



Total Body Irradiation (TBI) for HSCT (Hematopoietic Stem Cell Transplant)

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Short Communication

In the late 1950s, E.D. Thomas, recipient of the 1990 Nobel Prize in Medicine, introduced Total Body Irradiation (TBI) in the preparative regimen for allogeneic bone marrow transplantation.

TBI is most commonly used as part of the conditioning regimen prior to hematopoietic stem cell transplantation.

The goals of TBI are eradicating diseased marrow and reducing tumor burden; immunosuppressive which is particularly important in the setting of matched-unrelated donor transplants, when adequate immunosuppression is essential and deplete the BM to allow physical space for engraftment of healthy donor marrow.

TBI is now commonly being used for ALL, AML, severe thalassemia major, a plastic anemia and Fanconi's anemia as a conditioning regimen for Hematopoietic Stem Cell Transplant (HSCT).

Total Body Irradiation (TBI) is frequently used for conditioning prior to allogeneic Bone Marrow Transplantation (BMT) due to its immunosuppressive effect on the host immune system, thus minimizing the risk of engraftment failure [1-3]. This role has been used principally in Acute Myelogenous Leukemia (AML) and Acute Lymphoblastic Leukemia (ALL). In addition to aiding engraftment, TBI provides additional malignant cell kill and is active in chemotherapy inaccessible sanctuary sites. These latter functions are the predominant rationale for the use of TBI in autologous transplantation.

Randomized studies of BMT for AML with and without TBI as part of the conditioning regimen have found that TBI regimens provide equivalent or better outcomes for survival [4-7].

Recommendations state that the most common dose schedule for myeloablative TBI is 12 to 15 Gy given in 8 to 12 fractions over 3 to 4 days, with 2 to 3 treatments daily. At most of centers, 12Gy over 6-8# over 3-4 days (twice daily fraction) is commonly used.

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The concept of utilizing TBI for enhanced immunosuppression rather than myeloablative cytotoxic conditioning has allowed the engraftment of allogeneic stem cells from related and unrelated donors with lower early Transplant-Related Mortality (TRM) and morbidity. This approach shifts tumor eradication to the graft-vs-host immune response directed against minor histocompatibility antigens expressed on tumor cells.

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