

Department    Laboratory  
 Laboratory    Blood Bank  
 Section        Blood Selection and Component Prep  
 Site(s)        UMMC/UMMCH  
 Document #    D-5946 BB v12

**Subject    IRRADIATION OF BLOOD COMPONENTS**

**Purpose**    Describes procedure for use of the Best® Theratronics Raycell®, self-contained irradiator, and labeling of products.

**Policy**    All platelet concentrates are irradiated. Red blood cell products are irradiated as required. Plasma products are not irradiated. All components are removed from controlled storage or transport immediately prior to irradiation and returned to controlled storage immediately after irradiation.

**Specimen**    Blood component (Note: Bone marrow for transplantation or any stem cell products for transplantation **must not** be irradiated.)

**Equipment/Supplies**    1. Best® Theratronics Raycell®.  
    2. RAD-SURE labels: Type XR.

**Procedure**    The labeling, documentation, loading and unloading should be done in the following sequence.

1. Labeling
  - a. Attach RAD-SURE label to a clean dry portion of the unit (preferably above the component label). Do not obstruct any part of the original component label. The adhesive on the RAD-SURE label may not be sticky if labels are reapplied. **DO NOT** pre-sign and date labels. Visually verify RAD-SURE label reads “NOT.”
 

**Caution:** Once a RAD-SURE sticker is applied, the component must be irradiated or the sticker removed and discarded.

**Caution:** Split units from previously irradiated units do NOT need to be irradiated again. See procedures “Pediatric (Split) Red Cells: Preparation & Setup” and “Apheresis Platelets and Splitting Apheresis Platelets.”
  - b. If product is a licensed product (Red Cross license number is not blackened out), cross out the license number on unit.
  - c. Record new outdate on unit if unit is a red blood cell. It will outdate 28 days after irradiation or on the original outdate, which ever occurs first. (If new outdate is calculated, cross out the original outdate on unit).
2. Irradiation Log Documentation
  - a. Use of pen is mandatory.
  - b. Record unit(s) number, component code(s), date/military time (use clock located at irradiator work station), and initials.

- c. If more than one unit is being irradiated at the same time, arrows (provided they are complete) may be used to indicate duplicate information.
  - d. **If a mistake is made on the log, cross off the mistake with a single line. Write the word, "error" and sign your initials next to the mistake. Scribbles on the irradiator log are unacceptable.**
3. Loading the Irradiator
    - a. Place components **in irradiator** canister in a stacking configuration. Maximum capacity **on East is 2 L (Limit 4, 300mL units to allow lid to be closed.) and on West is 1.5L (Limit RBCs to 2 units and limit platelets to 3-4 units to allow lid to be closed.)**.
    - b. Ensure lid of canister is in place and closed tightly.
    - c. **Open irradiator door** and pull out canister holder. **(East Bank only: Press white XRAY OFF/UNLOCK button first to unlock the canister door.)**
    - d. Place canister into the holder.
      - 1) Ensure canister is pushed down as far as it will go.
      - 2) It may be necessary to add a weight when irradiating a small split component.
    - e. Push canister holder back in place and slide door shut.
    - f. Verify Warm Up, Door, and Canister LEDs are illuminated **green** at this point.
    - g. Push the X-RAY ON button to start the irradiation cycle.
    - h. The irradiation cycle time is preset to **3.5 minutes (3 minutes and 30 seconds) on East Bank and 4.6 minutes (4 minutes, 36 seconds) on West Bank.**
    - i. The X-RAY production can be stopped at any time by pressing the X-RAY OFF button or by opening the door. Pressing the X-RAY ON button will restart the cycle, picking up where it left off.  
 NOTE: If power is lost or the main power is shut off, the time remaining for the cycle is lost. The warm up steps must be completed to restart the irradiator.
    - j. A vertical LED bar will gradually illuminate throughout the irradiation cycle.
    - k. When the irradiation cycle is complete, x-rays will stop being produced and an audible indicator (beep) will sound. This indicator will continue to sound until the canister is removed.  
 WARNING: If the audible indicator does not sound and the vertical LED bar is not fully illuminated (complete), the irradiation cycle has not been completed.
  4. Unloading the Irradiator
    - a. Slide irradiator door open and pull out canister holder. **(East Bank only: Press white XRAY OFF/UNLOCK button first to unlock the canister door.)**
    - b. Remove the canister.
    - c. Push canister holder back in place and slide door shut.
  5. Inspection and Documentation
    - a. After irradiation the red window reading "NOT" on the RAD-SURE label will

- blacken (develop) obscuring the word “NOT” and validating the irradiation process.
- 1) If sticker is acceptable, initial and date sticker.
  - 2) If the sticker is not acceptable, the irradiation process failed. Contact Supervisor/**Specialist** for action to take.
- b. Complete Irradiator Log
- 1) Use of pen is mandatory.
  - 2) Record “Out” military time (use same clock located at irradiator work station).
  - 3) Record acceptability of sticker (**Y (Yes) or N (No)**).
  - 4) Record initials if not the same tech who started the process.
6. Computer processing steps (must be performed by the staff doing the irradiation):
- a. Component prep the unit using Blood Component Prep function into the appropriate irradiated component. (See LIS procedure D06.00 “Blood Component Prep.”) Change expiration date if needed.
  - b. **CAUTION:** Complete this step only if:
    - 1) The irradiation of the unit is documented on the irradiation log.
    - 2) The RAD-SURE label on the unit verifies acceptable irradiation.
    - 3) If either is missing the irradiation must be repeated.

Safety Measures:

1. X-ray production will not start unless door is closed.
2. X-ray production will cease during a warm-up or irradiation cycle if door is opened **or the cycle is interrupted by pushing the X-RAY OFF button.**
3. Follow procedure “Radiation Protection, Emergency, and Malfunction procedures: Raycell Self Contained Irradiator,” if **X-ray** does not turn off at end of cycle.
4. Film badges do not need to be worn when operating the irradiator.
5. Two film badges are placed in the vicinity of the irradiator to monitor the area.
6. Do not operate the irradiator if you suspect damage to the interlocks or lead shielding.

RAD-SURE Indicators:

1. RAD-SURE indicators are shipped and stored at 1-6°C.
2. Once opened, the indicators are stored at room temperature and are good for 30 days. Write date opened, new expiration date and initials on the box.
3. When a new box is opened, attach a “Date Opened” sticker (**shown below**) to the irradiator log and document the following:
  - a. Date the box is opened.
  - b. Lot number.
  - c. If the temperature indicator inside the box is acceptable.
  - d. Tech ID.

Date: _____	RAD-SURE BOX OPENED.	
Lot # _____		
TEMPERATURE INDICATOR ACCEPTABLE?		
_____ Yes	_____ No	
Tech: _____		

Irradiator Log Review:

1. Done by designated technologist when log sheet is full.
2. Ensure all arrows are complete.
3. Ensure all date/times, unit numbers, product codes, initials, and RAD-SURE acceptability questions are complete.
4. Follow-up with individual technologist if any incomplete, illegible, or discrepant information is found. If not possible to follow-up with technologist, forward log to Supervisor/**Specialist**.
5. Sign and date bottom of log after review of acceptability.

Irradiator Malfunction/Downtime:

1. Contact the Best Theratronics hotline to diagnose problem. **Phone numbers are listed on Irradiator.**
2. Fill out the “Out of Serviced/Repair” form.
3. Notify the other campus and **the American Red Cross** (Hospital Services 651-291-6767).
  - a. Give an approximate length of downtime.
  - b. Coordinate with both facilities to provide irradiated components.

Calibration The accuracy of the delivered dose is mapped semiannually. The Raycell is set by the manufacturer to deliver a central dose of 25 Gy and minimum perimeter dose of 15 Gy.

1. **Best Theratronics** provides a service for calibrating irradiators. A set of fifteen pairs of thermo luminescent dosimeters (TLD) placed in a phantam, are irradiated. The phantam containing the TLDs is returned to **Best Theratronics** for measurement.
2. The completed **dose mapping** report is reviewed by the Technical Supervisor/**Specialist** and Medical Director.

Maintenance: 1. Monthly: Performed by assigned staff.

Summary of Changes Updated model name of Irradiator.  
 Eliminated requirement of needing to re-irradiate split products.  
 Added directions for how to correct a mistake on the irradiator log.

Updated length of irradiation cycle on East Bank irradiator.

Updated size of East irradiation canister.

Added picture of RAD-SURE Indicator log sticker.

Updated location of irradiator calibration and dose mapping service to Best Theratronics.

Added Specialist role.

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