Extravasations in Nuclear Medicine: What You Need To Know
Nuclear Medicine: An Overview

**Definition:** Nuclear medicine combines a radioactive isotope with a carrier drug to create a radiotracer or radiopharmaceutical that can aid in diagnosis and treatment of a variety of medical conditions.

**How Does It Work?**

- Isotope/drug combo is injected into vein and travels within body to targeted areas.
- Patient is placed on table attached to PET or SPECT camera.
- Isotope emits radiation, some is deposited in your body, but much of it passes through body and is monitored by camera to allow your doctor to effectively diagnose or assess efficacy of treatment.

**Benefit of nuclear medicine scan when the isotope/drug is administered correctly:**

- Resulting image can provide your physician with valuable information to guide your care.
Extravasation occurs when the person administering the radioactive isotope inadvertently delivers some or all of the isotope into tissue rather than vein.

Implications of a large extravasation:

- Radiation is not spread throughout your body but concentrated in arm tissue
  - When administered properly, your tissue is barely exposed to radiation. When extravasated, your tissue can receive a very high radiation dose.
- Results in reduced image quality and imprecise medicine including:
  - Inaccurate staging, missed diagnosis and improper treatment
  - Unnecessary invasive procedures and additional imaging
**Extravasation Implications**

Incorrect, Missed & Delayed Diagnosis

---

**Extravasated Image**

- Injection site in imaging field of view – large extravasation present
- Lung lesion identified & no other disease noted
- Patient prognosis good with expensive treatment over 3-4 months
- Metastatic disease noted in adrenal

---

**3 Days Later No Extravasation**

- Lung lesion 80% more active than indicated by the extravasated image
- Patient prognosis not good with any treatment

---

*For Safer Nuclear Medicine*
Extravasation Implications

Increased radiation exposure

Severe extravasation cases have led to:

- Cancer development
- Skin necrosis
- Surgical debridement
- Skin grafting

Focal cutaneous squamous cell carcinoma following radium-223 extravasation

Katie E. Ranjegerdes, BS, Shannon C. Brown, MD, and Chad D. Housewright, MD

- Author information
- Copyright and License information

Extravasation leads to necrosis
Necrotic tissue surgically debrided
Skin graft required

Cancer developed
Extravasation By The Numbers

Estimated Annual U.S. Occurrence and Implications

30M Nuclear medicine injections a year

4.5M extravasated injections

500K+ Patients harmed by large extravasations

~$3B In healthcare waste annually
Radiopharmaceutical extravasations are NOT reported. Why?

- The Nuclear Regulatory Commission (NRC) is responsible for the proper use of radioactive isotopes in medicine.
- Due to an incorrect NRC policy created in 1980, there are no reporting requirements for accidental radiation exposures to a patient’s skin or tissue as the result of an extravasation.
  - NRC is not protecting patients from harm associated with extravasations.
  - Patients, their physicians, regulators, and payers remain unaware.
  - Extravasations are preventable.

Extravasations are not reported to the patient, the healthcare provider or the institution.
Pam Kohl is a metastatic breast cancer patient who depends on the accuracy of her nuclear medicine scans. During a recent scan, she was extravasated.

"I felt something burn. I really felt something wasn’t right."
Patients for Safer Nuclear Medicine (PSNM)

- PSNM was established to encourage the NRC to change the reporting requirement and make nuclear scans safer.
  - 29 patient advocacy organizations and 5 corporate partners.
  - Dedicated to the development of federal policies that support safe, transparent and effective nuclear medicine care.
  - Working to increase transparency for patients and accountability for institutions.
    - Sent 620 petition signatures and correction request to NRC.
    - Wrote letters to the NRC Commissioners.
    - Reached out to payers and members of Congress.
    - Published media articles.
    - Activated advocates through social media.
How You Can Help

www.safernuclearmedicine.org

Read & Share Resources

ACT NOW FOR SAFER SCANS

SIGN OUR PETITION

PROTECT YOURSELF DURING SCANS

SIGN THE PETITION

PROTECT YOURSELF DURING SCANS

Sometimes during NUCLEAR MEDICINE imaging, patients can be unknowingly exposed to high doses of radiation.

About 15%* of the time technicians accidentally inject a radioactive drug into a patient’s arm tissue, not their vein. This error is called an extravasation.

Many patients have no immediate signs, but some experience:

- Burning or tingling sensation
- Swelling, pain, redness, or numbness
- An unusual feeling at the injection site

One way to know for sure—ask your healthcare provider for an image of your injection site.

A black spot can be evidence of an error.

One way to know for sure—ask your healthcare provider for an image of your injection site. A black spot there can be evidence of an error.

If you find a black spot at your injection site, please share your story.

*Versant Medical Physics and Radiation Safety White Paper

Share Your Story

Have you had a nuclear scan?

Sometimes in nuclear medicine imaging, patients can be unknowingly exposed to high doses of radiation.

About 15%* of the time technicians accidentally inject a radioactive drug into a patient’s arm tissue, not their vein. This error is called an extravasation.

Many patients have no immediate signs, but some experiences:

- Burning or tingling sensation
- Swelling, pain, redness, or numbness
- An unusual feeling at the injection site

One way to know for sure—ask your healthcare provider for an image of your injection site. A black spot can be evidence of an error.

If you find a black spot at your injection site, please share your story.

*Versant Medical Physics and Radiation Safety White Paper
Until the NRC changes reporting requirements, it is important for patients and caregivers to self-advocate before, during and after nuclear medicine scans.

Helpful Tips:

- Ask for proof of imaging that there is no extravasation.
  - Request an image of injection site be shared with you.

- If the institution hesitates to share, ask the following:
  - What amount of radiation accidentally injected into my arm is bad for me?
  - How does the institution know what amount is injected into the arm if they are not monitoring?

- If you are receiving advanced nuclear medicine therapies and you are not imaged for 24 hours. Be sure to ask:
  - Exactly how does the institution know if the therapy was delivered as prescribed and not extravasated?
Anticipated Outcomes of a Positive Decision

- Institutions will have to monitor injections.
- Institutions that routinely extravasate will be held accountable and need to improve.
- Patients will be told, and the extravasation will be noted in EMR (electronic medical record).
- Steps will be taken immediately to reduce radiation dose to patient’s tissue.
- Most extravasations can be prevented with proper training and tools.
- Patients can make an informed decision on where they get their care based on the extravasation rates of an institution.

Most importantly, patients and their healthcare team will have the information they need to ensure safety and accountability.
### In Summary

<table>
<thead>
<tr>
<th>Extravasations occur about 15.5% of the time, harming approximately 500,000 patients annually.</th>
<th>Extravasations can pose harmful effects to tissue including tissue necrosis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% of PET/CT procedures are used for diagnosis and treatment in oncology care.</td>
<td>Today, extravasations do not have to be reported to the patient or their healthcare team.</td>
</tr>
<tr>
<td>Extravasations can lead to inaccurate staging, missed disease results, and improper treatment.</td>
<td>The NRC decided in 1980 that extravasations do not have to be reported.</td>
</tr>
<tr>
<td>Patients for Safer Nuclear Medicine is advocating for transparency in reporting to ensure patient safety.</td>
<td>The NRC will decide soon if extravasations should become reportable.</td>
</tr>
<tr>
<td></td>
<td>Self-advocacy is key to preventing extravasation until NRC changes their policy.</td>
</tr>
</tbody>
</table>