Document Number: TM14-15.01.001 Revision Number: 2.20
Document Type: Policy Effective Date: 5/6/2020 2:39:03 PM
Location: AHS Laboratory Services\Document Administration\Transfusion Medicine\APL Transfusion Medicine\14 Blood Components and Products\15 Component Modification\01 Irradiating

TM14-15.01.001 Use of Irradiated Blood Components Policy

APPLICABILITY

This document applies to all staff who prepare and transfuse blood components and/or cellular therapy products (CTP) provided by Alberta Precision Laboratories

PURPOSE

This policy provides direction to effectively aid in the selection of irradiated cellular blood components or therapy products for appropriate patients in Alberta.

BACKGROUND

Irradiation of blood components is recommended to reduce the risk of Transfusion Associated Graft Versus Host Disease (TA-GVHD) in immunocompromised recipients.

Irradiated blood components are more costly to provide than non-irradiated components. In addition, irradiation of red cells impacts the quality and integrity of the cells and reduces the shelf life of RBC units. Therefore, transfusion of irradiated red blood cells should be limited to patients with a clinical need.

DEFINITIONS

Transfusion Associated Graft Versus Host Disease (TA-GVHD)	A rare, usually fatal complication of transfusion resulting from the transfusion of donor T-lymphocytes into a recipient whose immune system is not capable of eliminating them. These donor lymphocytes attack and cause damage to recipient tissues. Patients at highest risk include those who are severely immunocompromised, and those who receive blood components from a donor with similar human leukocyte antigen (HLA) alleles (eg. directed donations from family members, HLA-matched platelets)
Irradiation	Treatment of a blood component using electromagnetic radiation. This inflicts irreparable DNA damage to T-lymphocytes and prevents them from replicating, thereby preventing TA-GVHD.
Cellular Therapy Product	A somatic cell based product that is procured from a donor and intended for processing and administration

POLICY

APL Transfusion Medicine will provide irradiated blood components according to the recommendations outlined below.

Orders for irradiated blood components that fall outside of the indications listed in the table below will be assessed by a Pathologist/Transfusion Medicine physician or CTL Medical Director on a case by case basis.

The following tables are based on international guidelines, and represents a minimum standard. Transfusion services and individual physicians may choose to provide irradiated products for additional patient groups based on transfusion committee / transfusion medicine physician recommendations.

RESPONSIBILITY

The patient's physician and health care providers on the patient care units are responsible for:

- Identifying patients who require irradiated blood components.
- Notifying the Transfusion Service of the requirement for irradiated blood components.
- Notifying the Cellular Therapy Laboratory of the requirement for irradiated CTP after consulting with the CTL Medical Director/CTL Director
- Notifying the Transfusion Service when irradiated cellular blood components are no longer required.
- Informing the patient of their need for irradiated blood components.

Transfusion Medicine Physicians are responsible for:

- Reviewing requests for irradiated blood components that fall outside of recommended indications

APL Transfusion Medicine is responsible for:

- Meeting the requirements for the provision of irradiated blood components.
- Appropriately recording blood component requirements when notified by physician and patient care units.
- Monitoring the utilization of irradiated blood components for appropriateness.

AHS Zone Clinical Department Heads are responsible for:

- Communicating and educating clinical colleagues on the appropriate use of irradiated blood components.

BLOOD COMPONENTS AND CTP REQUIRING IRRADIATION

Transfusion Medicine shall ensure the following blood components are irradiated (regardless of the immune status of the recipient).

- All HLA-selected/matched platelets.
- All granulocytes.
- Any components where the donor is a first- or second-degree relative of the patient (directed donation).
- Red cells and platelets to be transfused to a patient identified at risk of TA-GVHD.
- CTP that are to be infused into a recipient with relapsed or refractory disease to induce graft vs leukemia effect but prevent GVHD.

It is not necessary to irradiate fresh frozen plasma, cryoprecipitate, or fractionated plasma products.

Irradiated Component Availability

- Not all hospitals in Alberta have the ability to irradiate on-site, or stock irradiated components in regular inventory.
- In the event of emergency transfusion, when irradiated RBC are indicated but not available, red cells that have been stored for more than 14 days will be provided if possible.

CONTRAINDICATIONS

Irradiated red blood cells are generally contraindicated for:

- Patients with a history of renal disease
- Patients with elevated potassium or creatinine

PATIENTS AT RISK OF TA-GVHD, REQUIRING IRRADIATED BLOOD COMPONENTS

Table 1: Fetal, Neonatal, and Pediatric Patients

	Irradiated Components Required
Fetus receiving intra-uterine transfusion (IUT)	Yes
Neonate that has previously received IUT	Yes, until 6 months after expected delivery date
Neonatal exchange transfusions	Yes
Neonatal small-volume (top-up) transfusions for very low birthweight neonates	At discretion of local neonatology experts Up to 4 months of age
Neonate with complex cardiac malformations	Yes, until congenital immune deficiency disorder is excluded*
* The presence of a congenital cardiac abnormality identified in a neonate or infant may raise the suspicion of chromosome 22q11 deletion syndrome, commonly associated with a congenital T cell immunodeficiency. Cardiac abnormalities most frequently associated with chromosome 22q11 deletions include: Tetralogy of Fallot, ventricular septal defect, interrupted aortic arch, combined pulmonary atresia and ventricular septal defect, and truncus arteriosus. There is no need to irradiate red cells or platelets for infants undergoing cardiac surgery unless clinical or laboratory features suggest a coexisting T lymphocyte immunodeficiency syndrome. Irradiated components will be provided until T lymphocyte immunodeficiency syndrome has been excluded.	

Table 2: Patients with specific diagnoses and/or treatments

	Irradiated Components Required
Patient with Hodgkin's Disease	Yes
Suspected or confirmed (T cell) congenital immune deficiency (i.e. Wiskott-Aldrich, Di Georges, SCID)	Yes
Patients treated with purine analogs (e.g. fludarabine, cladribine, deoxycoformycin, clofarabine)**	Yes**
Patients treated with: ▪ Bendamustine, alemtuzumab (anti -CD52) ▪ Anti-thymocyte globulin (ATG) for severe aplastic anemia. ▪ Other immunosuppressive agents not listed***	Yes***

** Patients treated with fludarabine, cladribine and deoxycoformicin should receive irradiated components indefinitely. Transfusion requirements with other purine analogues should be reviewed annually.

This is not an exclusive list of diagnoses or immunosuppressive agents that may warrant provision of irradiated components. Consult with a TM physician is recommended.

The decision to provide irradiated blood for patients on immunosuppressive agents should be made with consideration given to perceived risks and benefits of irradiated blood transfusion, the availability of the irradiated components, and the immunosuppressive potency of the agent. Discussion between the patient's most responsible physician and a Transfusion Medicine physician is advised.

Table 3: Transplant Recipients and Donors

	Irradiated Components Required
Allogeneic bone marrow or stem cell transplant recipient	Yes, from start of conditioning
Donors (including autologous) of bone marrow and peripheral blood stem cells receiving allogenic transfusions	Yes, 7 days prior to or during the harvest
Patients with transplant associated graft-versus-host disease (GVHD)	Yes
Autologous bone marrow or stem cell transplant patient***	Yes, from start of conditioning During, and for 7 days before harvesting of bone marrow/stem cells
In the absence of other indications as listed above, autologous bone marrow or stem cell transplant patients require irradiated components for 3 months post-transplant (6 months if total body irradiation is used for conditioning).	

REFERENCES

Clinical Guide to Transfusion ©2017, Canadian Blood Services On-line Edition

Standards for Hospital Transfusion Services, Canadian Society for Transfusion Medicine, Version 4, April 2018 Revision

Recommendations for use of irradiated blood components in Canada, National Advisory Committee on Blood and Blood Products, A MAN and CCNMT Collaborative Initiative: 2018-05-14