

# Ethics in Nuclear Medicine: A Case-Based Approach

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# Objectives

1. Describe the key principles of medical ethics, including respect for persons / autonomy, beneficence, nonmaleficence, and justice.
2. Describe how the SNMMI-TS Code of Ethics and Code of Ethics of the American College of Radiology guide current ethical practice of nuclear medicine.
3. Discuss and apply these principles to real-life cases in nuclear medicine imaging and therapy.



# Key principles of medical ethics

Belmont Report

# Belmont Report, 1978

- Written by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research
- Identified basic ethical principles underlying conduct of research involving human subjects
- Developed guidelines to ensure research is conducted in accordance with those principles
- Similar principles can be applied more generally in medicine

<https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html>

# Ethical principles from the Belmont Report

- Respect for persons – protecting autonomy, treating patients with courtesy and respect, and allowing for informed consent
- Beneficence & nonmaleficence – "Do no harm": maximizing benefits while minimizing risks
- Justice – fair and equitable distribution of costs and benefits to patients

# Ethical principles from the Belmont Report

Further Reading: UW Department of Bioethics & Humanities  
<https://depts.washington.edu/bhdept/ethics-medicine/bioethics-topics>

36 specific topics and many other Bioethics Resources

## Bioethics Topics



Please select a topic to view details.

- Choose a topic -

### BIOETHICS TOPICS

Advance Care Planning & Advance Directives

Breaking Bad News

Clinical Ethics and Law

Complementary Medicine

Confidentiality

Cross-Cultural Issues and Diverse Beliefs

Difficult Patient Encounters




Do Not Resuscitate during Anesthesia and Urgent Procedures

Do Not Resuscitate Orders

# SNMMI-TS/NMTCB and ACR Codes of Ethics

# SNMMI-TS Code of Ethics: Principles

The Nuclear Medicine  
Technologist will:




- Provide services with compassion and respect for the dignity of the individual and with the intent to provide the highest quality of patient care.  Respect for persons  
Beneficence / nonmaleficence
- Provide care without discrimination regarding the nature of the illness or disease, gender, race, religion, sexual preference, or socioeconomic status of the patient.  Justice
- Maintain strict patient confidentiality in accordance with state and federal regulations.  Respect for persons

<https://tech.snmjournals.org/content/jnmt/45/1/53.full.pdf>



# SNMMI-TS Code of Ethics: Principles

The Nuclear Medicine  
Technologist will:

- Comply with the laws, regulations, and policies governing the practice of nuclear medicine.  Justice
- Continually strive to improve knowledge and technical skills.  Beneficence
- Not engage in fraud, deception, or criminal activities.  Nonmaleficence
- Be an advocate for the profession.

<https://tech.snmjournals.org/content/jnmt/45/1/53.full.pdf>

From the Code of  
Ethics, American  
College of  
Radiology,  
2022-23

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The principal objective of the medical profession is to render service to people with full respect for human dignity and in the best interest of the patient. → **Beneficence and Respect for Persons**

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Members should merit the confidence of patients entrusted to their care, rendering to each a full measure of service and commitment.

→ **Beneficence and Respect for Persons**

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Members should strive continually to improve their medical knowledge and skill and make these improvements available to their patients and colleagues. → **Justice and beneficence**

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Members should at all times be aware of their limitations and be willing to seek consultations in clinical situations where appropriate. These limitations should be appropriately disclosed to patients and referring physicians. → **Non-maleficence and Respect for persons**

<https://www.acr.org/-/media/ACR/Files/Governance/Ethics-and-Discipline.pdf>

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# Real-life cases in nuclear imaging and therapy

For each case, we will “think, pair, and share” to consider what principles of bioethics apply and what you would do in your practice.

- There’s no “right” answer (although there are some “wrong” answers)
- Technologists please speak up! (I’m not a technologist, so I want to hear your perspective)

# Case 1

- A 12 y.o. girl is brought to your department by her parents for a renogram to follow up ureteropelvic junction obstruction
- She had a renal ultrasound just before (for the same indication)
- The sonographer runs over to Nuc Med to warn you about what she found
- **What principles of bioethics apply to this situation, and what would you do?**



Representative image. Case courtesy of Matt A. Morgan, Radiopaedia.org, rID: 37588

# Case 1

## New Mexico Statutes regarding consent of minors

Your state may be different!

<u>Children 1 – 13 Years Old</u>	<u>Unemancipated Children 14 – 17 Years Old</u>	<u>Emancipated Minor</u>
<ul style="list-style-type: none"> <li>• Cannot consent to medical treatment without parent or legal guardian under most situations.</li> <li>• Can consent to initial assessment for verbal therapy.</li> <li>• Can consent to reproductive health services (birth control, pregnancy, STD's, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Can consent to medically necessary healthcare if living apart from parents.</li> <li>• Can consent to medically necessary healthcare if the child is a parent of a child.</li> <li>• Can consent to medically necessary healthcare if the child is married.</li> <li>• Can consent to medically necessary healthcare if the child is pregnant (prenatal, delivery, and postnatal care).</li> </ul>	<ul style="list-style-type: none"> <li>• Can consent to all medical treatment.</li> </ul>

NMSA 1978, 32A-6A-24(D)

# Case 1

- Attending physician contacted risk management
- Physician spoke with the patient in private and disclosed the pregnancy. (Respect for persons)
  - Patient disclosed that she was sexually active
- Scan was not performed, to avoid fetal harm (Non-maleficence)
- Ordering doctor was informed that the scan was not performed and why, so they can coordinate future care of the patient (Beneficence)

# Committee Opinion No. 723 Summary: Guidelines for Diagnostic Imaging During Pregnancy and Lactation

Author Information 

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used prudently and only when use is expected to answer a relevant clinical question or otherwise provide medical benefit to the patient. With few exceptions, radiation exposure through radiography, computed tomography scan, or nuclear medicine imaging techniques is at a dose much lower than the exposure associated with fetal harm. If these techniques are necessary in addition to ultrasonography or magnetic resonance imaging or are more readily available for the diagnosis in question, they should not be withheld from a pregnant patient.

Breastfeeding should not be interrupted after gadolinium administration.

ACOG



## Case 2

- A 72 y.o. man presents for Pluvicto treatment #2
- A signed consent is found in the EMR, but there is no unique patient identifier on the document. (In our system we affix patient ID stickers to all patient-specific documents).
- The hard copy of the consent that was scanned cannot be located.
- What principles of bioethics apply to this situation, and what would you do?
- Redo the consent (Autonomy/Respect for Persons)
- We located the consent form thanks to an awesome technologist. The patient confirmed it was his signature. A patient ID sticker was affixed and the consent was re-scanned

## Case 3

- 32 y.o. woman with h/o papillary thyroid cancer, s/p thyroidectomy, ATA intermediate risk, presenting for radioiodine imaging and treatment. She has been on low iodine diet for 2 weeks and is ready to receive I-123 for imaging.
- Technologist asked all the appropriate questions and patient indicated that she had unprotected sex with her male partner 10 days ago. “I’ve exclusively used the rhythm method with this partner for 10 years and never been pregnant.”
- Due to shipping issues, only I-131 is available for the imaging
- Due to her profession, patient is unable to significantly defer this treatment

## Case 3

- 32 y.o. woman with h/o papillary thyroid cancer, s/p thyroidectomy, ATA intermediate risk, presenting for radioiodine imaging and treatment.
- What principles of bioethics apply to this situation, and what would you do?
- Non-maleficence - potential embryo
- Beneficence – patient will benefit from RAI treatment
- Autonomy of patient to make decisions regarding her thyroid cancer treatment and reproductive care

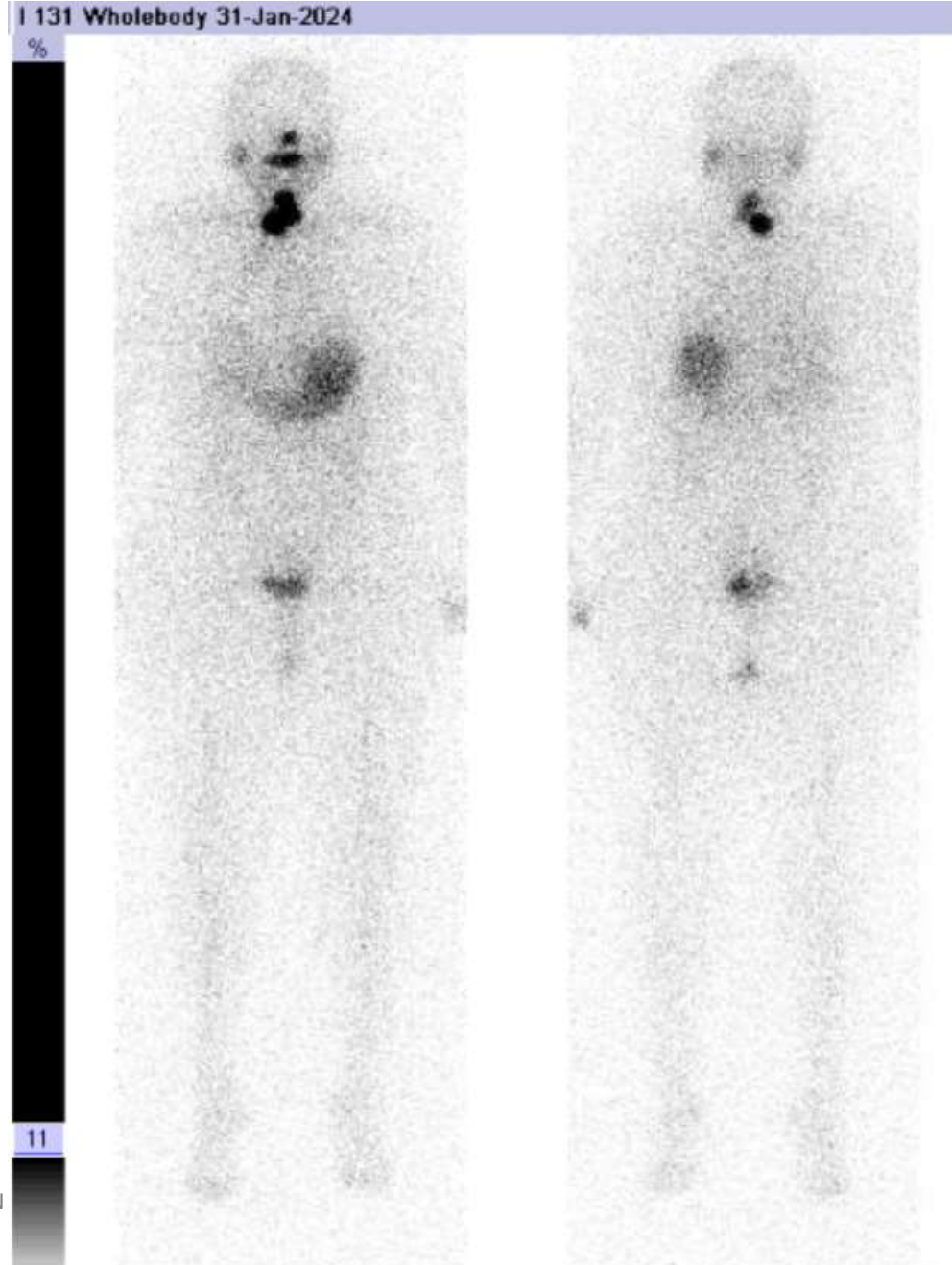
## Case 3

- 32 y.o. woman with thyroid cancer, s/p thyroidectomy, ATA intermediate risk, presenting for radioiodine imaging and treatment
- Patient indicated this would be an undesired pregnancy and she would terminate.
- Options
  - Defer treatment until after start of menstrual cycle or after pregnancy termination
  - Defer indefinitely (not recommended for ATA intermediate risk)
  - Proceed with treatment with intent to terminate pregnancy (not ideal – if patient changes her mind about termination this presents serious ethical considerations for the unborn child)

## Case 3

- 32 y.o. woman with thyroid cancer, s/p thyroidectomy, ATA intermediate risk, presenting for radioiodine imaging and treatment
- Patient shared data from a menstrual cycle tracking app indicating she has regular cycles of 24-29 days
- Deferral by 1 week would place her at day 30 on day of I-123 administration and day 32 at time of I-131 administration. Patient was amenable to this plan.
- In consultation with OB, we proceeded and checked serum hCG on the day of I-123 administration AND on date of I-131 administration
- Patient did start her next menstrual cycle by the time of treatment

# Case 3 Post-therapy scan



## Case 4

- You receive an order from an ordering provider for an inpatient HIDA scan
- You look through the medical record and see that the patient already had a negative HIDA one week previously
- **What principles of bioethics apply and what would you do?**
  - **Non-maleficence/beneficence: Repeat the scan only if medically necessary**
  - **Justice – In a system with finite resources, there is opportunity cost to doing any scan**

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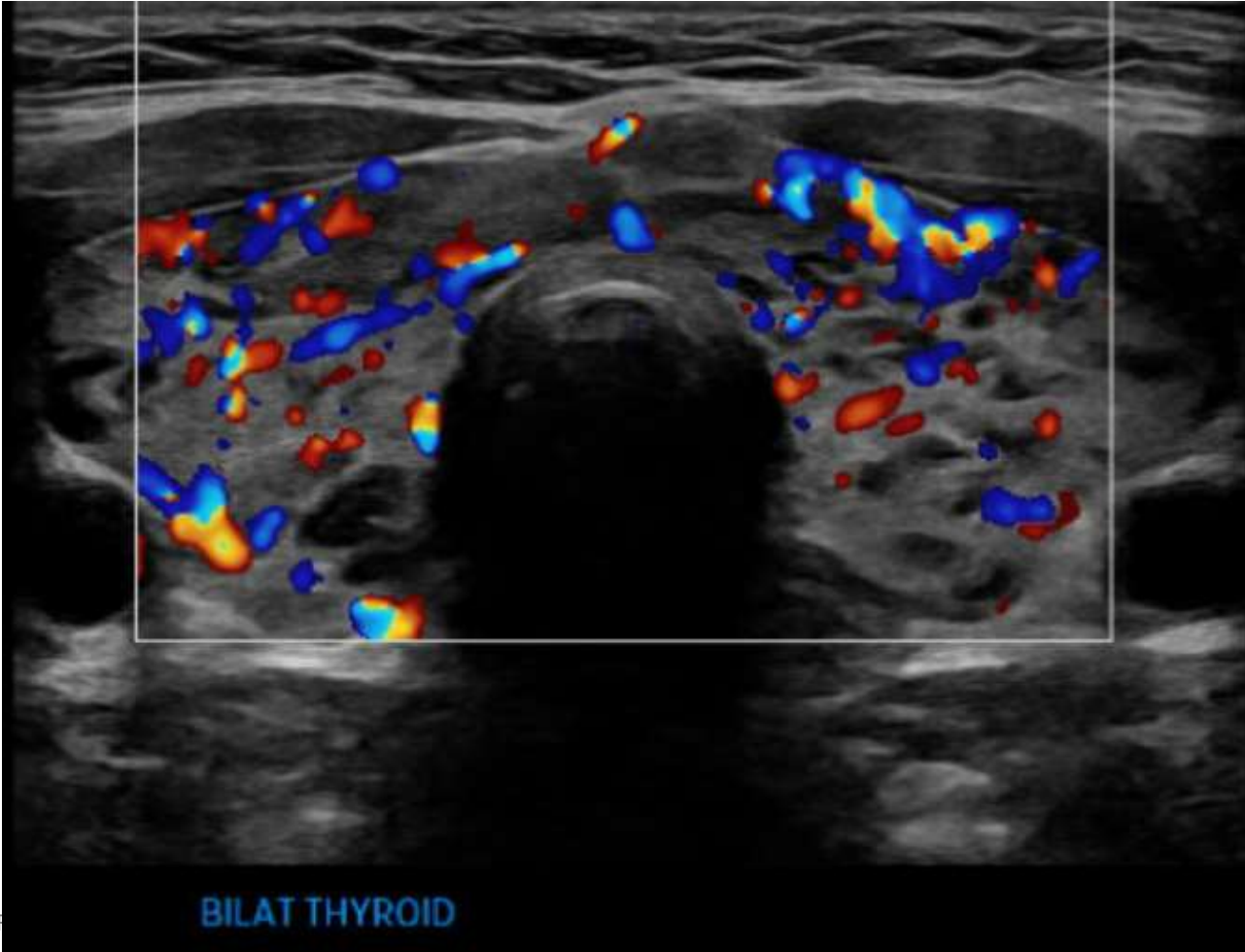
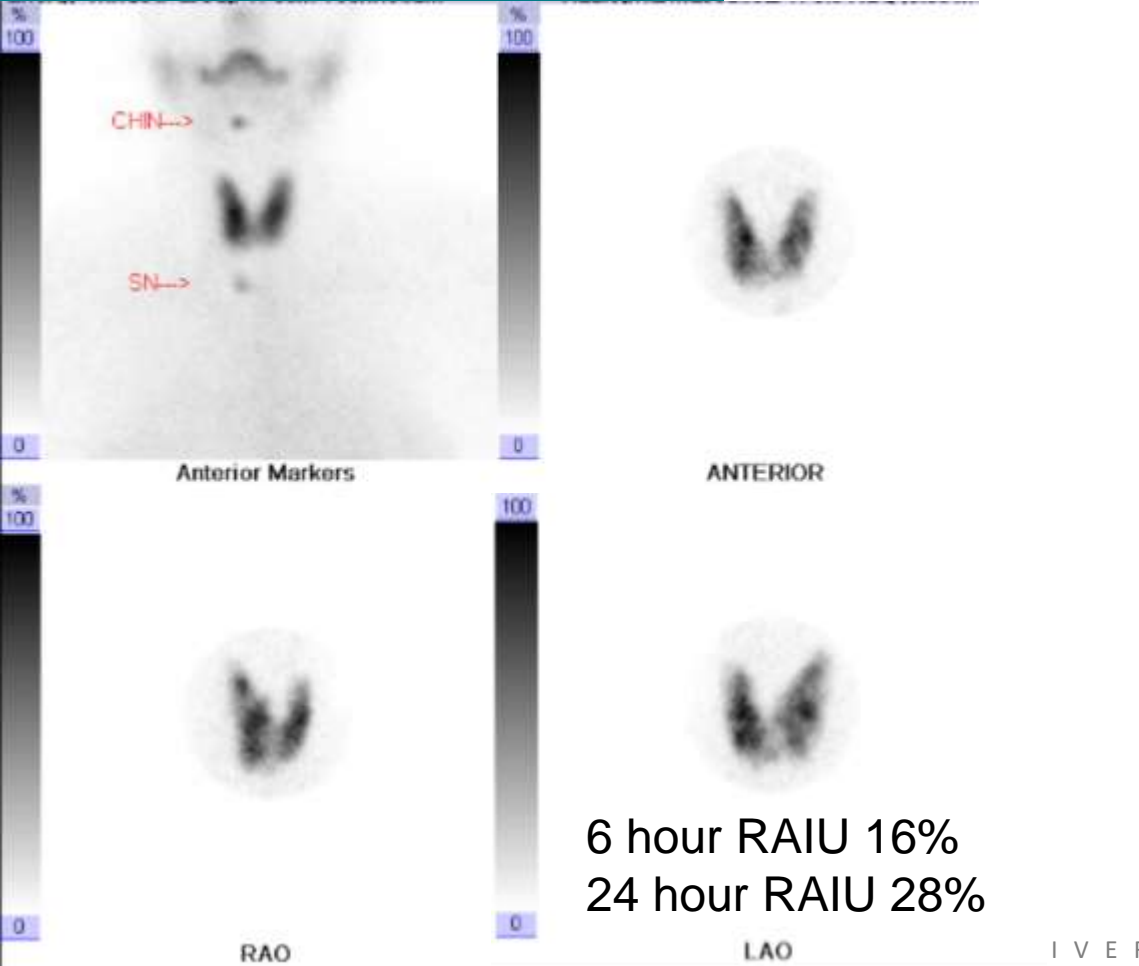
## Case 5

- A referring clinician contacts you about a VIP with cancer
- Their cancer is in remission, and the patient has no new symptoms or concerns, but they just want the PET/CT for reassurance
- Your next available slot is in 3 weeks
- The clinician asks you to fit in this VIP “in the next couple days.”
- What principles of bioethics apply and what would you do?
- Justice – fair distribution of resources. Patient was offered the slot in 3 weeks.

## Case 6

- A 14-year-old girl is referred for RAI treatment for Graves disease diagnosed ~4 years ago. The family recently immigrated to the US and does not speak English. They live 3 hours away. At consultation with nuclear medicine, we learned that the patient lives with her mom and 7 y/o sister. There is only one bathroom in the house, and there are no other family/friends nearby. Patient's father lives out of state and is not able to help at this time.
- We determined that this should be an inpatient therapy due to the single bathroom with another child in the house, and little outside support for the family.

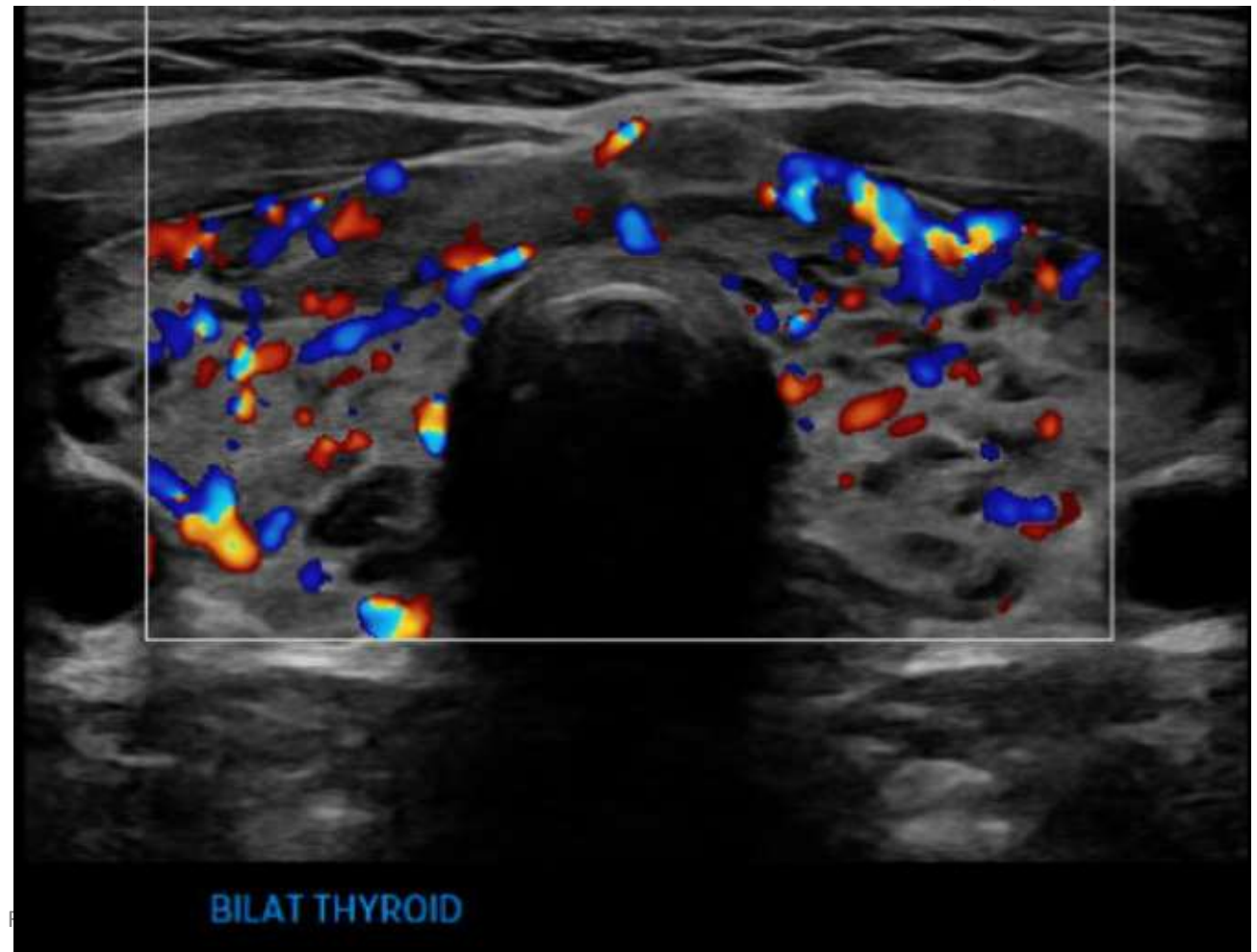
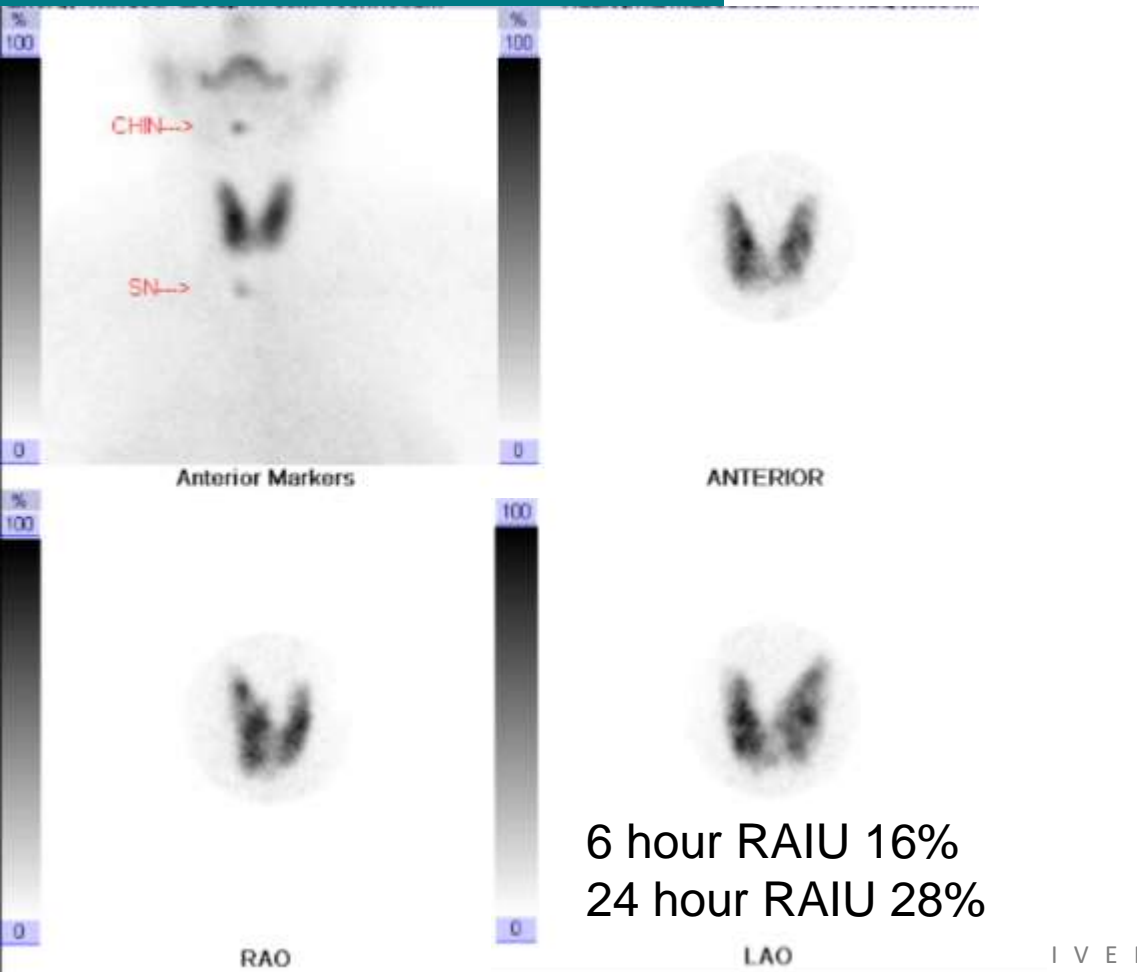
Due to long travel time, uptake and scan and ultrasound were performed at the time of intended treatment. Patient held methimazole for 1 week. Images from thyroid uptake and scan and ultrasound are shown. There were no nodules on US. TSH was undetectable with normal free T3 and T4.



Patient is admitted and it is time to decide on treatment.  
What principles of bioethics apply, and what would you do?

Non-maleficence: Is this patient appropriate for RAI at this time?

Patient was treated with 26 mCi I-131 and is now hypothyroid



## Case 7

- A 45 y.o. man with hyperparathyroidism presents for parathyroid scintigraphy
- You review the immediate image
- What is wrong, and what do you think happened?



## Case 7, continued

- On reviewing the label of the radiopharmaceutical, it was discovered that the technologist injected pertechnetate instead of sestamibi, due to a confusing system for organizing doses.
- What principles of bioethics apply, and what would you do?

## Case 7, continued

- Disclose to patient (Respect for persons)
- Need to ensure this is not a medical event (Non-maleficence)
- “... [A] radiopharmaceutical dose administration involving the **wrong patient, wrong radiopharmaceutical, wrong route of administration, or an administered dose differing from the prescribed dose** when: (1) the effective dose equivalent to the patient exceeds 5 rem to the whole body or 50 rem to any individual organ **OR** (2) a diagnostic dose of I-131 sodium iodide exceeds 30  $\mu\text{Ci}$ .” (Nuclear Medicine, The Requisites)
- In consultation with medical physics, it was determined this was not a medical event

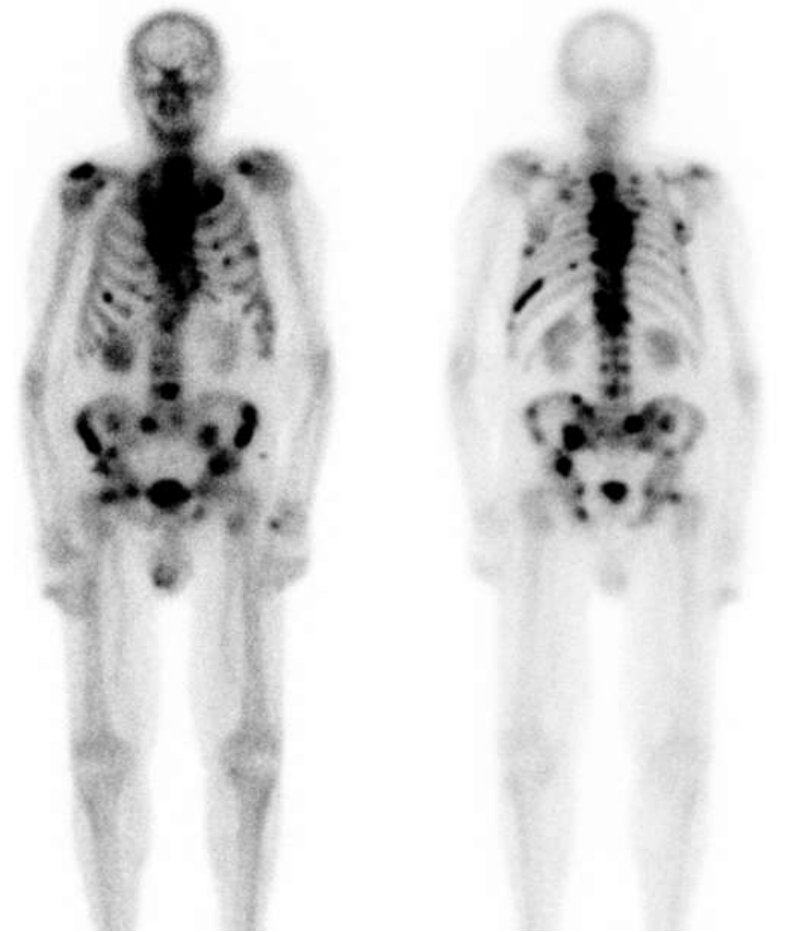
## Case 7, continued

- Repeat the scan at no charge to the patient
- Investigate systems issue that led to this event. In our case, we revised our system for organizing radiopharmaceutical doses to ensure this would not happen again.
- Just Culture - “The Just Culture concept establishes an organization-wide mindset that positively impacts the work environment and work outcomes in several ways. The concept promotes a process where mistakes or errors do not result in automatic punishment, but rather a process to uncover the source of the error.”  
(ANA Position Statement on Just Culture)



## Case 8

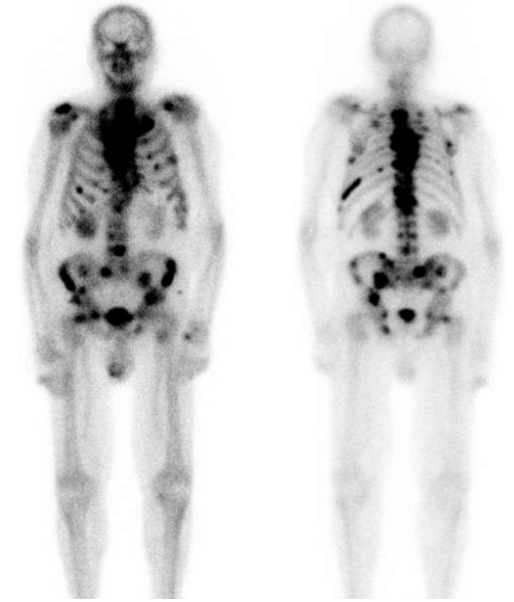
- An elderly gentleman presents to your outpatient imaging center for MDP bone scan
- He has been having some bone pain that his PCP wants to evaluate but he has no known history of malignancy. His PCP follow up is in 3 weeks.
- He asks to talk to you after his scan
- **What principles of bioethics apply and what would you do?**



Representative image.  
Case courtesy of Bruno Di Muzio,  
Radiopaedia.org, rID: 53413

# Case 8

- Respect for persons – Patient has a right to know the results of the scan.
- Beneficence: NM Physician can facilitate patient receiving appropriate care
- Attending physician met with the patient to review the findings.
- Patient knew “something was going on” and was grateful to have the information and that we didn’t just say “follow up with your PCP in 3 weeks.”
- Ordering doctor was notified of the unexpected finding and the patient was later diagnosed with metastatic prostate cancer.



# Conclusions

- Principles of bioethics and professional ethics codes should guide clinical decision making.
  - Respect for persons – protecting autonomy, treating patients with courtesy and respect, and allowing for informed consent
  - Beneficence & nonmaleficence – "Do no harm": maximizing benefits while minimizing risks
  - Justice – fair and equitable distribution of costs and benefits to patients
- Local laws should be followed
- Hospital Risk Management can help guide you

QUESTIONS?

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