Lecture 6

Interactive lecture of radiology of endocrine diseases

Radiology Team
Med433

● Slides ● Explanation ● Notes ● Additions ● Important

Objectives

Each case you should be able to answer these 4 questions :

What is the study?

What is the agent used?

What are the imaging findings?

What is the most likely diagnosis ?

Case1:Elevated T4 and suppressed TSH

- **What is the study?**

Nuclear scan of the thyroid.

- **What is the agent used?**

Tc-99m Pertechnetate.

- **What are the imaging findings?**

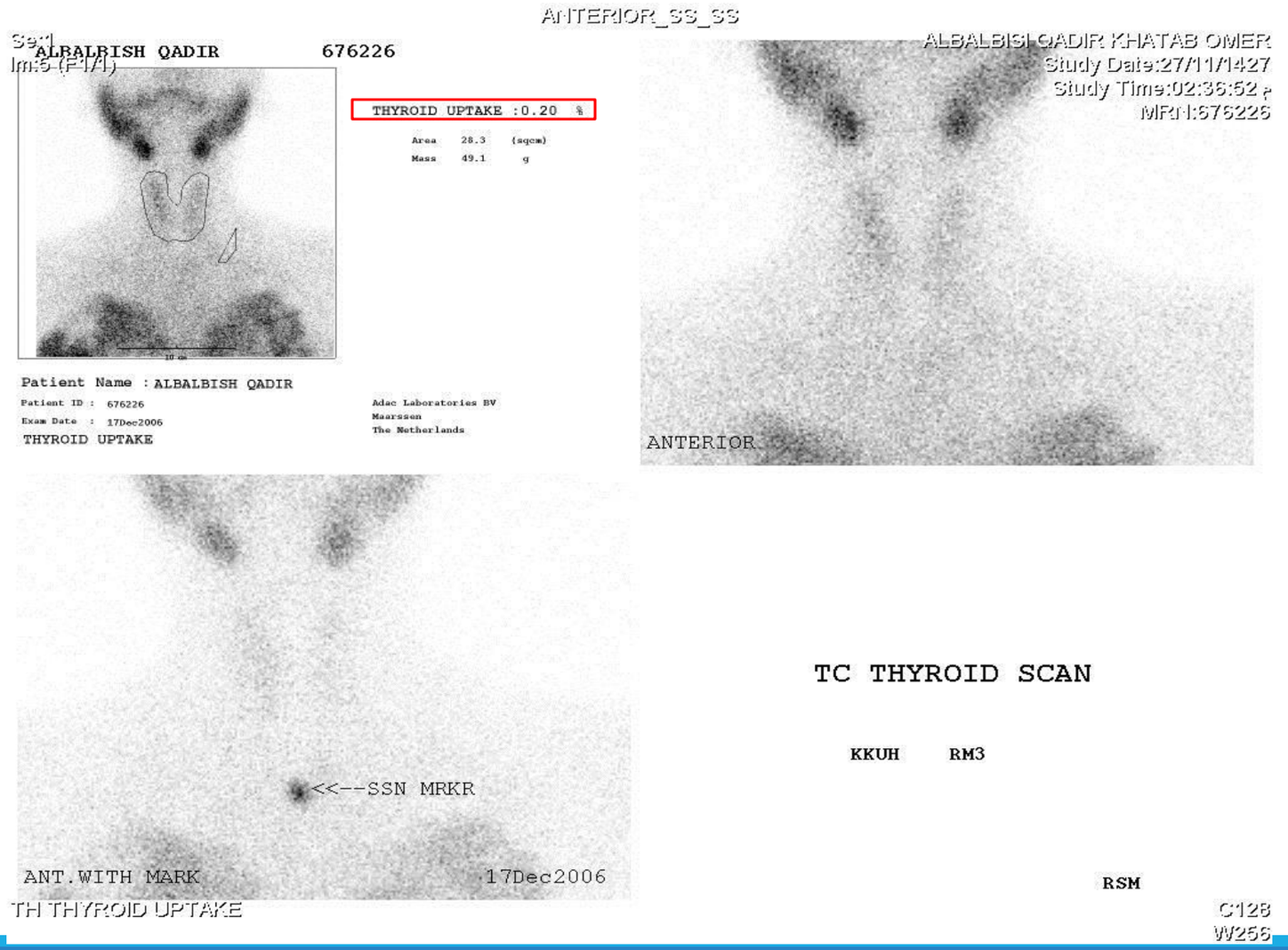
Decreased uptake in both lobes 0.20% (Normal 0.5%-4%)

- **What is the most likely diagnosis?**

SubacuteThyroditis.

- **What is the treatment ?**

Symptomatic treatment give beta blockers .



Case2:Elevated T4 and suppressed TSH

- **What is the study?**

Nuclear scan of the thyroid.

- **What is the agent used?**

Tc-99m Pertechnetate.

- **What are the imaging findings?**

Bilateral diffused uptake 24.13% (Normal 0.5%-4%)

- **What is the most likely diagnosis?**

Graves disease.

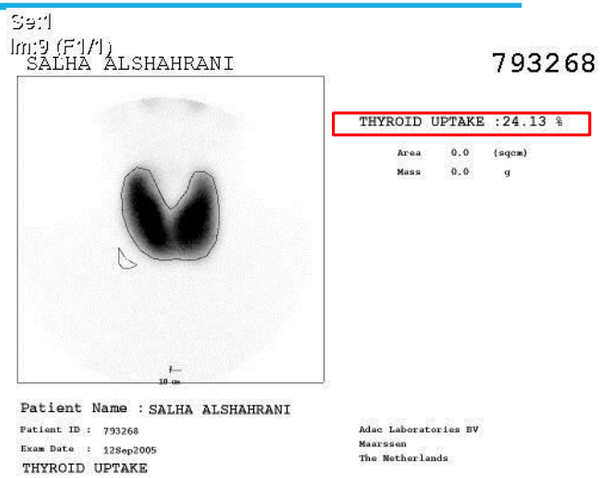
- **What is the treatment?**

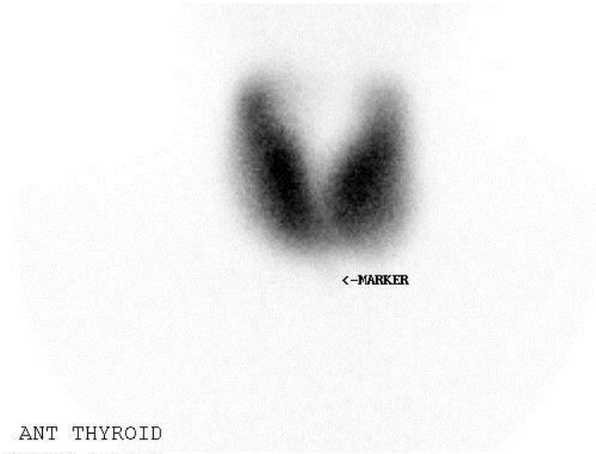
Need definitive treatment (3 modalities) :

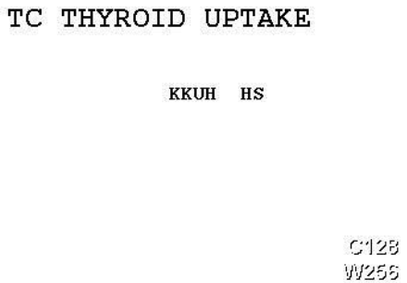
1) Medical (Antithyroid).
2) Surgical .
3) Radioactive iodine(RAI).

- **Give 4 causes of increased thyroid uptake?**

1) Autonomous toxic nodule .
2) Multinodular toxic goiter (Plumer's Disease).
3) Enzyme defects (Dyshormonogenesis).
4) Iodine starvation >Iodine deficiency. (important)







Case3:Elevated T4 and suppressed TSH

- **What is the study?**

Nuclear scan of the thyroid.

- **What is the agent used?**

Tc-99m Pertechnetate.

- **What are the imaging findings?**

Hot nodule on the right lobe suppressing the left

Elevated uptake 11.53% (Normal 0.5%-4%)

- **What is the most likely diagnosis?**

Single toxic nodule .

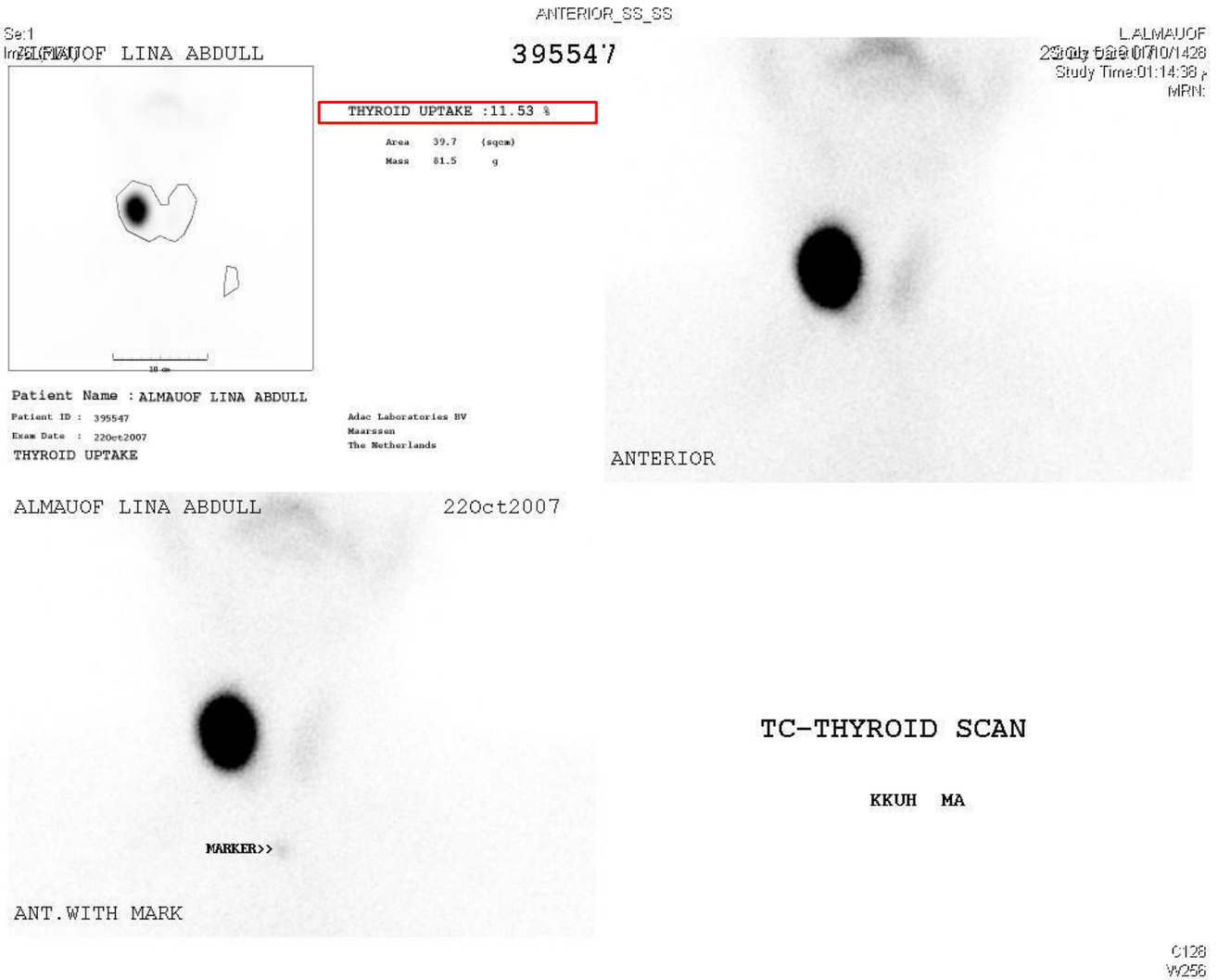
- **What is the treatment ?**

1st option : remove it

2nd option : RAI

- **What is the chances of this nodule of being malignant?**

low chance of being malignant < 5%.



Case4:Elevated TSH and low T4

- **What is the study?**

Nuclear scan of the thyroid (for a child).

- **What is the agent used?**

Tc-99m Pertechnetate.

- **What are the imaging findings?**

Enlarge gland (goiter)

- **What is the most likely diagnosis?**

Dyshormonogenesis

Note:

✓Dyshormonogenesis is Genetic defects in the synthesis of thyroid hormones.

✓Patient will have hypothyroidism ,goiter, increase uptake, elevated TSH and low T4.

Case5:Elevated TSH and low T4

- **What is the study?**

Nuclear scan of the thyroid (for a child).

- **What is the agent used?**

Tc-99m Pertechnetate .

- **What are the imaging findings?**

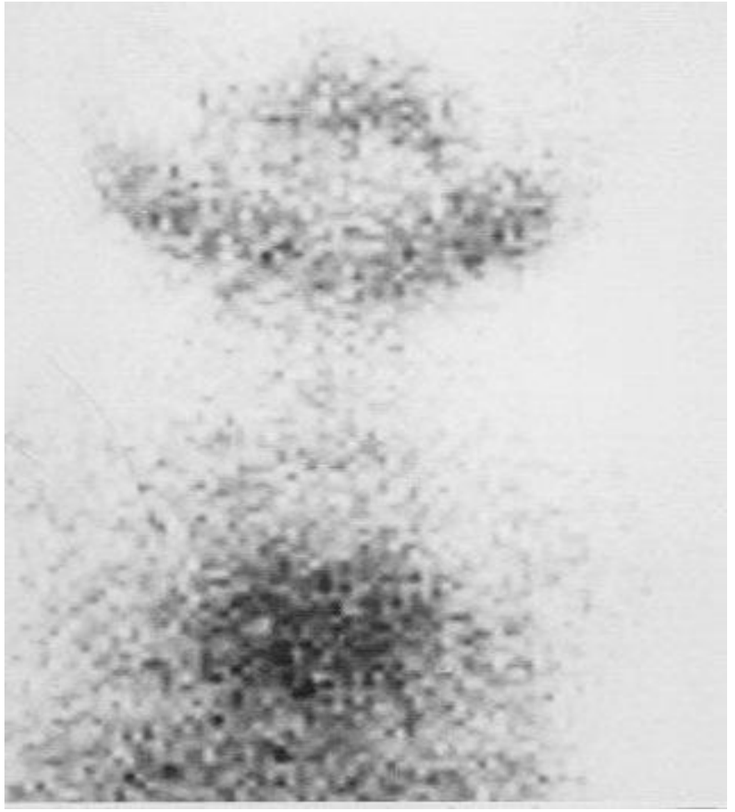
Absence of thyroid gland .

- **What is the most likely diagnosis?**

Agenesis .

- **What is the treatment ?**

Thyroxin whole life.



Case6:Palpable Neck Mass

- **What is the study?**

Nuclear scan of the thyroid .

- **What is the agent used?**

Tc-99m Pertechnetate .

- **What are the imaging findings?**

Solitary Cold nodule(White)in the left thyroid lobe.

- **What is the most likely diagnosis?**

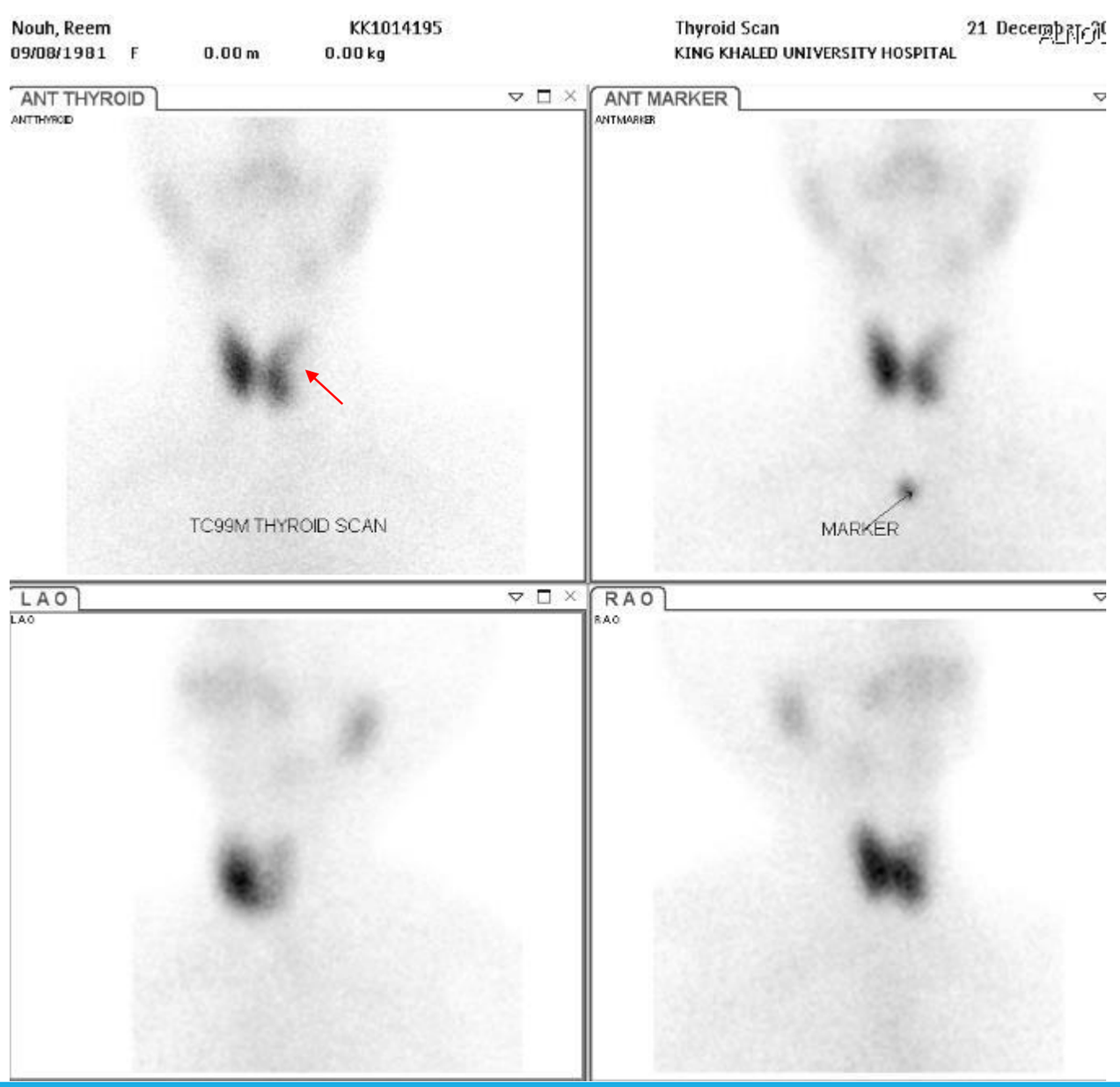
Thyroid cancer .

- **What are the chance of this nodule to be malignant?**

15%-20%

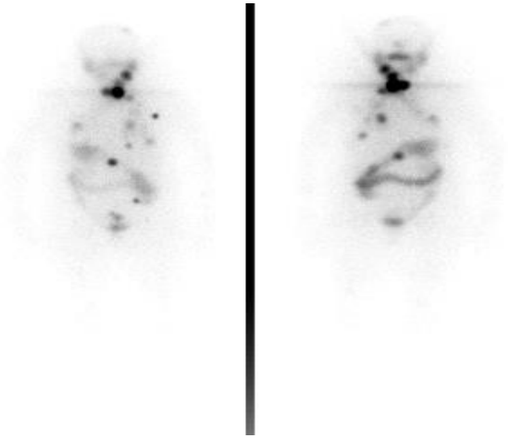
- **What is the next step ?**

FNA and if turns malignant next step is surgery to remove it .



Case7:Patient with thyroid cancer

Pre therapy



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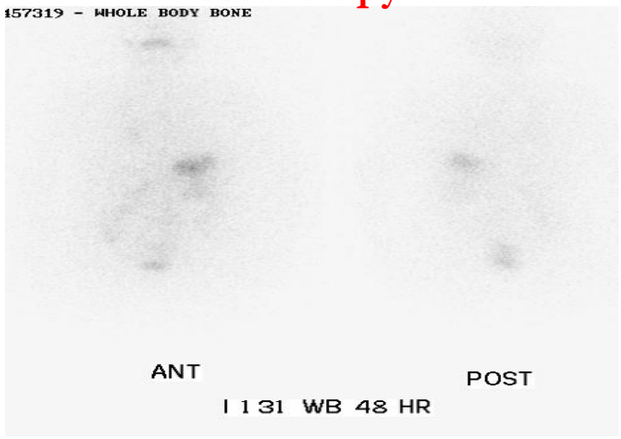
Post therapy



March06

Successful ablation by radioactive iodine (**I131)**

Case8:High PTH and High Ca

- **What is the study?**

Parathyriod scan.

- **What is the agent used?**

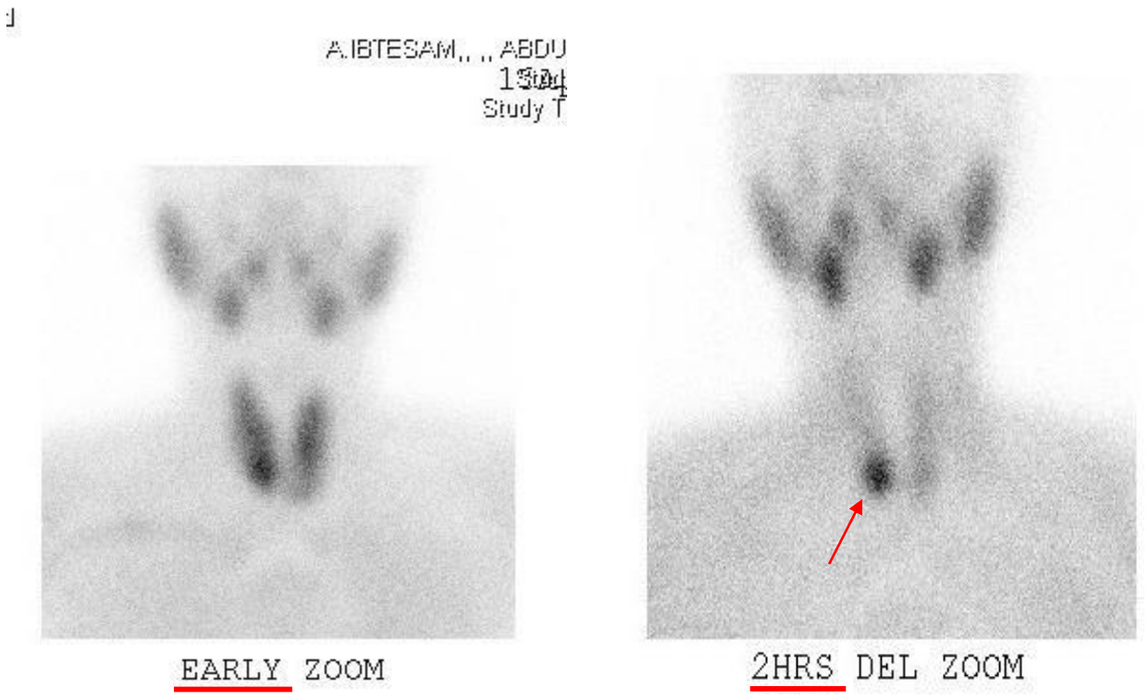
Tc-99m Sestamibi (Dual Phase).

- **What are the imaging findings?**

Right lower parathyroid adenoma.

- **What is the most likely diagnosis?**

Parathyroid adenoma.



Case9:High PTH and High Ca

- **What is the study?**

Parathyriod scan.

- **What is the agent used?**

Tc-99m Sestamibi (Dual Phase).

- **What are the imaging findings?**

False negative because it is from the clear cells Which has no mitochondria.

- **What is the most likely diagnosis?**

Parathyroid adenoma.

Case10:High PTH and High Ca

- **What is the study?**

Parathyriod scan & SPECT CT.

- **What is the agent used?**

Tc-99m Sestamibi (Dual Phase).

- **What are the imaging findings?**

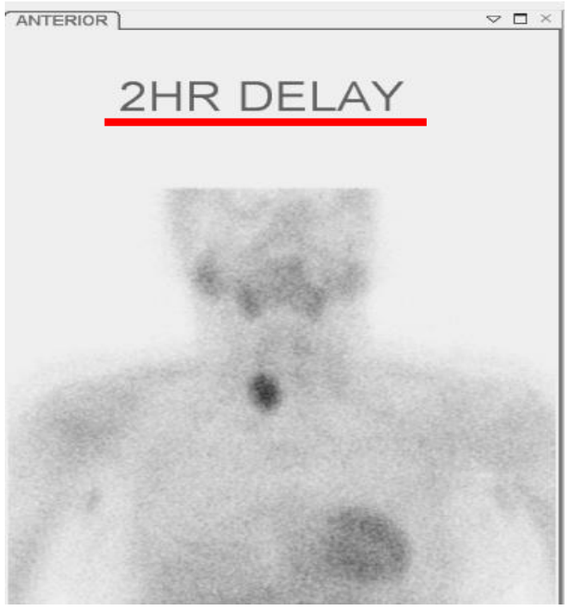
Adenoma anterior to trachea approved by SPECT CT (arrow).

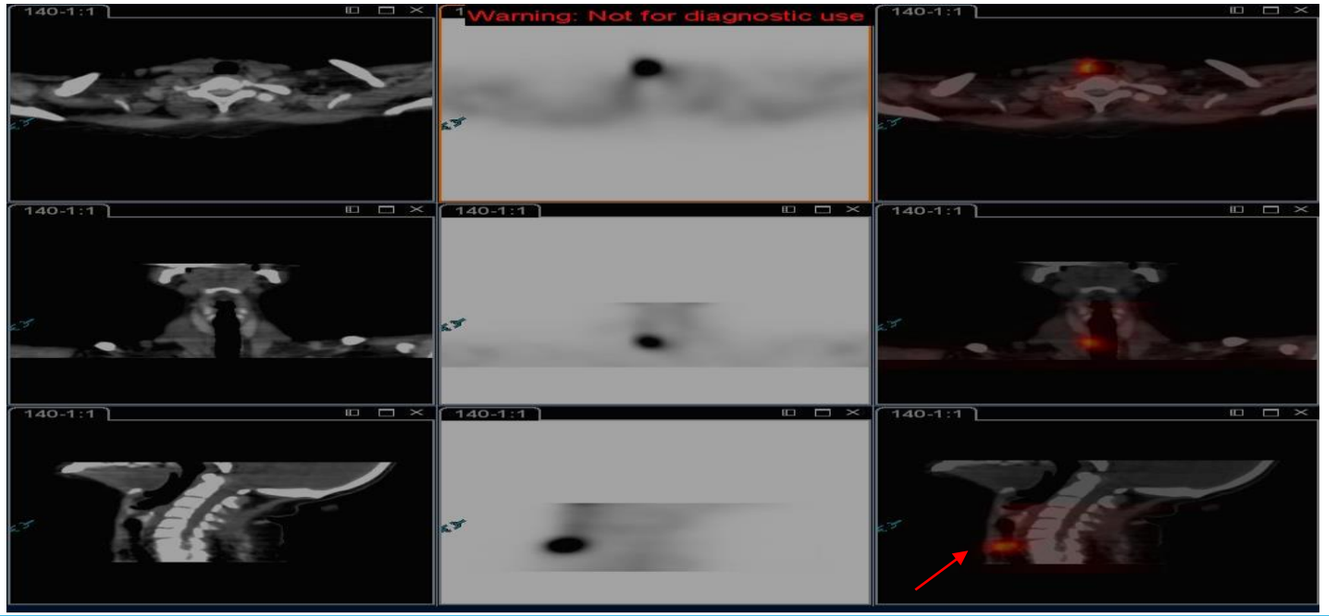
- **What is the most likely diagnosis?**

Parathyroid adenoma.

- **What is your advice to do other procedure to help surgeon ?**

Order SPECT CT to localize tumor .





Case11:High PTH and High Ca

- **What is the study?**

Parathyriod scan & SPECT CT.

- **What is the agent used?**

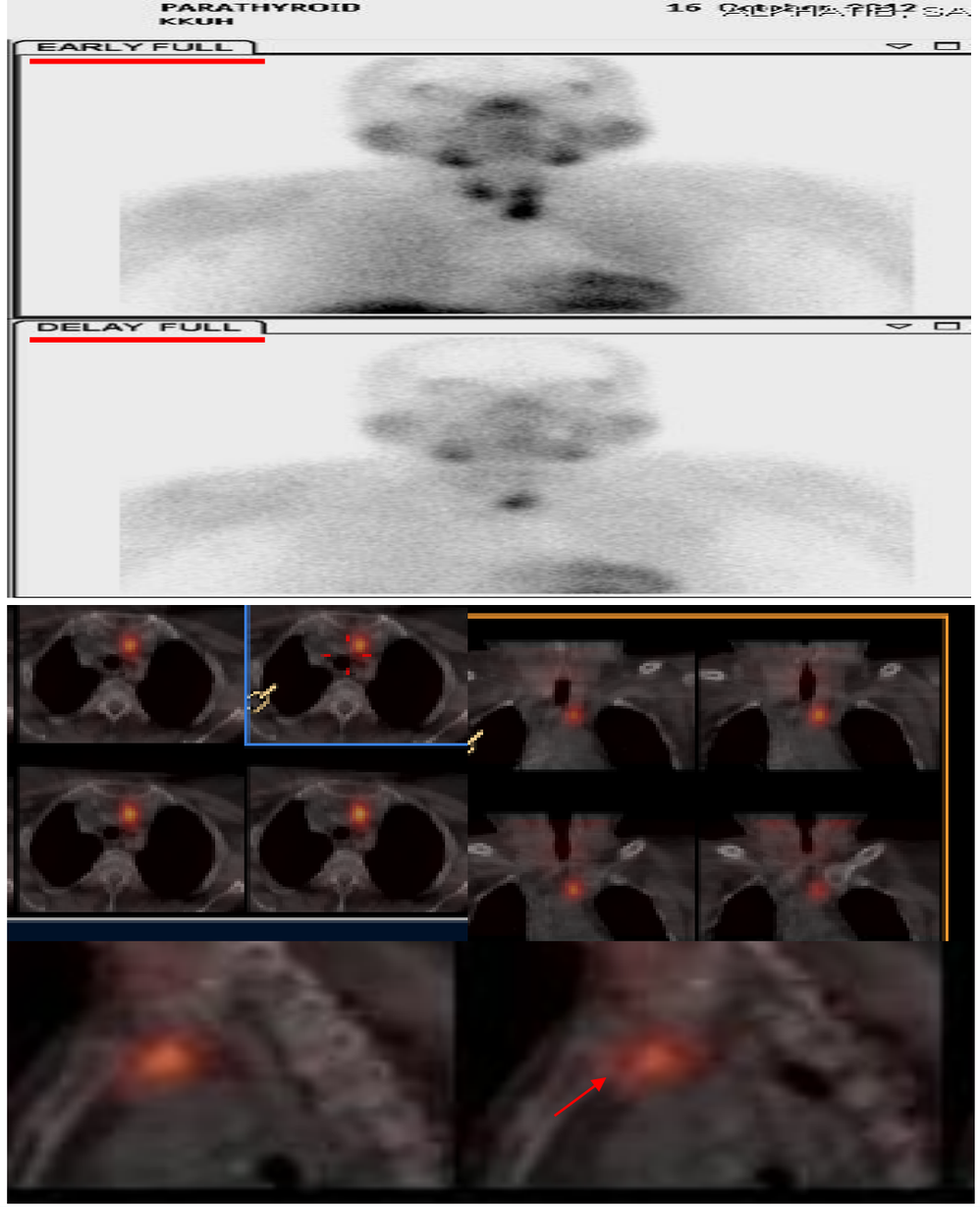
Tc-99m Sestamibi (Dual Phase)

- **What are the imaging findings?**

Adenoma in the upper mediastinum approved by SPECT CT (arrow).

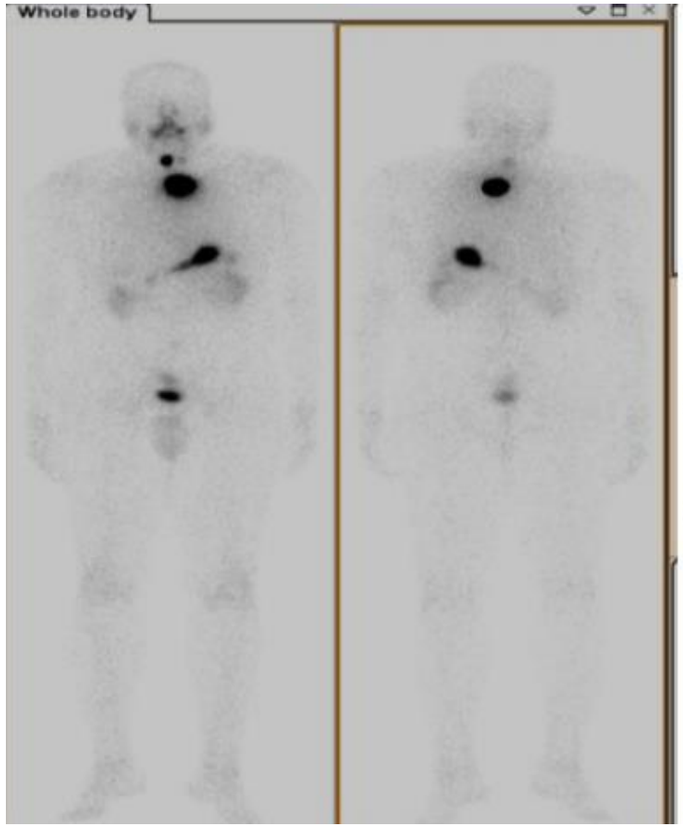
- **What is the most likely diagnosis?**

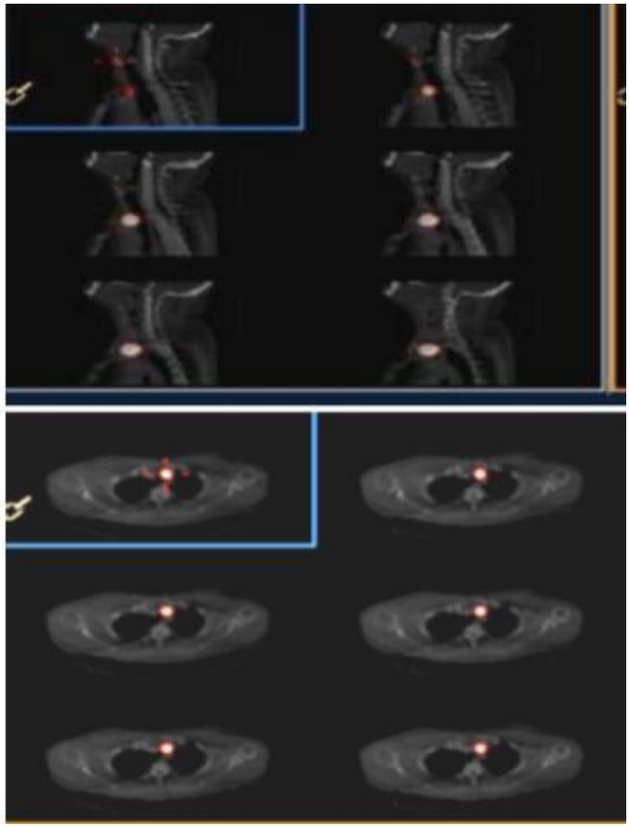
Ectopic parathyroid adenoma.



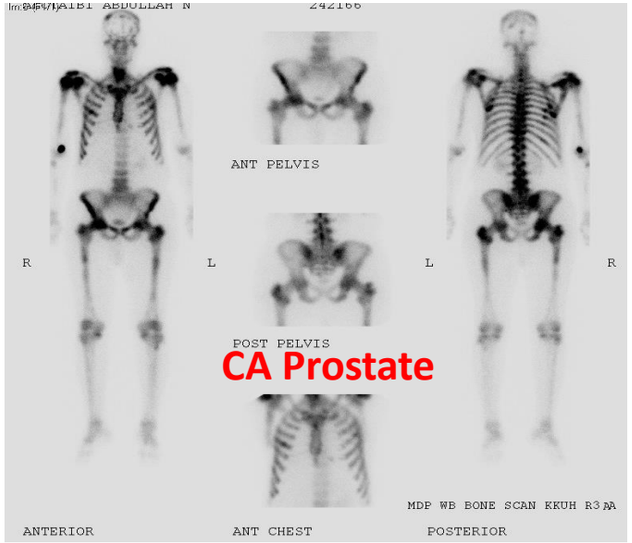
Case12

- **What is the study?**
  I-123 WB Scan
- **What is the agent used?**
  I-123
- **What are the imaging findings?**
  Post-operative, Thyroid remnants.
- **What is the most likely diagnosis?**
  This patient has a remanence of thyroid cancer after thyroid surgery.
- **Extra: What are the indications for this study?**
  Detection and localization of persistent or recurrent local or distant functioning thyroid cancer
- **How can we treat this patient and how much dose?**
  I-131 (80-100 mCi)

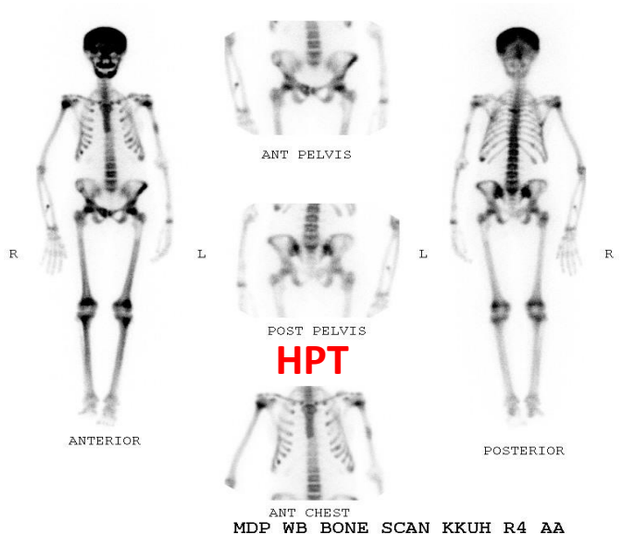




What is the difference ?



Bone metastasis is limit to axial skeleton



Metabolic bone disease is affect whole skeleton

Case13: A 66 year old male patient with elevated PSA and back pain .

- **What is the study?**

Bone scan

- **What is the agent used?**

Tc-99m MDP with prostate compound

- **What are the imaging findings?**

Superscan (Diffuse increased skeletal uptake) > bone metastasis

- **What is the most likely diagnosis?**

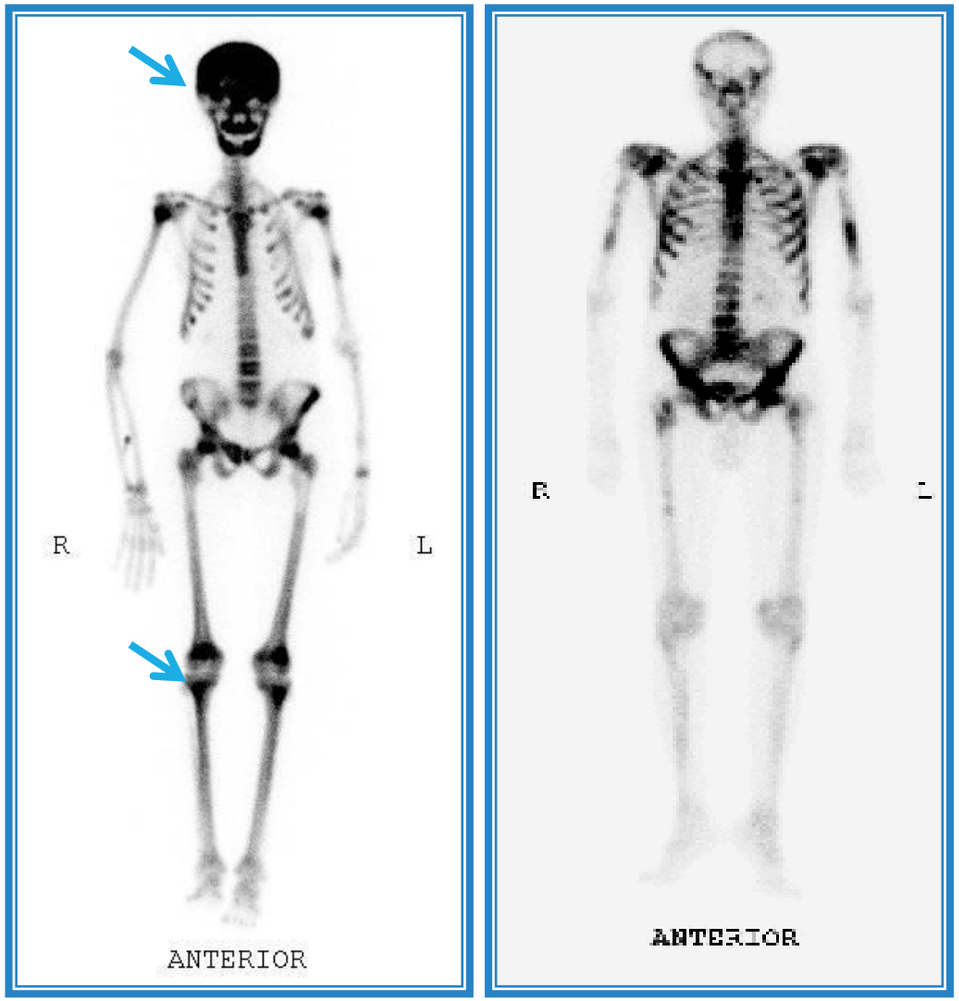
Prostate Cancer

- **Examples of cancer can cause bone metastasis :**

Breast,lung,bladder,rectum,stomach cancers .

***Arrows :** Nothing here.
***Arrow:** Only in axial skeleton

Case14: A 24 year old male patient with back pain .



- **What is the study?**

Bone scan

- **What is the agent used?**

Tc-99m MDP

- **What are the imaging findings?**

Superscan (Diffuse increased skeletal uptake)

- **What is the most likely diagnosis?**

Metabolic bone disease (hyperparathyroidism)

- **Give other Examples of metabolic bone disease :**

osteomalacia, Pagets disease and fibrous dysplasia.

***Arrows :** Involvement of both axial and appendicular bones.

Case15

- **What is the study?**

Bone scan

- **What is the agent used?**

Tc-99m MDP

- **What are the imaging findings?**

Cold nodule (Arrow) defect in spine .

- **What is the most likely diagnosis ?**

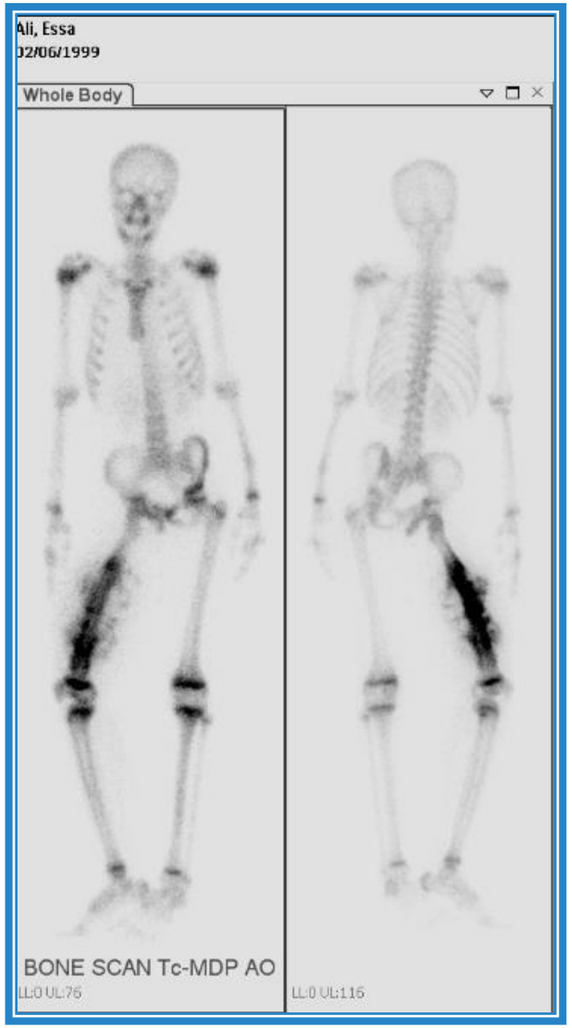
Pure osteolytic lesion (Renal cell carcinoma)

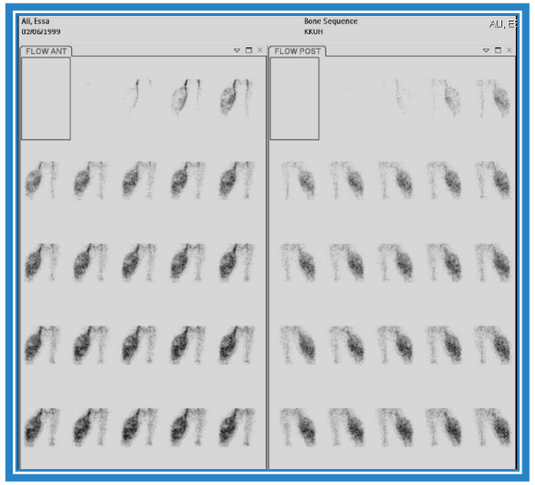
- **Give other examples of pure lytic lesion :**

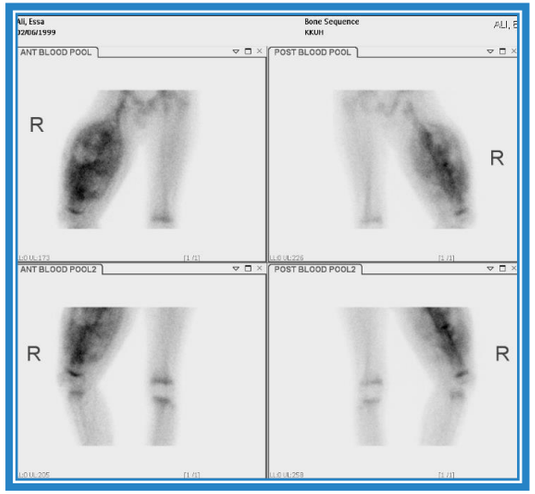
Thyroid cancer , anaplastic tumor , multiple myloma , radiation therapy .

This patient has Renal Cell Carcinoma and you can see **the cold lesions**.
It is a destructive lesion; it doesn't induce an osteoblastic activity.
From its name (Pure Lytic Lesions) easy to remember.
So not all bone metastasis appear as hot lesion.

Case16:A 17 year old female with right thigh mass







- **What is the study?**

Bone scan (3 phases)

- **What is the agent used?**

phosphate

- **What are the imaging findings?**

Area of increase blood flow and uptake

- **What is the most likely diagnosis?**

Soft tissue sarcoma

Case17: A 10 year old male patient presented with leg pain no allowing him to play football

- **What is the study?**

Bone scan

- **What is the agent used?**

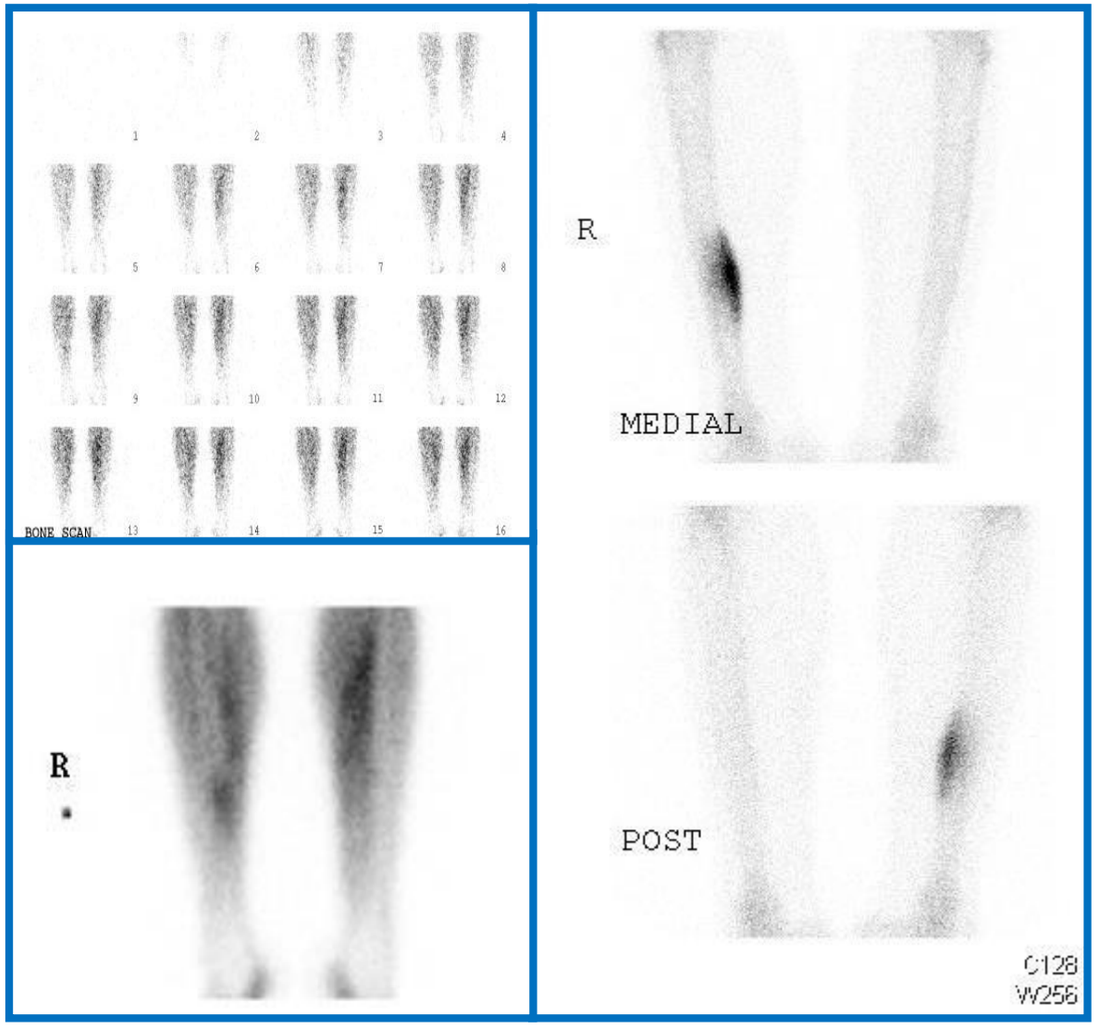
Tc-99m MDP

- **What are the imaging findings?**

Tumor localized in the mid shift of the right tibia .

- **What is the most likely diagnosis ?**

Osteoid osteoma



Note:

More common in pediatric : Primary benign bone tumor characterized by night pain that is relived by aspirin .

?

Case18

- **What is the study?**

Bone scan

- **What is the agent used?**

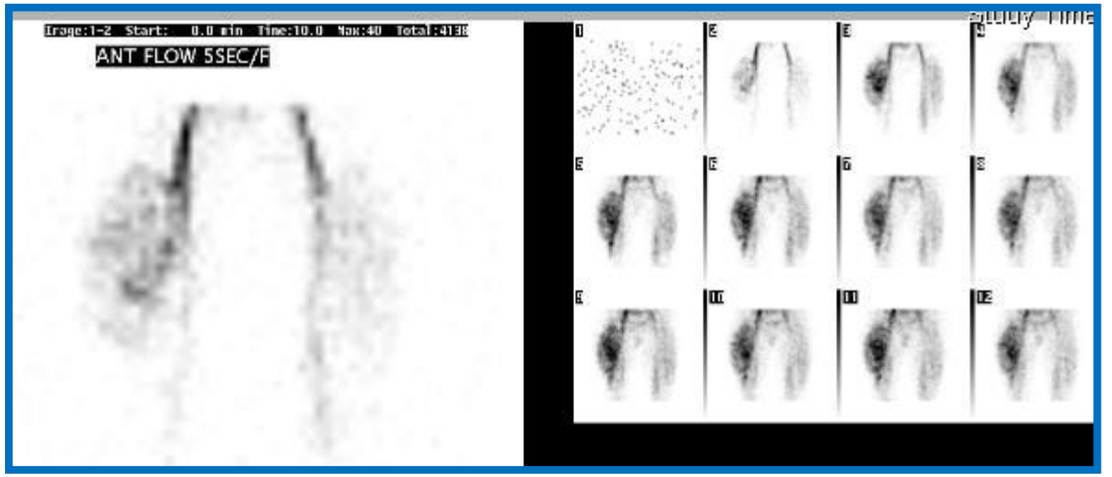
Tc-99m MDP

- **What are the imaging findings?**

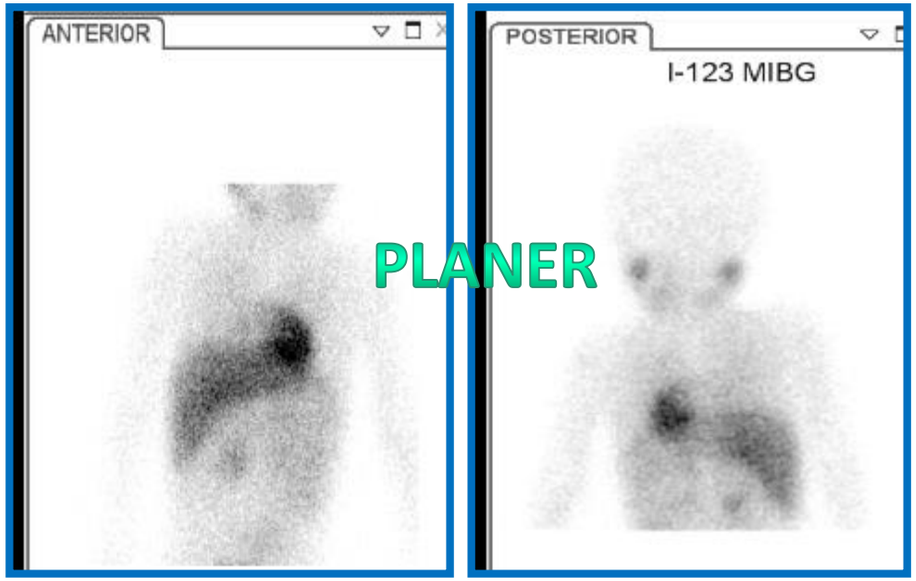
Large soft tissue sarcoma in the right thigh with underlying erosion of bone but with no metastasis.

- **What is the most likely diagnosis ?**

Soft tissue tumor



Case19: A 3 year old female patient with Opsoclonus Myoclonus Ataxia syndrome



- **What is the study?**

Spect CT

- **What is the agent used?**

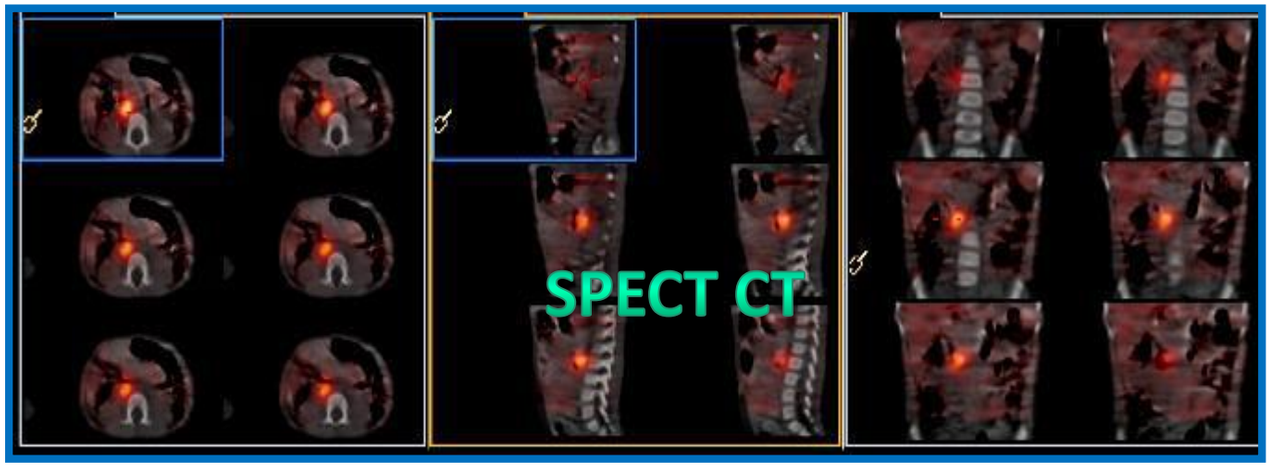
I-123/131 MIBG

- **What are the imaging findings?**

Focal area of increased up take in the right med abdomen(right para spinal)

- **What is the most likely diagnosis?**

Neuroblastoma



This is a patient with Neuroblastoma, we can see the primary tumor in the **planer image** but we cannot know where is it exactly. But in **SPECT CT** it shows the accurate location of Neuroblastoma in this child, right paraspinal.

Case 20: 41 years old female patient is with hypertension. ? Secondary HTN

- **What is the study?**

SPECT CT .

- **What is the agent used?**

I-123/131 MIBG

- **What are the imaging findings?**

Increased uptake of the right adrenal gland .

- **What is the most likely diagnosis?**

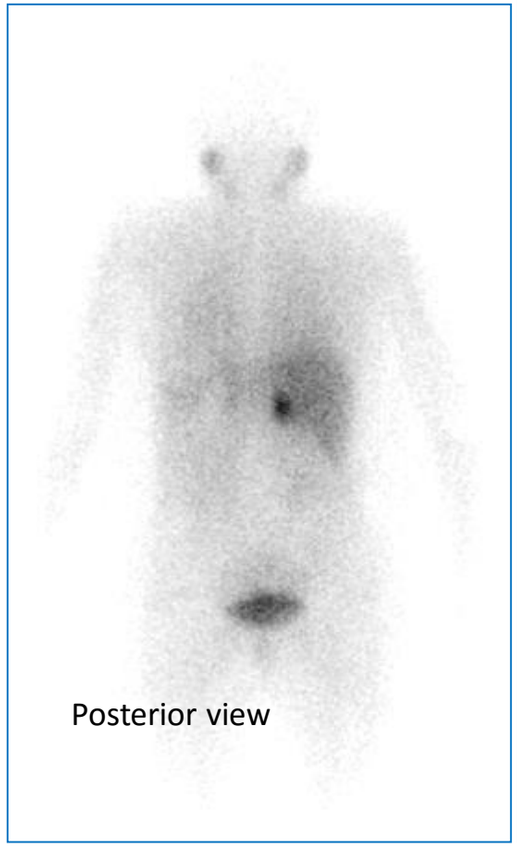
Pheochromocytoma

- **What are the causes of secondary HTN?**

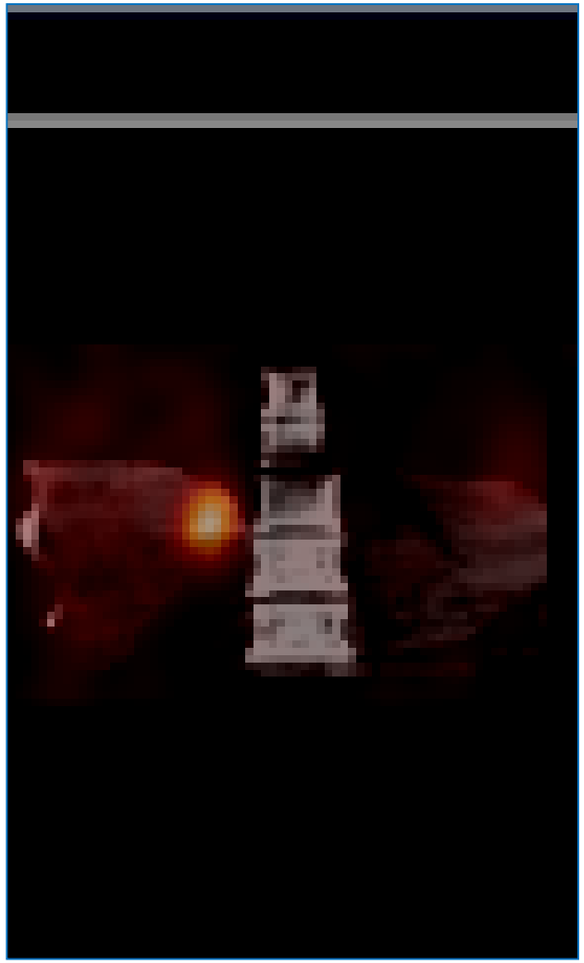
Renal artery stenosis

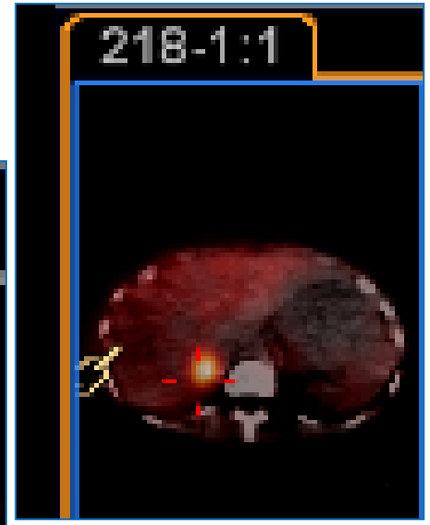
Note

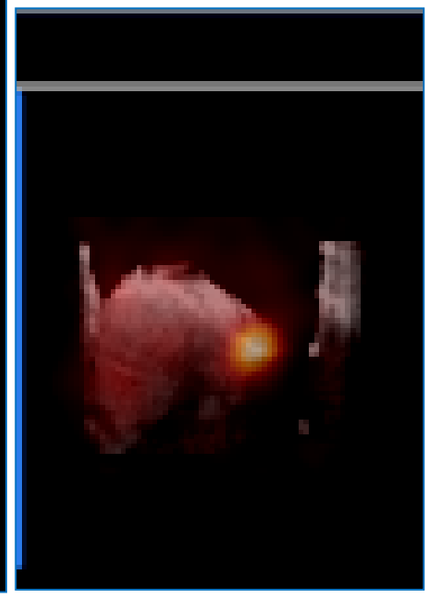
Pheochromocytoma is diagnosed by present of markers in blood (Catecholamines)
And In urine (Vanilly Mandelic Acid)



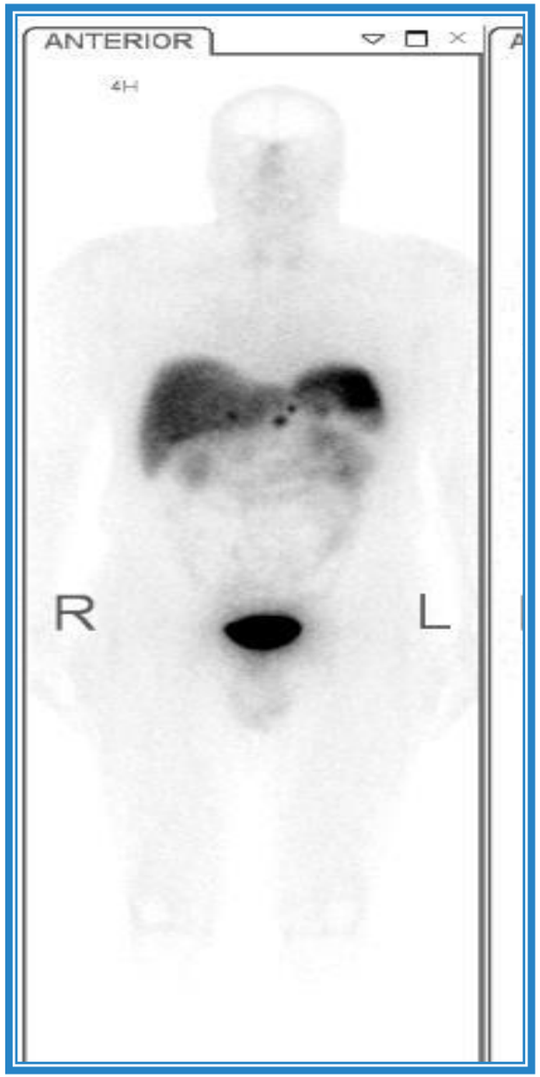
Posterior view

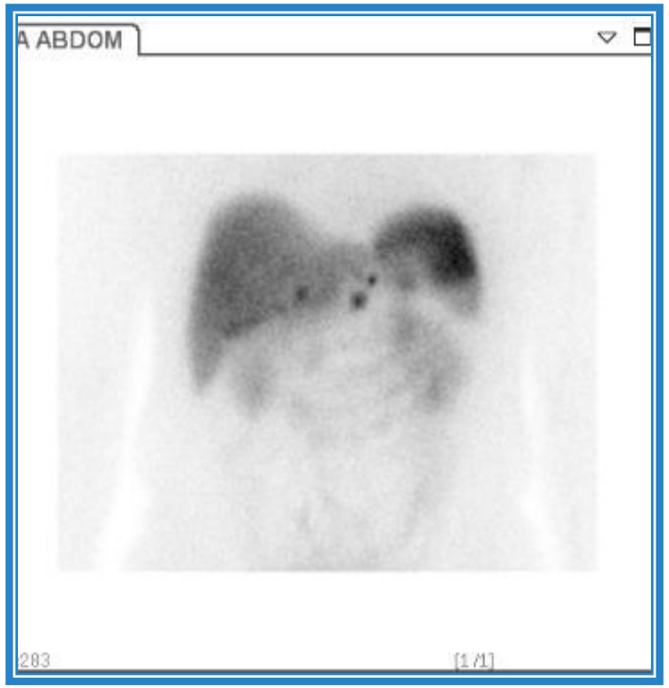






Case21: Patient with neuroendocrine tumor





- **What is the study?**

Spest CT

- **What is the agent used?**

In-111 octreoscan/ MIBD

- **What are the imaging findings?**

Multiple metastasis in the abdomen

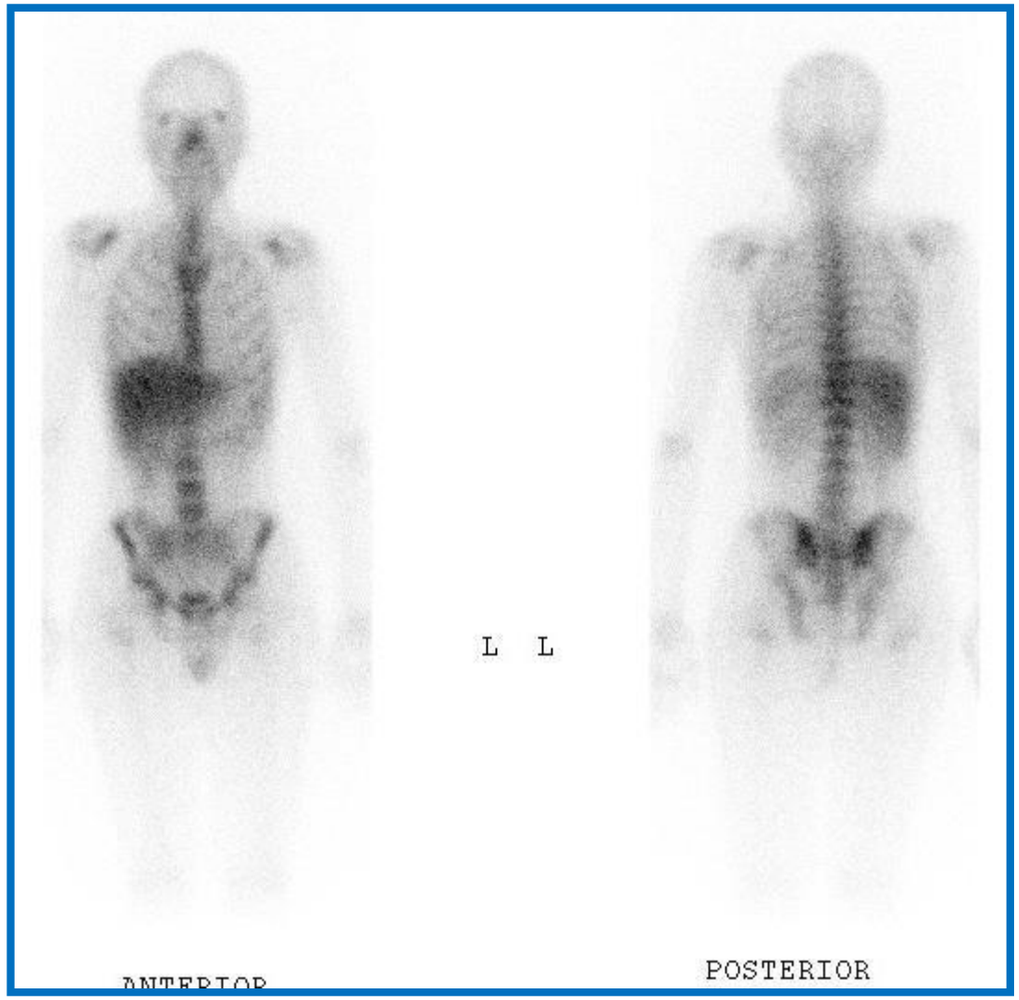
- **What is the most likely diagnosis?**

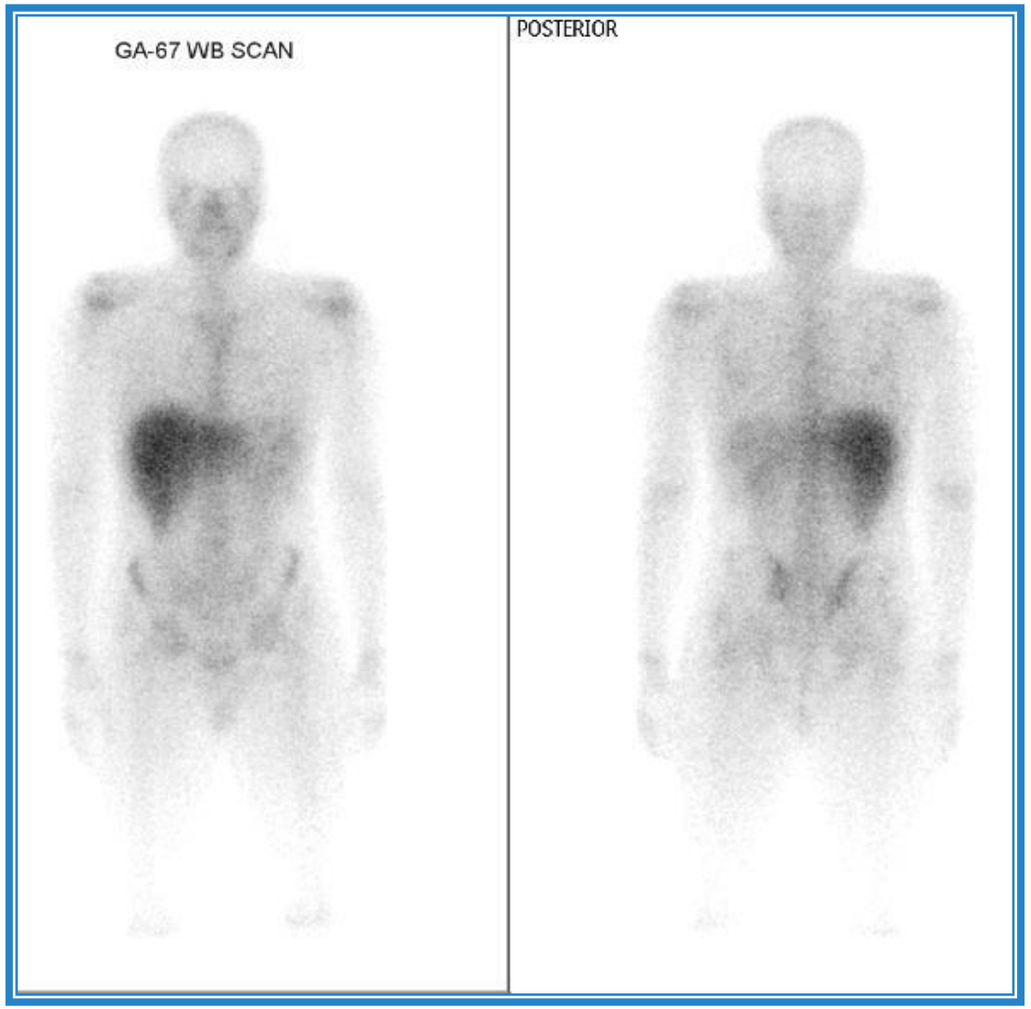
Neuroendocrine tumor

- **Give examples of neuroendocrine tumors :**

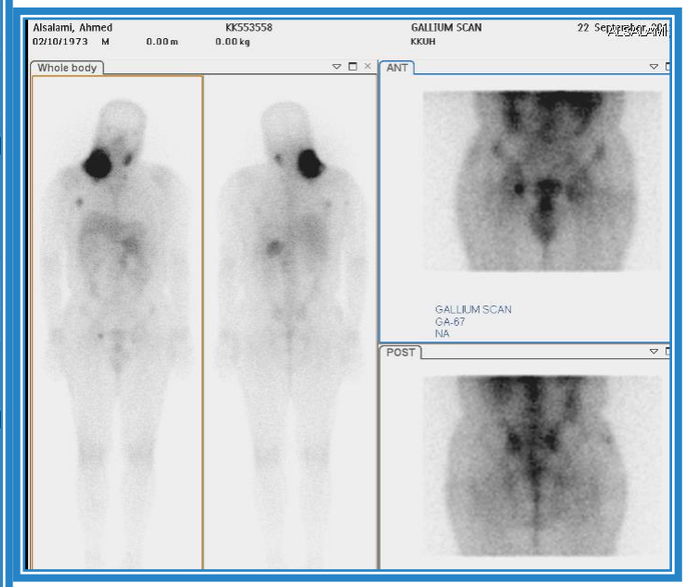
1. Pheochromocytoma
2. Paraganglioma
3. Insulinoma
4. Neuroblastoma
5. Medullary thyroid carcinoma
6. Carcinoid tumors

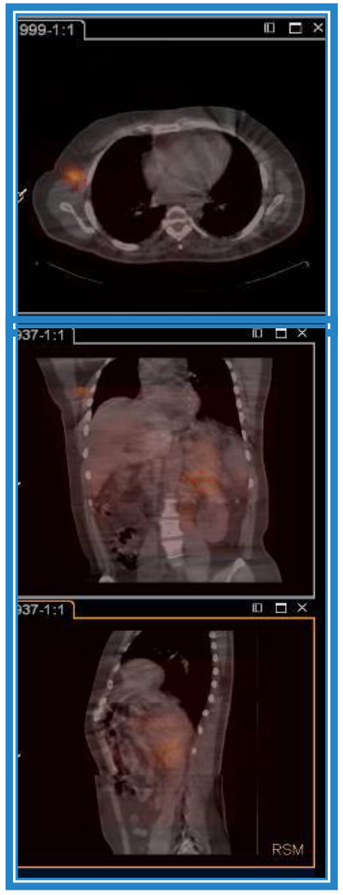
Case 22: Normal distribution: Ga-67scan





Case23





- **What is the study?**

Gallium scan

- **What is the agent used?**

Gallium

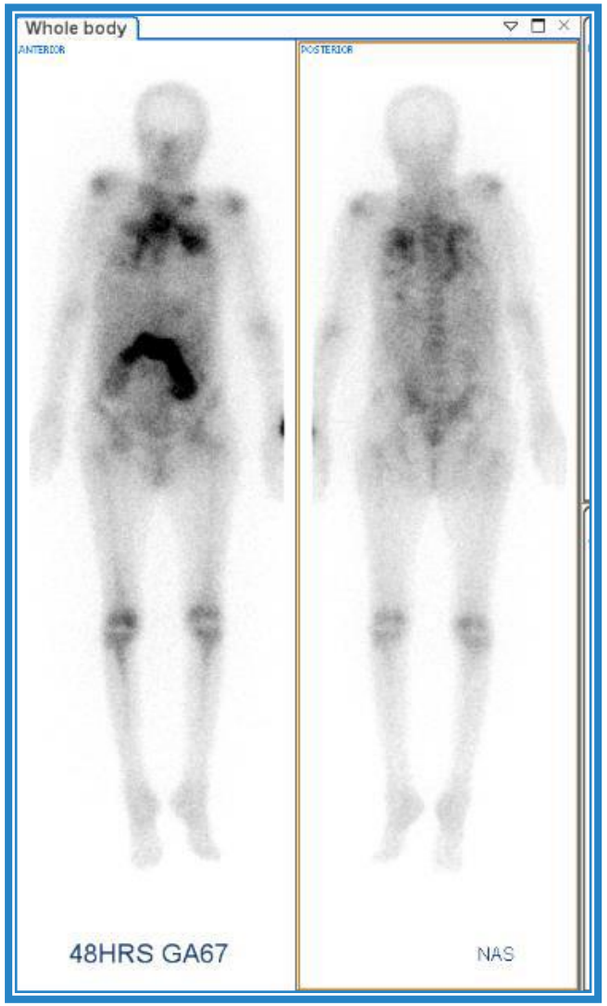
- **What are the imaging findings?**

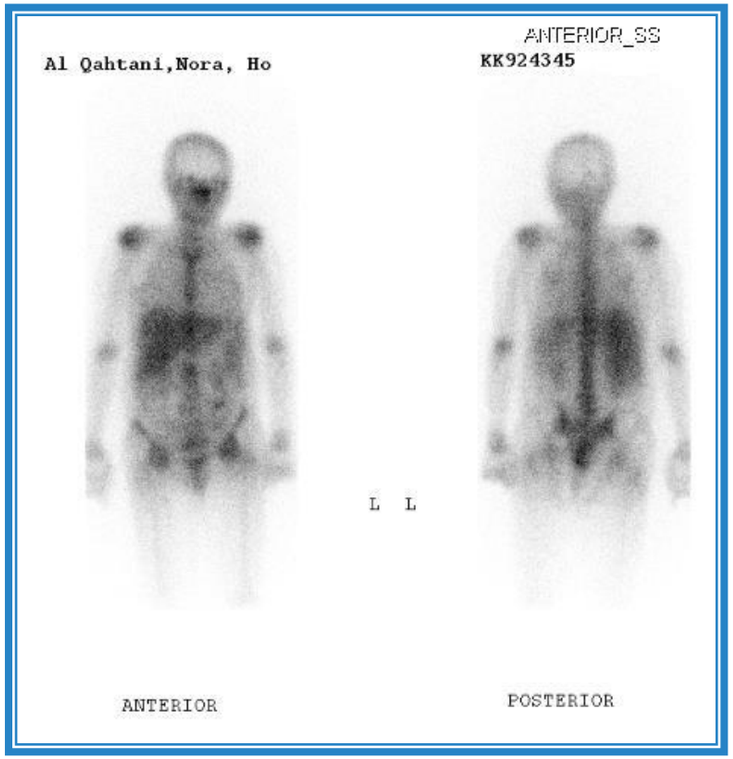
Multipule lymph nodes above and below the diaphragm with spleen involvement

- **What is the most likely diagnosis?**

Lymphoma,, stage4

Case24





- **What is the study?**

Gallium scan

- **What is the agent used?**

Gallium

- **What are the imaging findings?**

Before chemotherapy: lymph node above and below the diaphragm.

After chemotherapy: clear image

- **What is the most likely diagnosis?**

This scan was used to follow up the a patient with Lymphoma,, stage4

Extra: When do we ideally do the follow up scan?

2 weeks after the last after the last dose of chemotherapy

Thank You!

We hope you found this helpful and informative.

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