

Radiation Safety and Protection for I-125 Seeding localization: A Day in the Life of a Seed 2013 Update

Department of Education and Clinical Practice

High Impact Learning for
Remarkable, Compassionate Care

This module has been adapted with permission for the
North Memorial Ambulatory Surgery Center at Maple Grove (NMASCMG)



Introduction

- You should set aside **20 minutes** to complete this education module.

Performance Objectives

After viewing this module the learner will be able to:

- Describe the activity of a radio-isotope.
- Monitor and document the path of the I-125 seed from insertion to recovery.
- Identify basic radiation safety techniques to minimize exposure to radioactive materials.
- Describe emergency safety protocols necessary for the handling of I-125 radioactive seeds. (loss of, cutting of, or inability to find a seed).

Core Message

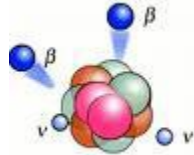
The inability to account for a deployed I-125 seed, or the transection of a seed can be grounds for termination of our radioactive seed localization program and inspection by the Minnesota Department of Health.



Radioisotopes

What is a radioactive isotope?

- A radioactive isotope:
 - Is an atom with an unstable nucleus.

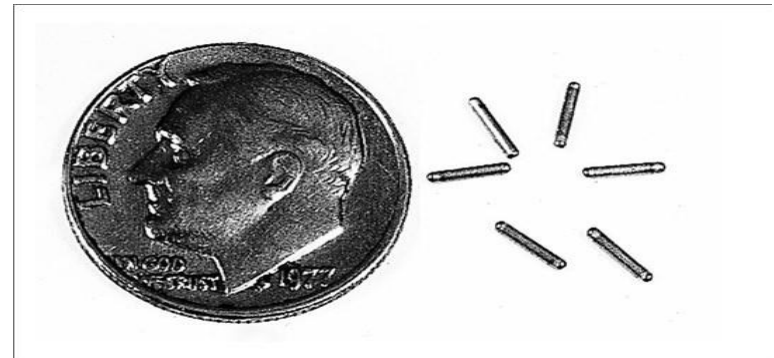


- The nucleus has excess energy.
- The nucleus must undergo radioactive decay to become stable.
- Principal photon emissions:
 - 35.5 keV gamma
 - 27.4 and 31.4 keV xrays



I-125 Seeds

- Each seed is about 5 mm long, and comes pre-loaded in a sterile needle
- Each seed has a 60.1-day half life
- The Radiologist determines the number of seeds required.
- Each seed contains radiation activity of 100-300 microcuries (μCi) of activity per seed.



I-125 Seeds

Why are we using I-125 seeds?



- This method is used as an alternative to wire localization.
- Guided by either a mammogram or ultrasound the radiologist places the iodine radioactive seed into the lesion using an 18 gauge needle.
- Less tissue removed from the patient undergoing surgery, providing better patient outcomes.
- Seeds can be placed up to 5 days prior to surgery.

Dose Limits

- Occupational Dose Limits

- Whole body 5 rem/year or 5000 mrem/year
- Lens of eye 15 rem/year or 15000 mrem/year
- Extremities 50 rem/year or 50000 mrem/year

FYI: REM or MREM are measurement definitions for radiation



Common Radiation Exposures

Source	Dose (mrem)	Extremity	Body
CT abdomen	1,000-2,000		X
Background (sunlight and radon)	300		X
¹²⁵ I seed @ 1 cm	225	X	
Abdomen x ray	200		X
Chest x ray	10		X
Plane flight	4-6		X
¹²⁵ I seed @ 15 cm	1	X	X
¹²⁵ I seed @ 30 cm	0.25	X	X

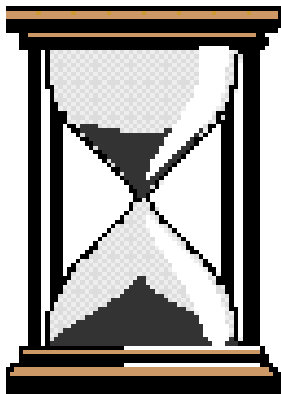
Did you know: The baseline measurement for radiation is the SUN!

Radiation Safety

Minimizing Radiation Exposure - external

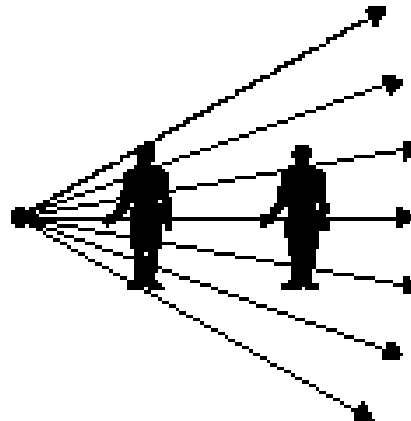
There are three principles for minimizing exposure from external sources of radiation.

Time



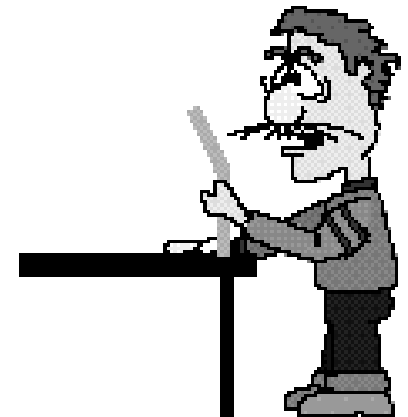
Minimize time

Distance



Maximize distance

Shielding



Use shielding,
if appropriate

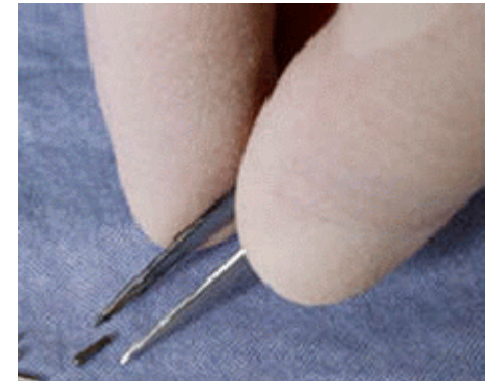
Radiation Safety

- Never touch I-125 seeds directly with your fingers.
- Use long handled forceps to pick up a seed, if the seed is dropped.
- If a seed is dropped, it is no longer sterile. Place it in the lead lined pouch or lead pig for return to Nuclear Medicine.



OTHER CONSIDERATIONS AND POLICY STATEMENTS

- Lead "PIG"
 - All patients with an internal radiation source should have a "PIG", or lead lined pouch available.
 - Place any radioactive seeds in the lead lined pouch or PIG if they should fall out—use the provided tweezers.



A Day in the Life of a Seed

- The Radiologist orders the number of seeds required for the patient, using the I-125 Seed Localization Form.
- Nuclear Medicine will order the seeds from the vendor.
- On the morning of the procedure Nuclear Medicine will get the seeds ready for the Breast Center.
- A Breast Center Tech will get the I-125 seeds and the Survey Meter from Nuclear Medicine prior to procedure.
- **All staff involved in seed transport must sign the Breast Seed Localization Form. This form must accompany the seeds at all times.**



I-125 Seed Localization Form

Breast I-125 Seed Localization Age: _____ Sex: _____

Number of seeds needed: _____ Radiologist's signature: _____

Seed activity/day of procedure: _____ µCi LOTS# _____

Survey Meter Serial #: _____ Radiographer: _____ Rite Check Source: _____ unit/yr

_____ **BREAST CENTER** _____

Seed(s) transferred to Breast Center by _____ at _____

_____ Breast Center Staff Time

Seed(s) placed in patient at _____ by _____

_____ Time Radiologist's signature

Were all seeds placed in the patient? Y or **N** If **No**, transfer extra seeds back to nuclear medicine.

Number of seeds transferred back to Nuclear Medicine: _____ Received By: _____ (Initials)

Were all seeds verified by mammography? Y or **No** Number of seeds visualized: _____

If **NO**, are all seeds accounted for? Y or **N** If **NO**, survey for the seed and call 57450 if unable to find.

_____ **SURGERY** _____

Date and Time of Surgery: _____

Surgery the same day as Seed Placement? Yes or **N** If **NO** patient must fill out a separate consent form.

Specimen Transferred to Xray by _____ at _____

_____ Surgery Staff Signature Time

_____ **RADIOLOGY** _____

Seeds verified in tissue specimen by _____ Dist. Radiologist

These specimens transferred to Pathology by _____ at _____

_____ X-ray Tech/Pathology Tech Time

_____ **PATHOLOGY** _____

Seeds removed from specimen by _____ at _____

_____ Pathologist Signature Time

Are all seeds accounted for? Y or **N** If **No** call nuclear medicine **IMMEDIATELY X57450**

IF ANY SEEDS ARE CUT CALL NUCLEAR MEDICINE IMMEDIATELY AND CONTAIN THE AREA OF CONTAMINATION- X57450

Seeds received by Nuclear Medicine- Signature: _____ at _____

_____ Time

_____ Authorized User Signature

A Signature is required for each transfer of seed possession.

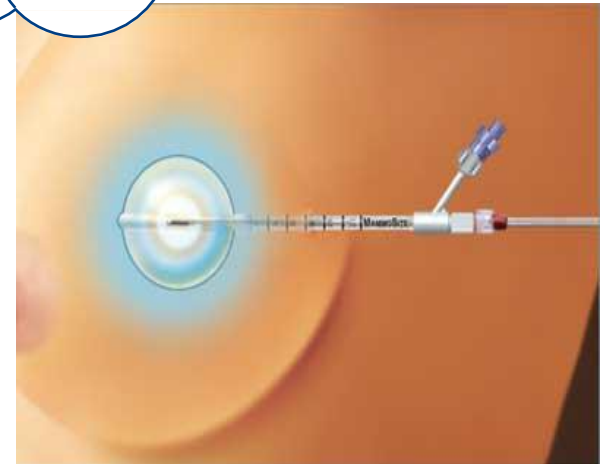


Implantation in the Breast Center

- The Seed(s) will be inserted by the Radiologist in the Breast Center, under Mammography or Ultrasound.



Whoops! I
dropped a
seed!



Lost or Dropped Seed

What if we lose a seed?



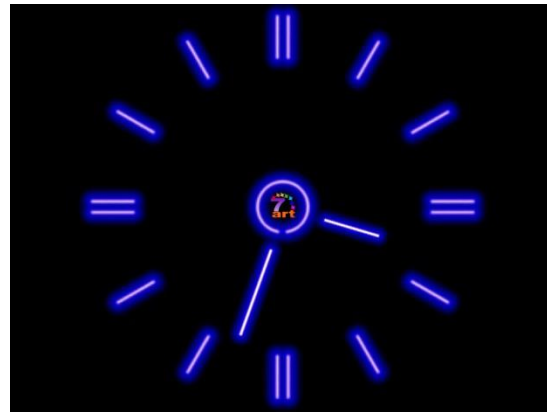
If at ANY point a seed is missing **call NUCLEAR MEDICINE IMMEDIATELY**

x11180

Do not let anyone leave the room until nuclear medicine staff arrives.

In the Meantime...

- Typically the patient will go directly to NMASCMG after the seed has been placed to await surgery. They *could* go home and return up to 5 days later to have surgery.



- The patient must sign separate consent form in the breast center **if they are returning a different day for surgery.**



In the OR...

- Surgeon will remove breast lesion.
 - Surgeon should not use scissors to avoid cutting the seed!
- Specimen is placed in a biohazard bag and labeled as usual.
- A yellow “radioactive” sticker must also be applied (the lead lined pouch has this label attached already).
- Specimen will be sent to X-ray to verify number of seeds.



In Radiology...

- Radiologist dictates the number of seeds in x-ray report.

Hmmm... I can't see all the seeds...



Call OR and tell them to re-survey the patient to find the missing seed.

Back In the OR...

- The patient has been waiting in the surgical suite until the report comes back from radiology.
- If the missing seed is not found on the resurvey, call Nuclear Medicine immediately and report a lost seed...



Back In the OR...

If a seed is cut inside the patient:

1. **Notify Nuclear Medicine immediately! (11180)**
2. Irrigate incision with saline or sterile water.
3. **No suction is to be used at this time!**
4. All excess irrigation will be wiped up with sterile gauze, placed in a plastic bag.
5. The patient is then surveyed for contamination.

Nuts! I cut the seed!



Back In the OR...

But what about
me?



- After patient decontamination, all staff will be surveyed and decontaminated as appropriate.
- **FYI: The amount of contamination is very small. Usually removal of gown and gloves is enough to decontaminate.**

In the Pathology Lab...

- The excised tissue specimen and Seed Localization form are transported to Pathology by X-ray staff for seed removal.
- The Pathologist will remove the seed(s), count them, and place them in the lead lined pouch or lead pig.
- The Pathologist will sign the form verifying that all seeds are present in the lead pig.
- Nuclear Medicine receives and signs for seeds from Pathology confirming the correct number of seeds are present.





Lost or Cut Seed in the Path lab...

What if we
cut a seed?
What if we
lose a seed?

Once again:
If at ANY point a seed is lost
or cut call NUCLEAR
MEDICINE IMMEDIATELY

X11180

Do not let anyone leave
the room until nuclear
medicine staff arrives.



Decontamination



Remember: The amount of contamination is so small, usually removal of the gloves and gown or your lab coat is enough to decontaminate. Contamination on skin is best removed with soap and water.

Nuclear Medicine will bag and remove all radioactive-contaminated materials for storage in the Hot Closet for 600 days.

Radiation Safety Phone Numbers

- If you have any questions or concerns about radiation safety, please contact Nuclear Medicine at 11180.



Summary

- Radiation safety techniques minimize exposure to the I-125 radioactive isotope.
- The following departments are all responsible for seed verification: Nuclear Medicine, Breast Center, Surgery, General Radiology, and Pathology.



References

- North Memorial Ambulatory Surgery Center at Maple Grove Policy and Procedure – Non-Palpable Breast lesion seed localization
- Minnesota Department of Health (MDH)
- North Memorial Policy and Procedure - General Rules of Radiation Safety - IMRS16
- North Memorial Radiology Department; Joni Gosch, Imaging Manager
- North Memorial Radiation Safety Officer, Mary Fox, Radiation Physicist

You Have Completed Part 1 of this module.

- You should set aside **10 minutes** to complete the 14 question assessment (copies at control desk).
- You must get 80% on this assessment to successfully complete this education module.
- See NMASC Clinical Educator for answer key.
- If you scored less than 80%, review the content in Part 1 of this module and complete the assessment again.
- Submit completed assessment to NMASC Clinical Educator.