Irradiation of Blood Products Guide for Vanderbilt University Medical Center (VUMC)

Purpose of document: Provide VUMC healthcare providers with clear guidance on clinical situations that require blood product irradiation. Document advantages and disadvantages.

The VUMC blood bank is located at 4650 TVC (phone is 2-2233), website <https://www.mc.vanderbilt.edu/root/vumc.php?site=vmcpathology&doc=39082>

Indication: Prevention of transfusion associated graft versus host disease (TA-GVHD), a uniformly fatal complication.

TA-GVHD: complication of transfusion of viable lymphocytes from allogeneic blood (RBC, platelets, granulocytes) to immunosuppressed recipient. Disparity of donor and recipient HLA types results in donor T lymphocyte activation—skin, gut, lover, bone marrow destruction.

Clinical Features of TA-GVHD: 1-2 weeks after transfusion development of fever, maculopapular rash, diarrhea, hepatitis, and bone marrow hypoplasia.

Diagnosis: Biopsy proven donor lymphocyte persistence (RFLP of donor WBC needed)

Prevention of TA-GVHD: Irradiation. VUMC blood bank uses Cesium-37 gamma irradiation to inactivate donor lymphocytes by delivering a minimum of 25 Gy to the blood product.

Who should receive irradiated blood products?

1. Stem cell transplant patients (either peripheral blood, bone marrow, or cord blood)
2. Directed donors
3. Treatment with purine analogs
4. Hematologic malignancy
5. Aggressive chemotherapeutic treatment
6. Intrauterine transfusion
7. Neonatal transfusion (<4 months of life)
8. Congenital T cell immunodeficiency

The VUMC Blood Bank SOP for irradiation can be review on the Policy Tech website <https://vanderbilt.policytech.com>

Who should **NOT** receive irradiated blood products? Routine surgery patients, solid tumor patients, HIV patients, autoimmune disease, solid organ transplantation

Disadvantage of irradiation? Increases supernatant potassium level of RBC product, alters inventory outdate, increased turn-around time for blood product orders

Recent literature from the UK calls into question the utility of blood product irradiation for patients undergoing alemtuzumab treated renal transplantion (Transfus Med. 2016 Apr;26(2):138-46.); however, the standards for leukocyte reduction between the US and the UK are discrepant. No definitive data exists to determine the role (for or against) for blood product irradiation in alemtuzumab treated renal transplant patients, as such caution should be applied when determining the role for irradiation in this patient population.

Document created by Garrett S. Booth M.D., M.S.