x 10(7) NC /kg b.w.**

<u>Graft is transplanted by infusion into the large vein</u>.

Conditioning

- **Myeloablative (immunosuppression + antitumor)**
  -TBI 12 Gy + Cyclophosphamide 120 mg/kg
  -Busulfan 16 mg/ kg + Cyclophosphamide 120 mg/kg

- **Nonmyeloablative (immunosuppression)**
  -Fludarabin 180 mg/m +Busulfan 8 mg/kg + ATG.
  -TBI 2 Gy + Fludarabin 90 mg/m

- **In autologous BMT (antitumor or immunosupresive)**

Indication for HCT

- **Malignant dis.**

-Acute myelogenous leukemia
-Acute lymphocytic leukemia
-Chronic myelogenous leukemia
-Chronic lymphocytic leukemia
-NonHodgkin lymphoma
-Hodgkin dis.
-Myelodysplasia (MDS)
-Myelofibrosis
-myeloma

- **Nonmalignant dis.**

-Severe aplastic anemia
-Autoimunne diseases
-Storage diseases
-Inborn defects of imune system
-Inborn defects of hematopoiesis
(hemoglobinopathies, FA,)