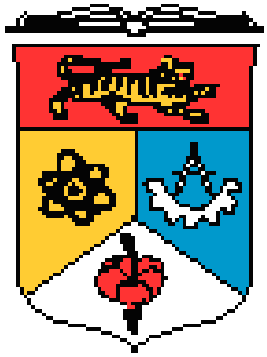

GUIDELINES ON BLOOD AND BLOOD COMPONENTS TRANSFUSION

(INDICATIONS FOR IRRADIATED CELLULAR BLOOD PRODUCTS)

BLOOD BANK

DEPARTMENT OF DIAGNOSTIC LABORATORY SERVICES

UKM MEDICAL CENTER

1ST Edition

2014

GUIDELINES ON THE INDICATIONS FOR IRRADIATED BLOOD AND BLOOD COMPONENTS

INTRODUCTION

Transfusion of blood and blood components is not without risk. One of the serious effect following blood transfusion is transfusion-associated graft versus host disease (TA-GvHD). This TA-GvHD is a major and serious risk for certain severely immunosuppressed or immunodeficient patients or even immunocompetent recipients who have received HLA-matched components or blood from an individual with a similar HLA haplotype, such as a close relative.

The pathogenesis of TA-GvHD is caused by engrafted donor lymphocytes in the immunosuppressed patients where the host immune mechanism was unable to eliminate the foreign donor lymphocytes and allowed them to be engrafted in the host; whereas in the immunocompetent recipient that received the homozygous HLA matched blood, the donor lymphocytes of similar HLA type are not perceived as foreign and therefore not destroyed by the recipient's immune system and thus engrafted in the host. With the proliferation of the engrafted donor lymphocytes which subsequently identify that the tissues of the host are different from itself, it started attacking the host tissues causing an almost invariably fatal syndrome, usually including dermatitis, high fever, hepatitis, severe gastrointestinal symptoms, and panmarrow suppression. These symptoms arise within four to 30 days after transfusion, and death usually ensues within the first month after symptoms. The disease cannot be treated effectively. Occasionally, chronic GVHD may appear some 100 days after transfusion, producing a scleroderma like syndrome.

Lymphocytes viability is retained in stored red cells for at least 3 weeks, TA-GvHD has developed following the transfusion of red cells, platelets and granulocytes. Leukoreduction does not adequately reduce the risk of GVHD. The mainstay of prevention of TA-GvHD is by gamma irradiation of blood products to prevent lymphocytes proliferation. The recommended minimal dose achieved in the irradiation field should be 25Gy, with no part receiving >50Gy.

Irradiation with 2.5Gy has not been demonstrated to alter significantly the lifespan or function of platelets or polymorphonuclear leukocytes. Irradiation does reduce red blood cell (RBC) viability. It is recommended that red cells may be irradiated at any time upto 14 days after collection, and the expiration date for irradiated RBCs is 14 days from the irradiation. The platelet concentrates can be irradiated at any stage of their 5-days storage and can thereafter be stored up to their normal shelf life of 5 days after collection. As for the granulocytes

products, they should be irradiated as soon as possible after production and thereafter transfuse with minimal delay.

At present, no data are available to support the speculation that administration of irradiated blood components carries any immediate or long-term risks other than those associated with similar non-irradiated components.

Irradiated units are not radioactive and require no special handling. Irradiated units may be used for patients other than the intended patient. There is no evidence that this practice is harmful.

Clinical indications for irradiated cellular blood products:

Absolute indication

Paediatric :

1. Intrauterine transfusion – red cells and / or platelets
2. Exchange transfusion
    a. neonate with previous history of IUT
    b. neonate receiving products from 1st or 2nd degree relatives
    c. other ET cases where irradiation does not delay the transfusion

    (for both the IUT and ET, blood should be transfused within 24 hours of irradiation and by 5 days or less.)
3. Top-up red cell or platelet transfusion in term and pre-term infant with previous history of IUT upto 6 months after the expected delivery date
4. Transfusion of blood or blood products donated by 1st or 2nd degree relatives.
5. Granulocyte transfusions – should be transfused as soon as possible after irradiation.
6. Patients with severe T lymphocyte immunodeficiency syndromes.

Haematological diseases :

1. Recipients of allogeneic or autologous haemopoietic stem cell transplantation – from time of initiation of conditioning radio-chemotherapy upto 6 months or 3 months post transplant or until lymphocytes > 1x10^{9}/L (6 months if total body irradiation is used in conditioning.

2. Patients with Hodgkin Lymphoma at any stage of the disease
3. Patients treated with purine analogue – indefinitely
4. Patients with aplastic anaemia receiving immunosuppressive therapy with ATG

No indication:

1. Patients with acute leukaemia
2. Patients with non-Hodgkin lymphoma
3. Patient with HIV antibody positive or who have AIDS.
4. Patients undergoing cardiac surgery
5. Patients undergoing routine surgery,
6. Patients with solid tumours, autoimmune disorders, acquired immunodeficiency
7. Patients post organ transplantation

References :

1. Guidelines on gamma irradiation of blood components for the prevention of transfusion associated graft versus host diseases. Prepared by the BCSH Blood Transfusion Task Force. 1996, Transfusion Medicine, (6): 261-271.
2. Jennie Treleaven et al. Guidelines on the use of irradiated blood components, Prepared by the BCSH Blood Transfusion Task Force. Reviewed January 2013.

Summary of clinical indications for irradiated cellular blood products

Irradiation is considered mandatory
Aplastic anemia receiving immunosuppressive therapy with Anti-thymocyte globulin
Allogeneic and autologous haematopoietic stem cell transplantation • from time of initiation of conditioning radio-chemotherapy up to 6 months post transplant or until lymphocytes > $1x10^9$/L (6 months if total body irradiation is used in conditioning.
Congenital immunodeficiency syndromes (suspected or known)
Granulocyte transfusions (should be transfuse as soon as possible)
Hodgkin's Lymphoma
Intrauterine transfusions
Neonatal exchange transfusions • Neonate with previous history of IUT • Neonate receiving products from 1^{st} or 2^{nd} degree relatives • Other ET cases where irradiation does not delay the transfusion
Top-up red cell or platelet transfusion in term and pre-term infant with previous history of IUT upto 6 months after the expected delivery date
Transfusions from first and second degree relatives
Treatment with alemtuzumab(anti-CD52) and other drugs/antibodies that affect T-lymphocyte number or function
Treatment with purine analogue drugs (fludarabine, cladribine, clofarabine and deoxycoformycin)
Irradiation is considered unwarranted
Acute leukemia
Non-Hodgkin's lymphoma and other hematologic malignancies
Autoimmune disease
Healthy newborns/ term infants
Patients with HIV/AIDS
Routine surgery
Solid organ transplantation
Solid tumour malignancy
Treatment with rituximab (anti-CD20)