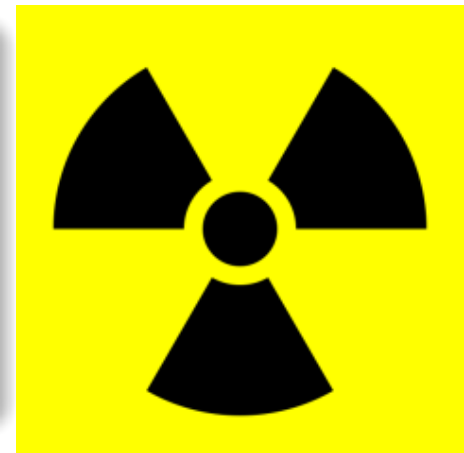


RADIATION SAFETY



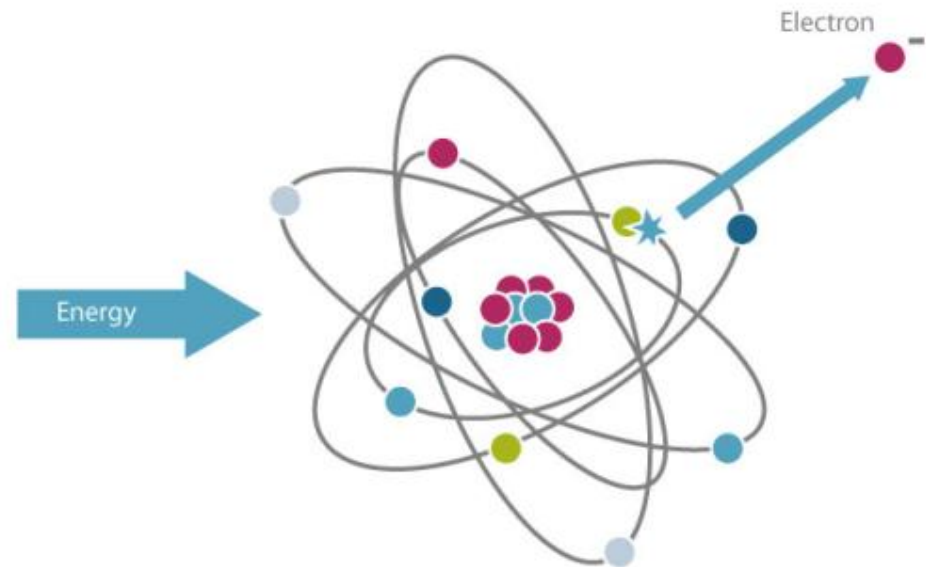
SIGNAGE

- All areas that contain Radiation Producing Equipment and/or Radioactive material must have signage to indicate the level activity present.
- Signage is posted to be visible
- Signage is posted at each entrance to radiation producing equipment / material

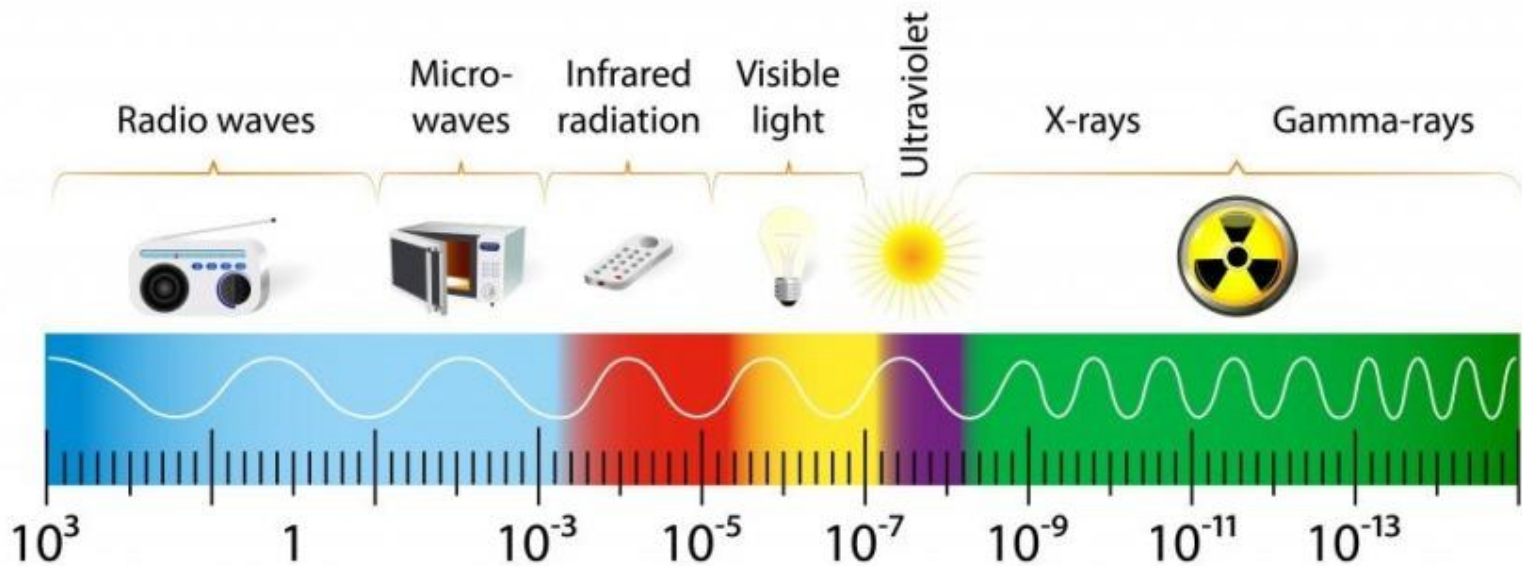


TYPES OF RADIATION

- **Non-Ionizing radiation:**
Radiation that does not have sufficient energy to dislodge orbital electrons
 - Examples: microwaves, Ultraviolet waves, radio waves, lasers
- **Ionizing Radiation:**
Radiation that has sufficient energy to dislodge orbital electrons
 - Examples: alpha, beta, gamma

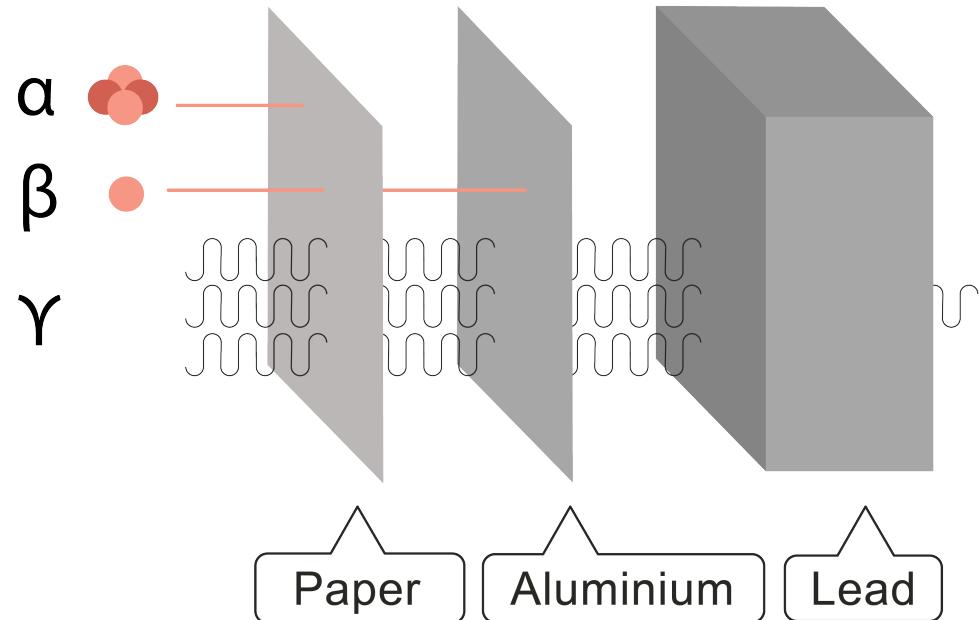


THE ELECTROMAGNETIC SPECTRUM



IONIZING RADIATION

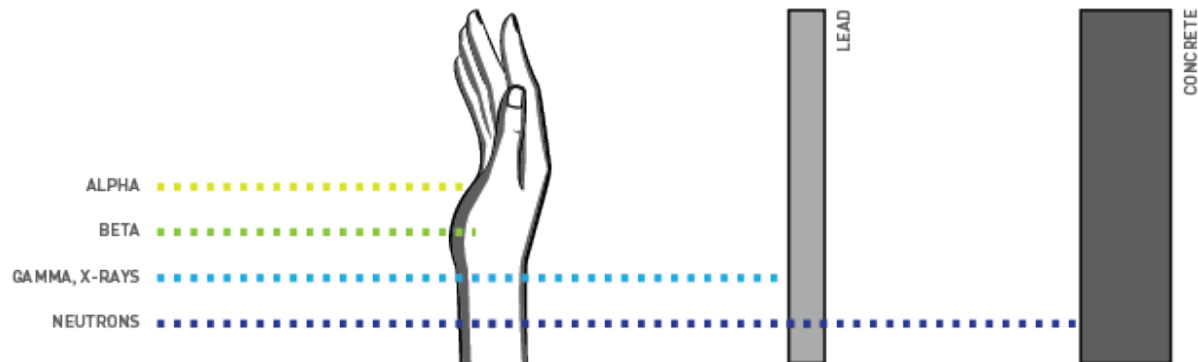
- Ionizing radiation ability to penetrate:
 - Alpha, beta, gamma



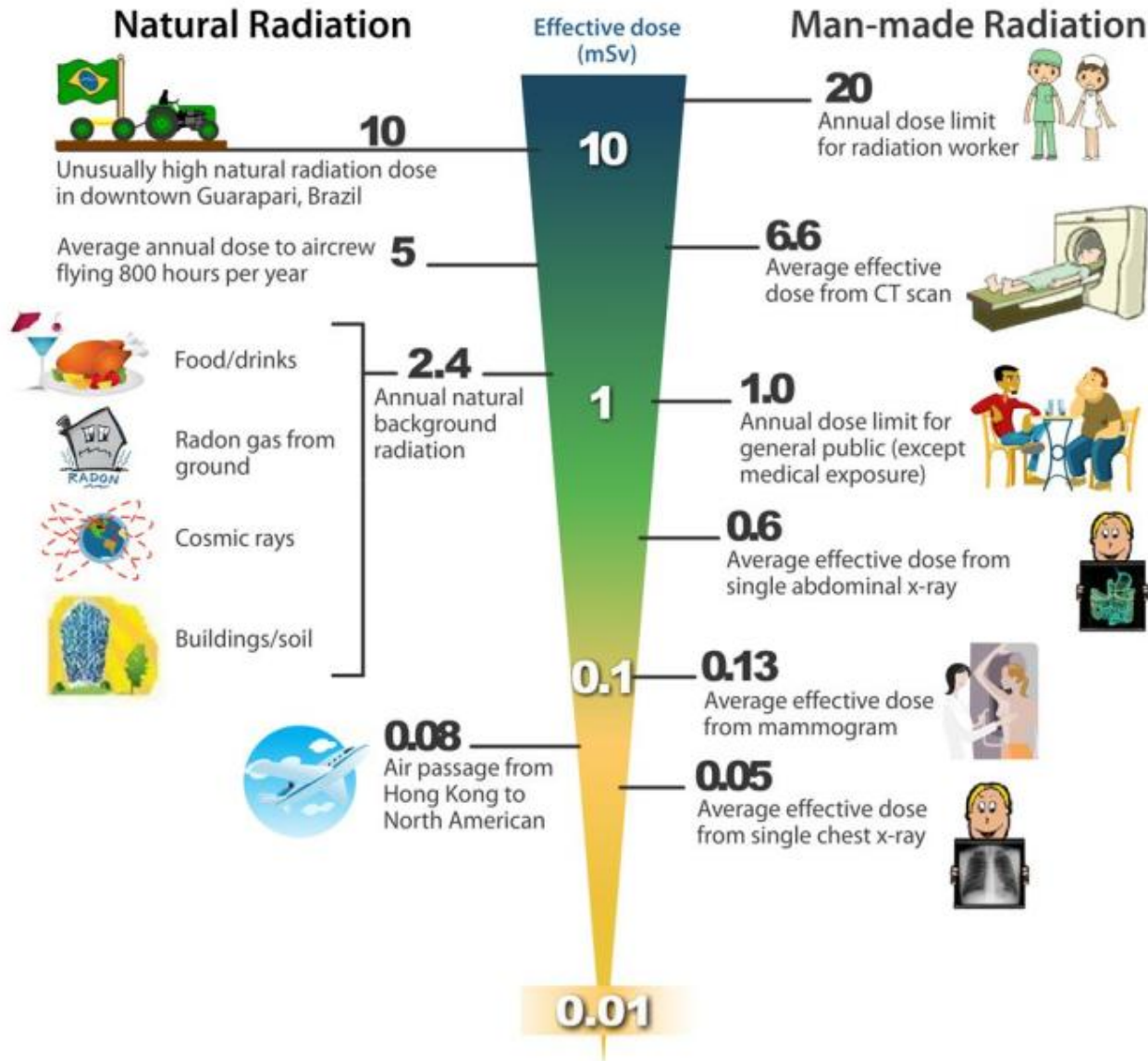
IONIZING RADIATION

- X-rays and gamma rays can penetrate the body and irradiate organs

TYPES OF RADIATION



Radiation in Daily Life



Dose Quantities

Absorbed Dose

Radiation energy absorbed per unit mass of a substance (Gy)



Equivalent dose

The concept of equivalent dose allows different types of ionizing radiation to be considered equally with respect to their potential to cause harm



Effective dose

Different tissues and organs may vary in how they respond biologically to a given type of radiation



ANNUAL RADIATION DOSE LIMITS

- Title 10, Part 20, of the *Code of Federal Regulations* ([10 CFR Part 20](#)), "Standards for Protection Against Radiation," establishes the [dose limits](#) for radiation workers. Although the limits vary, depending on the affected part of the body, the annual total effective dose equivalent ([TEDE](#)) for the whole body is 5,000 mrem (5 rem).
- Among the NRC licensees that are subject to the reporting requirements of 10 CFR Part 20, certain classes of licensees are required to provide the NRC with an annual report of their workers' individual exposures. The NRC, in turn, maintains such radiation exposure data in its Radiation Exposure Information and Reporting System ([REIRS](#)). As a result, the REIRS database represents a resource for use in responding to workers' requests for exposure information and dose histories.



IONIZING RADIATION

EMPLOYEE EXPOSURE LIMITS

5,000 mSv Half of people exposed to this level in a single dose will die within a month.
1,000 mSv Causes acute radiation sickness in people exposed to this amount in a single dose.
100 mSv / year Lowest level that causes a documented increase in cancer risk.
10-15 mSv CT scan
9 mSv / year Typical exposure by airline crew flying New York/Tokyo polar route.
2-3 mSv / year Amount of background radiation people are generally exposed to each year.
.2 mSv Chest x-ray
.01 mSv Dental x-ray

Annual Dose Limits

Per NRC regulations, if a radiation worker is likely to get 10% of the annual dose limits (shown on the right), they must be issued dosimetry.

The diagram shows a central orange human figure with several callout boxes pointing to different parts of the body. Each box contains the following information:

- Skin:** 0.5 Sv (50 rem)
- Eyes:** 0.15 Sv (15 rem)
- Extremities (below knees and elbows):** 0.5 Sv (50 rem)
- Internal Organs:** 0.5 Sv (50 rem)
- Total Effective Dose (whole body):** 0.05 Sv (5 rem)

Navigation arrows are visible at the bottom of the slide.

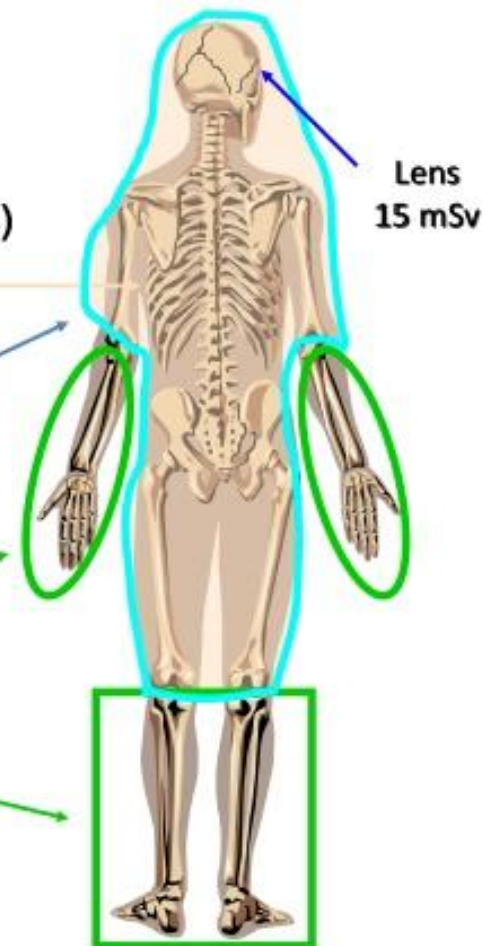
IONIZING RADIATION PUBLIC EXPOSURE LIMITS

Public Dose Limits

Whole Body (everything except extremities)
1 mSv per year

Skin of the Whole Body
50 mSv per year

Extremities
50 mSv per year



ALARA

As Low As Reasonably Achievable

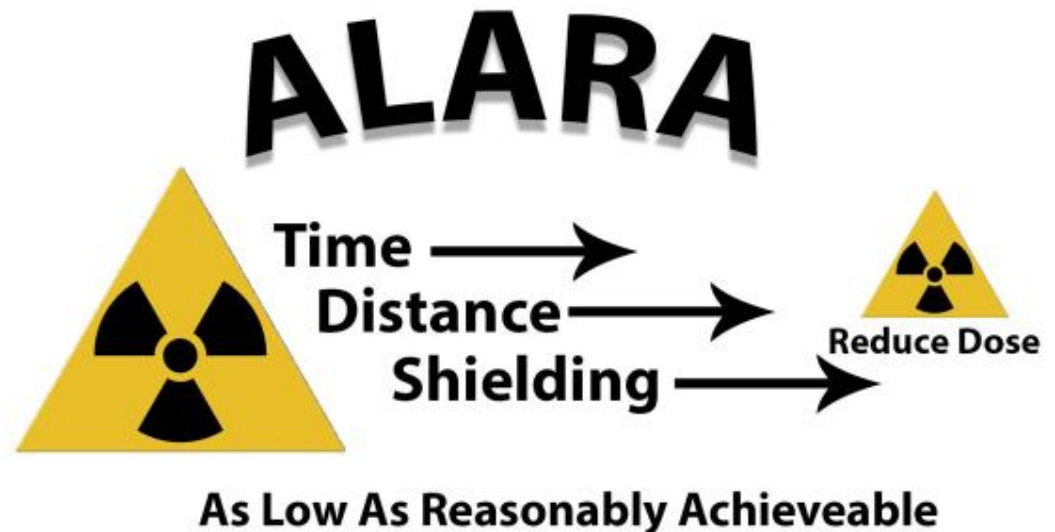
- Purpose of ALARA is to ensure minimal exposure to radiation at any one time.
- EVERYONE – staff, providers, techs, RN's, visitors and patients follow ALARA to minimize radiation exposure at any one time.



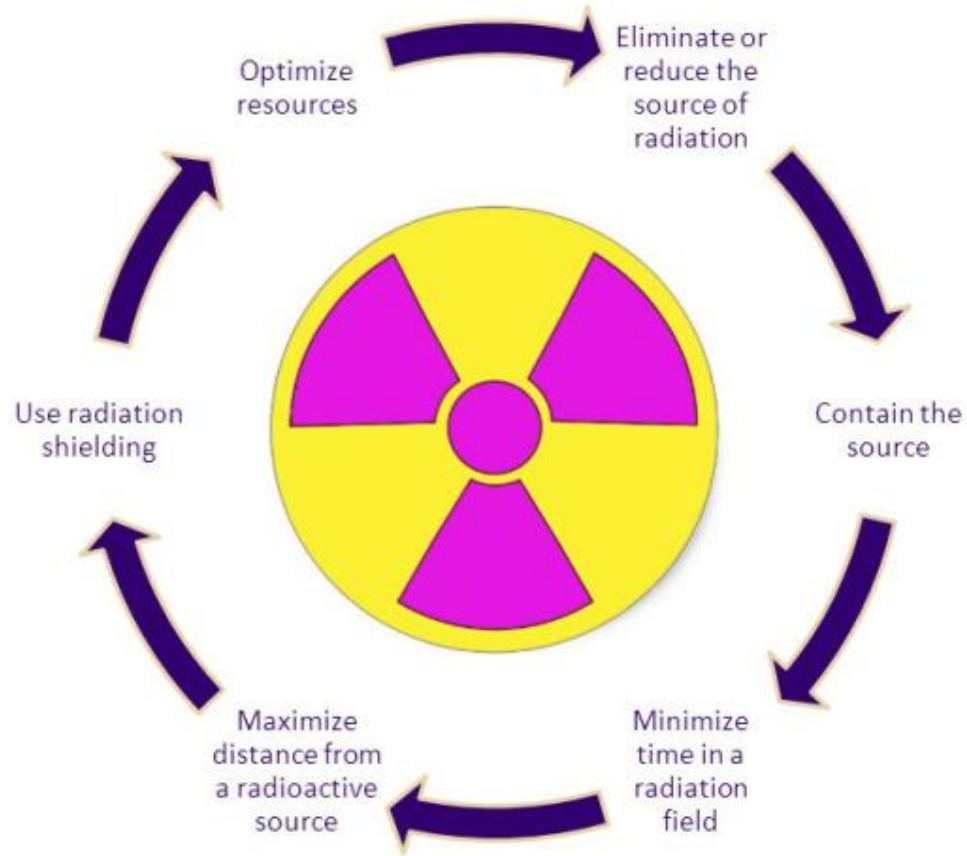
ALARA

As **L**ow **A**s **R**easonably **A**chievable

- HOW?
 - Time
 - Distance
 - Shielding
- WHY?
 - Minimize dose



Six Fundamental Principles of ALARA



ALARA

- **TIME:**
 - Less time = less radiation exposure
- **DISTANCE:**
 - More distance = less radiation exposure
 - Effective & easy
 - By doubling distance from source you decrease dose by a factor of 4
 - Tripling distance decreases dose 9 – fold
- **SHIELDING:**
 - Proper shielding = less radiation exposure
 - Certain materials absorb radiation



BASIC RADIATION PROTECTION GUIDELINES

- **TIME** - Limit your time around radiation.
- **DISTANCE** - Stay as far away as possible from radiation.
- **SHIELDING** - Use shielding whenever possible.
- Do not modify or disable any device safety features.



BIOLOGICAL EFFECTS OF RADIATION

- May be prompt and appear quickly or delayed which may take years to appear.
- Radiation can:
 - Deposit energy in the body
 - Cause DNA damage
 - Create ionizations in body leading to free radicals
- These effects may lead to biological damage
- Cells sensitive to radiation are those that have a:
 - High division rate
 - Long dividing future
 - unspecialized



BIOLOGICAL EFFECTS OF RADIATION

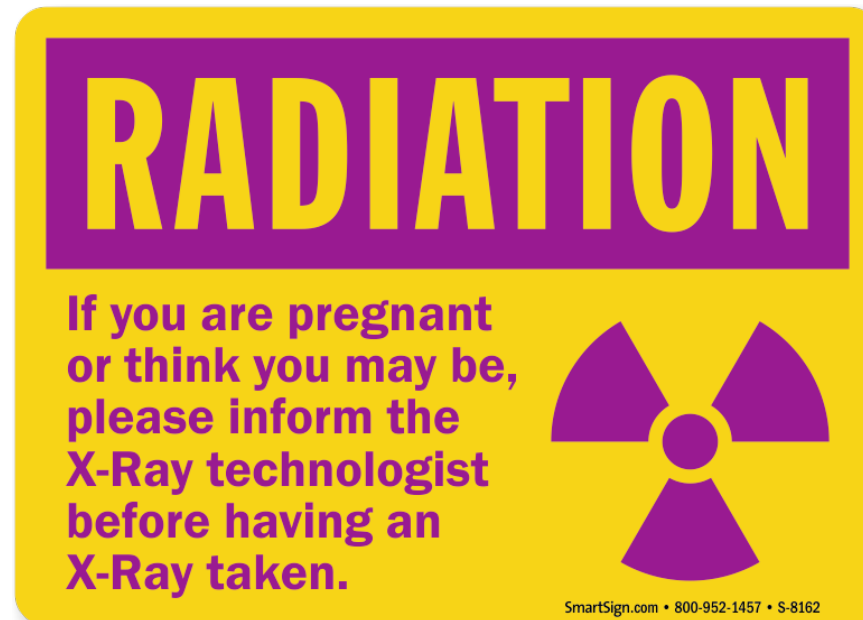
- Response to radiation depends on:
 - Total dose received
 - Dose rate received
 - Radiation quality received
 - Stage of development when exposed



BIOLOGICAL EFFECTS OF RADIATION

Prenatal Exposure

- Very hazardous because the rapidly dividing cells are very radiosensitive. Potential adverse effects include low birth weight, retardation and increased risk of cancer.

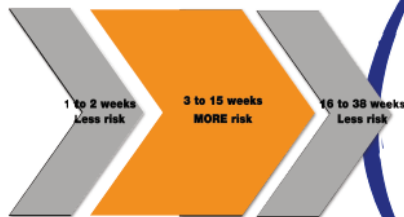


BIOLOGICAL EFFECTS OF RADIATION

Pregnant?

or think
you could be?

*Please tell
the staff
before an X ray
or nuclear medicine
procedure*



What you need to know

Unborn babies are more sensitive to radiation.

Risk depends on stage of pregnancy, type of procedure and the amount of radiation used.

Diagnostic radiological procedures are safe under most circumstances even during pregnancy.

DO's and DON'Ts

Don't avoid the procedure if it's important for your health.

Do ask the medical staff what measures will be taken to reduce any risks.

Do seek advice before the procedure if you are concerned.

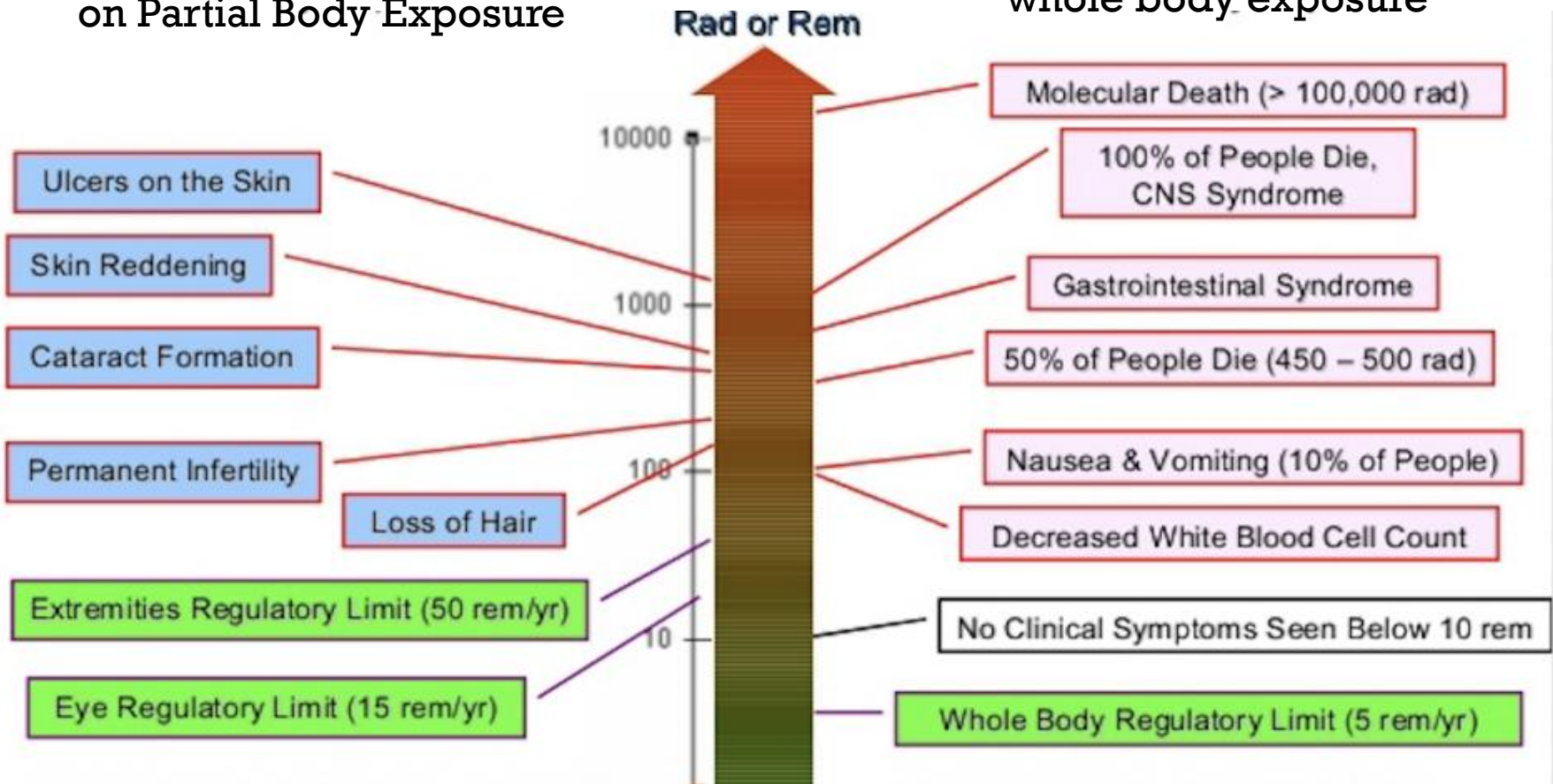
Do ask if a pregnancy test is needed.



BIOLOGICAL EFFECTS OF RADIATION

Impact of Radiation Dose on Partial Body Exposure

Impact of radiation dose on whole body exposure



SYMPTOMS OF RADIATION INJURY

Erythema: reddening of the skin

- Mild or transient, doses over 2 Gy
- Necrosis, doses over 12 Gy

- Epilation: hair lose
 - Temporary, doses over 3 Gy
 - Permanent, doses over 7 Gy
 -

- Acute radiation syndrome
 - doses over 100 R
 - Nausea , Vomiting, Diarrhea



RADIATION DOSIMETRY

- Dosimetry is the measurement of radiation dose received
- Dosimeters (badges) measure the amount of radiation received by radiation workers.
- Dosimeters help monitor radiation dose to be sure workers do not exceed annual limits.
- Dosimeters are given to employees based on the type of radiation they work with



RADIATION DOSIMETRY

Responsibilities of Those Wearing Dosimeters

Do's

- Store your dosimetry badge in a non-radiation location when not in use
- Exchange your badge when requested by the Departmental Badge Coordinator
- Keep your badge at work. Don't take it home
- Wear your dosimetry badge:
 - whenever using radiation-producing machines or radioactive materials that present an external hazard
 - for the current monitoring period
 - in the correct location on the body
- **If you are pregnant and wish to begin fetal monitoring, it is your responsibility to declare your pregnancy in writing to the RSP**

Don'ts

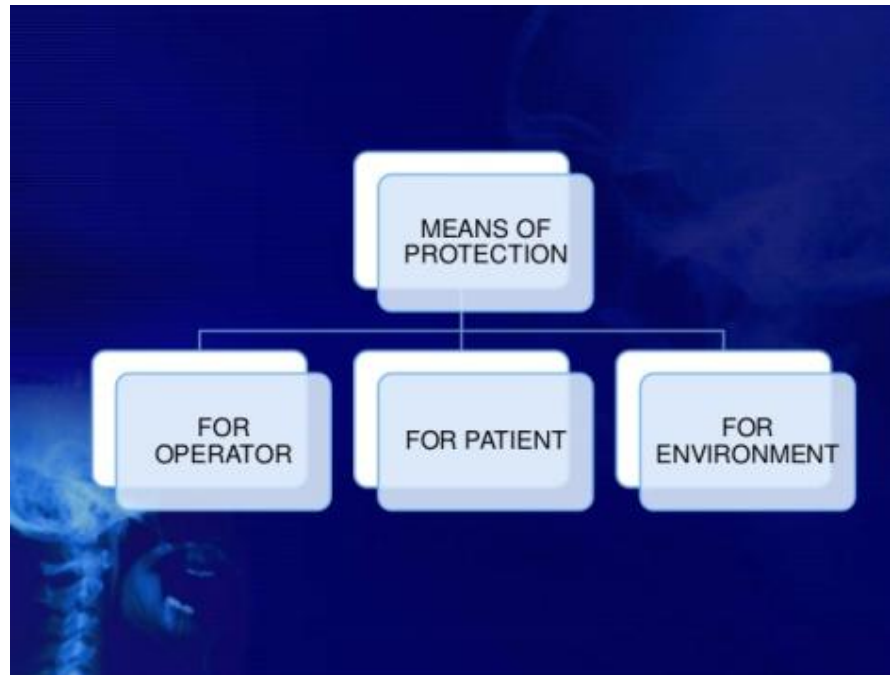
- Never share your dosimetry badge or wear someone else's
- Do not intentionally expose dosimeters to radiation
- Do not wear your dosimetry badge for non-occupational exposures
- Do not use your badge at an institution other than UCLA



RADIATION SAFETY PROTECTION



RADIATION SAFETY - PROTECTION



RADIATION SAFETY OPERATOR



RADIATION SAFETY

LEAD APRONS

- Lead aprons are lined with lead.
- The Lead in the aprons measures 0.25 mm to 0.5 mm thick
- Lead Aprons blocks X-Rays, and protect employees and patients from radiation exposure
- The manufacturer's recommendations regarding the handling and storage of protective clothing must be strictly observed.
- Except for the patient, only the staff and ancillary personnel required for the medical procedure or training shall be in the room during the radiation exposure.



RADIATION SAFETY

LEAD APRONS

AVAILABLE ARE:

- Lead aprons
- Wrap around skirt
- Gloves
- Gonadal shield and thyroid shields



RADIATION SAFETY

Shielding: Hang Lead Aprons Properly



Hanging lead aprons on hangers/hooks prevents the lead from cracking and tearing.

This is for your safety, so please be sure to take care of your lead.



RADIATION SAFETY

Lead Aprons

- **Protective aprons** of 0.5 mm lead equivalency must always be worn during fluoroscopy. Some technologists and radiologists may also choose to wear **lead-equivalent (Pb-Eq) protective eyewear** and **thyroid shields**.



RADIATION SAFETY

THE BASICS 101

- **TIME:** do not stand in a radiation area any longer than necessary
- **DISTANCE:** if you go from 1 foot from the tube to 2 feet from the tube your exposure goes to 1/4 of the original amount.

Step Back!

- **SHIELDING:** Get behind a barrier



RADIATION SAFETY

- Lead aprons must be worn when not behind another barrier
- Lead aprons are not primary barriers ,
Never stand in the x-ray beam
- Use lead gloves, lead aprons, and thyroid shields while in a radiation area.
- Always stand behind the primary barrier



RADIATION SAFETY

- Do not hold a patient unless there is no other choice
- Ask family member to help hold the patient
- Use devices like a pig-o-stat, compression bands to immobilize the patient
- Don't hold the IR. Use cassette holders
- "You held the last patient. I will hold this one."
- Annual radiation safety training



RADIATION SAFETY

- Get back! Use the 6 foot exposure cord
- Stand behind the machine
- Get all non mandatory people out
- Reduce repeat exams



RADIATION SAFETY

DOSIMETRY BADGES

- Change quarterly
- Don't lose your badge
- Don't wear another's badge
- Your badge is for occupational exposure. Do not wear it while getting a diagnostic x-ray yourself.
- Do not wear it to the dentist, etc.



RADIATION SAFETY

DOSIMETRY BADGE

Wear personal monitoring devices appropriately
 At the collar, outside the lead apron, not on the apron
 When you are pregnant wear 2nd badge inside apron on belly

Proper Dosimetry Badge Wear

For Whole Body Badges:



- Worn on the part of the body between your neck and waist
- Wear it so name tag faces radiation source
- If lead apron is worn, wear the badge at collar level on the outside of apron

For Dual Badges:




- One badge on the collar, outside lead apron
- One badge on the waist, under lead apron

Slide 23



RADIATION SAFETY

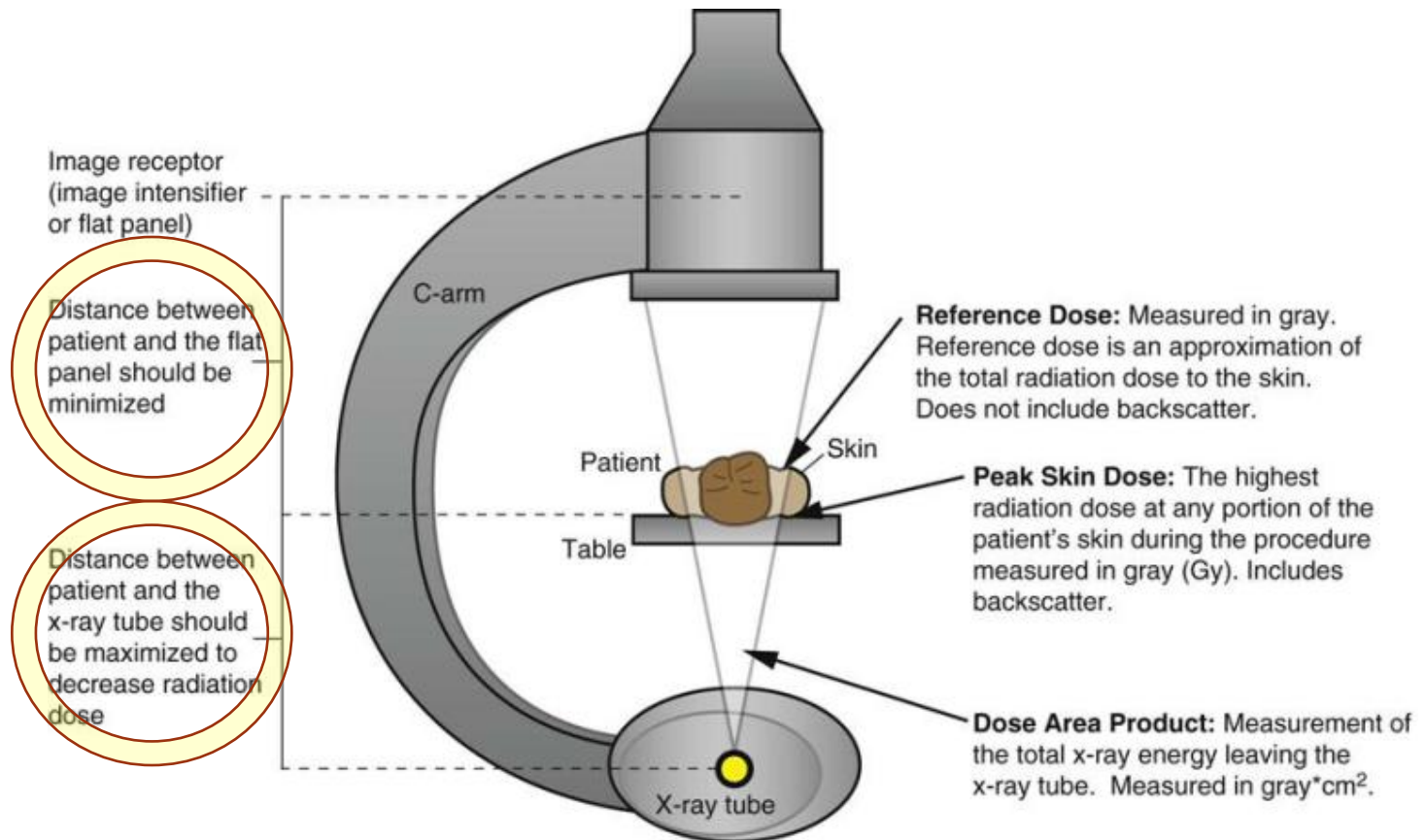
I THINK I'M PREGNANT.

- Declaration of pregnancy is voluntary.
- If you do declare yourself pregnant, the employer is responsible to keep the exposure to the fetus at > 500 mrem for the pregnancy or 50 mrem in any one month
- If your exposure exceeds the limit you will be required to take special work assignment



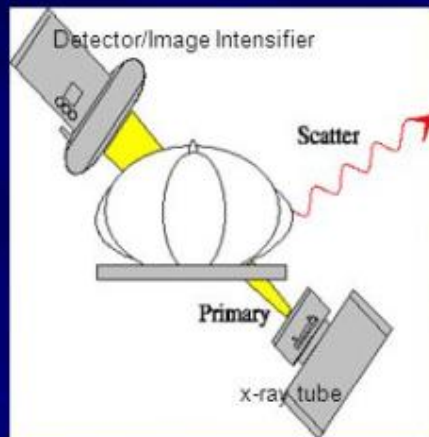
RADIATION SAFETY

C-ARM FLUOROSCOPY



RADIATION SAFETY

Distance: Scattered Radiation



During fluoroscopy, radiation is scattered from the surface of the patient where the x-ray beam enters.

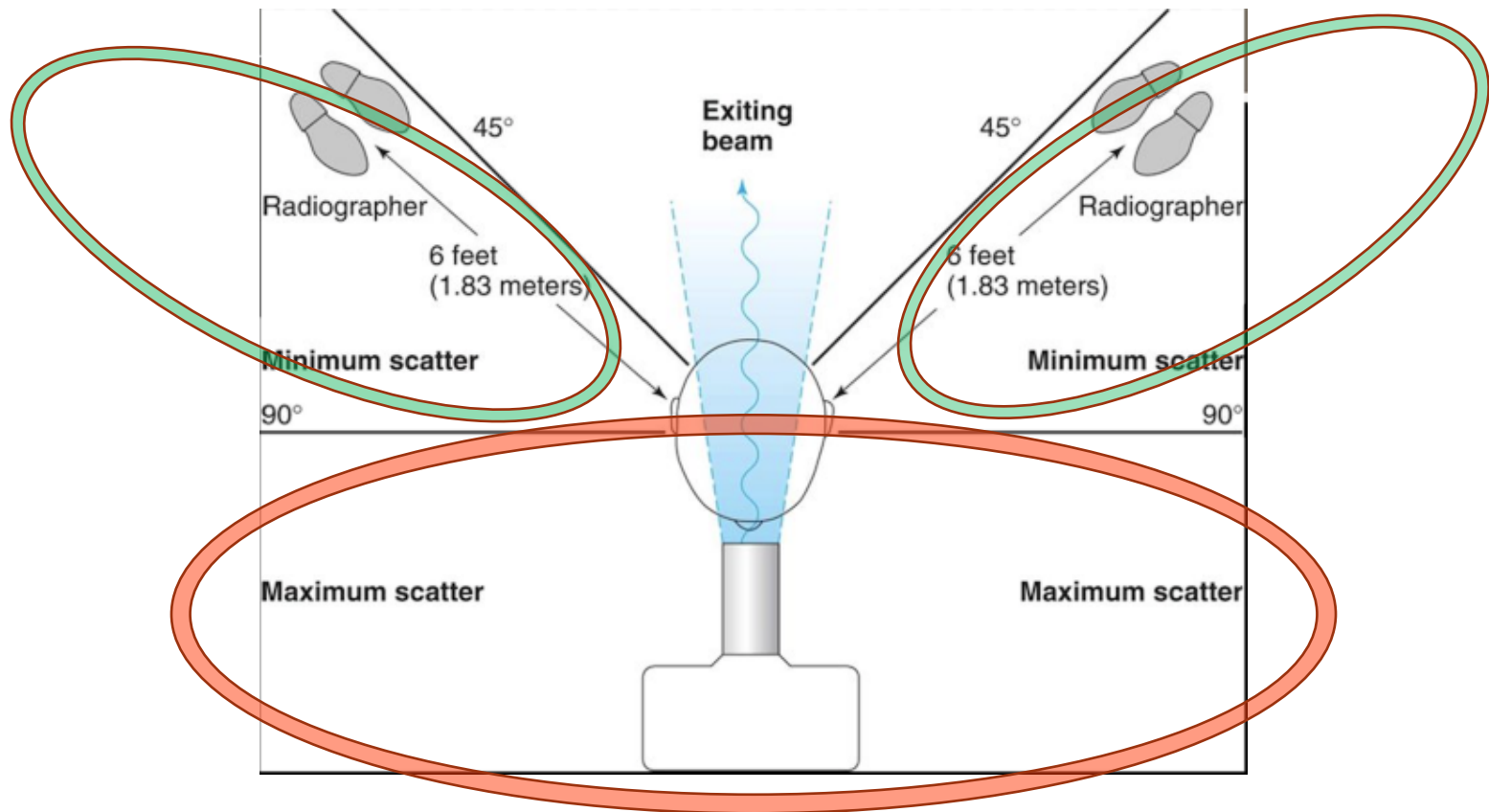
Scattered radiation is the main source of radiation dose to staff. It also decreases image contrast and degrades image quality.



RADIATION SAFETY

POSITION & DISTANCE RULE

6 feet



RADIATION SAFETY

Position and Distance Rule

The operator should stand at least six feet away from the patient at an angle between 90 and 135 degrees. As the tubehead is moved, this safe position will change relative to the patient's head (see below).



6 feet



PATIENT

RADIATION SAFETY PATIENT



RADIATION SAFETY – ENVIRONMENT

PROTECT THE PUBLIC

- Rooms have appropriate shielding
- Signage postage to prevent accidental exposure
- Unnecessary persons are restricted from remaining in the area by asking visitors to leave the room.
- Use shielding for everyone in the radiation area
- Close the door
- Warn others about the exposure
- Screen helpers for chance of pregnancy



RADIATION SAFETY

I THINK I'M PREGNANT.

- All female patients are screened for pregnancy
- Greatest risk during organogenesis
(greatest risk) 1st trimester > 2nd Trimester
> 3rd Trimester (least risk)
- If urine pregnancy not performed patient must sign release form stating that they are not pregnant and they understand the risks



RADIATION SAFETY

RADIATION RISKS AND INJURY

WHY INJURIES ARE OCCURRING

- Growth in the number and types of procedures using fluoroscopy
- More overweight and obese patient
 - Require higher radiation output for imaging
 - Highest risk of injury noted during:
 - Cardiac Catheterization
 - Interventional Radiology

Any Fluoroscopy procedure has potential to cause injury!



RADIATION SAFETY

RADIATION INJURIES



Arm injury: Patient was draped for procedure and staff did not realize that she had moved her arm so that it was resting on the port of the x-ray tube during the procedure



49 yr old man 22 months after 2 completed and 1 attempted TIPS placements within 1 week – resulted in a non healing ulcer

Most radiation-induced injury is not apparent (effects often appear days to weeks after exposure)

Radiation injury may not be directly observable by the patient

Follow-up care when exposure was greater than 15 minutes is required.

Successful law suits have resulted from radiation injury cases



MRI SAFETY

MRI SAFETY

Danger! The Magnet is always on!

**DO NOT ENTER WITHOUT PERMISSION
FROM AUTHORIZED MRI PERSONNEL**



Objects containing metal are prohibited in the MRI suite.

These objects include:



**Cell phone
Keys
Credit cards
Watch
Hair clips
Jewelry**

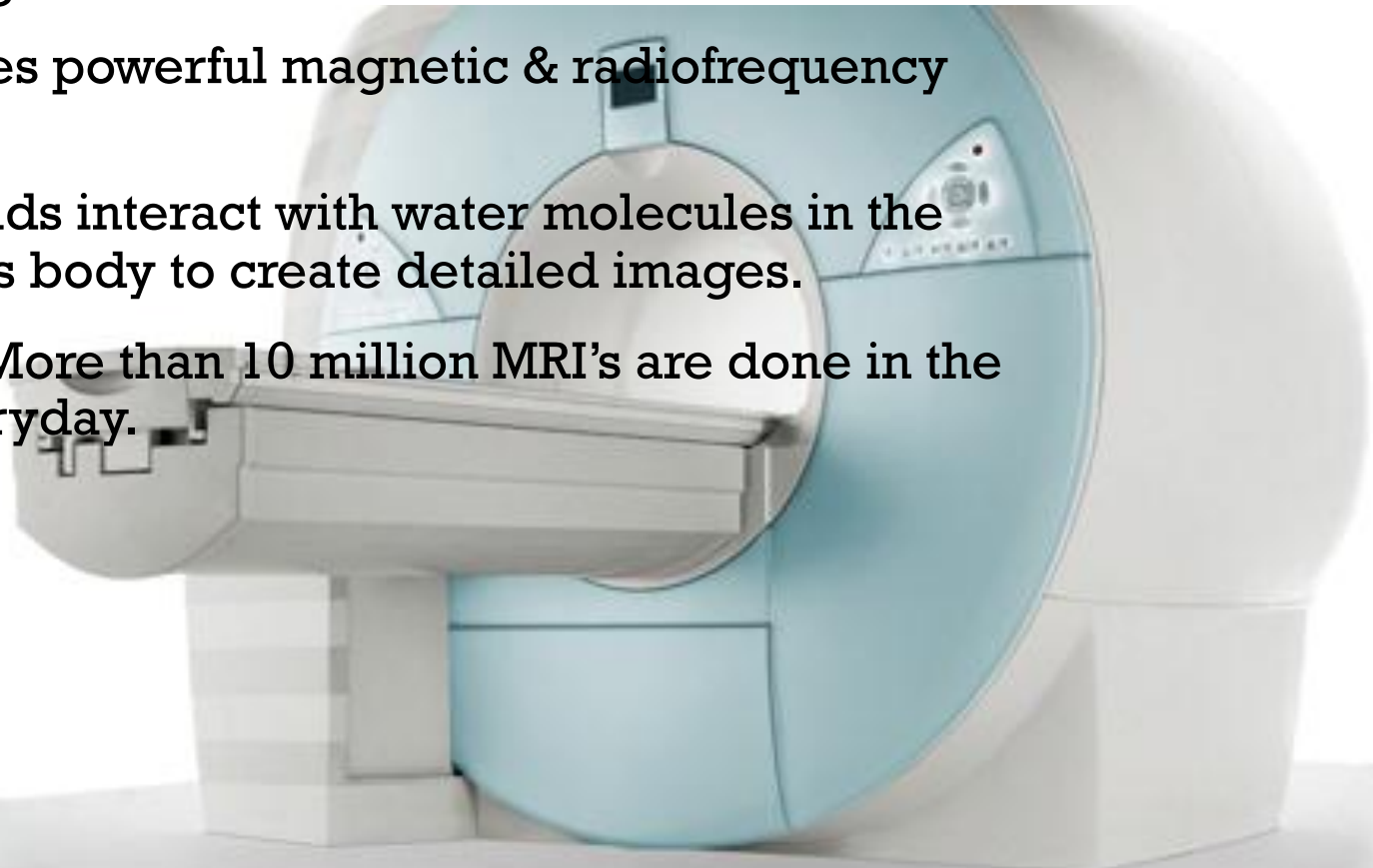
**Pens
Coins
Shoes
Belt buckle
Dentures**

**Hearing aids
Wheel chair
Oxygen tank
IV pole**

**Any other article that
may contain metal
(glasses, buttons, snaps, buttons,
underwire, or metal threads)**

MAGNETIC RESONANCE IMAGING (MRI)

- Is a form of imaging that does NOT involve ionizing radiation.
- MRI uses powerful magnetic & radiofrequency fields.
- The fields interact with water molecules in the patients body to create detailed images.
- **FACT:** More than 10 million MRI's are done in the US everyday.



MRI

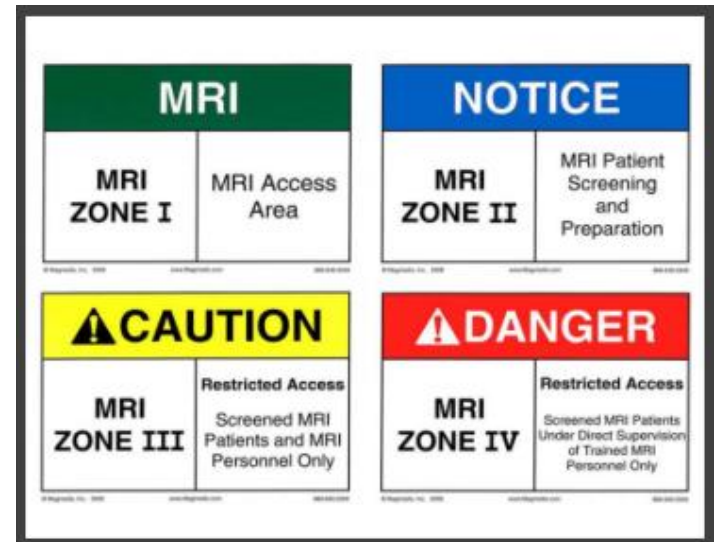


- Remember **MAGNET IS ALWAYS ON**
- 24/7, 365 days a year
- The magnet is very strong it can suck a bed into it.

MRI

MRI ZONES

- There is a progressive restriction of entry and increased supervision for the higher access zones III, IV.
 - **Zone 1** = free access to general public
 - **Zone 2** = Interface between unrestricted and restricted zone 3
 - **Zone 3** = Locked access. Access limited to people accompanied by a MRI tech. MRI lobby.
 - **Zone 4** = Locked access. Access limited to screened patients under direct supervision of trained MRI Tech. MRI scanner.



FIRE

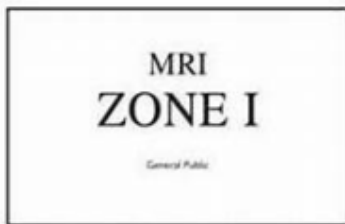
MISH MRI ZONES



- **Zone 1** = free access to general public
- **Zone 2** = Interface between unrestricted and restricted zone 3
- **Zone 3** = Locked access. Access limited to people accompanied by a MRI tech. MRI lobby.
- **Zone 4** = Locked access. Access limited to screened patients under direct supervision of trained MRI Tech. MRI scanner.

MRI ZONES

- Signs will explain access with zoning and warning specifications.
- All staff must be alert and follow all recommendations and strategies to prevent MRI accidents and injuries from occurring.



MRI

EMERGENCY POWER SHUT OFF

Pressing the button will disable electrical power to the MRI room

- BUT the MRI magnet will still work
- Press this button in case of:
 - Fire
 - Sparks, smoke from MRI
 - Flooding or Sprinkler Activation
 - Catastrophic Equipment Failure



MRI

EMERGENCY QUENCHING OF THE MRI

Quenching is the disabling of the Magnet

Pressing the button will disable the magnet.
The button is located in the MRI room.

Quenching causes severe damage to the Magnet –
ONLY performed in extreme cases.

Press this button in case of:

- Fire in MRI
- A person is pinned to the Magnet and being crushed



MRI

PATIENT IN MRI

If a patient needs to be removed from the MRI:

- Remember only trained staff may enter
- **DO NOT** bring in a stretcher, bed, Code cart, defibrillator or oxygen tank into the MRI room
- **ONLY MRI compatible equipment can be used in the MRI room.**
- If patient can not walk out on their own, wheel the patient out on the MRI table. The MRI table is mobile, and has wheels.
- Once out of Zone IV, preferably also zone III – a patient can be transferred to any other stretcher/bed, or can be attended to on the MRI table.
- **NEVER** attempt to resuscitate a patient in the MRI Room.



MRI DANGERS

- The actual magnetic field is not harmful.
- The hazards of MRI relate to its effects on objects and electronic devices in or near the magnetic field.
- Most injuries result from:
 - Objects that heat during MRI
 - Ferromagnetic objects attracted to magnet
 - Electronic device malfunctions because of the magnet



MRI

DANGERS



- **BURNS** are the most common injury in the MRI suite.
 - Examples: metal implants, cables (ECG leads), pulse oximeter sensor, metal clamps, surgical staples, drug delivery patches, safety pins, tattoos containing metallic ink.
- **FERROMAGNETIC OBJECTS** are attracted to the magnetic field of the MRI system. These objects can become dangerous projectiles “MISSILE EFFECT”.
 - Examples of ferromagnetic objects: oxygen tanks, fire extinguishers, wheelchairs, stethoscopes, patient transport carts. ONLY MRI approved supplies will be allowed in the MRI suite.
 - Both patients and staff should also remove all metal objects before entering the MRI suite including: coins, pens/pencils, earrings, car keys, watches, tape measures, credit cards, hearing aides, hair pens

THE MAGNET IS ALWAYS ON. FERROMAGNETIC OBJECTS WILL BE ATTRACTED TO THE MAGNET EVEN IF IT IS NOT IN USE.



MRI

DANGERS

Ferromagnetic objects contd.:

- Tearing of soft tissue in the brain due to movement of aneurysm clip
- Blindness due to movement of metallic fragments in or near the eye
- Injury to patient when IV pole slid and struck the patient
- Injury to patient when scissors were pulled from nurses hand and struck patient
- Death of pediatric patient when a metal oxygen tank fractured skull



MRI

DANGERS

Electronic device malfunction:

- Pacemakers may not function properly. Patients with pacemakers have died during, or shortly after, MRI exams.
- Other devices may suddenly fail to operate.



MRI

SAFETY

- MRI is a very safe test as long as precautions are taken.
- Ferromagnetic objects and devices **MUST** remain outside the magnetic field of the MRI system at all times.
- Remember, the magnet is **ALWAYS** on.



FIRE IN MRI

FIGHTING THE FIRE

Even in case of a FIRE DO NOT BRING ANY METALLIC fire fighting equipment into the MRI room – unless the magnet has been quenched (turned off).

Can NOT enter the MRI room (zone IV) unless you are metal free.

MRI compatible extinguishers are located in Zone II and Zone III.



MRI SAFETY

SAFETY STRATEGIES:

- Controlling Access
- Posting Warning Signs/Zone Signs
- Screening for and removing Ferromagnetic/Metallic Objects
- Thorough Screening of patients prior to performing testing
- Patient Positioning
- MRI compatible Equipment

CHECK THIS LIST!

- ✗ Pacemaker/Cardioverter/Defibrillator
- ✗ Aneurysm (brain) or Aortic (heart) Clip
- ✗ Permanent Hair Implants/Clips
- ✗ Implanted Spinal Cord Stimulator/Neurostimulator
- ✗ Fractured Bone Treated with Metal
- ✗ Hearing (cochlear/stapes) Implants
- ✗ Artificial Heart Valve
- ✗ Metal Fragments in Eye, Head or Skin
- ✗ IUD
- ✗ Eye Implant
- ✗ Nicotine Patch
- ✗ Medication Patch
- ✗ Stent
- ✗ Implanted Pump
- ✗ Shunt
- ✗ Wire Sutures
- ✗ Shrapnel
- ✗ Joint Replacement
- ✗ Pregnancy
- ✗ Vena Cava Filter



MRI

SAFETY

- To prevent patient and staff injury because of the powerful magnetic field:
 - access is restricted
 - Patients and staff are screened prior to entering Zone III



MRI

ACCESS SCREENING

- TO enter Zone III - staff, visitors and patients must be screened to avoid injury**

MRI STAFF / VISITOR Screening Form



Date ____/____/____
month day year

Address _____
City _____
State _____

1. Have you had prior surgery?
YES [] No [] If yes
2. Have you had an injury to your head?
YES [] No [] If yes
3. Have you ever been injured by a sharp object?
YES [] No [] If yes
4. Are you pregnant or suspect you are?
YES [] No [] If yes



WARNING
Do not touch or object

- Please indicate if you have a history of:
- | | | |
|-----|----|---------------------------------|
| Yes | No | Aneurysm clip |
| Yes | No | Cardiac pacer |
| Yes | No | Implanted cardiac device |
| Yes | No | Electronic implants |
| Yes | No | Magnetically sensitive implants |
| Yes | No | Neurostimulators |
| Yes | No | Spinal cord stimulators |
| Yes | No | Cochlear implants |
| Yes | No | Insulin or infusion pumps |
| Yes | No | Implanted drug delivery systems |
| Yes | No | Any type of foreign body |
| Yes | No | Artificial or prosthetic joints |
| Yes | No | Any metallic objects |
| Yes | No | Any external magnets |
| Yes | No | Hearing aid |
| Yes | No | Other implants |

I attest that the above information was reviewed and the patient had the opportunity to ask questions.
Signature of Person Completing Screening _____

Form Information Reviewed
Revised 8/13/2014

MRI Patient Safety Screening and Consent Form

Procedure Date ____/____/____ Patient ID Number _____

Name _____

Date of Birth ____/____/____ Male Female Age ____ Height ____ Weight ____ lbs

Reason for MRI and/or Symptoms _____

Please answer the questions below:

1. Have you had prior surgery or an operation of any kind? (Continue on the back of this sheet, if necessary.) Yes No
If yes, please indicate the date and type of surgery:
Date ____/____/____ Type of surgery _____
Date ____/____/____ Type of surgery _____
Date ____/____/____ Type of surgery _____
 2. Have you had a prior diagnostic imaging study or examination (MRI, CT, X-ray, etc.)? Yes No
If yes, please list: Body part Date Facility

MRI	_____	_____	_____
CT/CAT Scan	_____	_____	_____
X-Ray	_____	_____	_____
Other	_____	_____	_____
 3. Have you experienced any problem related to a previous MRI examination or MR procedure? Yes No
If yes, please describe: _____
 4. Have you had an injury to the eye with a metallic object or fragment (e.g., metallic slivers, shavings, foreign body)? Yes No
If yes, please describe: _____
 5. Have you ever been injured by a metallic object or foreign body (e.g., BB, bullet, shrapnel, etc.)? Yes No
If yes, please describe: _____
 6. Are you currently taking or have you recently taken any medication or drug? Yes No
If yes, please list: _____
 7. Are you allergic to any medication? Yes No
If yes, please list: _____
 8. Do you have a history of asthma, allergic reaction, respiratory disease, or reaction to a contrast medium or dye used for MRI, CT, or X-ray examination? Yes No
 9. Do you have any of the following (circle all that apply): anemia, any disease(s) that affects your blood, a history of renal (kidney) disease, renal (kidney) failure, kidney transplant, Nephrogenic Systemic Fibrosis (NSF), high blood pressure (hypertension), liver (hepatic) disease, a history of diabetes, or seizures? Yes No
If yes, please describe: _____
- For female patients:**
10. Date of last menstrual period: ____/____/____
 11. Are you pregnant or experiencing a late menstrual period? Yes No
 12. Are you taking oral contraceptives or receiving hormonal treatment? Yes No
 13. Are you taking any type of fertility medication or having fertility treatments? Yes No
If yes, please describe: _____

MRI

ACCESS SCREENING

IMPLANTS

- If implants are identified, device compatibility with the MRI is verified prior to entering Zone III

MR Implants-Devices-Materials Documentation Form

Patient Name: _____ DOB: _____

Investigator(s) Name(s): _____

If you discover the patient has had a surgical implant-device or an accident involving potential metal, your questioning should start with:

1. What was the procedure or nature of the accident? _____
2. What kind of implant is it? _____
 - a. Name of the manufacturer? _____
 - b. What does it do? _____
 - c. What is it used for? _____
2. When was the procedure/accident? ____/____/____
3. Where was the procedure/accident? (hospital-ER) _____
4. Who did the procedure (surgeon..)? _____
5. If accident, were x-rays done and was metal removed? _____
6. Have you had an MRI since implant or accident? Yes No _____
7. Have you been refused for an MRI before? Yes No _____
8. Have you had x-rays since implant - accident? Yes No, Where? _____
9. Does the patient have an ID card for the implant-device-material ? Yes No _____

Once you have all of the answers to these questions, proceed with the following:

1. Look up the item in the current **Reference Manual for Magnetic Resonance Safety, Implants, and Devices** by Frank G. Shellock, Ph.D. or on the web site: <http://www.mrisafety.com>
2. Take the information to the Lead Technician and director of radiology and/or safety officer. They will be able to assist you.
3. You may need to:
 - contact the surgeon who placed the implant and request a copy of the operating room report
 - contact the hospital and get a copy of operative report
 - contact the hospital and get a copy and/or reports of x-rays/CT scans/MRI if applicable
 - contact referring physician or other physician(s) for possible information in office medical record
 - perform an x-ray and/or CT as per radiologist
4. The final responsibility of canceling or proceeding with the exam lies with the radiologist who should make an informed decision based on the information provided by the MR technician.

ACTIONS:

- Implant-Device-Material Name: _____
- Implant-Device-Material Manufacturer Name: _____
- Object category/purpose: _____
- Manufacturer contact information: _____
- Manufacturer contacted - documentation attached? yes no _____
- Implant-Device-Material ID card copied? yes no _____
- Is It safe in a 3.0 Tesla magnetic Field? yes no _____

Final Decision: [] DO NOT PROCEED with MRI, [] PROCEED with MRI

Decision approved by radiologist: _____ Date: _____

Signature(s) of Investigator(s): _____

This Form will be attached to the patients MR safety screening form for permanent record.



MRI

ACCESS SCREENING

ANXIETY

Anxiety in the MRI is a common occurrence. Patients with claustrophobia, anxiety and such disorders as PTSD may not tolerate the confinement that they experience in the MRI

Mild sedation, and possibly anesthesia may be required to complete study.

Out-Patient MRI Orders		
Anxiety Relief Protocol Orders		
<i>Anxiety definition: anxiety is such that it is preventing the patient from going into or staying in the MRI.</i>		
<p>Protocol 1</p> <p><input type="checkbox"/> Ativan 1mg IV once</p> <p><input type="checkbox"/> May repeat Ativan 1 mg IV once after 20 minutes if first dose not effective. Maximum 2 doses total.</p> <p>OR</p> <p>Protocol 2</p> <p><input type="checkbox"/> Versed 2 mg IV once</p>		
<i>LIP Signature:</i>	<i>Date:</i>	<i>Time:</i>
<i>Pharmacist Signature:</i>	<i>Date:</i>	<i>Time:</i>
<i>Tech/RN Signature:</i>	<i>Date:</i>	<i>Time:</i>

Sedation Protocol Orders		
<i>Anxiety is such that they will not or cannot tolerate lying in the MRI for any prolonged period of time to complete MRI</i>		
<p><input type="checkbox"/> IV Sedation – as per CRNA (anesthesia type discussed).</p> <p><i>IV sedation can only be administered by anesthesia providers.</i></p>		
<i>LIP Signature:</i>	<i>Date:</i>	<i>Time:</i>
<i>Tech/RN Signature:</i>	<i>Date:</i>	<i>Time:</i>

Medication Administration Record							
ALLERGIES:							
<input type="checkbox"/> Verified Responsible Driver Available							
<i>Pre-Vitals: BP: _____ / _____ HR: _____ RR: _____ O₂ Sat: _____ on RA</i>							
Medication	dose	Route	Freq		Date	Time	Initials
Ativan	1 mg	IV	once				
Ativan <i>May give 20 min after 1st dose if not effective</i>	1 mg	IV	once				
Versed	2 mg	IV	once				
Tech/RN Signature: _____							
<i>Post MRI Vitals: BP: _____ / _____ HR: _____ RR: _____ O₂ Sat: _____ on RA</i>							
<i>Call for: BP greater than 190/95 or less than 90/50; HR greater than 130,less than 50; RR greater than 22,or less than 8; O₂Sat less 93% RA</i>							



Out-Patient MRI
Anxiety-Relief
Orders

MRI

CONTRAINDICATIONS

- **MRI CANNOT** be performed if screening reveals:
 - An active electronic device in the body
 - Cerebral aneurysm clip
 - Metal fragments in the eyes
 - Ferromagnetic foreign bodies
 - Any unfamiliar device
- However, some metallic implants may be safe during an MRI. Qualified Staff will screen and verify if it is safe to perform MRI.



MRI

ACCESS SCREENING



MRI

MRI COMPATIBLE EQUIPMENT

- Only equipment and devices that have been approved for MRI use are allowed in zone IV.
 - Some examples are:
 - fire extinguishers, wheelchairs, oxygen tanks, medical monitor devices, stethoscopes

NEVER RESUSCITATE A PATIENT OR RUN A CARDIAC ARREST CODE IN ZONE IV OF THE MRI SUITE.

