

LIMITING EXPOSURE TO RADIATION GUIDELINES

Last Revised: 4/25/17

A. Summary

Exposure to radiation can occur while operating machinery, such as diagnostic x-ray machines. Small amounts of radiation exposure can increase the risk of cancer, and large amounts of radiation exposure can cause radiation sickness and other health concerns. Health risks and injuries can be reduced by handling equipment correctly, wearing proper personal protective equipment (PPE) when around radiation-producing equipment, and through general awareness.

B. External Radiation Exposure Control

1. X-Rays and Gamma Rays

Exposure to x-rays and gamma rays can be decreased using the following methods, keeping in mind time, distance, and shielding:

- Keep your time of exposure to a minimum. Design your experiment to minimize time in the radiation field. Have, and be familiar with, an experimental protocol so you can work quickly and efficiently.
- Radiation intensity decreases the greater the distance (inverse square law), so maintain the maximum possible distance from the source at all times.
- Lead shields provide protection against radiation exposure. Use lead shields to reduce the amount of radiation you are being exposed to.

2. Diagnostic X-ray Machines

Diagnostic x-ray machines can emit various amounts of radiation when in operation. When using an x-ray producing machine, or assisting a patient during a radiograph, use the following safety techniques in addition to those listed above:

- Wear a lead apron.
- Wear lead gloves and leaded glasses.
- Use a lead drape around the work area during fluoroscopy.
- Do not routinely hold or support a patient. Rotate these duties with co-workers.

3. Beta Particles

Beta particles are high energy electrons that can be used in a variety of health conditions. Beta particles exhibit minimal penetration, but can lead to skin exposure. The time and distance methods of exposure reduction for x-rays and gamma rays listed above also apply to beta particles; however, when shielding beta particles, use Plexiglas, not lead. Beta particles that strike lead produce x-rays. Plexiglas, approximately one quarter inch thick, will effectively stop beta particles.

C. Internal Radiation Exposure Control

Radioactive material can get inside the body by absorption, inhalation, or ingestion. To minimize exposure, follow the precautions below:

- Wear a lab coat, disposable gloves, pants or a long skirt, and covered shoes (no sandals) while working with open sources of radioactivity to prevent absorption. Change your gloves frequently. Avoid touching your eyes, nose, or mouth while conducting experiments. Monitor your work area, wash your hands, and remove your lab coat when leaving the laboratory. Do not assume your co-workers have not contaminated the laboratory. Routinely check yourself with a survey meter.
- Work in a fume hood when millicurie amounts of open sources of radioactivity are used to prevent inhalation.
- Do not smoke, eat, or drink in the laboratory. Do not store food in refrigerators, freezers, or other areas designated for chemical or radioactive material storage that may lead to ingestion.