

## RADIATION PROTECTION

Students entering the Program must be advised of the radiation protection precautions prior to being clinically assigned to a location where ionizing radiation is produced.

Responsibility: Program Director, students, clinical instructors, Radiation Safety Officer (RSO)

Standard: Human Resources

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No student shall be assigned in an area of clinical education where the student is exposed to ionizing radiation before receiving basic instruction and demonstrating understanding of radiation protection measures. This includes but is not limited to, the following areas of education:

- a. Risks of ionizing radiation
- b. Exposure limit
- c. Radiation monitoring practices
- d. Safety precautions
- e. Cardinal rules of radiation protection
- f. Protection from scatter radiation

Sufficient instruction in this area will be met with successful completion of the course **Health Physics I 260** and successful completion of the laboratory exercises corresponding to this course. All students must strictly observe Imaging Services Department Radiation Safety Policies.

ALARA - As Low As Reasonably Achievable (ALARA) which means making every reasonable effort to maintain exposure to radiation as far below the dose limits as practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology. This definition recognizes the concept of ALARA to include energies for magnetic resonance and sonographic imaging.

All students must be instructed about and shall practice the concept of ALARA for radiation exposures. This shall be accomplished for patients, visitors, employees, other students, and themselves.

### **Radiation Monitor Badges:**

1. The Program Director shall provide to each student entering the Program a radiation monitoring badge request form. This form must be completed and returned to the Program Director. This completed form shall be used to obtain a radiation monitoring badge for the student.

2. Radiation monitoring devices shall be worn by the student between the neck and waist except when wearing a radiation protective apron when it shall be worn at collar level and above the apron.
3. Each student must have the Imaging Services authorized radiation monitoring badge on his/her person at all times while in attendance for clinical education in a clinical assignment or in a laboratory situation where ionizing radiation is used.
4. Any student who does not have his/her radiation monitoring badge will not be permitted to attend his/her clinical area and the student will be sent home to get the monitoring badge.
5. If the student loses his/her monitoring badge, the student will notify the diagnostic supervisor so that arrangements may be made for a replacement.
6. A new badge is provided every month for each student. The student shall promptly exchange his/her current badge with the arrival of a new badge.
7. The student shall use the same assigned monitoring badge for the monthly interval for all clinical educational settings.
8. To minimize exposure of the radiation monitoring badge from non-occupational radiation sources, the student should avoid placing the badge near radiation sources. Examples of radiation sources include microwaves, granite counters, smoke and fire detectors, watches with luminescent dials, television and computer monitors.
9. If the student needs to have a radiographic procedure as a patient, the student shall not wear the monitoring badge during the procedure.

**Radiation Exposure Report:**

1. The effective dose equivalent limit for students is 3.5 Rem/year (35 mSv/year or 3500 mrem/year). The numerical value of the individual student's lifetime effective dose equivalent in mSv shall not exceed the value of the student's age in years times ten.
2. A current exposure report is available for each badge holder. These reports are available from the Imaging Services Assistant Department Director. Routinely, these reports are kept in the Administrative Offices of the Imaging Services Department.

3. The Radiation Safety Officer (RSO) monitors radiation reports of students and informs a student if the hospital's action levels are exceeded.
4. A copy of the monthly radiation monitoring badge report will be provided to a Program official for review. The Program or Sponsoring Institution will make available a badge report to a student upon request.
5. The final cumulative badge report will be placed in the student's permanent record.
6. The Program Director shall provide students leaving the Program a record of the final cumulative radiation dose received while in the Program when the final report is available.

**Pregnant Radiology Student:**

1. The student who becomes pregnant should also refer to the Pregnancy Policy 722.8.41.10 for further information.
2. A pregnant occupationally exposed student should, but is not required to, make early disclosure of her pregnancy to the Program Director in writing. Early disclosure ensures that proper radiation safety precautions may be observed during the entire pregnancy. A copy of this disclosure document will be forwarded to the sponsoring institution's Occupational Health Department. The student may also withdraw this pregnancy declaration at any time.
3. If a student declares pregnancy, the student shall be advised of possible hazards from radiation to the fetus as described in the Pregnancy Policy 722.8.41.10.
4. A second monitoring badge will be obtained for the student who declares pregnancy. This designated monitoring badge shall be worn at the waist at all times when in the clinical assignment and beneath the leaded apron when an apron is worn.
5. The effective dose equivalent limits to the fetus from the occupationally exposed mother should not exceed 0.3 mSv per month or 3 mSv (300mRem) for the gestational period.
6. The RSO will monitor all radiation monitoring reports for pregnant students.

**Review of Radiation Exposure Reports:**

1. Regional West Medical Center has established investigational levels for occupational external radiation doses, which when exceeded, will initiate review and investigation by the RSO and/or the Radiation Safety Committee (RSC).
2. The RSO shall review the results of the radiation monitoring reports on a monthly basis to determine students are following the principle of ALARA. The investigation levels adopted are listed in Table 1. Level I and Level II are set for monthly exposures. These levels apply to the exposure of individual students.
3. The following actions will be taken at the levels as stated in Table 1:

- a. Personal doses less than Investigational Level I.

Except those deemed appropriate by the RSO, no further action will be taken in those cases where a student's dose is less than Table 1 values for the investigation Level I in a month.

- b. A student's dose equal to or greater than Investigational Level I but less than Investigational Level II.

The RSO will review the dose of each student whose monthly dose equals or exceeds Investigational Level I in a month and will report the results of the review at the first RSC meeting following the quarter when the dose was recorded. If the dose does not equal or exceed Investigational Level II in a month, no action related specifically to the exposure is required unless deemed appropriate by the RSC. The RSC will, however, review each such dose in comparison with those of others performing similar tasks as index of ALARA program quality and will record the review in the RSC minutes.

- c. A student's doses greater than Investigational Level II.

The RSO will investigate in a timely manner the causes of a student's dose equaling or exceeding Investigational Level II in a month and, if warranted, will take action to reduce further dose. A report of investigation, and action taken, and a copy of the exposure report or the equivalent will be presented to the RSC at the first meeting following completion of the investigation. The details of the reports will be included in the RSC minutes. A copy of the report will also be placed in the student's permanent record.

**TABLE 1**

Investigational Levels (mRem) Per Reporting Period			
Description	Level I	Level II	Annual Limit
1. Whole Body (DDE)	125/month	375/month	3500
2. Lens of the Eye (LDE)	150/month	450/month	10,000
3. Extremity (SDE-ME)	500/month	2000/month	45,000
4. Skin (SDE-WB)	500/month	2000/month	45,000
5. Declared Pregnant Women (DPW)	40/month	50/month	300/ gestational period

4. In the event of accidental exposure to ionizing radiation, the student shall fill out an incident report form and inform the RSO or the Imaging Services Assistant Department Director of such an event so that appropriate action can be taken to reduce the chance of a reoccurrence and to determine the amount of accidental exposure.

**Protection of the Student from Unnecessary Radiation:**

1. All energizing switches in fixed units shall be maintained at a distance of thirty inches from the control booth opening so the student cannot be exposed to radiation.
2. A student shall be in the radiographic room during radiation exposure only when necessary.
3. Radiation protection apparel shall be worn when in the fluoroscopy room during fluoroscopy, in a radiographic room during an exposure or when making the exposure or in the vicinity of the portable unit or the patient during the exposure.
4. Technologists are required to observe and correct students on radiation safety practices.
5. Students must not hold image receptors during any radiographic procedures.
6. Student should not hold patients during any radiographic procedure when an immobilization method is the appropriate standard of care.

**Protection of Patients, Visitors and Other Staff from Unnecessary Radiation:**

1. Female patients of child bearing age shall be asked to sign a menstrual history questionnaire prior to exposure to ionizing radiation
2. All doors in radiographic rooms shall be closed during radiation exposure.
3. Proper gonadal shielding shall be used on all patients with reproductive potential whenever the diagnosis of the exam is not compromised.
4. Close collimation of the x-ray beam is required on every exposure. At minimum, the x-ray field must never be larger than the image receptor being used.

A digital image should not be cropped or masked such that it eliminates areas of exposure from the image that are presented for interpretation. To determine that exposed anatomy on an image is not significant or of diagnostic value is a medical decision and is therefore outside of the scope of practice for a radiologic technologist.

5. The minimum distance between the x-ray tube and the patient's skin surface shall not be less than 12 inches (30 centimeters).
6. Visitors and family are not permitted in radiographic rooms, except in extraordinary situations. No one other than staff and ancillary personnel shall be allowed in the room during a radiographic exposure. Exceptions include other patients in the room who cannot be moved.
7. If no other immobilization method is appropriate and the student must assist a patient during exposure, the student must protect him or herself by wearing radiation protective apparel with the following requirements:
  - a. Of the student, staff or ancillary personnel remaining in the room, no part of the body shall be exposed to the primary beam without protection of at least 0.5 mm of lead equivalent.
  - b. Of the student, staff or ancillary personnel remaining in the room, the body shall be protected by lead apron or whole body barriers of at least 0.25 mm of lead equivalent if not in the primary beam.
  - c. When a person is required to hold a patient during an exposure, his or her name and pertinent data shall be entered in the Exposure Holding Log.
8. When portable procedures are performed, the technologist and the student are responsible for proper radiation safety of the patient and other persons.

All people in the area must be moved to a safe environment. Patients who cannot be removed from the room shall be protected from scatter radiation by whole body protectors of at least 0.25 mm lead equivalent or shall be positioned at least 2 meters from the tube head and image receptor. Before an exposure is made, the technologist/student shall inform all people in the area that the exposure is to be made and allow for these individuals to move to a safer distance.

9. When the C-arm or O-arm is in operation, all personnel in the area shall wear lead aprons and lead gloves as applicable. The fluoro time shall be part of the patient's record.

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Signature  
Stephanie Cannon, MSRS, RT(R)(ARRT)  
Program Director

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Signature  
Joshua Lively, MHA, BSRT(R), RT (R)(VI)(ARRT)  
Director of Imaging Services

Reviewed: 3/28/00, 3/28/02, 8/12/08, 1/28/2010, 7/7/2011, 5/24/12, 5/16/13, 2/3/17, 2/6/18, 5/1/20,  
9/3/2021  
Revised: 10/21/92, 12/12/94, 5/28/98, 12/99/99, 8/18/00, 4/4/03, 6/28/05, 7/5/06, 6/15/10,  
5/24/12, 1/17/2014, 4/4/2014, 2/27/15, 3/4/16, 2/7/19

**RADIATION MONITOR REQUEST FORM**

**PLEASE PROVIDE A RADIATION MONITOR BADGE FOR THE FOLLOWING PERSON:**

**Name:** \_\_\_\_\_

**Social Security Number:** \_\_\_\_\_

**Birth date:** \_\_\_\_\_

**Date:** \_\_\_\_\_



**RADIATION DOSIMETRY REPORT**

Student Name: \_\_\_\_\_

**PERIOD**

Reporting Period _____ to _____	
Description	Dose Equivalent in mrems
Whole Body (DDE)	
Lens of the Eye (LDE)	
Skin (SDE-WB)	

**YEAR TO DATE**

<u>January 1, 20</u> _____ to _____	
Description	Dose Equivalent in mrems
Whole Body (DDE)	
Lens of the Eye (LDE)	
Skin (SDE-WB)	

**LIFETIME TO DATE**

Inception Date of _____	
Description	Dose Equivalent in mrems
Whole Body (DDE)	
Lens of the Eye (LDE)	
Skin (SDE-WB)	

Method of Monitoring:     OSL  
 Monitoring Company:     Landauer

M = Minimum