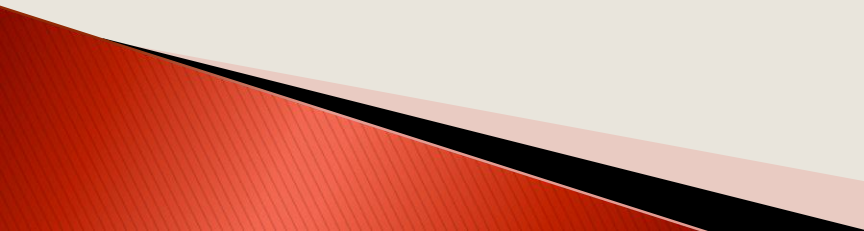


Radiation Safety General Awareness Training

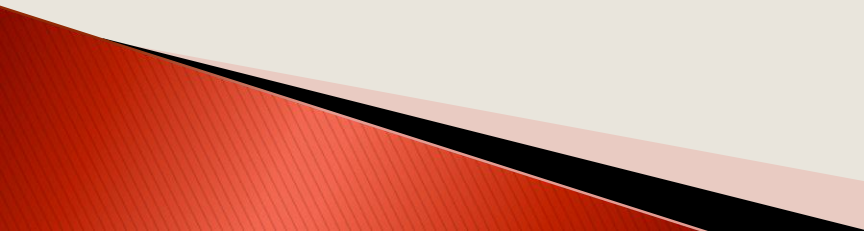
University of New Mexico



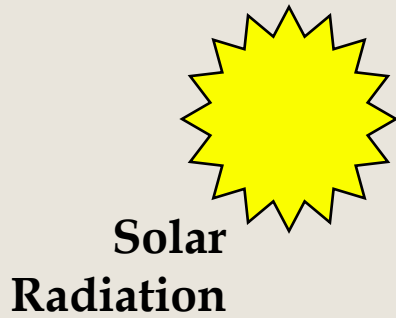
Introduction

- ▶ The intended audience for this course are ancillary workers such as in Environmental Services, Food Service, Clergy, Custodial staff, or Shipping/Receiving workers.
 - ▶ These groups have no responsibility for radiation sources, but may encounter areas where radiation sources are used in the course of their job, and should be aware of them.
 - ▶ There are many sources of radiation used and stored on the University of New Mexico campus and at UNMH. It is important to have a basic understanding of them.
- 

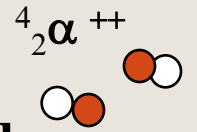
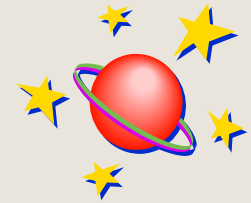
Course Objectives

- ▶ Provide a general awareness of radiation sources.
 - ▶ Review radiation fundamentals.
 - ▶ Know how to identify an area where radiation sources are used or stored.
 - ▶ Know what precautions you should take when working in the vicinity of radiation sources.
 - ▶ Learn who to call to get radiation safety assistance.
- 

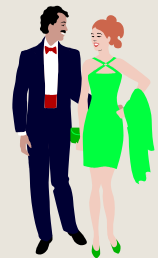
Radiation is All Around Us in the Natural Environment



Cosmic Rays



Radon Gas



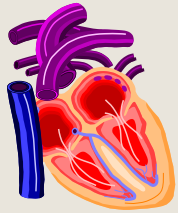
In Each Other

Terrestrial Radiation



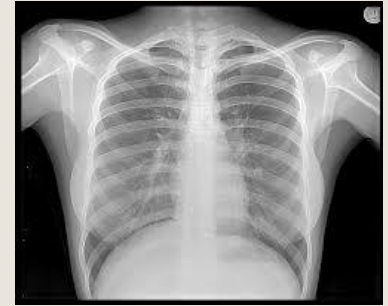
Radiation is also Used in Hospitals and Universities with Great Benefit

**Nuclear
Medicine to see
inside the body**



Cancer treatment

**X-Rays to
Diagnose Disease**

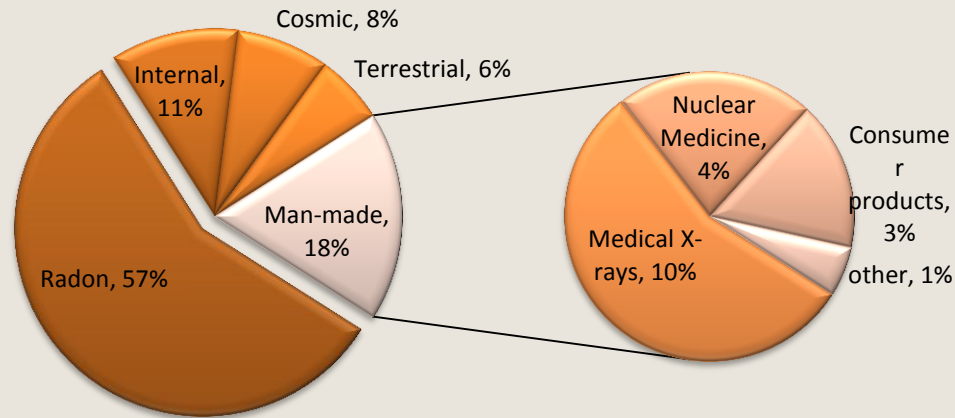


**Consumer
Products, to
detect fire and
smoke**



**Researching Cures
for disease**

Annual Dose from Background Radiation



In the US, everyone in the population receives an average dose of about 300 mrem per year from natural radiation sources in the environment. This is called natural background radiation.

An additional 300 mrem or more is received due to medical radiation.

No adverse effects have been attributed to this exposure.

What is Radiation ?

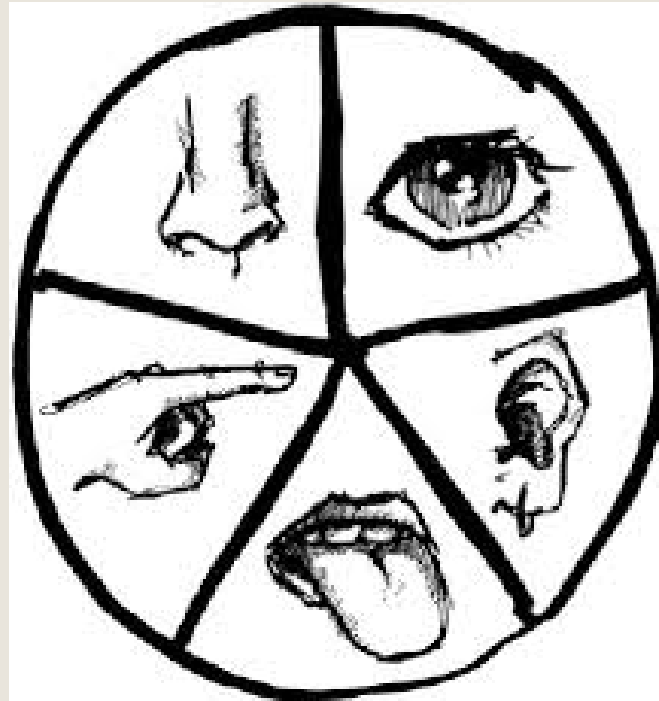
- **Radiation** is simply energy transmitted through space. It is emitted by x-ray machines when the switch is turned “on”, or by radioactive materials.
- Radiation is similar to other familiar forms of radiation such as light & microwave, but can be harmful if not used safely.



What is Radiation ?

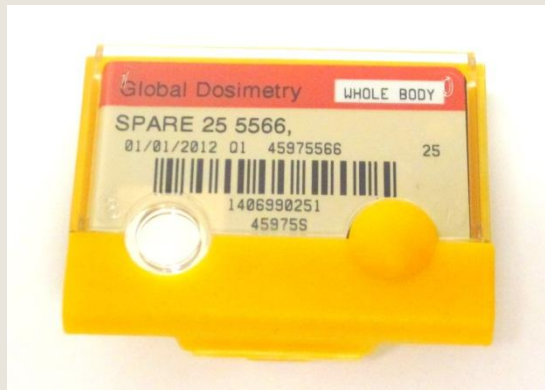
- Radiation can be harmful in large amounts because it can disrupt atoms in materials through which it passes.
- To minimize this risk, many controls are in place so that radiation dose to workers, patients, and visitors is **as low as reasonable achievable (ALARA)**.

We Cannot Detect Radiation with Any of our Senses



Radiation Detection

- We could be standing in a high radiation field and never know it.
- Special instruments and devices are needed to detect and measure radiation.

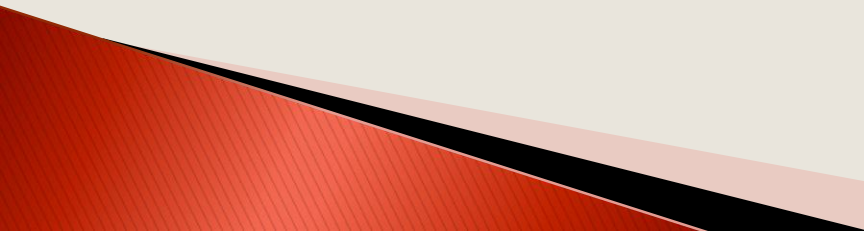


Radiation Badge

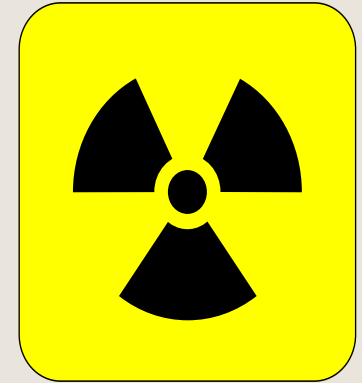


Geiger Counter

Should you wear a radiation badge?

- ▶ The use of radiation badges is reserved only for those workers whose job duties require them to directly use radiation sources, or frequent radiation use areas.
 - ▶ Badges are used to track exposure to those at risk of receiving it.
 - ▶ For others, like ancillary staff, administrative and engineering controls are used to minimize radiation exposure.
- 

How Do I Recognize a Radiation Hazard ?



The Universal Radiation Warning Colors are **Magenta, Purple, or Black** on a **Yellow Background**

The Radiation Warning Symbol is a 3 blade trefoil.

Radiation Warning Signs

There are many varieties of signs and devices but all will have the same colors and design.



Postings in X-Ray Machine Areas



Entry Rules for Radiation Areas

- Do not enter a radiation area unless you have been given specific instructions on how to do your job safely.
- At a minimum, you should know what the radiation source looks like and where it is located.
- Always knock first and receive a response before entering.
- Never touch or remove anything from a radiation area without permission.



There are Two Main Types of Radiation Sources Used in Hospitals

Machines that produce radiation:

- X-ray machines
- Linear Accelerators



Radioactive materials:

- Sealed sources (solids)
- Unsealed sources (liquids)



What Areas Have X-Ray Machines ?

- ▶ Radiology
- ▶ Operating Rooms
- ▶ Endoscopy
- ▶ Urology
- ▶ Emergency Room
- ▶ Pain Therapy
- ▶ Radiation Oncology



Portable X-Ray Machines Can Go Anywhere:



Portable C-arm

These x-ray machines can be taken to any patient care area. If you see one in use, stay at least 6 feet away while the x-ray is taken. Otherwise, wear a lead apron.



Portable radiographic

What are the X-Ray Machine Hazards ?

- ▶ X-ray machines produce radiation **only** when the operator is pressing the “ON” switch.
- ▶ If an x-ray room is not in use, there is no radiation hazard.
- ▶ There is no radioactive material in an x-ray machine, so there is no risk of contamination.
- ▶ Patients do not become radioactive if they have an x-ray exam.

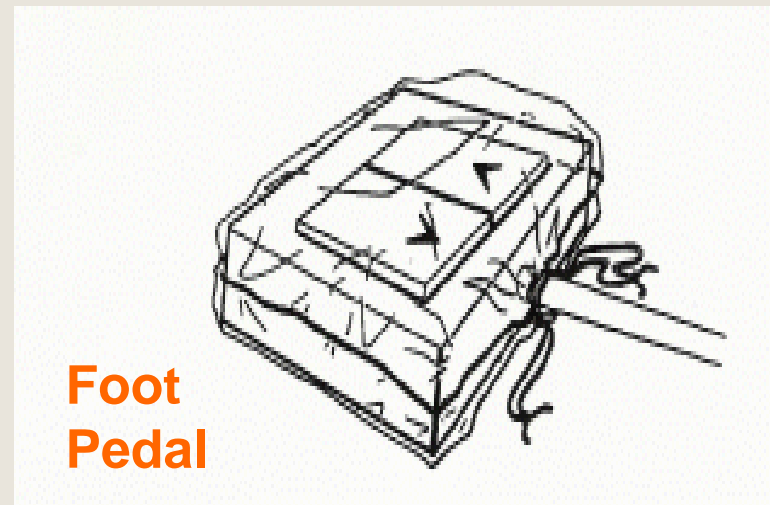
X-Ray Machine Safety



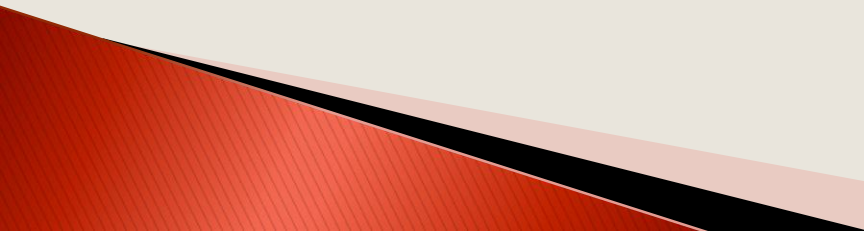
- ▶ A light outside the door illuminates when the x-ray machine is in use.
- ▶ Always knock first or receive permission before entering an x-ray room.
- ▶ Stay at least 6 feet away when a portable x-ray machine is in use.
- ▶ Always wear a lead apron if you must be within 6 feet of an operating x-ray machine.

X-Ray Machine Safety

- ▶ Fluoroscopic x-ray machines have a foot pedal to turn the x-ray beam “ON”. Use extreme care to avoid stepping on the pedal unintentionally.



What Areas Have Radioactive Materials ?

- ▶ UNMH Nuclear Medicine
 - ▶ Cancer Center
 - ▶ UNMH Cardiac Stress Lab
 - ▶ Hospital Rooms on 5E where patients are treated
 - ▶ Research laboratories on Main Campus
 - ▶ Reactor Building in Nuclear Engineering
 - ▶ Radiation Safety Office
- 

Hazards from Radioactive Materials

- ▶ Radioactive materials constantly emit radiation. There is no off/on switch.
- ▶ The sources can be solid as **sealed sources** or liquid as **unsealed sources**. If they escape from their containment, they can cause **contamination**, which is unwanted radioactivity on a surface.

Sealed Sources in the Cancer Center



Tiny radioactive seeds used for cancer treatment.



HDR Afterloader

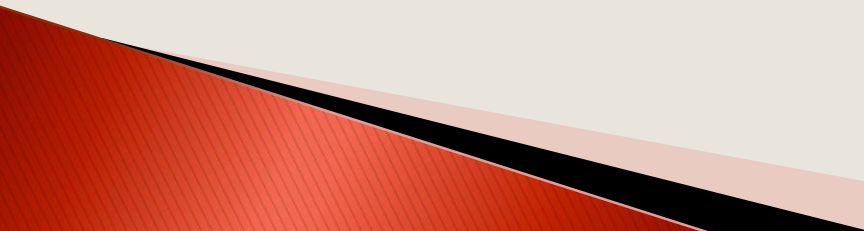
Cancer Center Patients on 5E

- Some patients may be treated with sealed sources to treat cancer, and admitted to the hospital (on 5E).
- There can be a high radiation level in the room.
- Visitor stay times are restricted and posted.
- The hospital room is off-limits to everyone except essential clinical staff.

Sealed Sources in Nuclear Medicine



Working Safely Around Sealed Sources

- ▶ Sealed sources may be used and handled only by persons specifically authorized to do so.
 - ▶ Sources are returned to a high security storage area (a hot lab) for storage following use.
 - ▶ At no time should a sealed source be unsecure or accessible to unauthorized staff. If you see an unsecure source, contact the RSO immediately.
- 

Unsealed Sources in Nuclear Medicine



Unsealed radioactive liquids for diagnosis & therapy



Lead pigs are used to store radiation sources

Nuclear Medicine Hot Lab



- The hot lab is a high security area used to prepare & store radioactive doses for patients.
- Surfaces are lined with absorbent paper to control spills.
- Cabinets & refrigerators used to store radioactive materials are posted.

Nuclear Medicine Imaging Room



- A camera is used to detect radiation from patients and form a picture.
- The imaging room is a secure area; only authorized persons are allowed during business hours.

Hazards in Nuclear Medicine

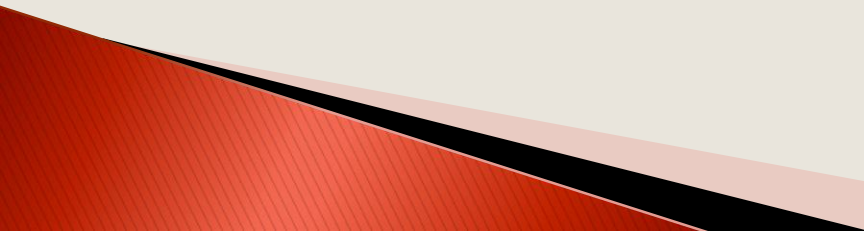


- ▶ Spills and contamination can occur.
- ▶ Patients have a radiation field around them.
- ▶ Hot lab, injection rooms, and imaging rooms are high security, restricted access.
- ▶ Entry by ancillary staff must be authorized by the department supervisor.
- ▶ No unescorted entry is permitted.

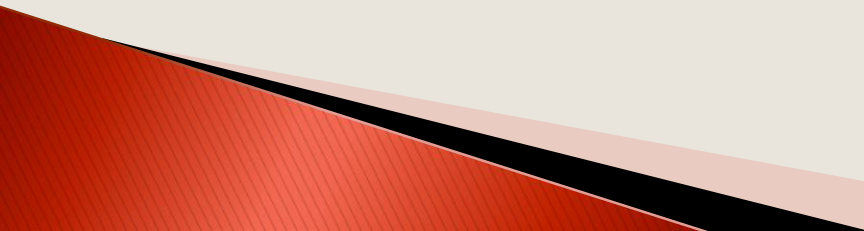
Iodine Therapy In-Patients

- Patients may be treated with radioactive iodine to treat thyroid cancer, and admitted to the hospital (on 5E).
- The hospital room becomes contaminated.
- The floor and surfaces in the room are covered with paper and plastic to protect them.
- The hospital room is off-limits to everyone except essential nursing staff.

Cardinal Rule of Radiation Protection

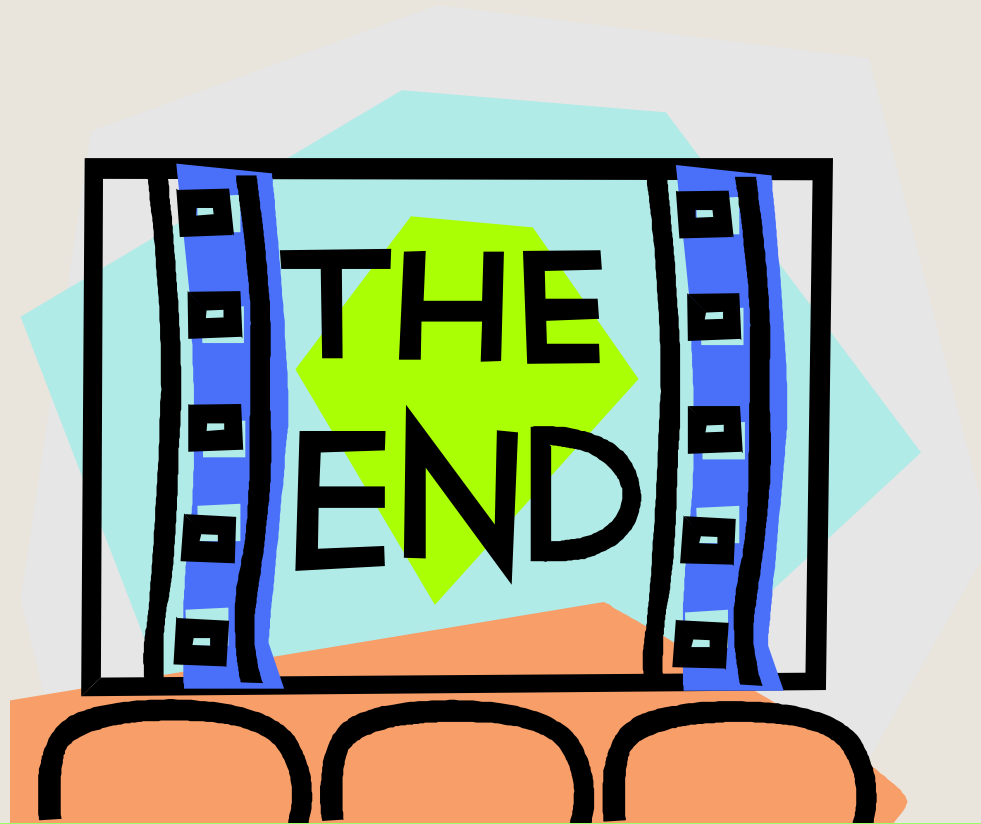
- **Minimize time** spent near radiation sources.
 - **Maximize distance** away from radiation sources.
The further away you are, the less exposure you receive.
 - **Place shielding** between you and the radiation source to stop the x-ray photons from reaching you.
- 

Who is Responsible for Radiation Safety?

- A Radiation Safety Officer (RSO) is appointed to oversee the safe use of radiation in a hospital.
 - Radiation use is highly regulated. Many policies are in place to ensure safety for workers and patients and compliance with the regulations.
 - If you see something that you feel is not safe, call the RSO immediately!
- 

How to Contact Radiation Safety

- At UNM, the Radiation Safety Office staff are in the Health Sciences Center Office of Research:
 - CTSC Rooms B50J and B50K
 - (505) 272-4607 (main #)
 - (505) 925-0743 (Radiation Specialist)
 - (505) 925-0745 (RSO)



Thank You!