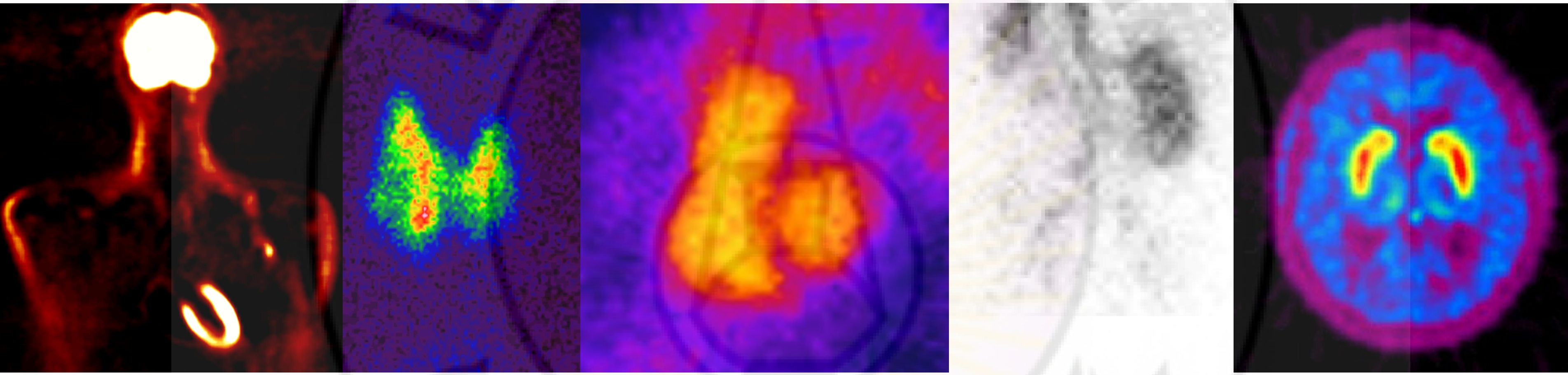
# Nuclear Medicine & Radiotherapy

# الطب النووي و المعالجة الشعاعية

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**Head Dept of Nuclear Medicine**

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# Nuclear Medicine
# & Radiotherapy
# الطب النووي و المعالجة الشعاعية

## الأشعة الطبية Medical Radiation

**I- Medical Imaging:التصوير الطبي**

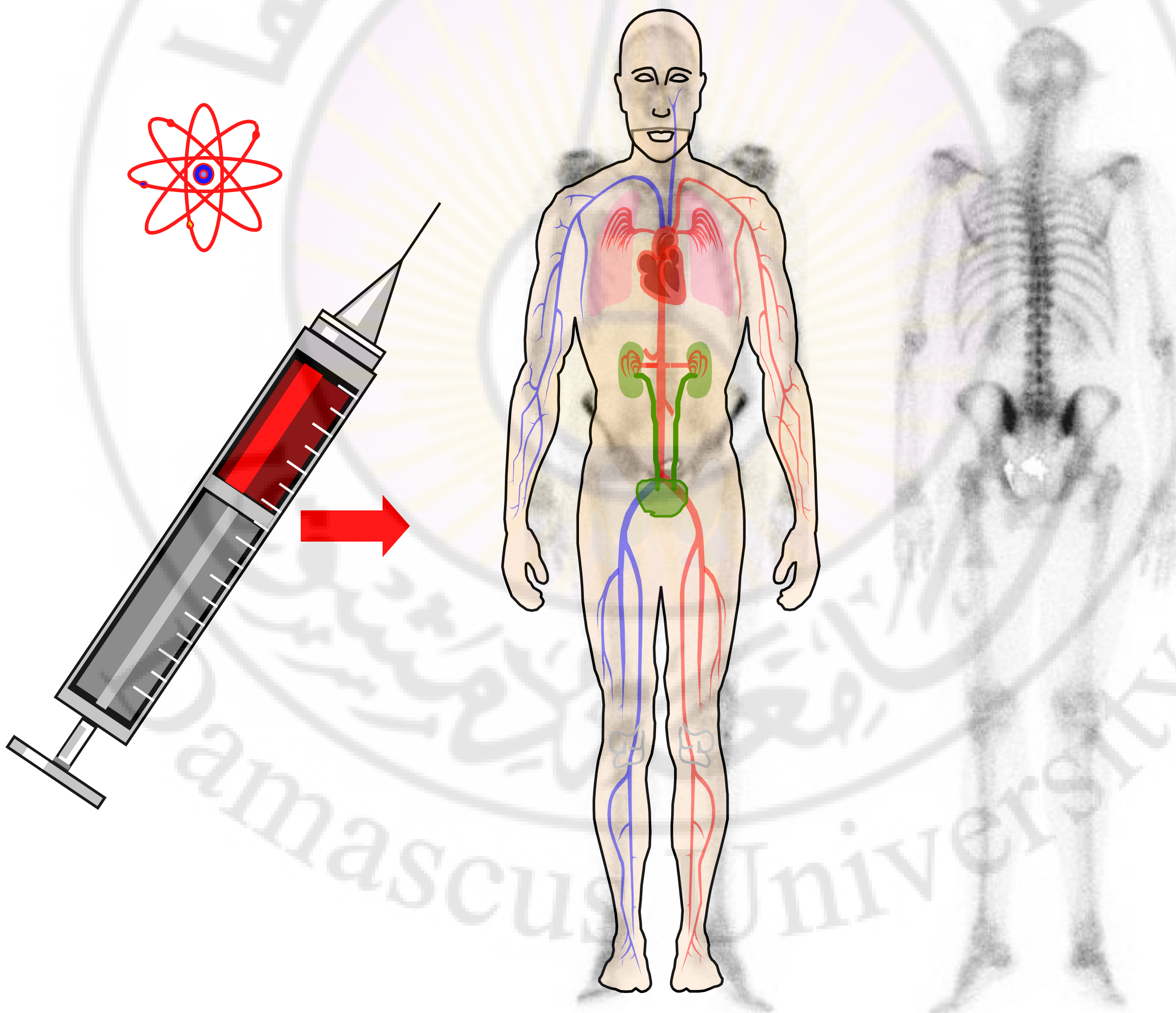
**1- Medical Radiology :** Conventional x-ray imaging, Computerized Tomography ( CT/Scan), ultrasonography ( Echo), magnetic resonance imaging ( MRI)

**2- Nuclear Medicine**

**II – Radiotherapy: Radiation Oncology.**

# Nuclear Medicine: is the Use of Radioactive Isotopes for Diagnosis and Therapy

**الطـــب النـــووي** استخدام المنابع المشعة المفتوحة في تشخيص الآفات التي تصيب مختلف أعضاء و أجهزة الجسم و معالجة بعض الآفات الورمية و غير الورمية

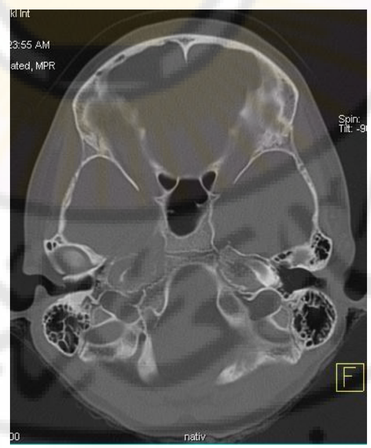


# Different Imaging Modalities

Radiology:

Transmission Imaging – Tomography:

Computer Tomography (CT)



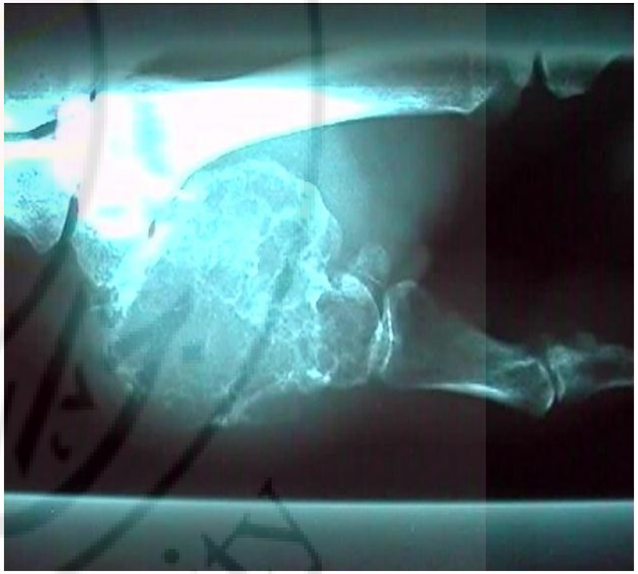
# Different Imaging Modalities

Radiology:

Transmission Imaging

Structural Information:

- Size
- Shape
- Location



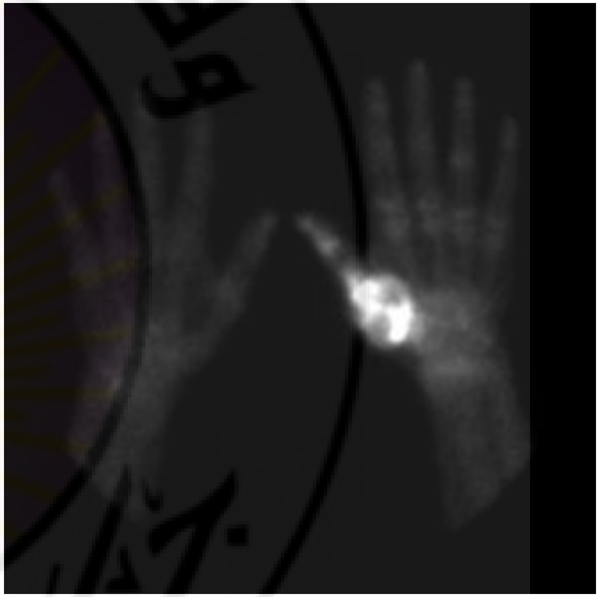
# Different Imaging Modalities

Nuclear Medicine:

Emission Imaging

Uptake Information

- Activity
- Function
- Localization



# What is Nuclear Medicine ?

**Functional Imaging**

- Perfusion
- Biological activity of cells and organs
- Enzyme activity in cells
- Glucose consumption of tissue
- …

# Why do we need Nuclear Medicine ?

Changes in function and cell activity precede changes in size or shape

Examples:

Lymph node metastasis in a normal size lymph node

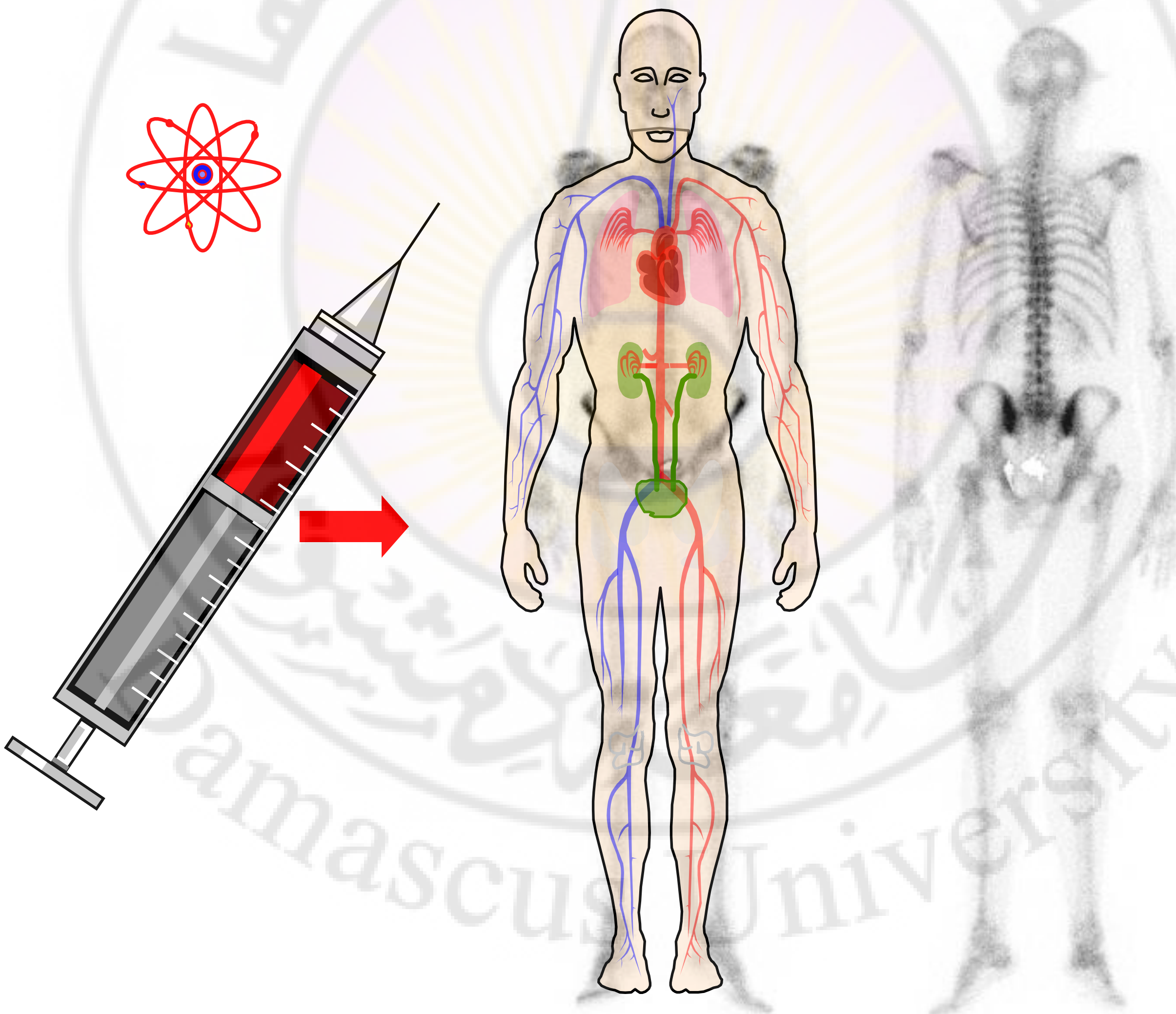
Tumour activity after chemotherapy

Tumour involvement of a normal size spleen

…

## **Nuclear Medicine:** is the Use of Radioactive Isotopes for Diagnosis and Therapy

**الطــب النــووي** استخدام المنابع المشعة المفتوحة في تشخيص الآفات التي تصيب مختلف أعضاء و أجهزة الجسم و معالجة بعض الآفات الورمية و غير الورمية



# Basic Physics for Nuclear Medicine

## فيزياء الطب النووي

**Medical imaging is based on the interaction of energy with biological tissues**. The kind of diagnostic information available in each modality is determined by the nature of these interactions. In conventional x-ray imaging, the differential absorption of x-rays in air, water, fat, and hone allows the distinction of these tissues in the image. In ultrasonography, the differing reflective properties of tissues are the basis for creating images. In magnetic resonance imaging the differences in hydrogen content and in the chemical and physical environments of hydrogen nuclei provide the basis for distinguishing tissues.

In ***nuclear medicine***, the body is imaged from the inside out" Radiotracers, often in the form of complex radiopharmaceuticals, are administered internally. Diagnostic inference is gained by recording the distribution of the radioactive material in both time and space. Tracer pharmacokinetics and selective tissue uptake form the basis of diagnostic utility. To understand nuclear imaging procedures, it is necessary to understand a sequence of concepts, beginning with the physics of radioactivity and continuing through the process of detecting radiation, the selection of appropriate radio-pharmaceuticals. and then the understanding of the uptake and distribution of those pharmaceuticals in health and disease

# ATOMS AND THE STRUCTURE OF MATTER

**Atoms** are the building blocks of molecules and are the smallest structures that represent the physical and chemical properties of the elements

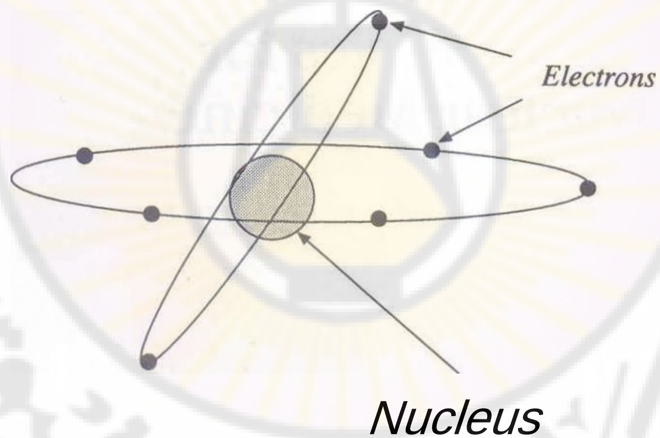



**Fig.** Schematic of the Bohr model of the atom. The nucleus contains protons and neutrons and has a radius of 10-14 m. The protons in the nucleus carry a positive charge. The orbital electrons carry a negative charge

# RADIONUCLIDES AND THEIR RADIATIONS

Because of their physical properties, certain nuclides are unstable and undergo radioactive decay. For each radionuclide the type of radiation emitted, the energy of the radiation(s), and the half-life of the decay process are physical constants `

The types of radiation important in nuclear medicine are gamma rays, characteristic x-rays, negatrons (beta- particles), positrons (beta+ particles), and alpha particles. (By definition the term *gamma ray* is used for photons originating in the nucleus and *x-ray* for photons originating outside the nucleus

**Alpha Decay**

Alpha particles are essentially helium nuclei with a +2 charge and an atomic mass number of 4.

Negatron Decay

The negatron decay process involves the conversion of a neutron into a proton, an electron, and an antineutrino.

**Positron Decay and Electron Capture**

As the name implies, in *positron decay* a positive electron or positively charged beta particle is ejected from the nucleus.

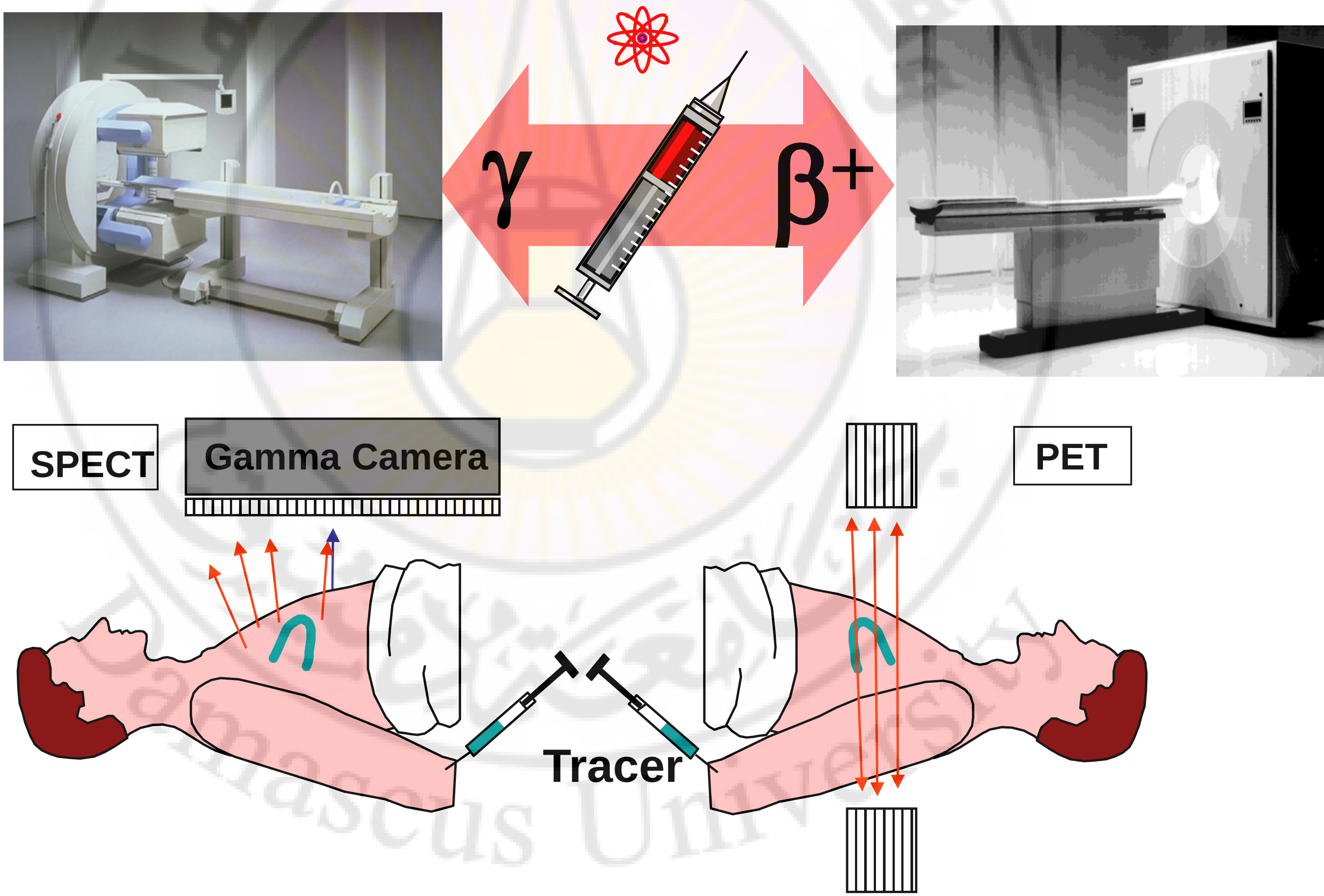
In *electron capture* an electron from one of the orbital shells (typically close to the nucleus) is incorporated into the nucleus, converting a proton into a neutron.

**Isomeric Transition and Internal Conversion**

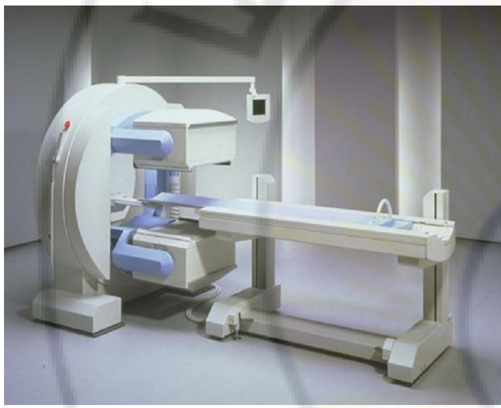
Gamma Ray Emission

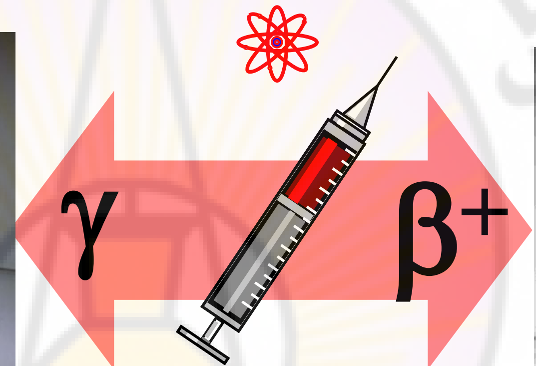
many radioactive decay processes result in the release of gamma rays or gamma photons.

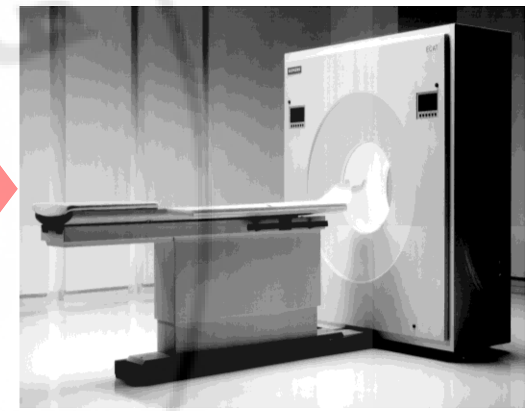
# Emission (from Patient) - Detection



# Emission (from Patient) - Detection





SPECT

PET

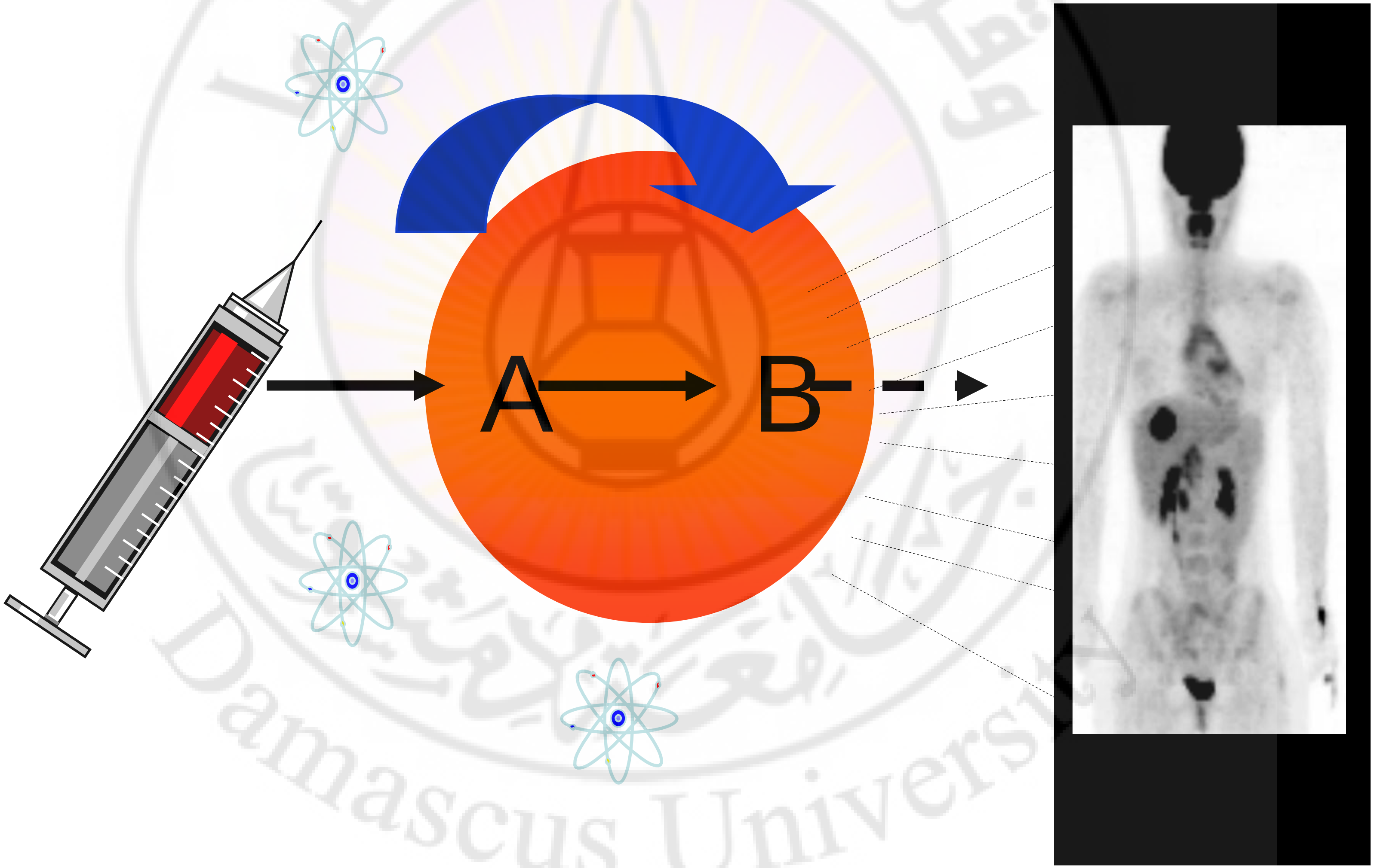
Single Photon

Positron

Emission Tomography

# Nuclear Medicine...is Molecular Imaging

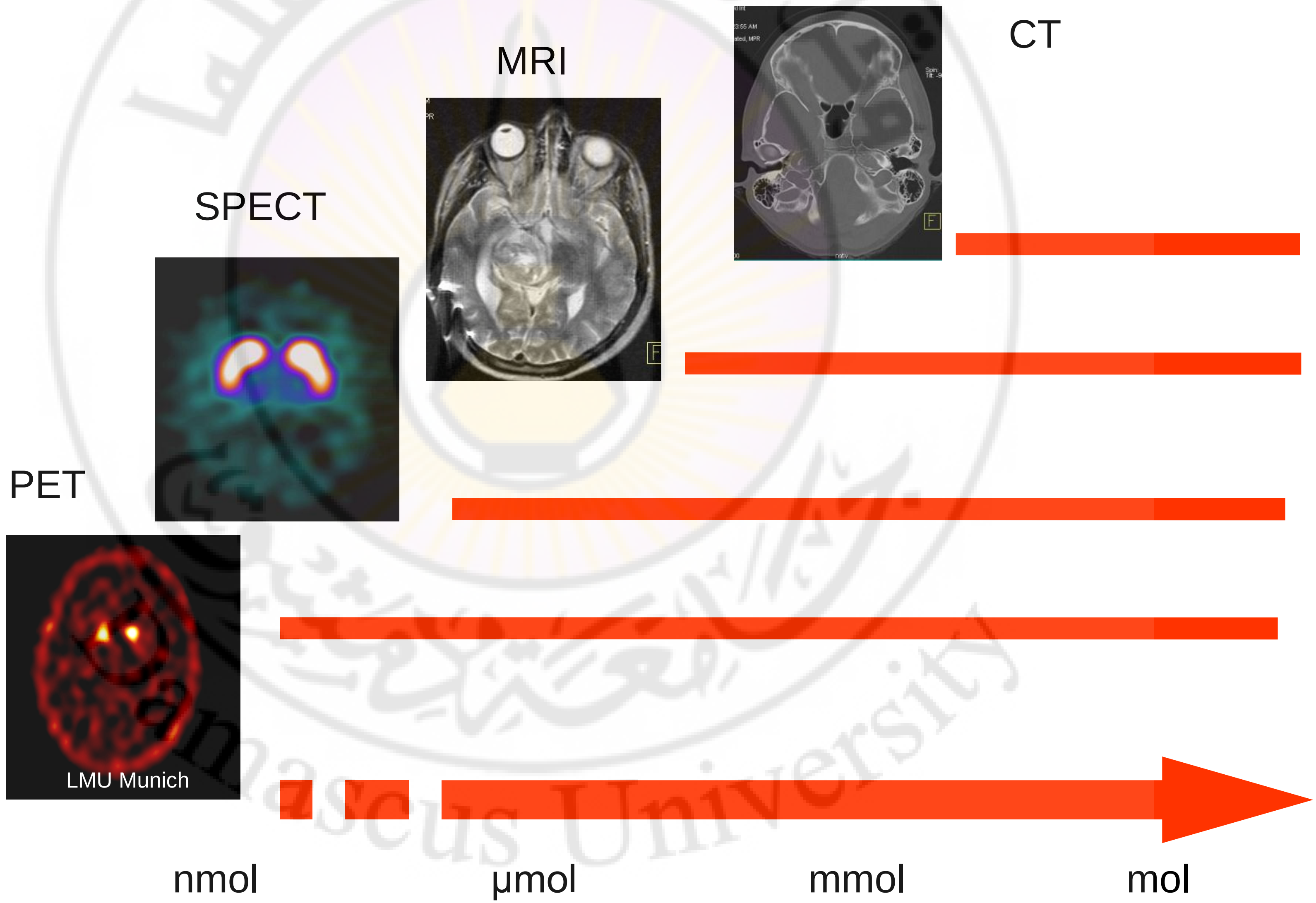
...



# Different Tracers - Different Images

I-131 | Ga-67 | I-123-MIBG | Tc-99m-DPD | Tc-99m Antibody | Tc-99m-MIBI | In-111-SMS | F-18 FDG

# Nuclear Medicine... is Molecular Imaging



# TERMINOLOGY, UNITS, AND MATHEMATICS OF RADIOACTIVE DECAY

## Units of Radioactivity

Two systems for expressing decay or disintegration rates are in widespread use and are potentially confusing. The more widely used system historically was based on the ***curie***. This unit was based on the disintegration rate of 1 gram of radium and was defined as 3.7 X 10'n disintegrations per second (dps). It is now known that the disintegration rate of 1 gram of radium is slightly different than 1 curie, but the quantitative definition has been widely used throughout the world. Most medical diagnostic applications involve amounts of radioactivity in the microcurie (3.7 X 104 dps) or millicurie (3.7 X 107 dps) range.

An alternative to the curie in the international system of units is the ***Becquerel (Bq),*** which is equal to 1 disintegration per second. The relationship between the curie and the becquerel is straightforward if somewhat confusing to those used to the older term.

**One millicurie equals 37,000,000 Bq, or 37 MBq**.

Both terminology systems are used widely in the literature both in the United States and internationally`

## Half-life and Decay Constant

- The mathematics of radioactive decay follow from direct physical measurements. The fundamental empirical observation determined early in the history of work with radionuclides is that the number of atoms undergoing decay during any finite period of time is proportional the physical half-life have reciprocal units of time. The half-life can be expressed in seconds, minutes, hours, days, or years. Radionuclides with long physical half-lives have smaller values for the decay constant. That is, a lower fraction of the radioactive atoms undergo disintegration in any given unit of time the longer the physical half-life. From a practical standpoint, most radionuclides used in clinical nuclear medicine must have half-lives of hours or days. This permits shipping from the manufacturing site to the hospital, preparation of the radiopharmaceutical, and imaging. Use of shorter-lived agents is feasible in institutions with radionuclide production facilities such as cyclotrons or special accelerators.
- In certain cases radionuclides are obtained from "generator" systems,

# INTERACTIONS OF RADIATION WITH MATTER

## Negatrons (Beta Particles)

Negatrons or beta particles cause ionization in tissues by electrostatic interactions with orbital electrons

## Positrons

Positrons also give up their kinetic energy through electrostatic ionizations. As the positron approaches thermal energy it undergoes ***annihilation*** by combining with a negatively charged electron

## Gamma Rays and X-Rays

There are three processes through which gamma rays and x-rays are attenuated in tissues. Photons can be completely absorbed by the *photoelectric effect* or in *pair production.* They can also undergo scattering or deflection from their original path by the *Compton effect* or *Compton scattering* phenomenon, in which photons give up part of their original energy.

**Pair production Pair** production requires a photon with a minimum energy of 1.02 MeV. The photon energy is converted into one negative and one positive electron. Because the energy required is greater than the photon energies used in medical imaging, this form of attenuation is not important in nuclear medicine.

**Photoelectric absorption** Photoelectric absorption occurs when the total energy of an x-ray or gamma ray photon is transferred to an orbital electron.

**Compton scattering or Compton effect In** Compton scattering a photon interacts with a weakly bound outer shell electron. Instead of being completely absorbed as in the photoelectric interaction, in the Compton process the photon is deflected from its original direction and continues to exist but at lower energy

-

# Radiation Detection and Instrumentation
# أجهزة الكشف عن الإشعاع

## Ionization Chambers , Proportional Counters, and Geiger-Milner Counters

**Scintillation Detectors: Thallium-Activated Sodium Iodide Crystals**

**Gas-filled ionization chambers** are very insensitive to x-rays and gamma rays because of the low likelihood of ionizing interactions. The "stopping power" of gas is low. In current practice, **thallium-activated sodium iodide crystals, NaI (T1),** are used as the detector medium for single photon imaging systems. These crystals are optically transparent and have sufficient stopping power for sensitive detection of gamma rays.

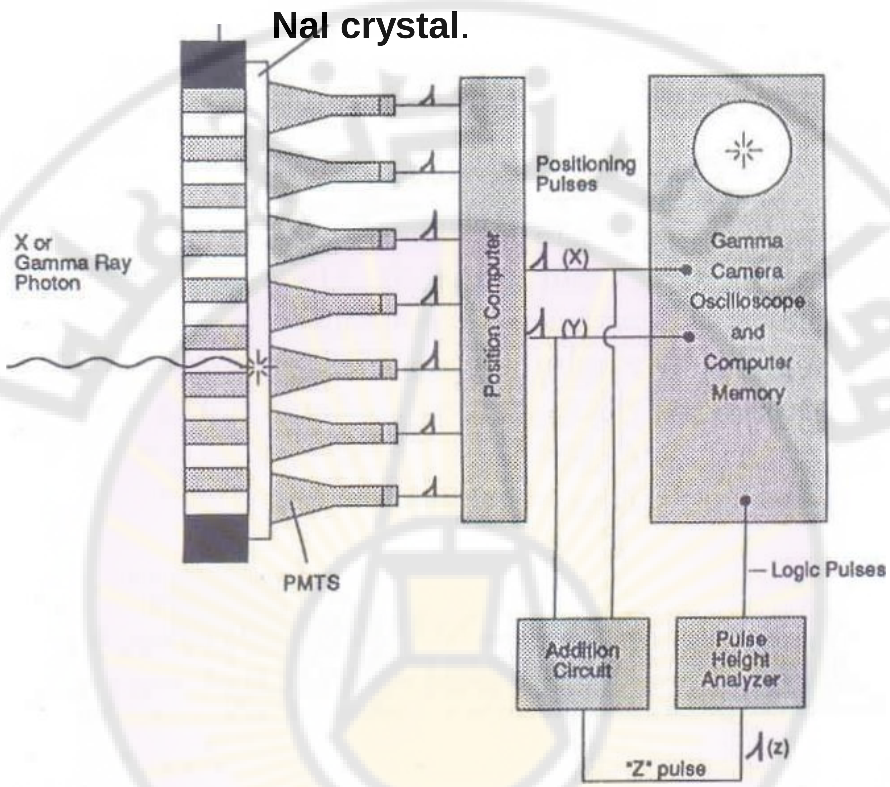
# IMAGING INSTRUMENTATION
# أجهزة التصوير الومضاني

- **Rectilinear Scanners** جهاز الماسح الخطي
- In the 1950s probe systems were adapted into electromechanical devices called *rectilinear scanners.* The geometric field of view of the probe was focused or restricted through the application of collimating devices, and the probes were mounted on mechanical transport systems to systematically traverse back and forth over an organ of interest.

# Gamma Scintillation Cameras
# جهاز الغاماكاميرا الومضاني

By the late 1960s the rectilinear scanners were progressively replaced by the gamma scintillation camera invented by Hal Anger and also known as the Anger camera. The gamma camera offers far more flexibility than the rectilinear scanner and has been developed into a very sophisticated series of imaging devices that permit dynamic and tomographic imaging, as well as conventional static planar imaging..

The major components of the gamma scintillation camera are illustrated in Figure 2-1. Perhaps the easiest way to understand the way gamma cameras work is to follow a photon through the entire radiation detection and spatial localization process, beginning with the origin of photons in the patient.

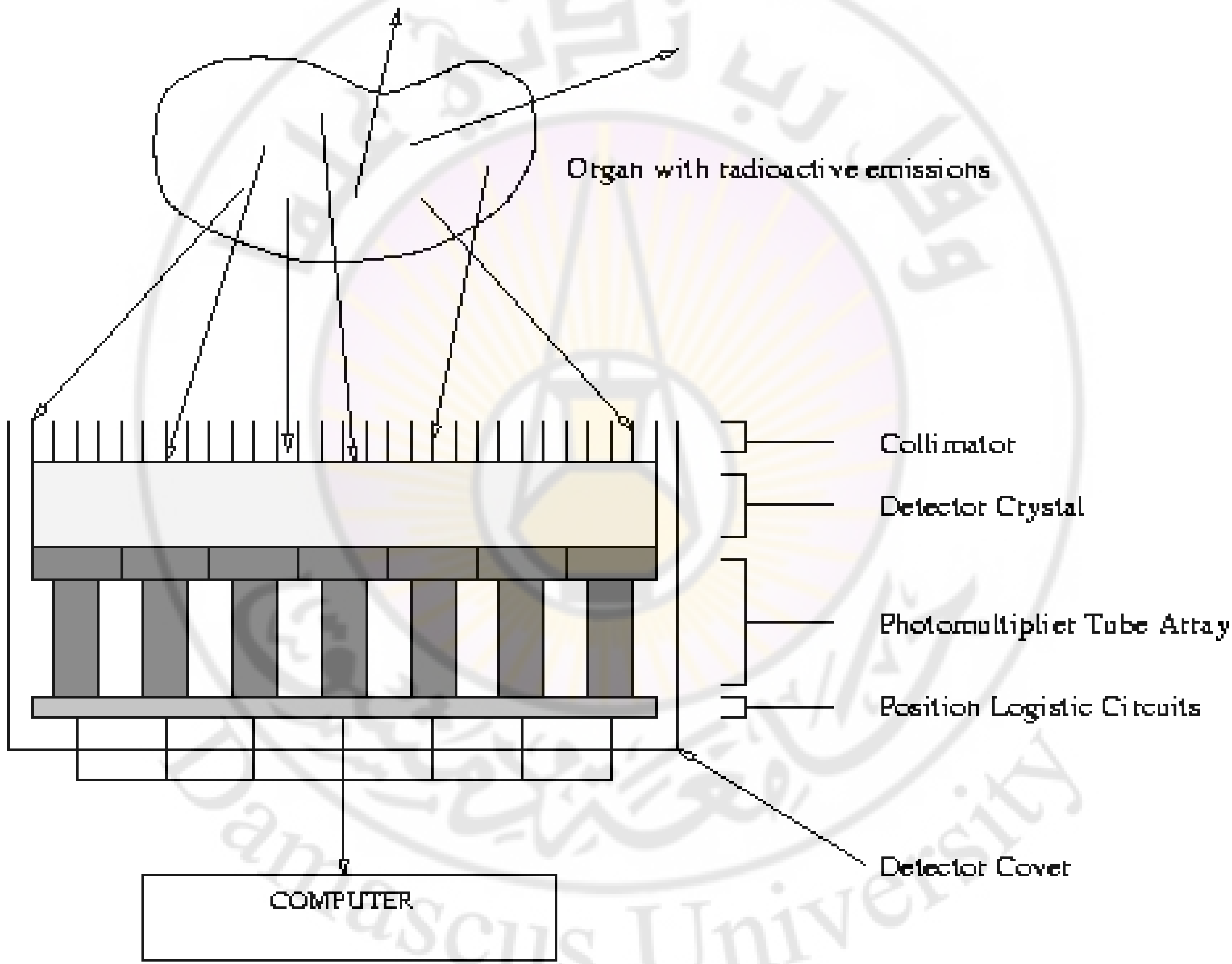



**Simplified schematic of gamma scintillation camera.**

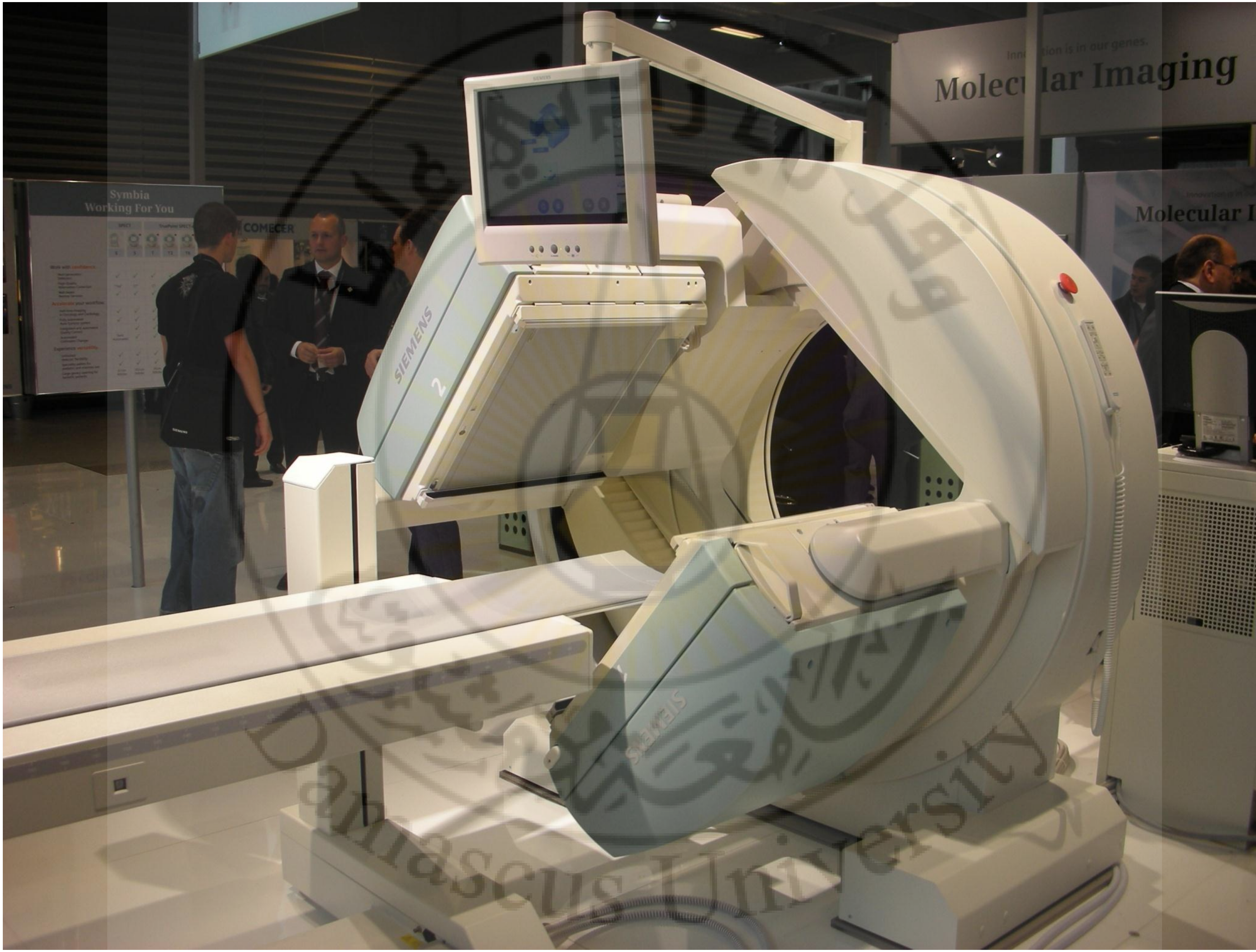
The diagram shows a photon reaching the crystal through the collimator and undergoing photoelectric absorption.

The photomultiplier tubes (PMI's) are optically coupled to the NaI (to crystal). The electrical outputs from the respective photomultiplier tubes are further processed through positioning circuitry to calculate x, **y** coordinates and through addition circuitry to calculate the Z pulse.

The Z pulse passes through the pulse height analyzer.


Organ with radioactive emissions
Collimator
Detector Crystal
Photomultiplier Tube Array
Position Logistic Circuits
Detector Cover
COMPUTER


الغاماكاميرا


Molecular Imaging
Symbia
Working For You
COMECER
SIEMENS
2
SIEMENS
Molecular Im


Alcyone technology*
Alcyone technology

Change the way you image
with Infinia and Xeleris 2
Efficient
SPECT/CT
Infinia Hawkeye 4
Evolution
Essential
SPECT/CT
Infinia Hawkeye 4
Beyond
standards
Infinia Evolution
The Gold
Standard
Infinia & Xeleris 2
Infinia
Advanced Technology


PHILIPS
PHILIPS
sense and simplicity
PHILIPS
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B1


PHILIPS


Cardiology
Accurate and most complete analysis software for all Bloodpool and Perfusion Studies
PET CT
SPECT CT
PET PET
PET MRI
0° diagnosis™

# COMPUTERS IN NUCLEAR MEDICINE

**1- Creation of the Digital Image**

**2- Data Analysis**

**3- Data Display and Formatting**

**4- *RADIONUCLIDE TOMOGRAMY***

*** Rotational SPECT**

# Nuclear Pharmacy
# الصيدلانيات الشعاعية النووية ( المواد المشعة)

## • RADIOPHARIVIACEITTICALS, RADIOCHEMICALS, AND RADIONUCLIDES

The term ***Radionuclide*** refers only to the radioactive atoms. When a radionuclide is combined with a chemical molecule to confer desired localization properties, the combination is referred to as a ***Radiochemical.***

The term ***Radiopharmaceutical*** is reserved for those radioactive materials that have met legal requirements for administration to patients or subjects. This often requires the addition of stabilizing and buffering agents to the basic radiochemical and requires approval in the United States by the Food and Drug Administration (FDA) before an agent is acceptable for routine clinical use.

# PRODUCTION OF RADIONUCLIDES
# إنتاج النظائر المشعة

All radionuclides in clinical use today are produced in either **nuclear reactors** or **cyclotrons** or other types of accelerators

# RADIONUCLIDE GENERATORS

# مولدات النظائر المشعة

These systems consist of a *longer-lived parent and a shorter-lived daughter*.

This combination of half-lives allows for the logistics of shipping the generator from a commercial vendor while still being able to use a daughter product with a reasonable half-life for clinical applications.

**مولد الموليبدينيوم ٩٩- تيكنيسيوم ٩٩م**

**The Mo-99/Tc-99m system**, which is ubiquitous in the practice of clinical nuclear medicine.

# MOLYBDENUM-99/TECHNETIUM-99m

## TECHNETIUM CHEMISTRY AND RADIO- PHARMACEUTICAL PREPARATION

Technetium-99m has become the most commonly used radionuclide based on its ready availability, the favorable energy of its principal gamma photon ( 140 kev), its favorable dosimetry with lack of primary particulate radiations, and its nearly ideal half life for many clinical imaging studies ( 6 hours).

# Technetium-99m labeled radiopharmaccutical

**AGENT**

Tc-99m-Sodium pertechnetate

Tc-99m-Sulfur colloid

Tc-99m-Pyrophosphate

Tc-99m-Diphosphonate

Tc-99m-Macroaggregated albumin

Tc-99m-Red blood cells

Tc-99m-Human serum albumin`

Tc-99m-DTP.A (pentetate),
(diethylenetriamine-pentaacetic acid)

Tc-99m $MAG_3$ (mercaptoacetyltniglycine)`

Tc-99m-DMSA (di mercaptosuccinic acid).

Tc-99m-HIDA and derivatives(hepatic iminodjacidic acid).

Tc-99m-Sestamibi

1'c-99m-Teboroxime

TC-99m-HMPAO
(hexamethyl propyleneamineoxirne)

## APPLICATION

Meckel's diverticulum detection
Salivary gland scintigraphy

Thyroid gland scintigraphy

(Brain scintigraphy)Liver/spleen scintigraphy (RES) GI bleeding detectionBone marrow scintigraphyAcute myocardial infarction detection(Skeletal scintigraphy)

Skeletal scintigraphy

Pulmonary perfusion scintigraphyPeriperal and regional (e.g., liver) arterial perfusion scintigraphy Radionuclide ventriculographyGI bleeding detectionHepatic hemangiOma detectionBlood pool imaging (e.g., radionuclide ventriculography)Renal and urinary tract scintigraphy(GFR)(Brain scintigraphy)Renal scintigraphyRenal cortical scintigraphy Hepatohiliary scintigraphy Myocardial perfusion scintigraphy' Myocardial perfusion scintigraphy

Cerebral perfusion scintigraphy

# Radiopharmaceuticals for Single Photon Imaging (Non-Tc-99m)

**AGENT** •

T1-201 Thallious chloride •

Ga-67 Gallium citrate •

Xe-127 Xenon (inert gas) Xe-127 Xenon (inert gas) •

Kr-81m Krypton (inert gas) •

1-131 Sodium iodide •

I-123 Sodium iodide •

I-131 Hippuran •

I-123 Hippuran •

In-111-labeled •

white blood cells. –

In 111 – I 131 labeled antibodies –

131-labeled –

proteins and peptides` •

1-123 lodoamphetamine •

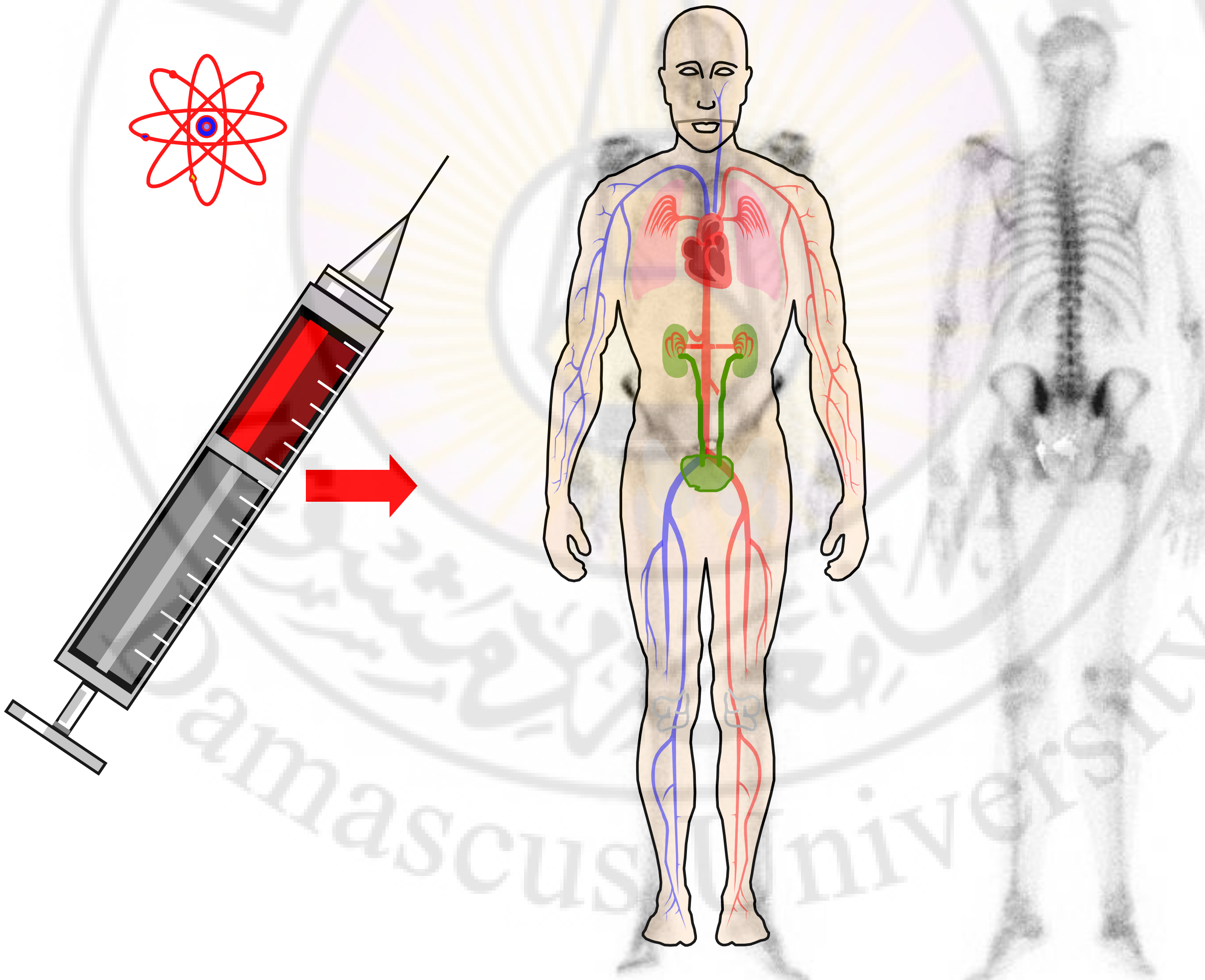
**APPLICATION**

Myocardial perfusion
scintigraphy Inflammatory disease
detection
Tumor imaging
Pulmonary ventilation scintigraphy
Pulmonary ventilation scintigraphy
Pulmonary ventilation scintigraphy
Thyroid scintigraphy Thyroid iodine uptake
function studies Treatment of
hyperthyroidism and thyroid cancer
Thyroid scintigraphy Thyroid iodine
uptake functions studies
Renal imaging and function studies
Renal imaging and function studies
Inflammatory disease detection
Wide variety of Receptor binding
and tumor localization studies
Cerebral perfusion scintigraphy

# **NM** is the Use of Radioactive Isotopes for Diagnosis and Therapy

## الطـــب النـــووي

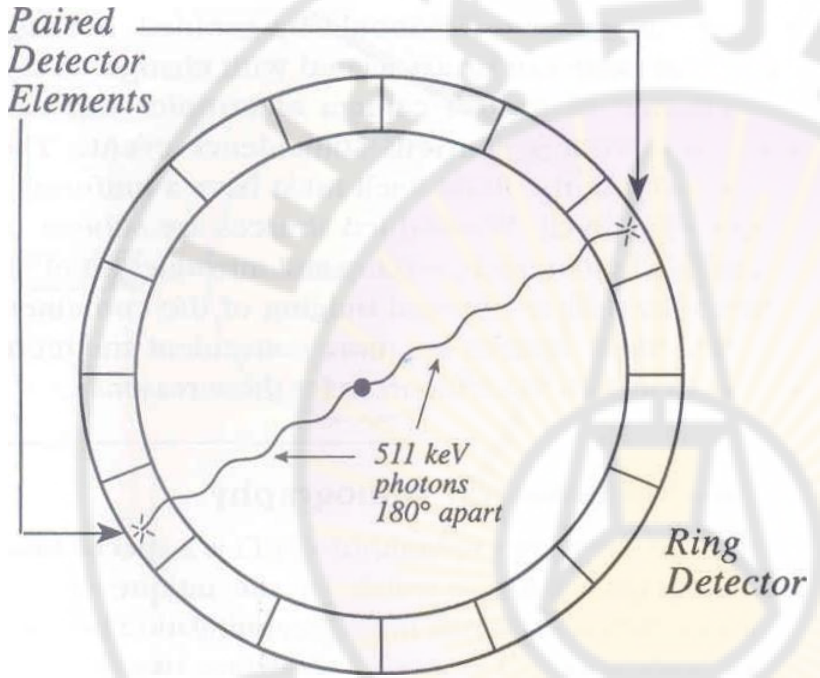
استخدام المنابع المشعة المفتوحة في تشخيص الآفات التي تصيب مختلف أعضاء و أجهزة الجسم و معالجة بعض الآفات الورمية و غير الورمية



# Positron Emission Tomography

- Positron emission tomography (PET) is a special kind of tomography made possible by the unique fate of positrons. When positrons undergo annihilation by combining with negatively charged electrons, two **511** keV gamma rays are given off in opposite directions 180° apart. In PET imaging, instead of detecting single events, two detectors on opposite sides of the subject are used to detect these paired annihilation photons (Figure 2-28). PET imaging cannot be performed with conventional gamma cameras; specially designed instrumentation is required.
- **Instrumentation** Instrumentation for PET has undergone several generations of development. Current clinical systems have multiple rings of detectors so that multiple tomographic planes over a continuous volume of tissue in the patient can be imaged simultaneously. Detectors on opposite sides of the patient are paired (Figure 2-28). Special circuitry allows detection of coincidence events from the two gamma ray photons given off by a single annihilation event. Thus the geometry of the detector ring defines a tomographic plane of interest. This detector geometry suppresses contribution from extraneous and scattered radiation. The detectors are also shielded from the sides to further reduce activity from outside the plane of interest. Even if such activity is not recorded as a coincidence event, it requires electronic processing and potential dead time in the system.

# PET




Simplified schematic of a ring detector system for positron emission tomography. The detection of two 511 keV annihilation photons is illustrated.

# RADIOPHARMACEUTICALS FOR POSITRON EMISSION TOMOGRAPHY

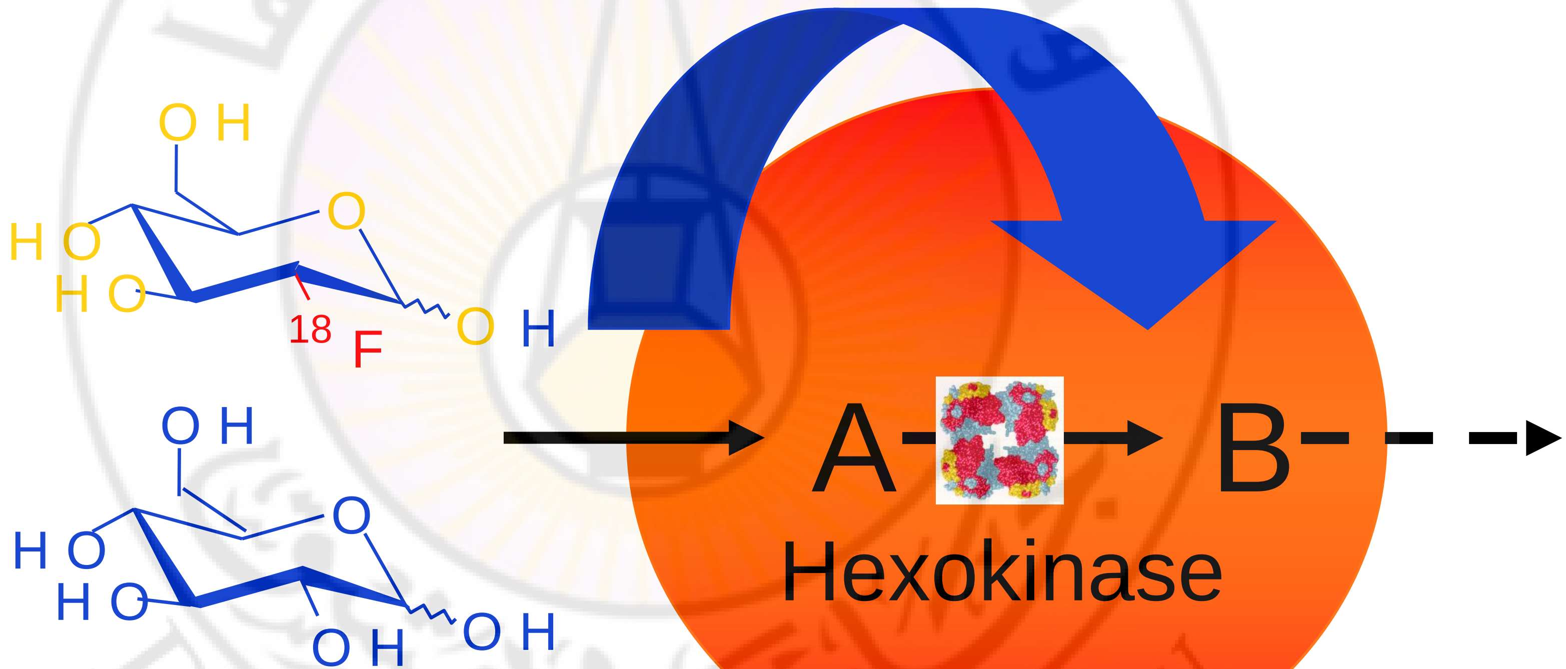
| | | |
|---|---|---|
| **PERFUSION AGENTS** | | |
| | O-15 | Carbon dioxide |
| | O-15 | Water |
| | N-13 | Ammonia |
| | Rb-82 | |
| **BLOOD VOLUME** | | |
| | O-15 | Carbon Monoxide |
| | C-11 | Carbon Monoxide |
| | Ga-68 | EDTA |
| **METABOLIC AGENTS** | | |
| | F-18 | Fluorodeoxyglucose |
| | O-15 | |
| | C-11 | Acetate |
| | C-11 | Palmitate |
| | N-13 | Glutamate |
| **TUMOR AGENTS** | | |
| | F-18 | Fluorodeoxyglucose |
| **RECEPTOR-BINDING AGENTS** | | |
| | F-18 | Spiperone |
| | C-11 | Carfentanil |
| | F-18 | Fluoro-L-Dopa |

***Fluorine-18*** has the advantage of a longer half-life than C-11, N-13, or 0-15 ( 112 minutes) and has found use as a label for the glucose analogue

***F-18 fluorodeoxyglucose.***

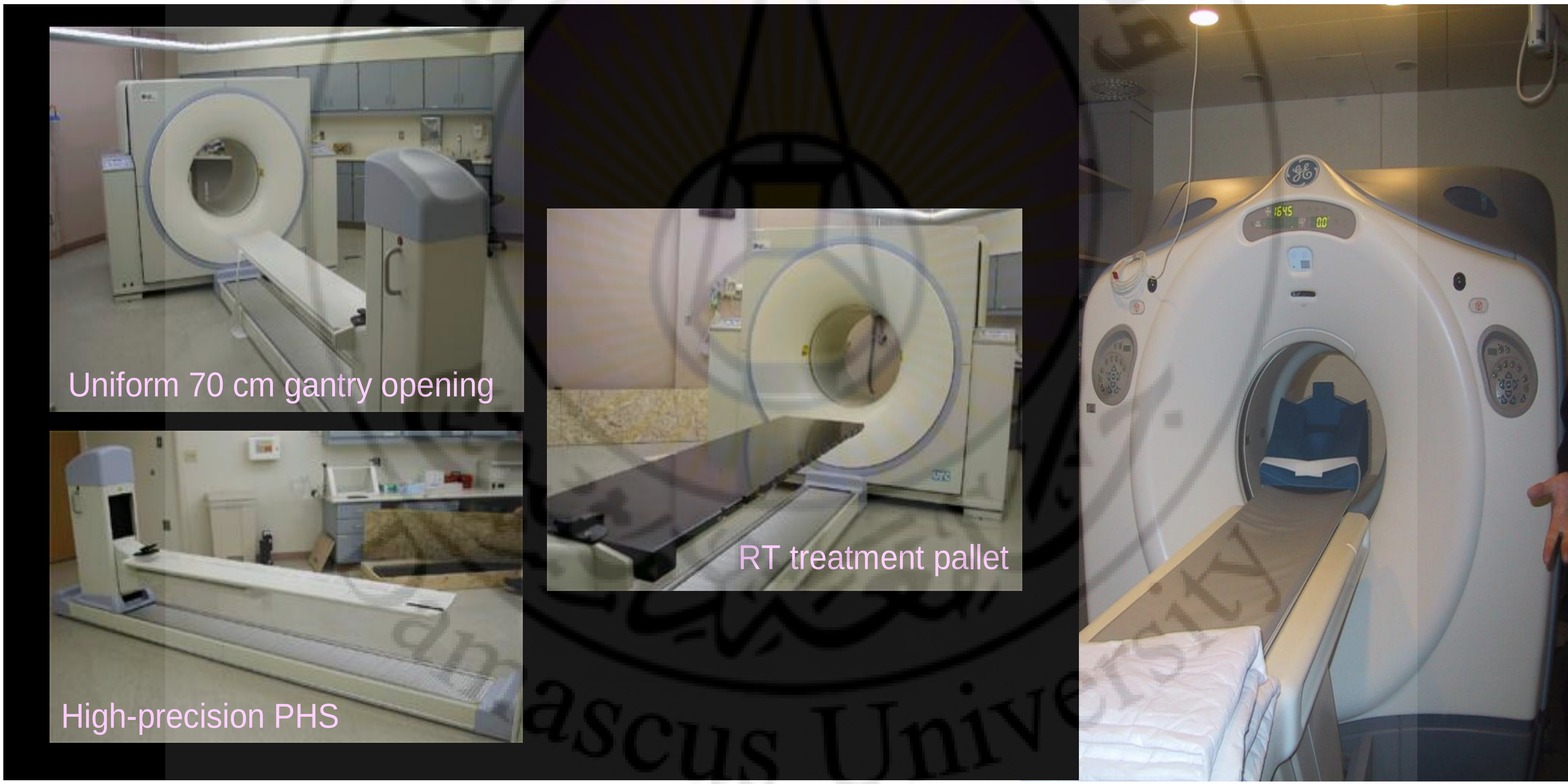
This pharmaceutical has found widespread application in imaging of the brain, the heart, and a wide variety of tumors throughout the body. Tumors derive their energy from glucose metabolism, and the uptake of F-18 fluorodeoxyglucose is a marker of tumor metabolism and viability.

# FDG-PET - Glucose Metabolism




FDG = Fluor-18-Deoxyglucose

# PET/CT- The Future for NM = Fusion PET



# Nuclear Medicine in Endocrine System

# الطب النووي في الغدد الصم

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Damascus University
Al-Assad University Hospital
Head Department of Nuclear Medicine

**Thyroid Imaging and Function Studies**
Radiopharmaceuticals

Technique
Radiopertechnetate imaging
Radioiodine-123
Thallium-201
Iodine-131: Postoperative and follow-up imaging for thyroid carcinoma
Clinical applications
Appearance of the normal thyroid scintigram Interpretation of the abnormal thyroid scan Scintigraphic detection of thyroid cancer metastases Thyroid function studies
**Radioiodine Treatment of Hyperthyroidism and**
**Thyroid Cancer**
**Adrenal Scintigraphy**
Adrenal cortical scintigraphy Radiopharmaceuticals Technique
Interpretation of the normal adrenal cortical scintigram
Clinical applications
Adrenal medullary scintigraphy Radiopharmaceuticals Technique
Precautions
Interpretation of the normal MIBG scintigram
Clinical applications
**Parathyroid Scintigraphy**

# THYROID IMAGING AND FUNCTION STUDIES

## ومضان الدرق و الدراسات الوظيفية

Thyroid scintigraphy remains uniquely suited to

1- The determination of the functional status of thyroid nodules,

2- the detection of extra thyroidal metastases from differentiated thyroid carcinoma,

3- and in establishing the thyroid as the tissue of origin of mediastinal masses.

The thyroid scintigram has the advantage over cross sectional techniques of *depicting the entire gland in a single image* and *allows physical findings to be correlated with specific abnormalities in the image.*

# Radiopharmaceuticals
## النظائر المشعة المستخدمة للتصوير الومضاني للدرق

The principal radiopharmaceuticals employed for thyroid imaging include

**Iodine-131**, (I-131)

**Iodine-123**, ( I-123)

**Technetium-99m**. ( Tc99m)

**Thallium-201** ( Tl 201) has also been used selectively in studies of thyroid cancer


Xe123
2.00 h
Xe124
0.10
Xe125
57 s
17.1 h
Xe126
0.09
Xe127
1.15 m
36.4 d
Xe128
1.91
Xe129
8.89 d
26.4
Xe130
4.1
Xe131
11.9 d
21.2
I122
3.6 m
I123
13.2 h
I124
4.18 d
I125
60.1 d
I126
13.0 d
I127
100
I128
25.00 m
I129
1.57E7 a
I130
9.0 m
12.36 h
Te121
154 d
16.8 d
Te122
2.59
Te123
119.7 d
0.905
Te124
4.79
Te125
58 d
7.12
Te126
18.93
Te127
109 d
9.4 h
Te128
31.70
Te129
33.6 d
1.16 h
Sb120
5.76 d
15.89m
Sb121
57.4
Sb122
4.21 m
2.70 d
Sb123
42.6
Sb124
20.3 m
60.20d
Sb125
2.758 a
Sb126
11 s
12.4 d
19.0 m
Sb127
3.84 d
Sb128
10.1 m
9.1 h

# Isotopes of Iodine

| Isotope | Emissions | Half-life | Uses |
|---|---|---|---|
| I-123 | EC | 13.2 hr | Diagnostic Scanning |
| I-124 | Positron (B+) Auger, EC | 4.2 d | Diagnostic Scanning |
| I-125 | EC | 59.4 d | Immunoassays |
| I-129 | Beta - | 15M yrs | none |
| I-131 | Beta - Gamma | 8 d | Diagnostic and Therapuetic |

# Box 13-1 Iodine-131: Summary of Physical Characteristics and Dosimetry

## اليــود المشع ١٣١

## المواصفات و الخصائص و طريقة الإعطاء

Mode of decay: Beta minus + Gamma rays.

Physical half-life : 8.1 days

Photon energy: 364 keV

DOSIMETRY*:

SODIUM IODIDE -131 ADMINISTERED ORALLY

# Box 13-2 Iodine-123: Summary of Physical Characteristics and Dosimetry

PHYSICAL CHARACTERISTICS

## اليــود المشع ١٢٣

## المواصفات و الخصائص و طريقة الإعطاء

Mode of decay: Electron capture (Gamma rays).

Physical half-life : 13.2 hr.

Photon energy: 159 keV

DOSIMETRY*:

SODIUM IODIDE CAPSULES ADMINISTERED ORALLY

# Box 13-3 Technetium 99m: Summary of Physical Characteristics and Dosimetry

## التيكنيسيوم المشع ٩٩م 99m*Tc*
## المواصفات و الخصائص و طريقة الإعطاء

Mode of decay: Isomeric transition.(Gamma rays).
Physical half-life : 6 hr.
Photon energy: 140 key.

DOSIMETRY':
**SODIUM PERTECHNETATE ADMINISTERED INTRAVENOUSLY**

## Box 13-5 Thyroid Imaging With I-123 (Sodium Iodide): Protocol Summary

# تحضير المريض للتصوير الومضاني للدرق

**PATIENT PREPARATION :**

Discontinue any medications that interfere with thyroid uptake of radioiodine,

**DOSAGE AND ROUTE OF ADMINISTRATION**

100-400 ILO administered orally in capsule form.

**TIME OF LM AGING**

Image at 6 and/or 24 hr.

**PROCEDURE**

Use a gamma camera with pinhole ollimator

Position the patient supine

# Box 13-4 Tc-99 Pertechnetate Thyroid Imaging: Protocol Summary

**PATIENT PREPARATION**

Discontinue any medications that interfere with thyroid uptake of Tc-99m pertechnetate .

DOSAGE AND ROUTE OF ADMENTISTRATION

1-10 mCi (37-370 MBq) Tc-99m pertechnetate

-administered IV.

TIME OF IMAGING

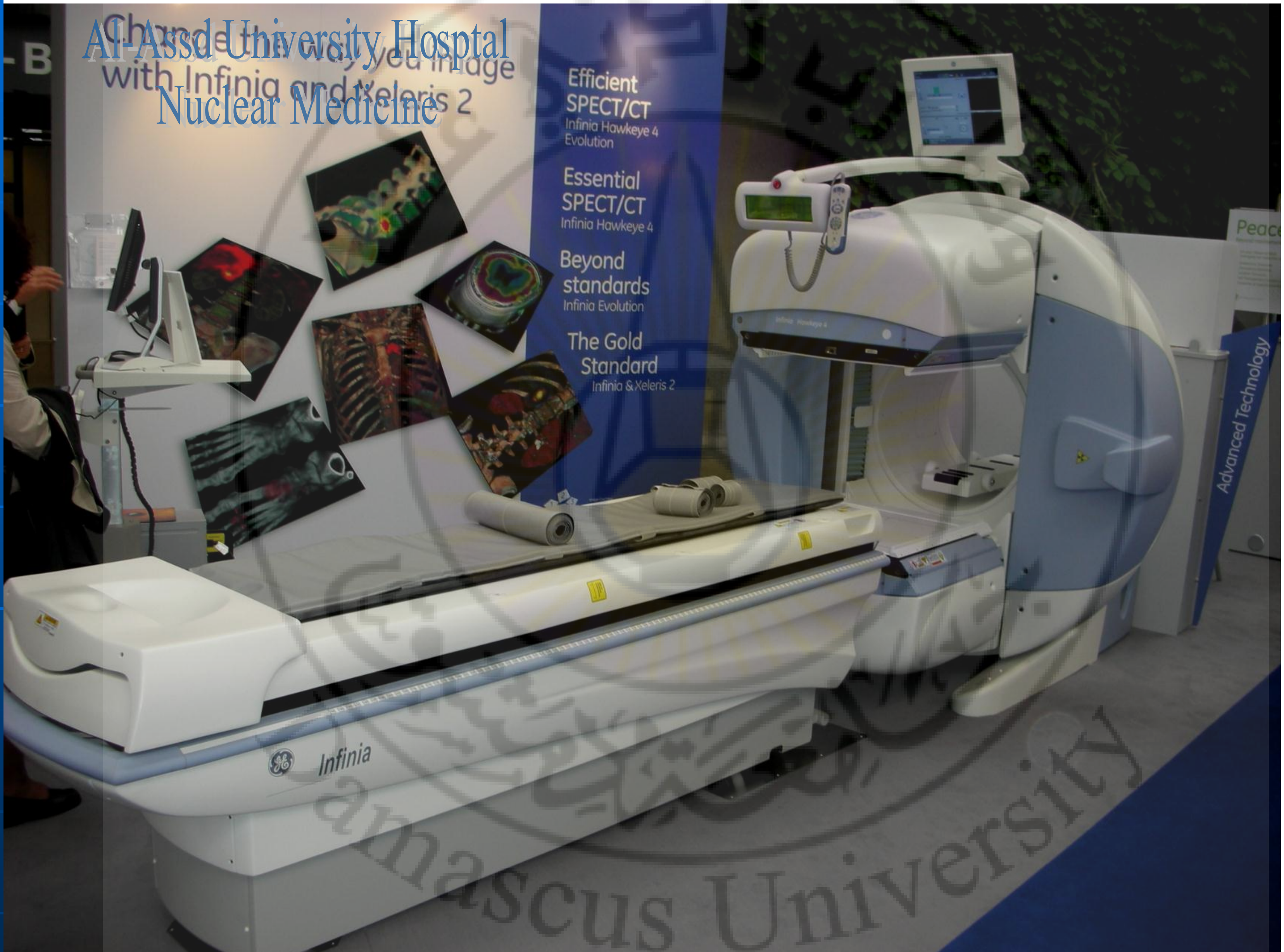
20 min after radiopharmaceutical administration.

PROCEDURE

Use a gamma camera with a 3-6-mm-aperture- pinhole collimator and a 20% energy window centered at 140 key.

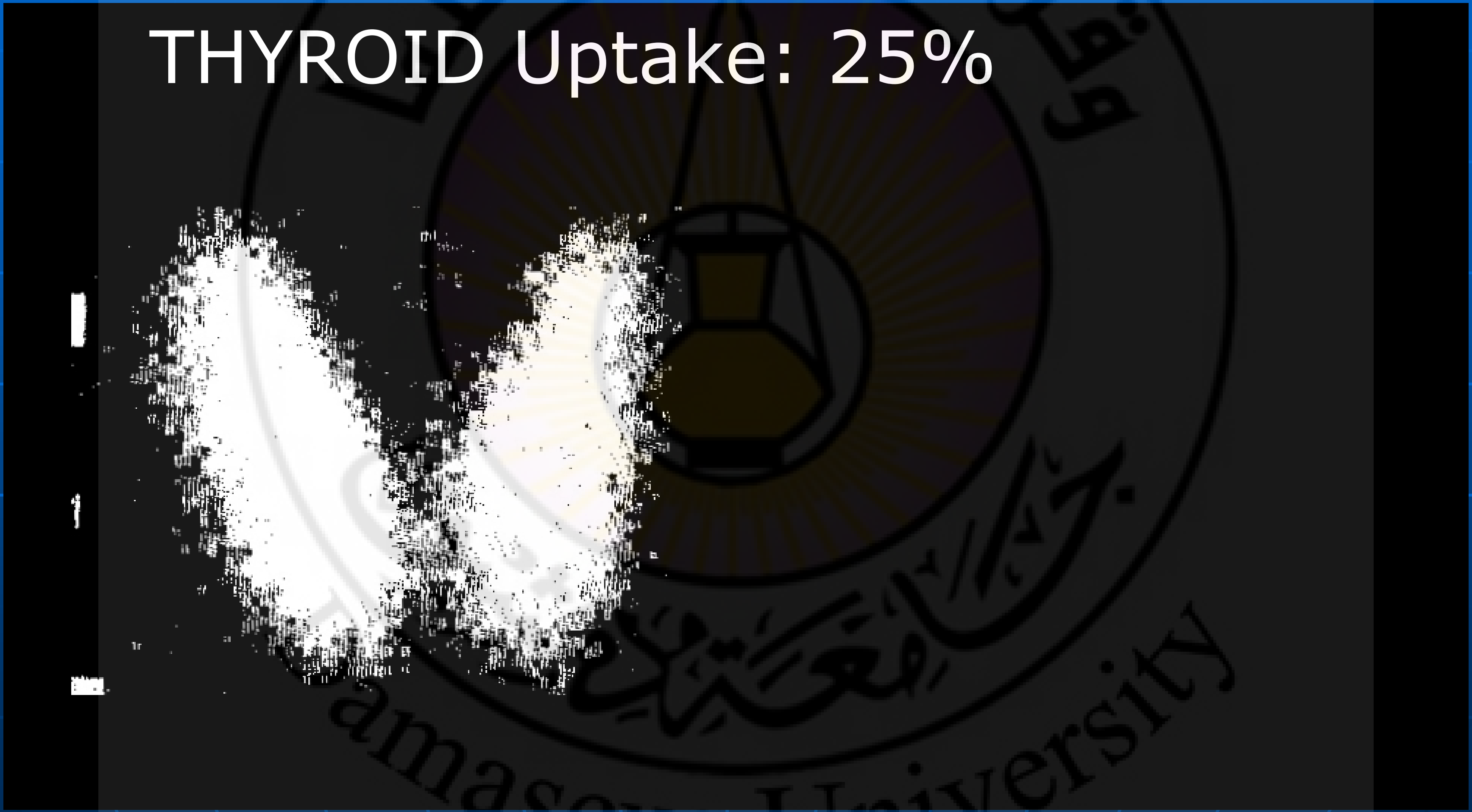
Position the patient supine with the chin up and neck extended.

# Al-Assd University Hospital
# Nuclear Medicine



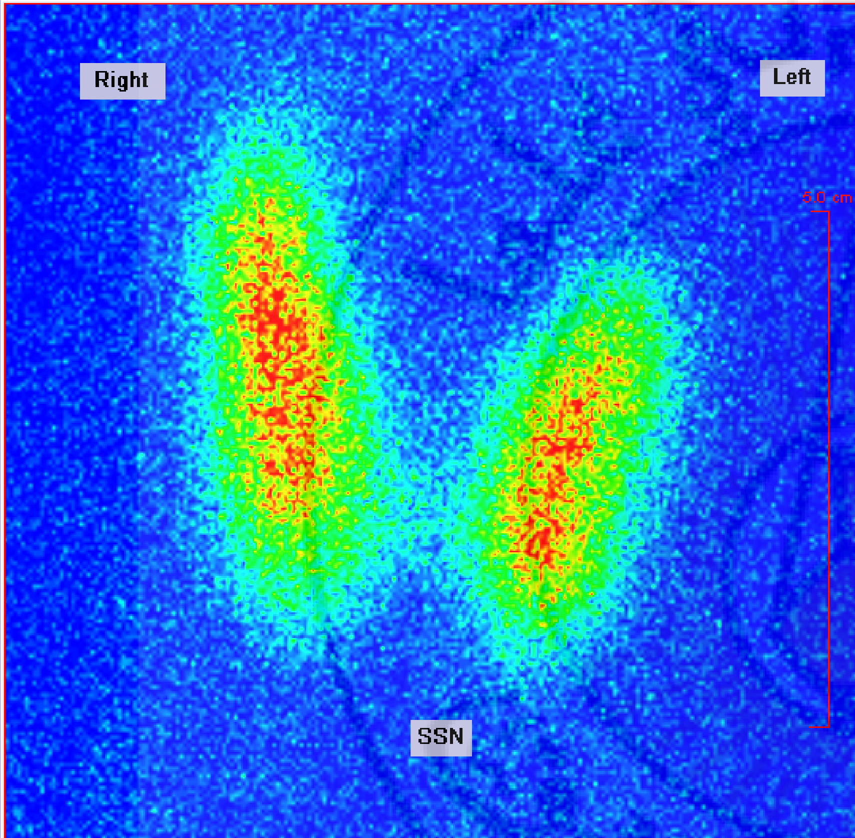
# جهاز الغاماكاميرا

## Normal thyroid scintigram obtained with 1-123. The sternal notch is indicated,



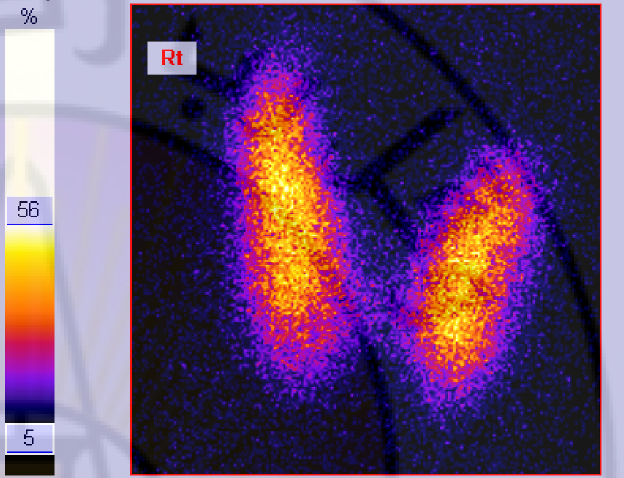
Patient Name: Sahli, Walaa Patient ID: 5844 DOB: 04/09/1988 Study Name: Thyroid Scan

Study Date: 04/09/2008




Ant 485K Duration:302sec 512x512 Pix:0.4mm 99m Technetium

Thyroid 04/09/2008




Ant
ssn

Thyroid 99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

## Calibration Information

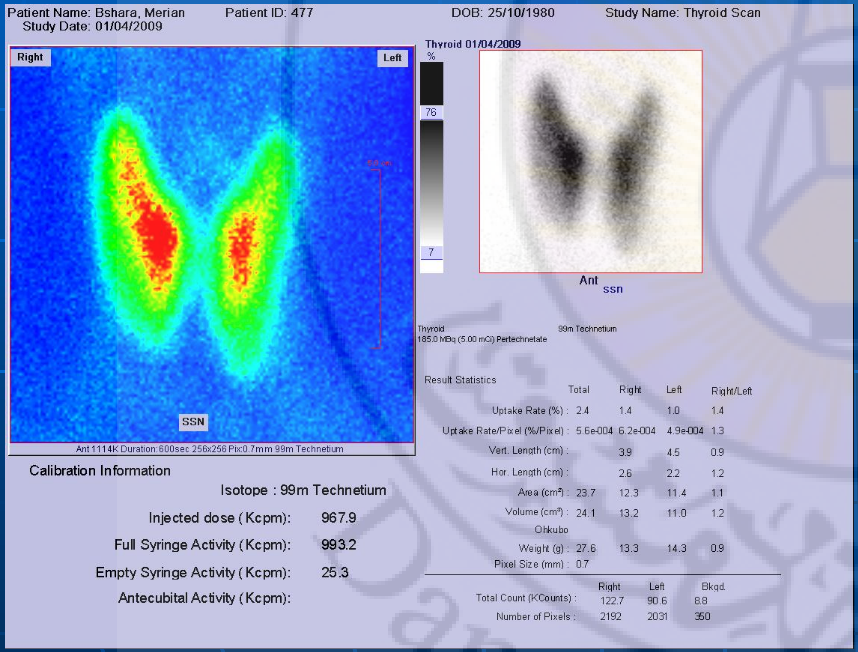
Isotope : 99m Technetium

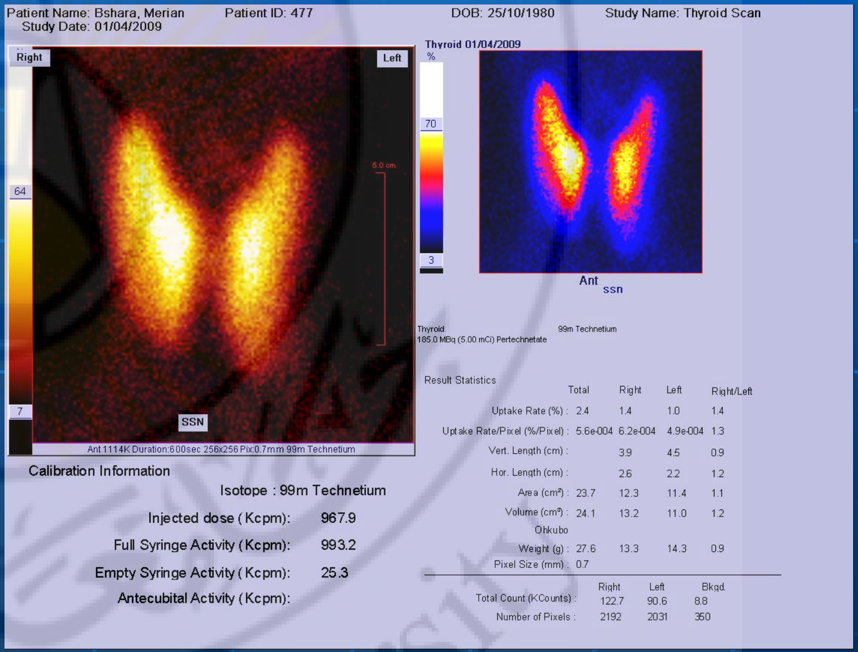
| | |
|---|---|
| Injected dose ( mCi ): | 2.0 |
| Full Syringe Activity ( mCi ): | 2.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/mCi ): | 1111.0 |

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 3.0 | 1.8 | 1.2 | 1.5 |
| Uptake Rate/Pixel (%/Pixel) : | 2.7e-004 | 2.7e-004 | 2.7e-004 | 1.0 |
| Vert. Length (cm) : | | 5.5 | 3.7 | 1.5 |
| Hor. Length (cm) : | | 2.1 | 1.8 | 1.1 |
| Area ($cm^2$) : | 16.0 | 9.6 | 6.3 | 1.5 |
| Volume ($cm^3$) : | 18.6 | 12.3 | 6.3 | 2.0 |
| Ohkubo | | | | |
| Weight (g) : | 21.4 | 14.9 | 6.5 | 2.3 |
| Pixel Size (mm) : | 0.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 48.6 | 32.1 | 1.1 |
| Number of Pixels : | 6851 | 4520 | 448 |


Patient Name: Bshara, Merian
Patient ID: 477
DOB: 25/10/1980
Study Name: Thyroid Scan
Study Date: 01/04/2009
Right
Left
SSN
Ant 1114K Duration:600sec 256x256 Pix:0.7mm 99m Technetium
Thyroid 01/04/2009
%
76
7
Ant
ssn
Thyroid
185.0 MBq (5.00 mCi) Pertechnetate
99m Technetium
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 2.4 1.4 1.0 1.4
Uptake Rate/Pixel (%/Pixel) : 5.6e-004 6.2e-004 4.9e-004 1.3
Vert. Length (cm) : 3.9 4.5 0.9
Hor. Length (cm) : 2.6 2.2 1.2
Area (cm²) : 23.7 12.3 11.4 1.1
Volume (cm³) : 24.1 13.2 11.0 1.2
Ohkubo
Weight (g) : 27.6 13.3 14.3 0.9
Pixel Size (mm) : 0.7
Right Left Bkgd.
Total Count (KCounts) : 122.7 90.6 8.8
Number of Pixels : 2192 2031 350
Calibration Information
Isotope : 99m Technetium
Injected dose (Kcpm): 967.9
Full Syringe Activity (Kcpm): 993.2
Empty Syringe Activity (Kcpm): 25.3
Antecubital Activity (Kcpm):


Patient Name: Bshara, Merian
Patient ID: 477
DOB: 25/10/1980
Study Name: Thyroid Scan
Study Date: 01/04/2009
Right
Left
64
7
SSN
Ant 1114K Duration:600sec 256x256 Pix:0.7mm 99m Technetium
Thyroid 01/04/2009
%
70
3
Ant
ssn
Thyroid
185.0 MBq (5.00 mCi) Pertechnetate
99m Technetium
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 2.4 1.4 1.0 1.4
Uptake Rate/Pixel (%/Pixel) : 5.6e-004 6.2e-004 4.9e-004 1.3
Vert. Length (cm) : 3.9 4.5 0.9
Hor. Length (cm) : 2.6 2.2 1.2
Area (cm²) : 23.7 12.3 11.4 1.1
Volume (cm³) : 24.1 13.2 11.0 1.2
Ohkubo
Weight (g) : 27.6 13.3 14.3 0.9
Pixel Size (mm) : 0.7
Right Left Bkgd.
Total Count (KCounts) : 122.7 90.6 8.8
Number of Pixels : 2192 2031 350
Calibration Information
Isotope : 99m Technetium
Injected dose (Kcpm): 967.9
Full Syringe Activity (Kcpm): 993.2
Empty Syringe Activity (Kcpm): 25.3
Antecubital Activity (Kcpm):

# استطبابات التصوير الومضاني للدرق
# Indications for Thyroid Scan

1-Further evaluation of physical examination findings.

2- Detection of metastases in patients with thyroid carcinoma.

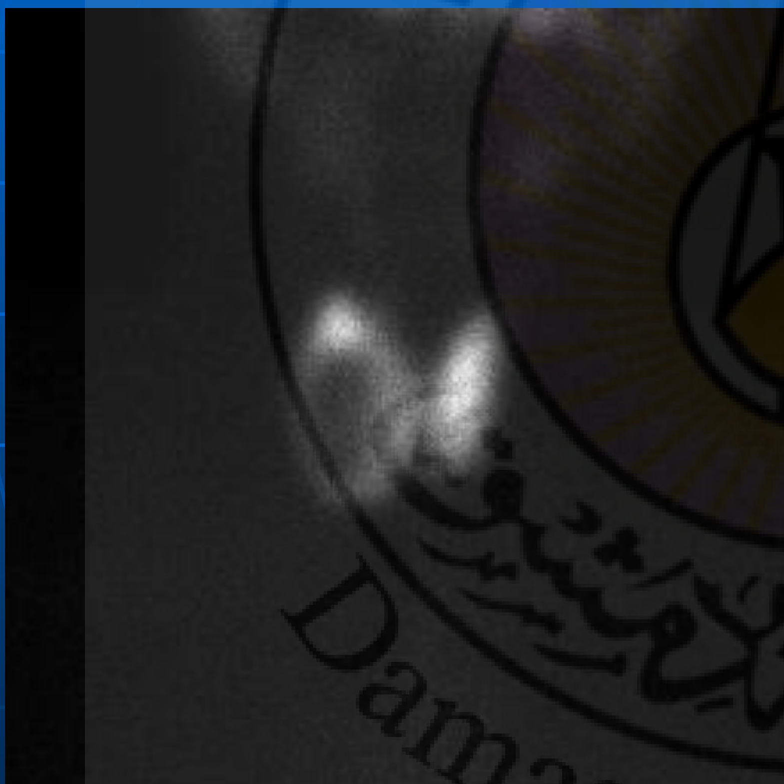
3-Follow-up after radioiodine therapy for differentiated thyroid cancer.

4-Determination of functional status of thyroid nodule.

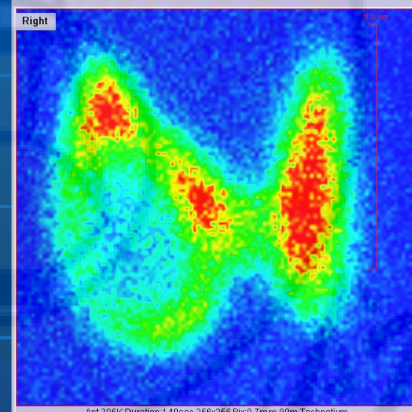
5-Differential diagnosis of mediastinal masses.

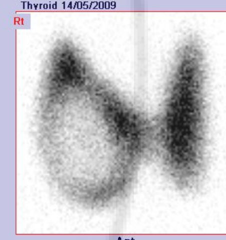
6-Detection of extrathyroidal tissue (lingual thyroid).

7-Screening after head and neck irradiation.



Patient Name: Badreia, Saaied    Patient ID: 7476    DOB: 14/05/1969    Study Name: Thyroid Scan
Study Date: 14/05/2009




Thyroid
185.0 ME

Calibration Information

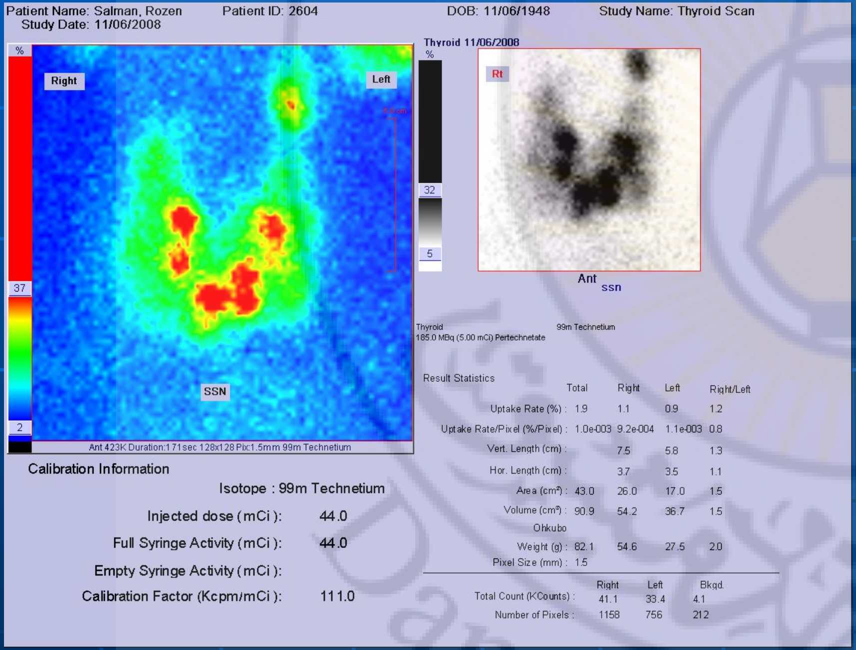
Isotope : 99m Technetium

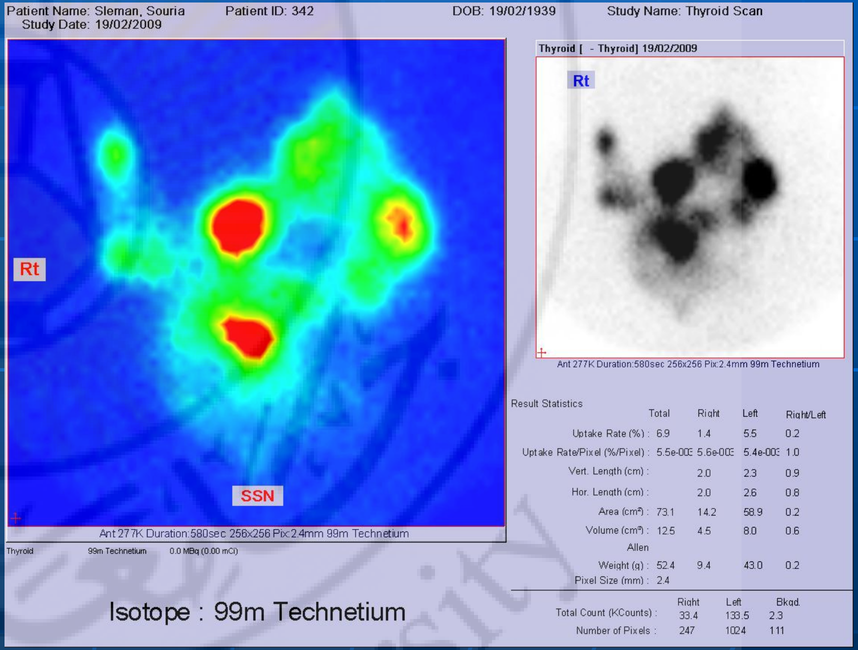
| | |
|---|---|
| Injected dose (mCi): | 10.0 |
| Full Syringe Activity (mCi): | 10.0 |
| Empty Syringe Activity (mCi): | |
| Calibration Factor (Kcpm/mCi): | 666.0 |

Result Statistics

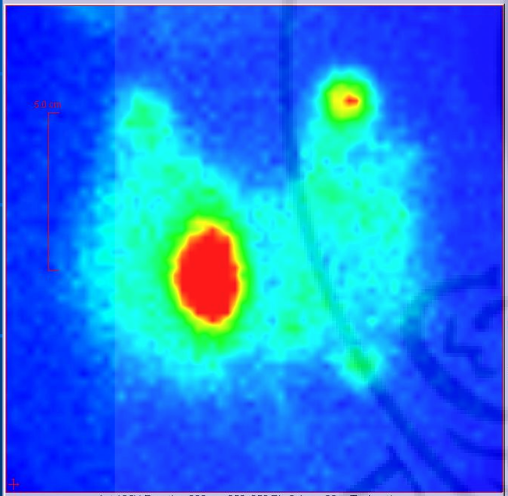
| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 3.3 | 1.9 | 1.4 | 1.4 |
| Uptake Rate/Pixel (%/Pixel) : | 6.7e-004 | 6.0e-004 | 8.0e-004 | 0.7 |
| Vert. Length (cm) : | | 5.2 | 4.0 | 1.3 |
| Hor. Length (cm) : | | 3.5 | 0.5 | 6.6 |
| Area (cm²) : | 27.4 | 17.7 | 9.7 | 1.8 |
| Volume (cm³) : | 34.7 | 34.1 | 0.6 | 57.5 |
| Ohkubo Weight (g) : | 36.9 | 26.0 | 11.0 | 2.4 |
| Pixel Size (mm) : | 0.7 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 58.2 | 42.7 | 2.2 |
| Number of Pixels : | 3150 | 1728 | 318 |


Patient Name: Salman, Rozen
Study Date: 11/06/2008
Patient ID: 2604
DOB: 11/06/1948
Study Name: Thyroid Scan
%
Right
Left
37
2
SSN
Ant 423K Duration:171sec 128x128 Pix:1.5mm 99m Technetium
Thyroid 11/06/2008
32
5
Rt
Ant
ssn
Thyroid
185.0 MBq (5.00 mCi) Pertechnetate
99m Technetium
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 1.9 1.1 0.9 1.2
Uptake Rate/Pixel (%/Pixel) : 1.0e-003 9.2e-004 1.1e-003 0.8
Vert. Length (cm) : 7.5 5.8 1.3
Hor. Length (cm) : 3.7 3.5 1.1
Area (cm²) : 43.0 26.0 17.0 1.5
Volume (cm³) : 90.9 54.2 36.7 1.5
Ohkubo
Weight (g) : 82.1 54.6 27.5 2.0
Pixel Size (mm) : 1.5
Right Left Bkgd.
Total Count (KCounts) : 41.1 33.4 4.1
Number of Pixels : 1158 756 212
Calibration Information
Isotope : 99m Technetium
Injected dose (mCi): 44.0
Full Syringe Activity (mCi): 44.0
Empty Syringe Activity (mCi):
Calibration Factor (Kcpm/mCi): 111.0


Patient Name: Sleman, Souria
Study Date: 19/02/2009
Patient ID: 342
DOB: 19/02/1939
Study Name: Thyroid Scan
Rt
SSN
Ant 277K Duration:580sec 256x256 Pix:2.4mm 99m Technetium
Thyroid
99m Technetium
0.0 MBq (0.00 mCi)
Isotope : 99m Technetium
Thyroid [ - Thyroid] 19/02/2009
Rt
Ant 277K Duration:580sec 256x256 Pix:2.4mm 99m Technetium
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 6.9 1.4 5.5 0.2
Uptake Rate/Pixel (%/Pixel) : 5.5e-003 5.6e-003 5.4e-003 1.0
Vert. Length (cm) : 2.0 2.3 0.9
Hor. Length (cm) : 2.0 2.6 0.8
Area (cm²) : 73.1 14.2 58.9 0.2
Volume (cm³) : 12.5 4.5 8.0 0.6
Allen
Weight (g) : 52.4 9.4 43.0 0.2
Pixel Size (mm) : 2.4
Right Left Bkgd.
Total Count (KCounts) : 33.4 133.5 2.3
Number of Pixels : 247 1024 111

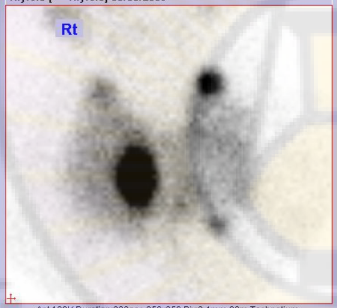
Patient Name: Araj, Naeila    Patient ID: 923    DOB: 04/03/1944    Study Name: Thyroid Scan
Study Date: 04/03/2009




Ant 188K Duration:322sec 256x256 Pix:2.4mm 99m Technetium

Thyroid    99m Technetium    0.0 MBq (0.00 mCi)

Thyroid [ - Thyroid] 05/03/2009




Ant 188K Duration:322sec 256x256 Pix:2.4mm 99m Technetium

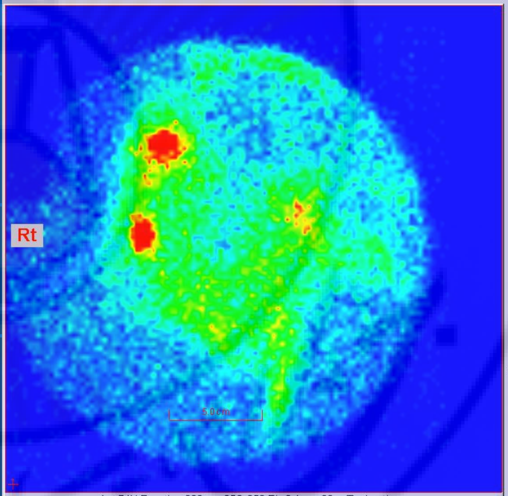
Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 7.2 | 3.1 | 4.1 | 0.8 |
| Uptake Rate/Pixel (%/Pixel) : | 4.1e-003 | 2.9e-003 | 6.0e-003 | 0.5 |
| Vert. Length (cm) : | | 1.4 | 1.8 | 0.8 |
| Hor. Length (cm) : | | 1.3 | 1.4 | 0.9 |
| Area (cm²) : | 101.6 | 62.3 | 39.3 | 1.6 |
| Volume (cm³) : | 3.0 | 1.2 | 1.8 | 0.7 |
| Allen | | | | |
| Weight (g) : | 52.1 | 29.0 | 23.1 | 1.3 |
| Pixel Size (mm) : | 2.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 42.6 | 55.3 | 2.0 |
| Number of Pixels : | 1084 | 683 | 161 |

Isotope : 99m Technetium

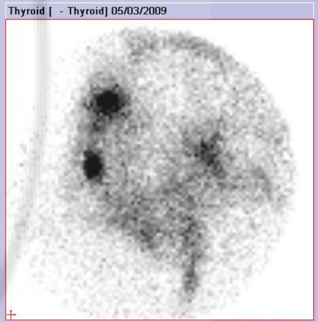
Patient Name: Zeidan, Ayman    Patient ID: 5433    DOB: 05/03/1972    Study Name: Thyroid Scan
Study Date: 05/03/2009




Ant 74K Duration:236sec 256x256 Pix:2.4mm 99m Technetium

Thyroid    99m Technetium    0.0 MBq (0.00 mCi)

Thyroid [ - Thyroid] 05/03/2009



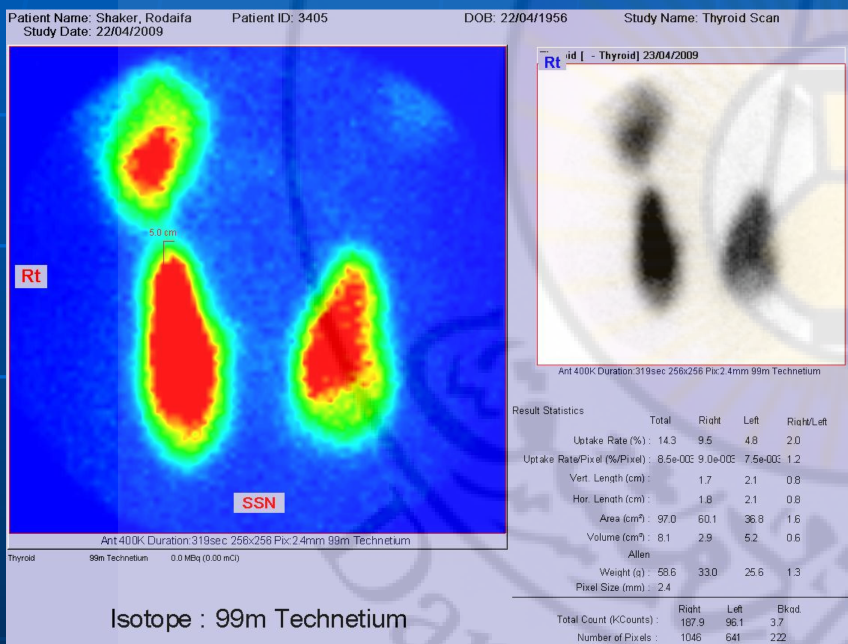
Ant 74K Duration:236sec 256x256 Pix:2.4mm 99m Technetium

Result Statistics

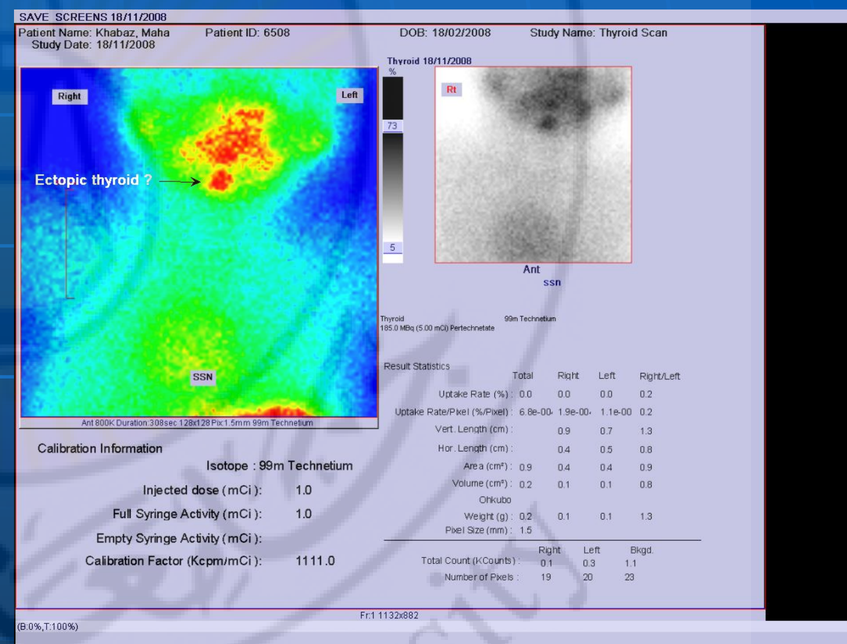
| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 0.2 | 0.1 | 0.1 | 0.7 |
| Uptake Rate/Pixel (%/Pixel) : | 1.0e-004 | 7.3e-005 | 1.3e-004 | 0.6 |
| Vert. Length (cm) : | | 1.0 | 1.4 | 0.7 |
| Hor. Length (cm) : | | 1.3 | 1.2 | 1.1 |
| Area (cm²) : | 98.6 | 53.7 | 44.8 | 1.2 |
| Volume (cm³) : | 1.8 | 0.8 | 1.0 | 0.8 |
| Allen | | | | |
| Weight (g) : | 36.5 | 16.8 | 19.7 | 0.9 |
| Pixel Size (mm) : | 2.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 7.3 | 11.1 | 1.6 |
| Number of Pixels : | 935 | 780 | 176 |

Isotope : 99m Technetium

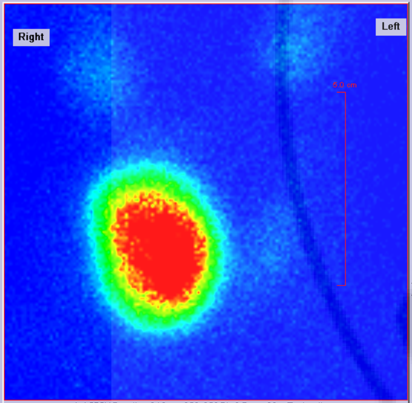


Patient Name: Shaker, Rodaifa
Study Date: 22/04/2009
Patient ID: 3405
DOB: 22/04/1956
Study Name: Thyroid Scan
Rt
5.0 cm
SSN
Ant 400K Duration:319sec 256x256 Pix:2.4mm 99m Technetium
Thyroid
99m Technetium
0.0 MBq (0.00 mCi)
Rt
Thyroid] 23/04/2009
Ant 400K Duration:319sec 256x256 Pix:2.4mm 99m Technetium
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 14.3 9.5 4.8 2.0
Uptake Rate/Pixel (%/Pixel) : 8.5e-00 9.0e-00 7.5e-00 1.2
Vert. Length (cm) : 1.7 2.1 0.8
Hor. Length (cm) : 1.8 2.1 0.8
Area (cm²) : 97.0 60.1 36.8 1.6
Volume (cm³) : 8.1 2.9 5.2 0.6
Allen
Weight (g) : 58.6 33.0 25.6 1.3
Pixel Size (mm) : 2.4
Right Left Bkgd.
Total Count (KCounts) : 187.9 96.1 3.7
Number of Pixels : 1046 641 222
Isotope : 99m Technetium

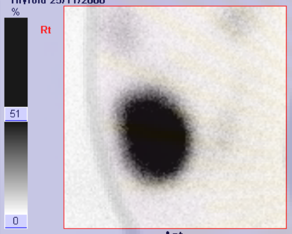
SAVE SCREENS 18/11/2008
Patient Name: Khabaz, Maha
Study Date: 18/11/2008
Patient ID: 6508
DOB: 18/02/2008
Study Name: Thyroid Scan
Right
Left
Ectopic thyroid ?
SSN
Ant 800K Duration:308sec 128x128 Pix:1.5mm 99m Technetium
Thyroid 18/11/2008
73
5
Rt
Ant
ssn
Thyroid
185.0 MBq (5.00 mCi) Pertechnetate
99m Technetium
Calibration Information
Isotope : 99m Technetium
Injected dose (mCi): 1.0
Full Syringe Activity (mCi): 1.0
Empty Syringe Activity (mCi):
Calibration Factor (Kcpm/mCi): 1111.0
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 0.0 0.0 0.0 0.2
Uptake Rate/Pixel (%/Pixel) : 6.8e-00 1.9e-00 1.1e-00 0.2
Vert. Length (cm) : 0.9 0.7 1.3
Hor. Length (cm) : 0.4 0.5 0.8
Area (cm²) : 0.9 0.4 0.4 0.9
Volume (cm³) : 0.2 0.1 0.1 0.8
Ohkubo
Weight (g) : 0.2 0.1 0.1 1.3
Pixel Size (mm) : 1.5
Right Left Bkgd.
Total Count (KCounts) : 0.1 0.3 1.1
Number of Pixels : 19 20 23
Fr:1 1132x882
(B:0%,T:100%)

Patient Name: Aziz, Telba Patient ID: 7632 DOB: 25/11/1940 Study Name: Bone Scan
Study Date: 25/11/2008




Ant 575K Duration:218sec 256x256 Pix:0.7mm 99m Technetium

Thyroid 25/11/2008




Ant

Thyroid 99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 8.2 | 8.0 | 0.1 | 61.8 |
| Uptake Rate/Pixel (%/Pixel) : | 2.6e-003 | 3.3e-003 | 2.0e-004 | 16.7 |
| Vert. Length (cm) : | | 4.5 | 2.9 | 1.6 |
| Hor. Length (cm) : | | 3.5 | 1.5 | 2.3 |
| Area (cm²) : | 17.3 | 13.6 | 3.7 | 3.7 |
| Volume (cm³) : | 31.9 | 28.4 | 3.5 | 8.0 |
| Ohkubo | | | | |
| Weight (g) : | 20.2 | 17.2 | 3.0 | 5.8 |
| Pixel Size (mm) : | 0.7 | | | |

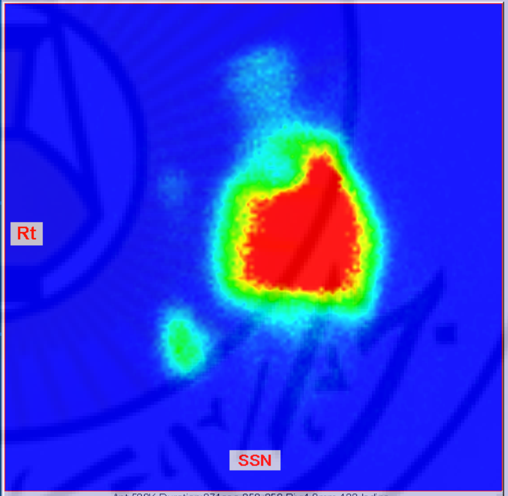
| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 198.1 | 3.2 | 2.8 |
| Number of Pixels : | 2429 | 657 | 232 |

Calibration Information

Isotope : 99m Technetium

| | |
|---|---|
| Injected dose ( Kcpm): | 684.3 |
| Full Syringe Activity ( Kcpm): | 698.4 |
| Empty Syringe Activity ( Kcpm): | 14.1 |
| Antecubital Activity ( Kcpm): | |

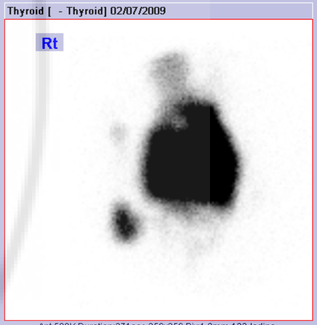
Patient Name: Hershawi, Salwa Patient ID: 784 DOB: 02/07/1957 Study Name: Thyroid Scan
Study Date: 02/07/2009




Ant 500K Duration:271sec 256x256 Pix:1.9mm 123-Iodine

Thyroid 123 Iodine 0.0 MBq (0.00 mCi)

Thyroid [ - Thyroid] 02/07/2009




Ant 500K Duration:271sec 256x256 Pix:1.9mm 123-Iodine

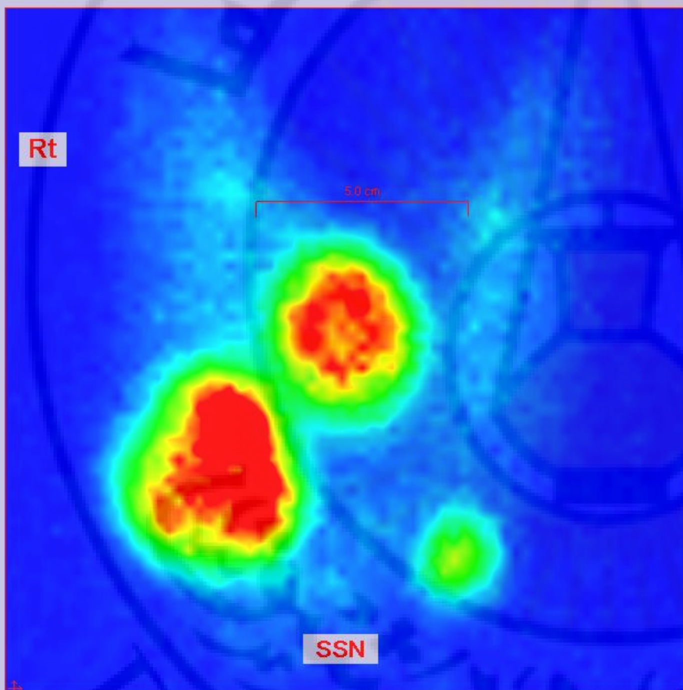
Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 77.5 | 5.4 | 72.1 | 0.1 |
| Uptake Rate/Pixel (%/Pixel) : | 3.6e-002 | 1.2e-002 | 4.2e-002 | 0.3 |
| Vert. Length (cm) : | | 0.8 | 0.9 | 0.8 |
| Hor. Length (cm) : | | 2.4 | 8.5 | 0.3 |
| Area (cm²) : | 81.0 | 16.6 | 64.4 | 0.3 |
| Volume (cm³) : | 36.7 | 2.3 | 34.3 | 0.1 |
| Allen | | | | |
| Weight (g) : | 23.2 | 4.1 | 19.1 | 0.2 |
| Pixel Size (mm) : | 1.9 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 26.1 | 349.0 | 4.1 |
| Number of Pixels : | 437 | 1698 | 176 |

Isotope : 123 Iodine

Patient Name: orabi, Nahed Patient ID: 779 DOB: 29/03/1963 Study Name: Thyroid Scan
Study Date: 29/03/2009




Thyroid [ - Thyroid] 30/03/2009


Ant 201K Duration:125sec 256x256 Pix:2.4mm 99m Technetium

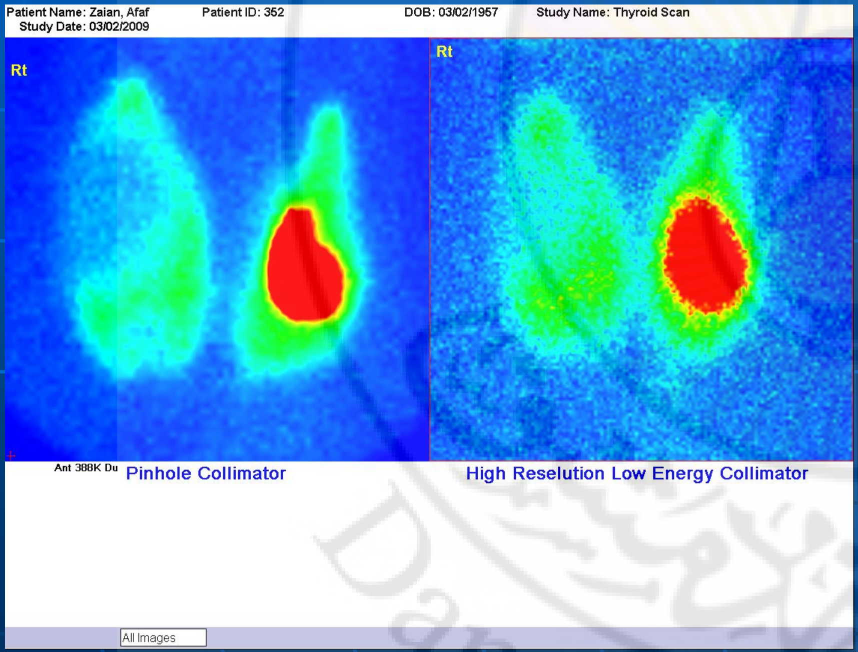
Result Statistics

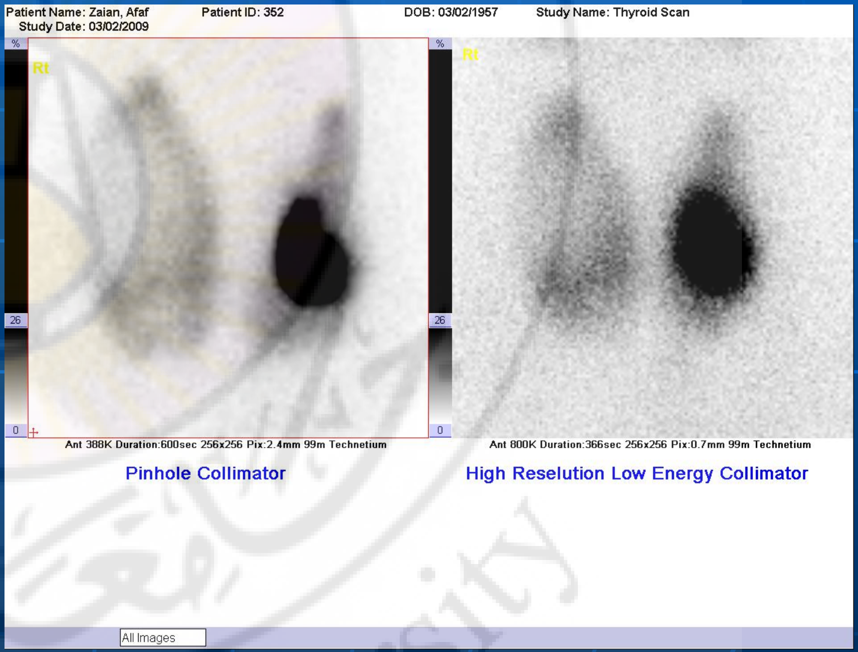
| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 10.4 | 1.5 | 8.9 | 0.2 |
| Uptake Rate/Pixel (%/Pixel) : | 7.3e-003 | 2.6e-003 | 1.1e-002 | 0.3 |
| Vert. Length (cm) : | | 2.3 | 1.9 | 1.2 |
| Hor. Length (cm) : | | 1.6 | 1.5 | 1.0 |
| Area (cm²) : | 81.2 | 32.7 | 48.6 | 0.7 |
| Volume (cm³) : | 5.3 | 2.9 | 2.4 | 1.2 |
| Allen | | | | |
| Weight (g) : | 54.2 | 23.9 | 30.3 | 0.8 |
| Pixel Size (mm) : | 2.4 | | | |

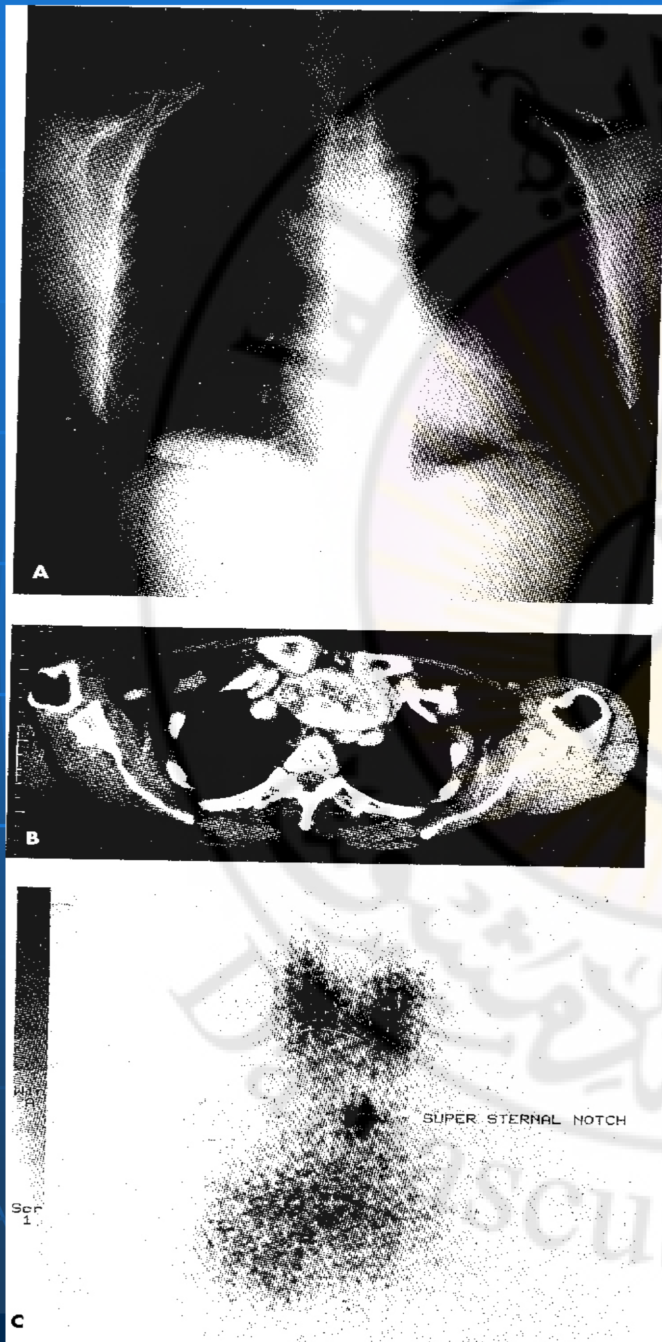
| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 18.5 | 110.0 | 2.8 |
| Number of Pixels : | 568 | 845 | 161 |

Thyroid 99m Technetium 0.0 MBq (0.00 mCi)

Isotope : 99m Technetium

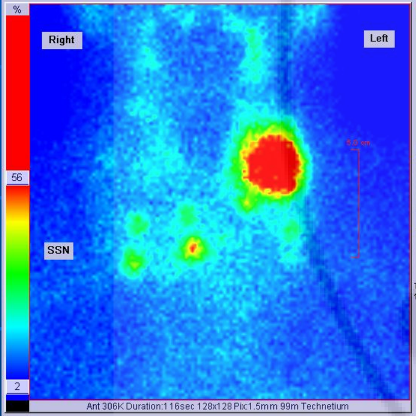

Patient Name: Zaian, Afaf
Study Date: 03/02/2009
Patient ID: 352
DOB: 03/02/1957
Study Name: Thyroid Scan
Rt
Rt
Ant 388K Du
Pinhole Collimator
High Reselution Low Energy Collimator
All Images

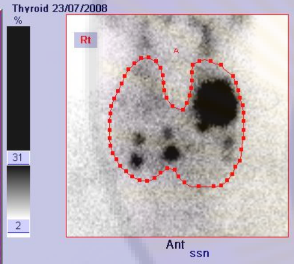

Patient Name: Zaian, Afaf
Study Date: 03/02/2009
Patient ID: 352
DOB: 03/02/1957
Study Name: Thyroid Scan
Rt
Rt
Ant 388K Duration:600sec 256x256 Pix:2.4mm 99m Technetium
Ant 800K Duration:366sec 256x256 Pix:0.7mm 99m Technetium
Pinhole Collimator
High Reselution Low Energy Collimator
All Images


A
B
SUPER STERNAL NOTCH
C


A
B

Patient Name: Shehada, Nadia Patient ID: 2567 DOB: 23/07/1973 Study Name: Thyroid Scan
Study Date: 23/07/2008




Thyroid
185.0 MBq (5.00 mCi) Pertechnetate
99m Technetium

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 2.7 | 0.8 | 1.9 | 0.4 |
| Uptake Rate/Pixel (%/Pixel) : | 6.4e-004 | 4.0e-004 | 8.7e-004 | 0.5 |
| Vert. Length (cm) : | | 10.2 | 11.3 | 0.9 |
| Hor. Length (cm) : | | 5.3 | 5.5 | 1.0 |
| Area (cm²) : | 95.3 | 45.5 | 49.9 | 0.9 |
| Volume (cm³) : | 329.9 | 149.5 | 180.3 | 0.8 |
| Ohkubo Weight (g) : | 286.8 | 129.5 | 157.3 | 0.8 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 28.4 | 68.4 | 4.5 |
| Number of Pixels : | 2025 | 2220 | 316 |

Calibration Information

Isotope : 99m Technetium

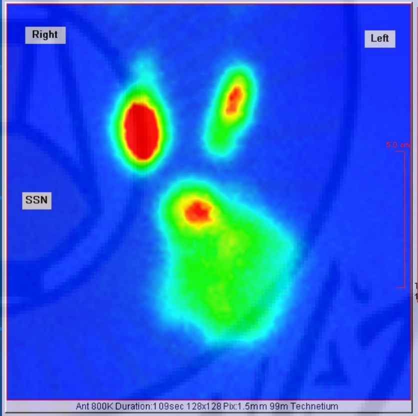
Injected dose (mCi): 6.0

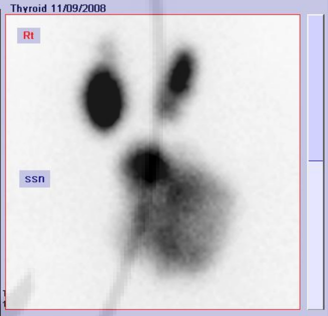
Full Syringe Activity (mCi): 6.0

Empty Syringe Activity (mCi):

Calibration Factor (Kcpm/mCi): 1111.0

Patient Name: Esmaiel, Kasma Patient ID: 5443 DOB: 11/09/1941 Study Name: Thyroid Scan
Study Date: 11/09/2008




Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 7.6 | 2.1 | 5.5 | 0.4 |
| Uptake Rate/Pixel (%/Pixel) : | 3.1e-003 | 3.7e-003 | 2.9e-003 | 1.3 |
| Vert. Length (cm) : | | 4.7 | 10.4 | 0.5 |
| Hor. Length (cm) : | | 2.8 | 5.6 | 0.5 |
| Area (cm²) : | 54.8 | 12.4 | 42.4 | 0.3 |
| Volume (cm³) : | 188.2 | 20.0 | 168.2 | 0.1 |
| Ohkubo Weight (g) : | 140.3 | 16.5 | 123.8 | 0.1 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 149.7 | 400.6 | 4.3 |
| Number of Pixels : | 554 | 1888 | 175 |

Calibration Information

Isotope : 99m Technetium

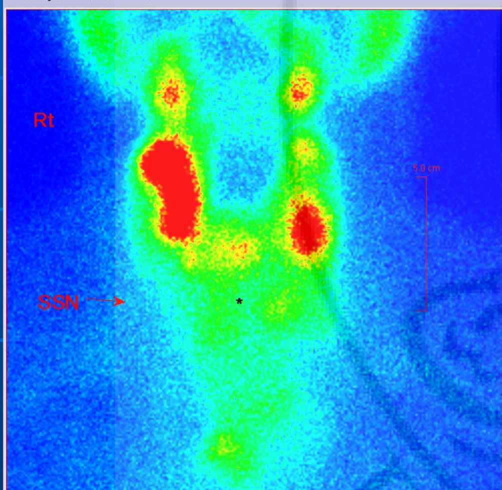
Injected dose (mCi): 5.0

Full Syringe Activity (mCi): 5.0

Empty Syringe Activity (mCi):

Calibration Factor (Kcpm/mCi): 3333.0

Patient Name: Sawwaf, Afaf    Patient ID: 276    DOB: 14/01/1934    Study Name: Thyroid Scan
Study Date: 14/01/2009




Ant 1200K Duration:556sec 256x256 Pix:0.7mm 99m Technetium

Thyroid    99m Technetium    185.0 MBq (5.00 mCi) Pertechnetate

Thyroid [ - Thyroid] 14/01/2009

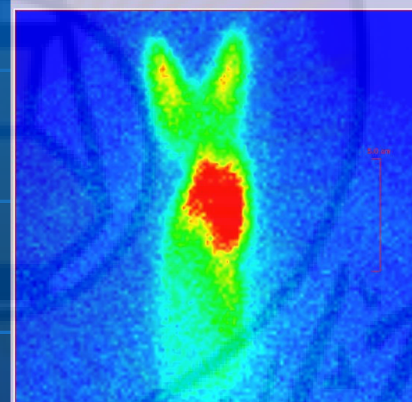

Ant 1200K Duration:556sec 256x256 Pix:0.7mm 99m Technetium

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 6.1 | 3.0 | 3.0 | 1.0 |
| Uptake Rate/Pixel (%/Pixel) : | 3.7e-00 | 4.8e-00 | 3.0e-00 | 1.6 |
| Vert. Length (cm) : | | 9.8 | 13.7 | 0.7 |
| Hor. Length (cm) : | | 4.1 | 4.8 | 0.9 |
| Area (cm²) : | 91.7 | 35.3 | 56.4 | 0.6 |
| Volume (cm³) : | 252.8 | 87.2 | 165.6 | 0.5 |
| Allen | | | | |
| Weight (g) : | 361.1 | 111.7 | 249.4 | 0.4 |
| Pixel Size (mm) : | 0.7 | | | |

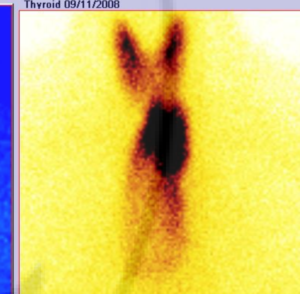
| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 201.6 | 201.0 | 9.2 |
| Number of Pixels : | 6286 | 10045 | 668 |

Patient Name: Hbobati, Manal    Patient ID: 4008    DOB: 09/11/1973    Study Name: Thyroid Scan
Study Date: 09/11/2008



Ant 422K Duration:162sec 128x128 Pix:1.5mm 99m Technetium

Thyroid 09/11/2008



Calibration Information

Isotope : 99m Technetium

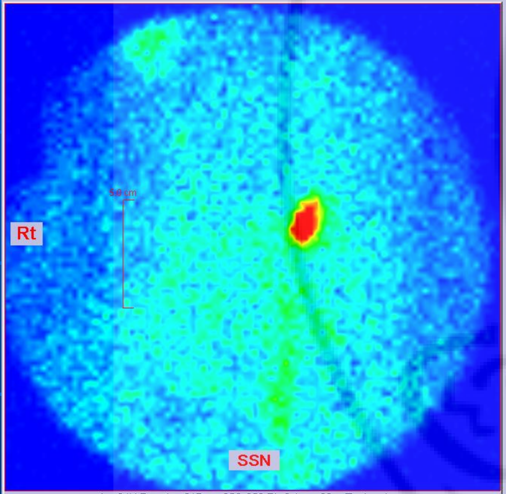
| | |
|---|---|
| Injected dose ( mCi ): | 5.0 |
| Full Syringe Activity ( mCi ): | 5.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/ mCi ): | 555.0 |

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 5.9 | 1.1 | 4.8 | 0.2 |
| Uptake Rate/Pixel (%/Pixel) : | 1.9e-00 | 2.1e-00 | 1.9e-00 | 1.1 |
| Vert. Length (cm) : | | 5.5 | 17.1 | 0.3 |
| Hor. Length (cm) : | | 2.2 | 3.6 | 0.6 |
| Area (cm²) : | 69.5 | 11.9 | 57.6 | 0.2 |
| Volume (cm³) : | 132.5 | 14.3 | 118.2 | 0.1 |
| Ohkubo | | | | |
| Weight (g) : | 293.5 | 18.2 | 275.3 | 0.1 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 24.4 | 107.7 | 7.6 |
| Number of Pixels : | 530 | 2567 | 267 |

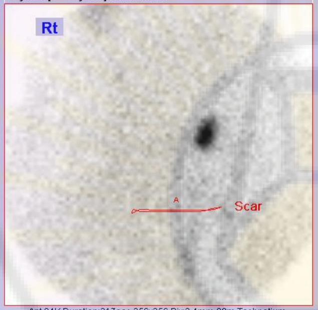
Patient Name: Kara Mohamad, Noama Patient ID: 347 DOB: 08/06/1982
Study Name: Thyroid Scan Study Date: 08/06/2009




Ant 94K Duration:317sec 256x256 Pix:2.4mm 99m Technetium

Thyroid 99m Technetium 0.0 MBq (0.00 mCi)

Thyroid [ - Thyroid] 08/06/2009




Ant 94K Duration:317sec 256x256 Pix:2.4mm 99m Technetium

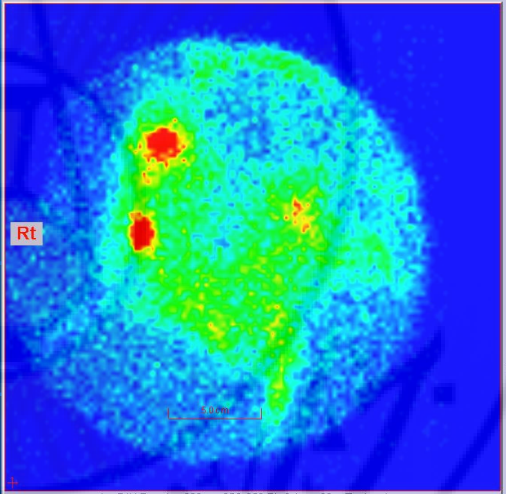
Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 0.1 | | 0.1 | -0.0 |
| Uptake Rate/Pixel (%/Pixel) : | 1.0e-00 | -7.6e-00 | 1.7e-00 | -0.0 |
| Vert. Length (cm) : | | 0.3 | 1.2 | 0.2 |
| Hor. Length (cm) : | | 0.5 | 1.7 | 0.3 |
| Area (cm²) : | 5.1 | 1.8 | 3.2 | 0.6 |
| Volume (cm³) : | 1.8 | 0.0 | 1.7 | 0.0 |
| Allen | | | | |
| Weight (g) : | 1.4 | 0.2 | 1.2 | 0.1 |
| Pixel Size (mm) : | 2.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | | 2.0 | 0.7 |
| Number of Pixels : | 32 | 56 | 39 |

Isotope : 99m Technetium

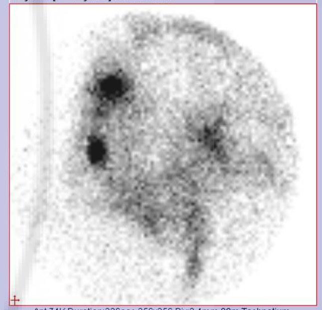
Patient Name: Zeidan, Ayman Patient ID: 5433 DOB: 05/03/1972 Study Name: Thyroid Scan
Study Date: 05/03/2009




Ant 74K Duration:236sec 256x256 Pix:2.4mm 99m Technetium

Thyroid 99m Technetium 0.0 MBq (0.00 mCi)

Thyroid [ - Thyroid] 05/03/2009



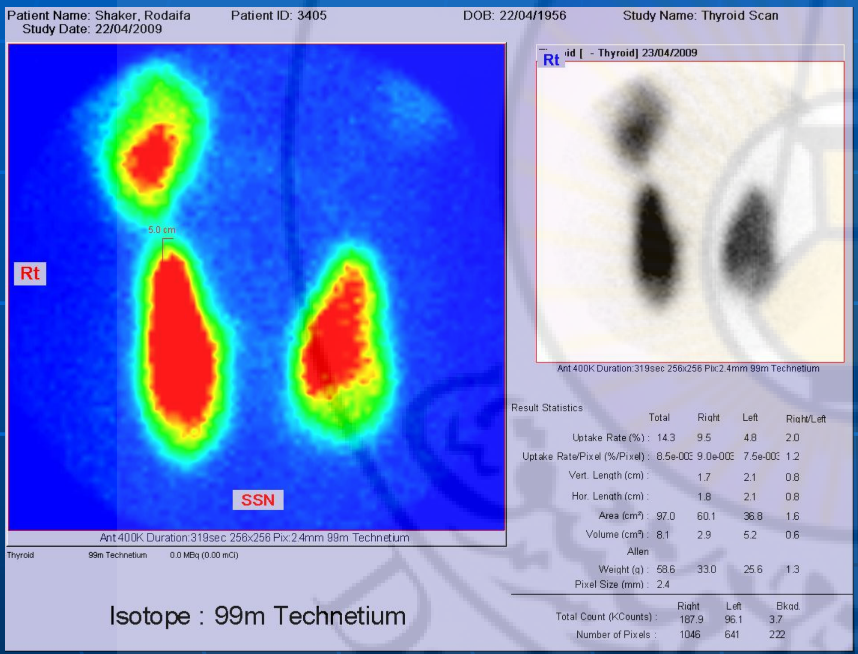
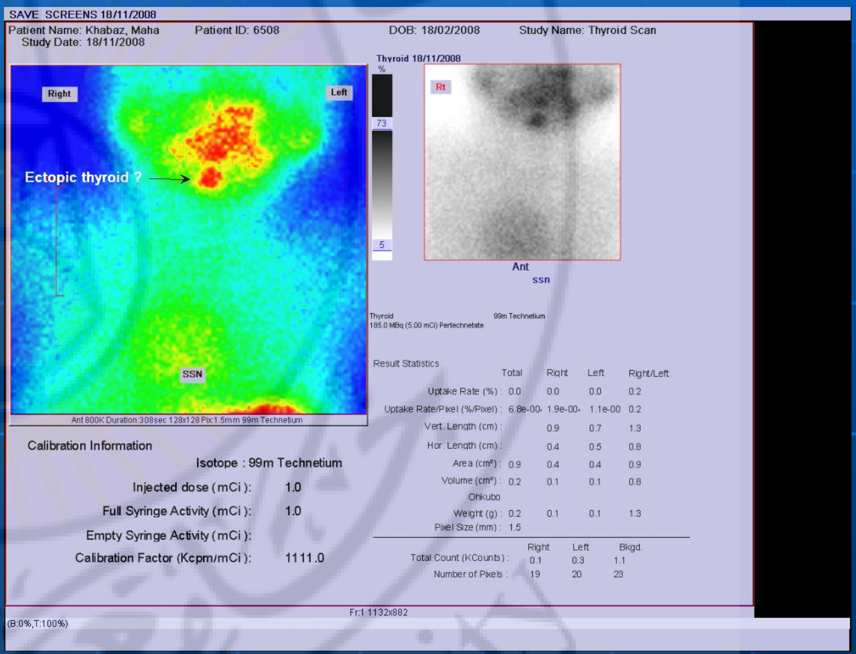
Ant 74K Duration:236sec 256x256 Pix:2.4mm 99m Technetium

Result Statistics

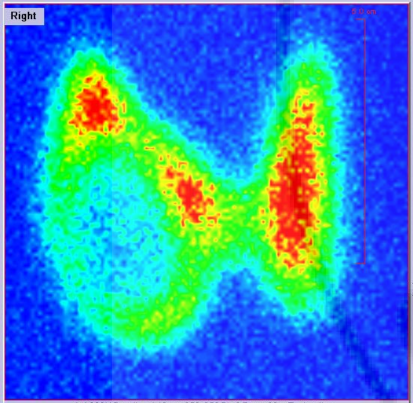
| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 0.2 | 0.1 | 0.1 | 0.7 |
| Uptake Rate/Pixel (%/Pixel) : | 1.0e-004 | 7.3e-00 | 1.3e-00 | 0.6 |
| Vert. Length (cm) : | | 1.0 | 1.4 | 0.7 |
| Hor. Length (cm) : | | 1.3 | 1.2 | 1.1 |
| Area (cm²) : | 98.6 | 53.7 | 44.8 | 1.2 |
| Volume (cm³) : | 1.8 | 0.8 | 1.0 | 0.8 |
| Allen | | | | |
| Weight (g) : | 36.5 | 16.8 | 19.7 | 0.9 |
| Pixel Size (mm) : | 2.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 7.3 | 11.1 | 1.6 |
| Number of Pixels : | 935 | 780 | 176 |

Isotope : 99m Technetium

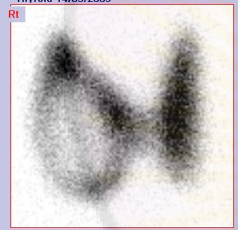

Patient Name: Shaker, Rodaifa
Patient ID: 3405
DOB: 22/04/1956
Study Name: Thyroid Scan
Study Date: 22/04/2009
Rt
5.0 cm
SSN
Ant 400K Duration:319sec 256x256 Pix:2.4mm 99m Technetium
Thyroid
99m Technetium
0.0 MBq (0.00 mCi)
Isotope : 99m Technetium
Ant 400K Duration:319sec 256x256 Pix:2.4mm 99m Technetium
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 14.3 9.5 4.8 2.0
Vert. Length (cm) : 1.7 2.1 0.8
Hor. Length (cm) : 1.8 2.1 0.8
Area (cm²) : 97.0 60.1 36.8 1.6
Volume (cm³) : 8.1 2.9 5.2 0.6
Allen
Weight (g) : 58.6 33.0 25.6 1.3
Pixel Size (mm) : 2.4
Right Left Bkgd.
Total Count (KCounts) : 187.9 96.1 3.7
Number of Pixels : 1046 641 222

SAVE SCREENS 18/11/2008
Patient Name: Khabaz, Maha
Patient ID: 6508
DOB: 18/02/2008
Study Name: Thyroid Scan
Study Date: 18/11/2008
Thyroid 18/11/2008
Right
Left
Ectopic thyroid ?
SSN
Rt
Ant
ssn
Calibration Information
Isotope : 99m Technetium
Injected dose (mCi): 1.0
Full Syringe Activity (mCi): 1.0
Empty Syringe Activity (mCi):
Calibration Factor (Kcpm/mCi): 1111.0
Result Statistics
Total Right Left Right/Left
Uptake Rate (%) : 0.0 0.0 0.0 0.2
Vert. Length (cm) : 0.9 0.7 1.3
Hor. Length (cm) : 0.4 0.5 0.8
Area (cm²) : 0.9 0.4 0.4 0.9
Volume (cm³) : 0.2 0.1 0.1 0.8
Ohkubo
Weight (g) : 0.2 0.1 0.1 1.3
Pixel Size (mm) : 1.5
Right Left Bkgd.
Total Count (KCounts) : 0.1 0.3 1.1
Number of Pixels : 19 20 23

Patient Name: Badreia, Saaied Patient ID: 7476 DOB: 14/05/1969 Study Name: Thyroid Scan
Study Date: 14/05/2009




Ant 306K Duration:140sec 256x256 Pix:0.7mm 99m Technetium

Thyroid 14/05/2009




Ant

Thyroid
185.0 ME

Calibration Information

Isotope : 99m Technetium

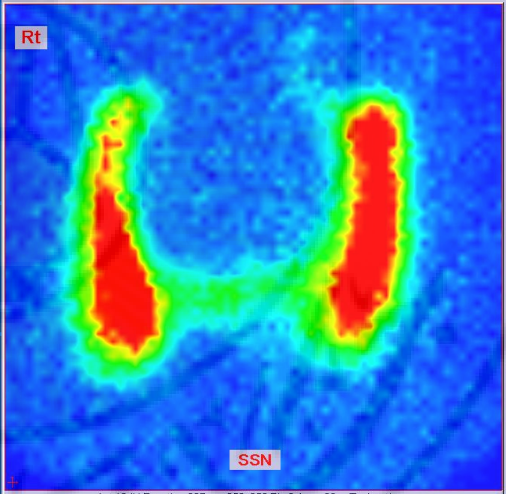
| | |
|---|---|
| Injected dose ( mCi ): | 10.0 |
| Full Syringe Activity ( mCi ): | 10.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/mCi ): | 666.0 |

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 3.3 | 1.9 | 1.4 | 1.4 |
| Uptake Rate/Pixel (%/Pixel) : | 6.7e-004 | 6.0e-004 | 8.0e-004 | 0.7 |
| Vert. Length (cm) : | | 5.2 | 4.0 | 1.3 |
| Hor. Length (cm) : | | 3.5 | 0.5 | 6.6 |
| Area (cm²) : | 27.4 | 17.7 | 9.7 | 1.8 |
| Volume (cm³) : | 34.7 | 34.1 | 0.6 | 57.5 |
| Ohkubo | | | | |
| Weight (g) : | 36.9 | 26.0 | 11.0 | 2.4 |
| Pixel Size (mm) : | 0.7 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 58.2 | 42.7 | 2.2 |
| Number of Pixels : | 3150 | 1728 | 318 |

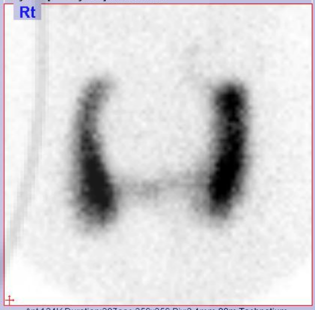
Patient Name: Shikh Mos, Khalsa Patient ID: 878 DOB: 24/02/1972 Study Name: Thyroid Scan
Study Date: 24/02/2009




Ant 124K Duration:307sec 256x256 Pix:2.4mm 99m Technetium

Thyroid 99m Technetium 0.0 MBq (0.00 mCi)

Thyroid [ - Thyroid] 24/02/2009




Ant 124K Duration:307sec 256x256 Pix:2.4mm 99m Technetium

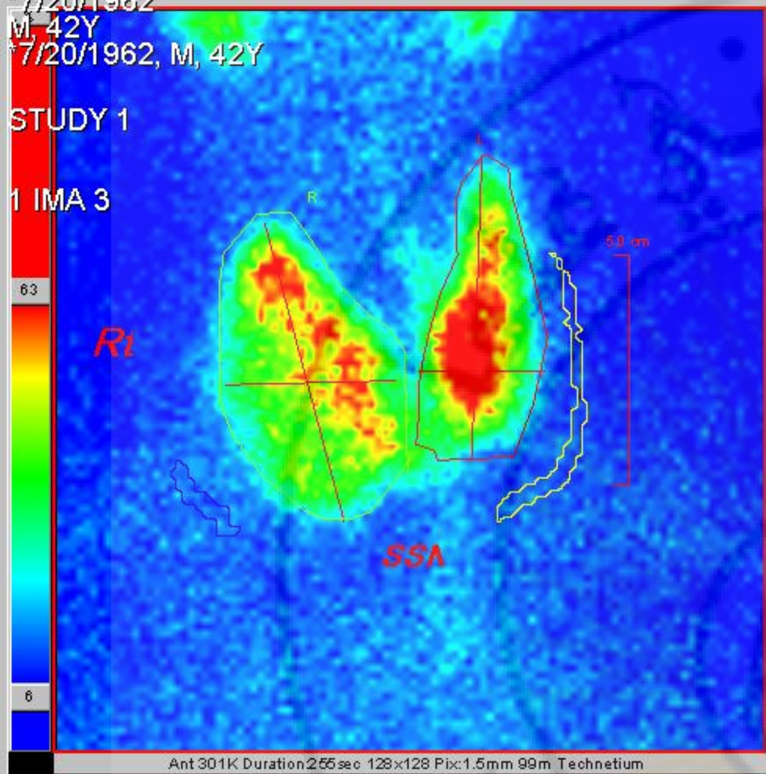
Result Statistics

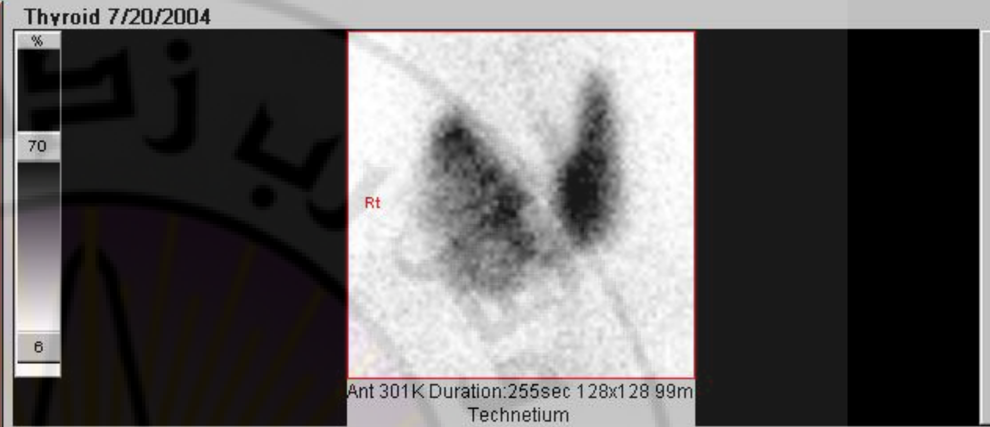
| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 2.0 | 1.1 | 0.9 | 1.2 |
| Uptake Rate/Pixel (%/Pixel) : | 1.7e-003 | 1.7e-003 | 1.7e-003 | 1.0 |
| Vert. Length (cm) : | | 1.5 | 1.4 | 1.1 |
| Hor. Length (cm) : | | 0.9 | 0.3 | 2.7 |
| Area (cm²) : | 67.3 | 36.0 | 31.3 | 1.2 |
| Volume (cm³) : | 0.7 | 0.6 | 0.1 | 7.6 |
| Allen | | | | |
| Weight (g) : | 31.2 | 17.1 | 14.1 | 1.2 |
| Pixel Size (mm) : | 2.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 33.3 | 27.9 | 1.6 |
| Number of Pixels : | 626 | 544 | 165 |

Isotope : 99m Technetium

Patient Name: Labbad, Mahmood Patient ID: 1066 DOB: 7/20/1962
Study Name: Thyroid Scan Study Date: 7/20/2004




Thyroid 99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

Calibration Information

Isotope : 99m Technetium

Injected dose (Kcpm): 952.6

Full Syringe Activity (Kcpm): 961.5

Empty Syringe Activity (Kcpm): 8.9

Antecubital Activity (Kcpm):

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 1.6 | 0.9 | 0.7 | 1.3 |
| Uptake Rate/Pixel (%/Pixel) : | 1.0e-003 | 9.5e-004 | 1.1e-003 | 0.8 |
| Vert. Length (cm) : | | 6.7 | 6.6 | 1.0 |
| Hor. Length (cm) : | | 3.7 | 2.7 | 1.4 |
| Area (cm²) : | 34.2 | 20.8 | 13.5 | 1.5 |
| Volume (cm³) : | 74.4 | 49.0 | 25.4 | 1.9 |

Allen

Weight (g) :

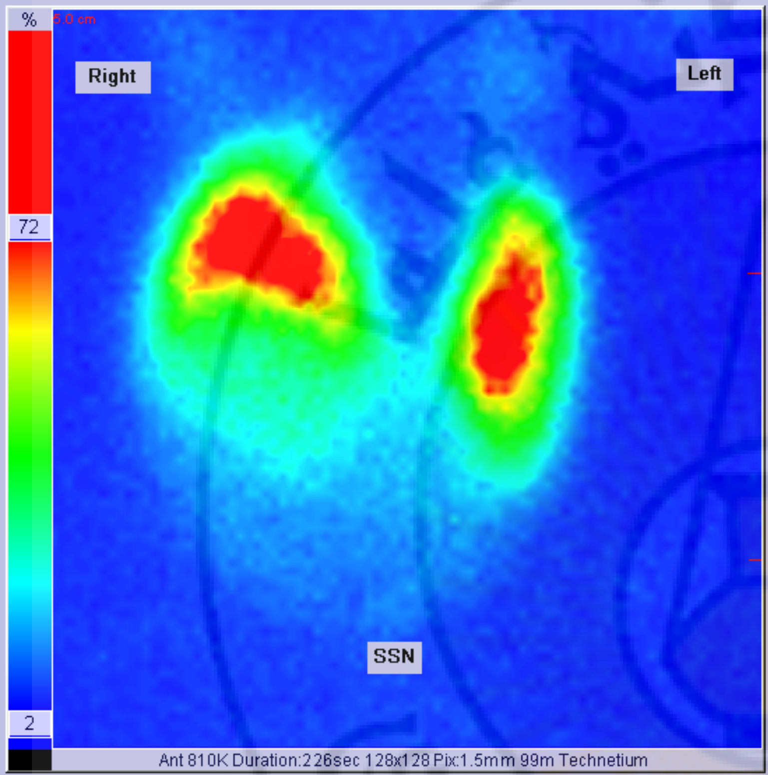
Pixel Size (mm) : 1.5

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 35.3 | 27.4 | 2.1 |
| Number of Pixels : | 926 | 599 | 133 |

895*1132

Thyroid Results

Patient Name: Allo, Badryeh    Patient ID: 208    DOB: 10/16/1953    Study Name: Adrenal Scan
Study Date: 10/16/2006




Thyroid 10/16/2006


Ant

ssn

All Images

Thyroid
185.0 MBq (5.00 mCi) Pertechnetate

99m Technetium

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 2.4 | 1.6 | 0.8 | 2.1 |
| Uptake Rate/Pixel (%/Pixel) : | 1.0e-003 | 8.7e-004 | 1.6e-003 | 0.6 |
| Vert. Length (cm) : | | 9.5 | 5.5 | 1.7 |
| Hor. Length (cm) : | | 4.7 | 2.3 | 2.1 |
| Area (cm²) : | 53.2 | 41.8 | 11.4 | 3.7 |
| Volume (cm³) : | 126.9 | 111.6 | 15.3 | 7.3 |
| Ohkubo | | | | |
| Weight (g) : | 128.5 | 111.0 | 17.5 | 6.3 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 244.7 | 118.7 | 7.4 |
| Number of Pixels : | 1860 | 508 | 222 |

## Calibration Information

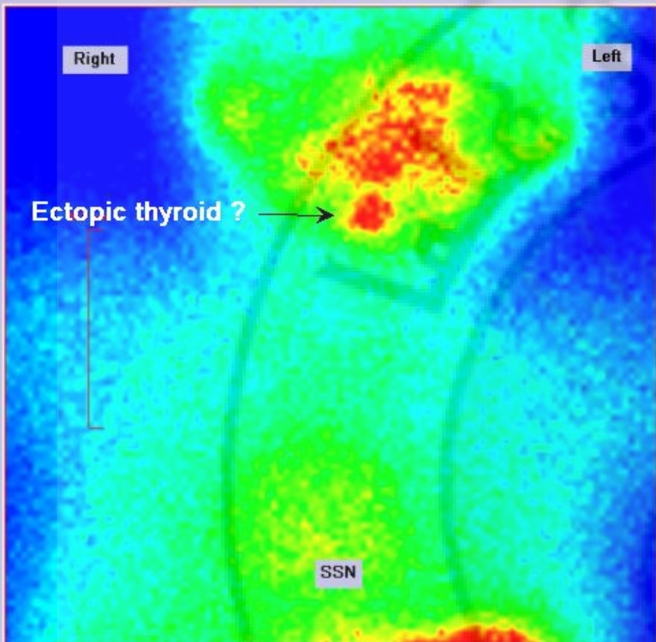
Isotope : 99m Technetium

| | |
|---|---|
| Injected dose (mCi): | 40.0 |
| Full Syringe Activity (mCi): | 40.0 |
| Empty Syringe Activity (mCi): | |
| Calibration Factor (Kcpm/mCi): | 333.0 |

SAVE SCREENS 18/11/2008

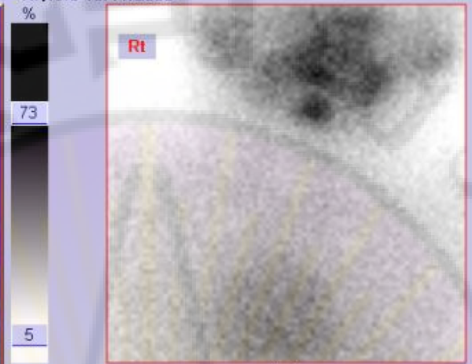
Patient Name: Khabaz, Maha Patient ID: 6508 DOB: 18/02/2008 Study Name: Thyroid Scan

Study Date: 18/11/2008




Ant 800K Duration:308sec 128x128 Pix1.5mm 99m Technetium

Thyroid 18/11/2008




Ant

ssn

Thyroid 99m Technetium

185.0 MBq (5.00 mCi) Pertechnetate

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 0.0 | 0.0 | 0.0 | 0.2 |
| Uptake Rate/Pixel (%/Pixel) : | 6.8e-00· | 1.9e-00· | 1.1e-00 | 0.2 |
| Vert. Length (cm) : | | 0.9 | 0.7 | 1.3 |
| Hor. Length (cm) : | | 0.4 | 0.5 | 0.8 |
| Area (cm²) : | 0.9 | 0.4 | 0.4 | 0.9 |
| Volume (cm³) : | 0.2 | 0.1 | 0.1 | 0.8 |
| Ohkubo | | | | |
| Weight (g) : | 0.2 | 0.1 | 0.1 | 1.3 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 0.1 | 0.3 | 1.1 |
| Number of Pixels : | 19 | 20 | 23 |

Calibration Information

Isotope : 99m Technetium

| | |
|---|---|
| Injected dose (mCi): | 1.0 |
| Full Syringe Activity (mCi): | 1.0 |
| Empty Syringe Activity (mCi): | |
| Calibration Factor (Kcpm/mCi): | 1111.0 |

Fr:1 1132x882

(B:0%,T:100%)

## Box 13-8 Differential Diagnosis of Thyroid Nodules

**BENIGN**

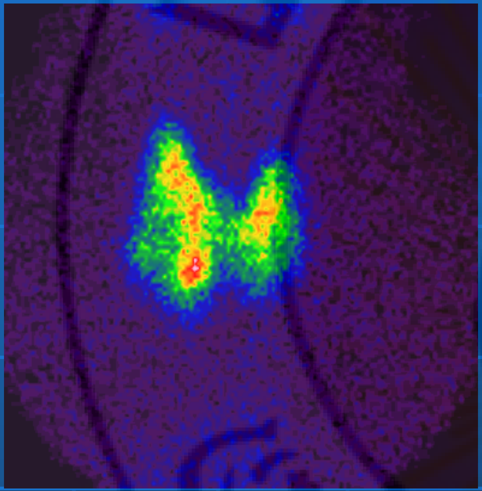
Colloid nodule
Simple cyst
Hemorrhagic cyst
Adenoma
Thyroiditis (focal)
Abscess
. Parathyroid cyst or adenoma

**MALIGNANT**

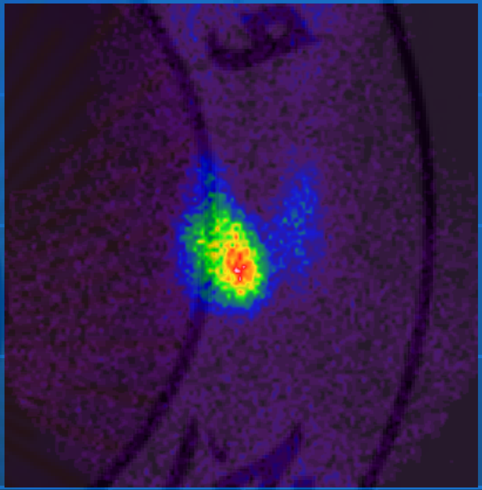
Thyroid cancer
Papillary
Follicular
Anaplastic
Medullary
Lymphoma
Metastatic carcinoma
Lung Breast
Melanoma
Gastrointestinal
Renal

***10-15% OF COLD NODULES ARE MALIGNANT***

# Thyroid Scanning with Tc-99m-Pertechnetate Well Established, Unequaled Performance



Thyroid Ca



Autonomous Adenoma

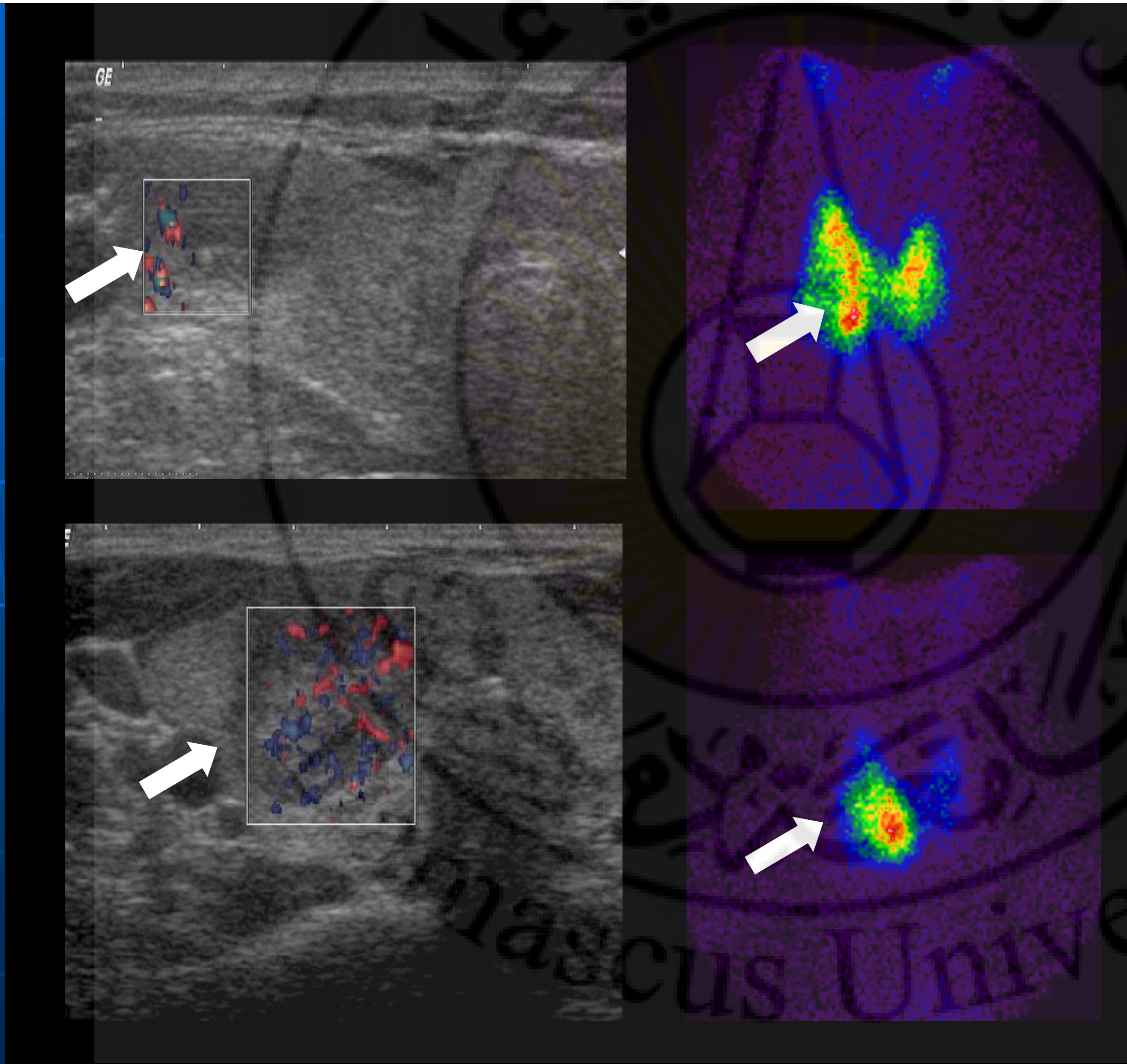
Indications: Hyperthyroidism, Dx. of autonomous nodules

Competitor: Practically none, ultrasound complementary

Advantage: Information on rate of hormone synthesis

# Nuclear Medicine versus Radiology

## Suspicious Thyroid Nodule



„Cold lesion“:
Malignancy ??
=> biopsy or surgery

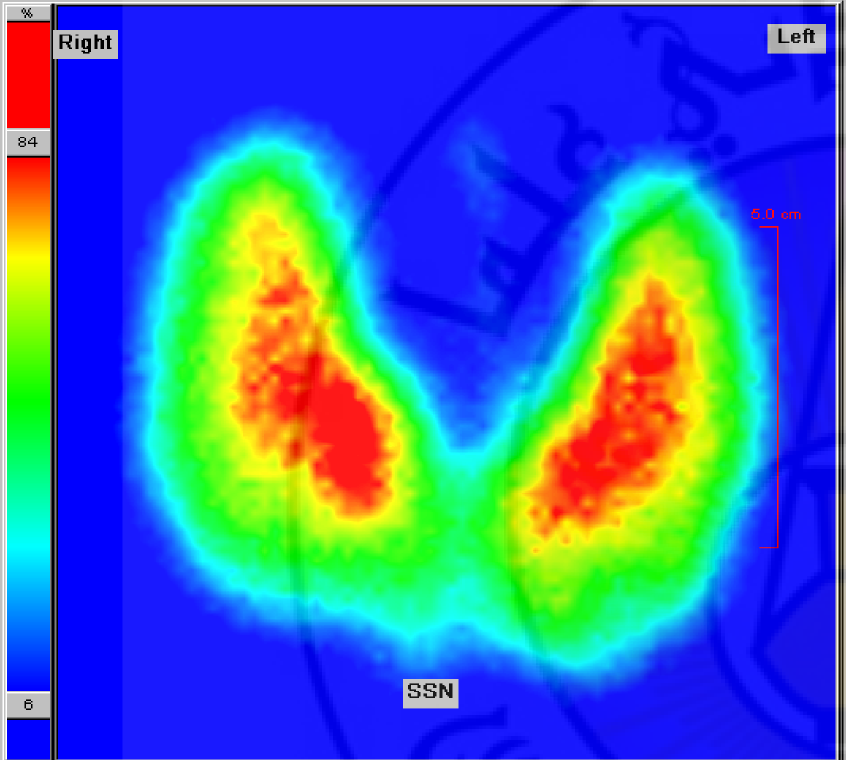
„Hot lesion“:
=> antithyroid drugs, Iodine-131 or surgery

# معالجة فرط نشاط الدرق باليود المشع ١٣١

- RADIOIODINE TREATMENT OF HYPERTHYROIDISM

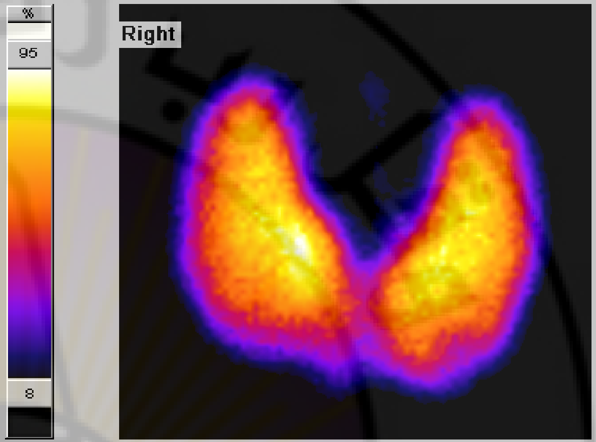
- Dose: 8 -29 mCi

Patient Name: Ebrahim, Ali Kaser    Patient ID: 8360    DOB: 7/6/1958
Study Name: Thyroid Scan    Study Date: 7/6/2005



Ant 1006K Duration:71sec 128x128 Pix1.5mm 99m Technetium

Thyroid 7/6/2005



Ant

Thyroid    99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

Calibration Information

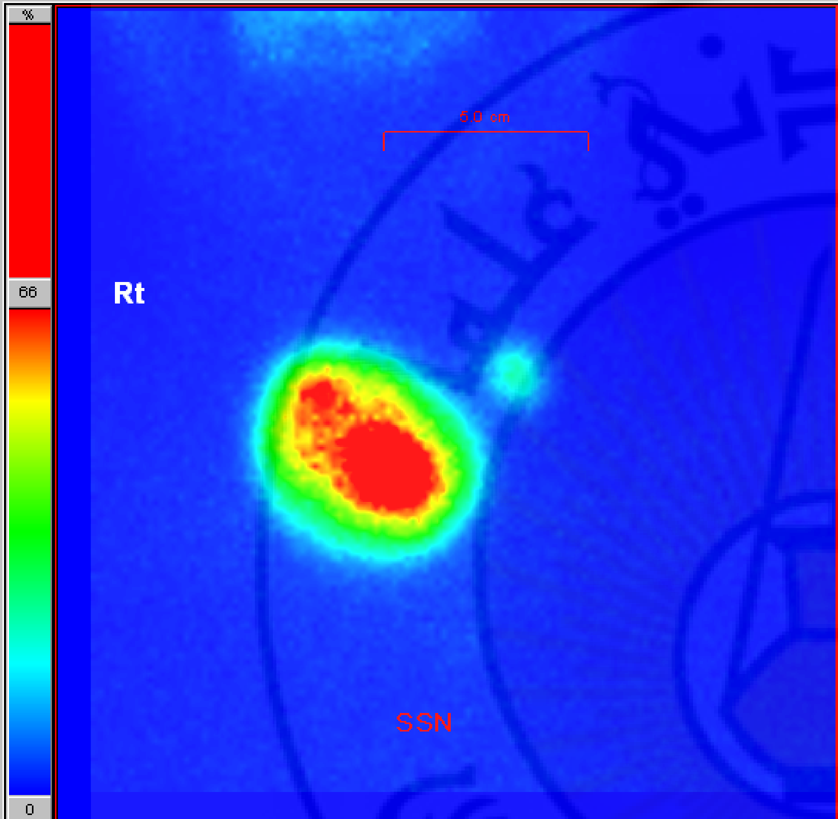
Isotope : 99m Technetium
Injected dose (Kcpm): 1151.1
Full Syringe Activity (Kcpm): 1181.3
Empty Syringe Activity (Kcpm): 30.2
Antecubital Activity (Kcpm):

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 60.4 | 31.3 | 29.1 | 1.1 |
| Uptake Rate/Pixel (%/Pixel) : | 2.2e-002 | 2.3e-002 | 2.2e-002 | 1.0 |
| Vert. Length (cm) : | | 8.1 | 8.0 | 1.0 |
| Hor. Length (cm) : | | 4.6 | 4.5 | 1.0 |
| Area (cm²) : | 61.4 | 31.2 | 30.2 | 1.0 |
| Volume (cm³) : | 175.0 | 90.4 | 84.6 | 1.1 |
| Ohkubo | | | | |
| Weight (g) : | 138.9 | 71.2 | 67.7 | 1.1 |
| Pixel Size (mm) : | 1.5 | | | |

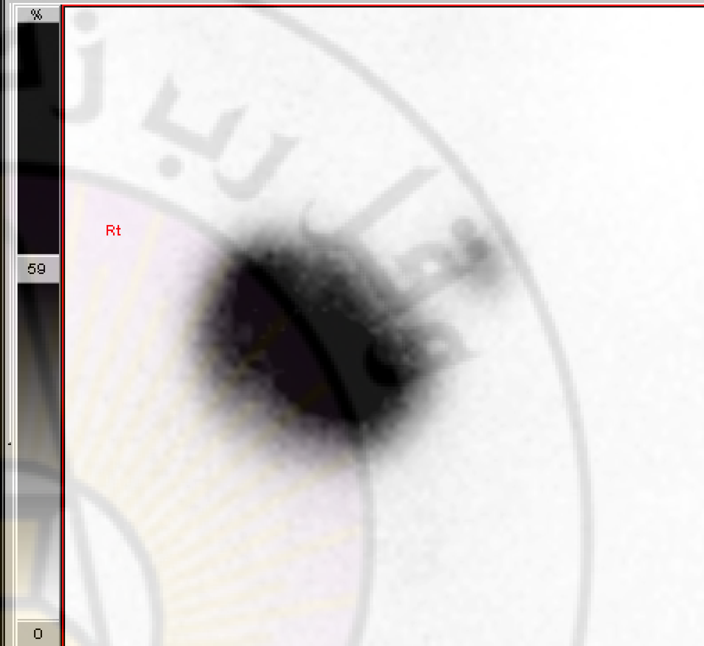
| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 426.8 | 397.3 | 5.4 |
| Number of Pixels : | 1391 | 1344 | 255 |

Patient Name: Dawood, Mouna Patient ID: 5704 DOB: 3/31/1973 Study Name: Thyroid Scan
Study Date: 3/31/2005



Ant 603K Duration:249sec 128x128 Pix:1.5mm 99m Technetium

Thyroid [ - Thyroid] 3/31/2005



Ant 603K

(B:0%,T:59%)

Thyroid [ - Thyr

Calibration Information

Isotope : 99m Technetium

Injected dose (Kcpm): 455.5

Full Syringe Activity (Kcpm): 497.3

Empty Syringe Activity (Kcpm): 41.7

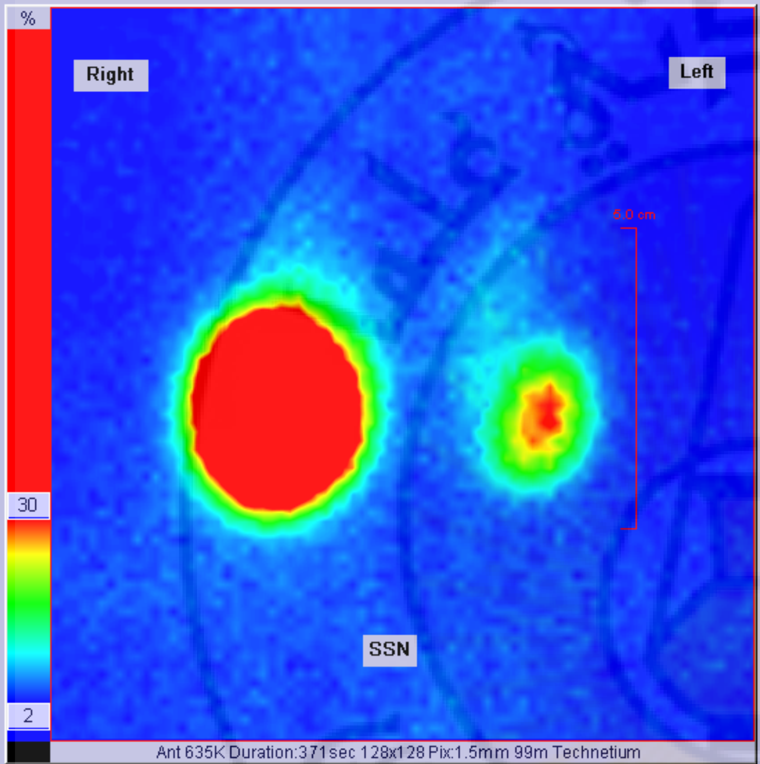
Antecubital Activity (Kcpm):

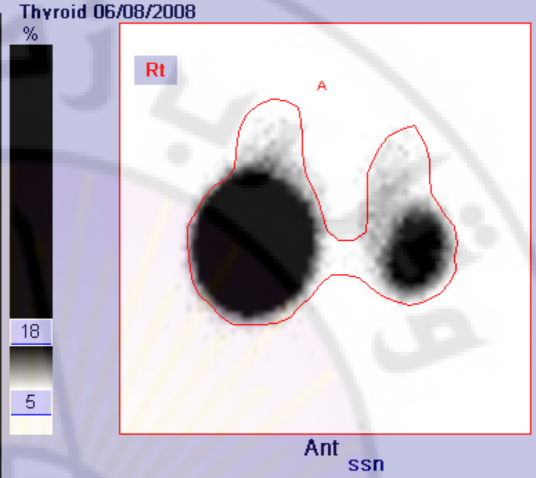
Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 18.0 | 17.3 | 0.7 | 24.5 |
| Uptake Rate/Pixel (%/Pixel) : | 1.3e-002 | 1.6e-002 | 2.0e-003 | 8.1 |
| Vert. Length (cm) : | | 6.3 | 3.9 | 1.6 |
| Hor. Length (cm) : | | 4.9 | 2.0 | 2.4 |
| Area (cm²) : | 32.1 | 24.1 | 8.0 | 3.0 |
| Volume (cm³) : | 89.0 | 80.5 | 8.5 | 9.5 |
| Allen | | | | |
| Weight (g) : | 59.3 | 49.3 | 10.0 | 4.9 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 325.8 | 13.3 | 4.7 |
| Number of Pixels : | 1073 | 355 | 150 |

Patient Name: Abu Hamra, Maha Patient ID: 8744 DOB: 06/08/1964 Study Name: Thyroid Scan
Study Date: 06/08/2008




Thyroid 99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

## Calibration Information

Isotope : 99m Technetium

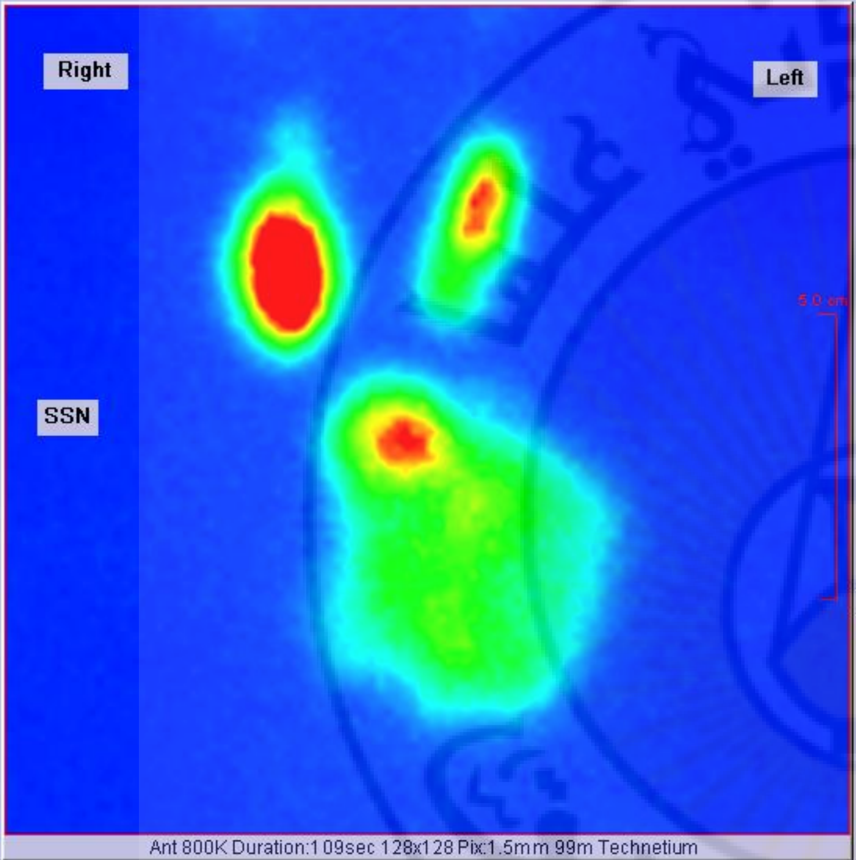
| | |
|---|---|
| Injected dose ( mCi ): | 5.0 |
| Full Syringe Activity ( mCi ): | 5.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/mCi ): | 444.0 |

Result Statistics

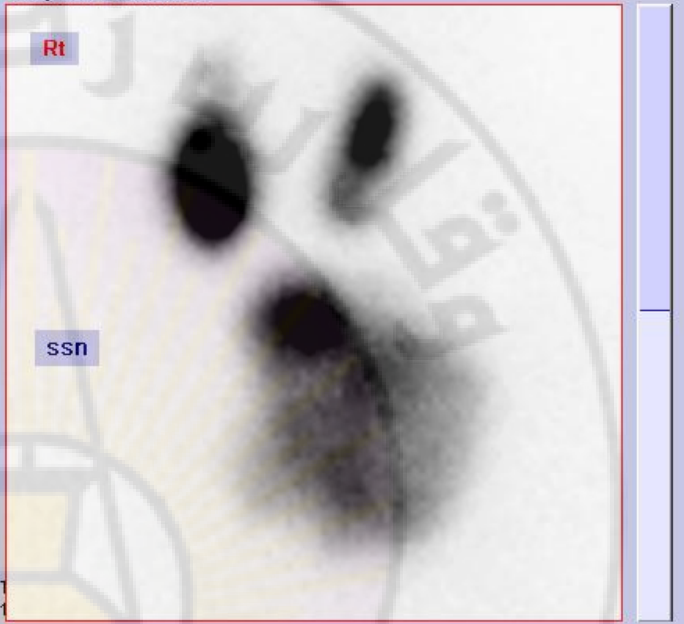
| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 11.8 | 10.3 | 1.5 | 6.8 |
| Uptake Rate/Pixel (%/Pixel) : | 9.8e-003 | 1.4e-002 | 3.4e-003 | 3.9 |
| Vert. Length (cm) : | | 5.6 | 4.3 | 1.3 |
| Hor. Length (cm) : | | 3.5 | 2.0 | 1.7 |
| Area ($cm^2$) : | 27.0 | 17.0 | 9.9 | 1.7 |
| Volume ($cm^3$) : | 45.3 | 36.0 | 9.3 | 3.9 |
| Ohkubo Weight (g) : | 38.5 | 26.5 | 12.0 | 2.2 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 204.4 | 30.1 | 4.4 |
| Number of Pixels : | 759 | 442 | 122 |

Patient Name: Esmaiel, Kasma Patient ID: 5443 DOB: 11/09/1941 Study Name: Thyroid Scan
Study Date: 11/09/2008




Thyroid 11/09/2008




Calibration Information

Isotope : 99m Technetium

Injected dose (mCi): 5.0

Full Syringe Activity (mCi): 5.0

Empty Syringe Activity (mCi):

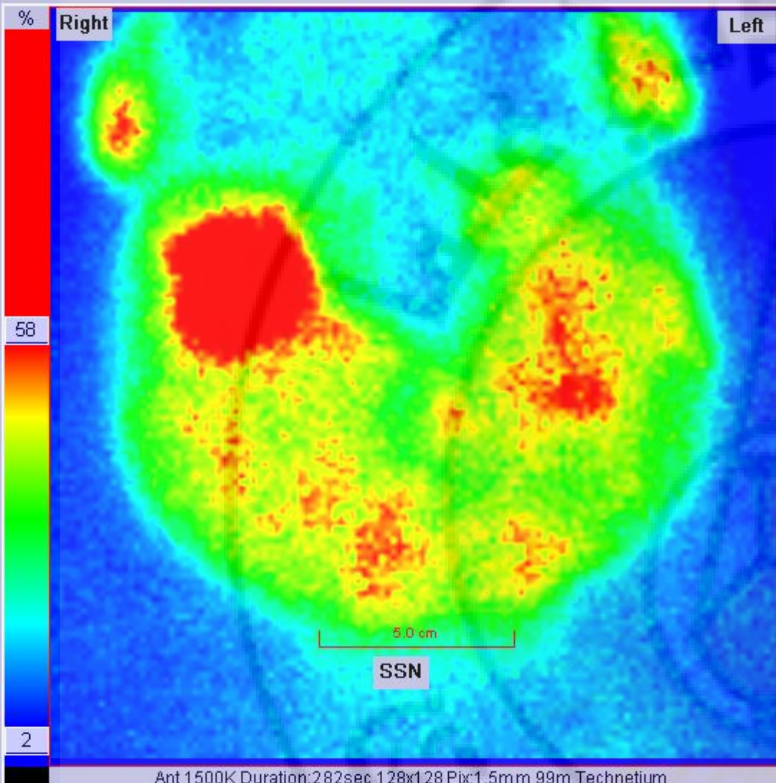
Calibration Factor (Kcpm/mCi): 3333.0

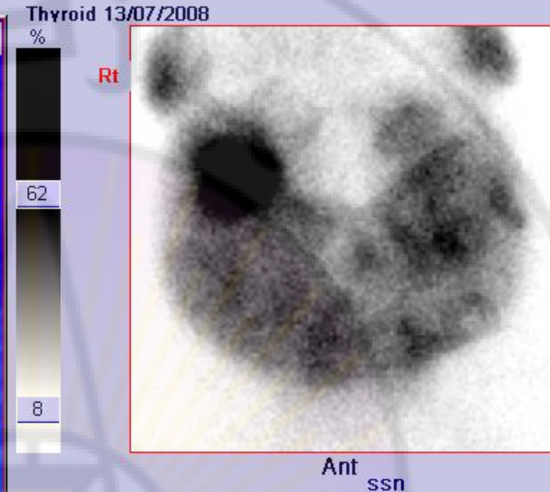
Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 7.6 | 2.1 | 5.5 | 0.4 |
| Uptake Rate/Pixel (%/Pixel) : | 3.1e-003 | 3.7e-003 | 2.9e-003 | 1.3 |
| Vert. Length (cm) : | | 4.7 | 10.4 | 0.5 |
| Hor. Length (cm) : | | 2.8 | 5.6 | 0.5 |
| Area ($cm^2$) : | 54.8 | 12.4 | 42.4 | 0.3 |
| Volume ($cm^3$) : | 188.2 | 20.0 | 168.2 | 0.1 |
| Ohkubo | | | | |
| Weight (g) : | 140.3 | 16.5 | 123.8 | 0.1 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 149.7 | 400.6 | 4.3 |
| Number of Pixels : | 554 | 1888 | 175 |

Patient Name: Nouri Hassoun, Souham Patient ID: 5333 DOB: 13/07/1936
Study Name: Thyroid Scan Study Date: 13/07/2008




Thyroid
185.0 MBq (5.00 mCi) Pertechnetate

99m Technetium

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 18.3 | 10.0 | 8.3 | 1.2 |
| Uptake Rate/Pixel (%/Pixel) : | 2.6e-003 | 3.0e-003 | 2.3e-003 | 1.3 |
| Vert. Length (cm) : | | 13.1 | 12.5 | 1.0 |
| Hor. Length (cm) : | | 8.1 | 7.9 | 1.0 |
| Area (cm²) : | 156.3 | 74.1 | 82.2 | 0.9 |
| Volume (cm³) : | 849.3 | 445.4 | 404.0 | 1.1 |
| Allen | | | | |
| Weight (g) : | 643.8 | 312.7 | 331.1 | 0.9 |
| Pixel Size (mm) : | 1.5 | | | |

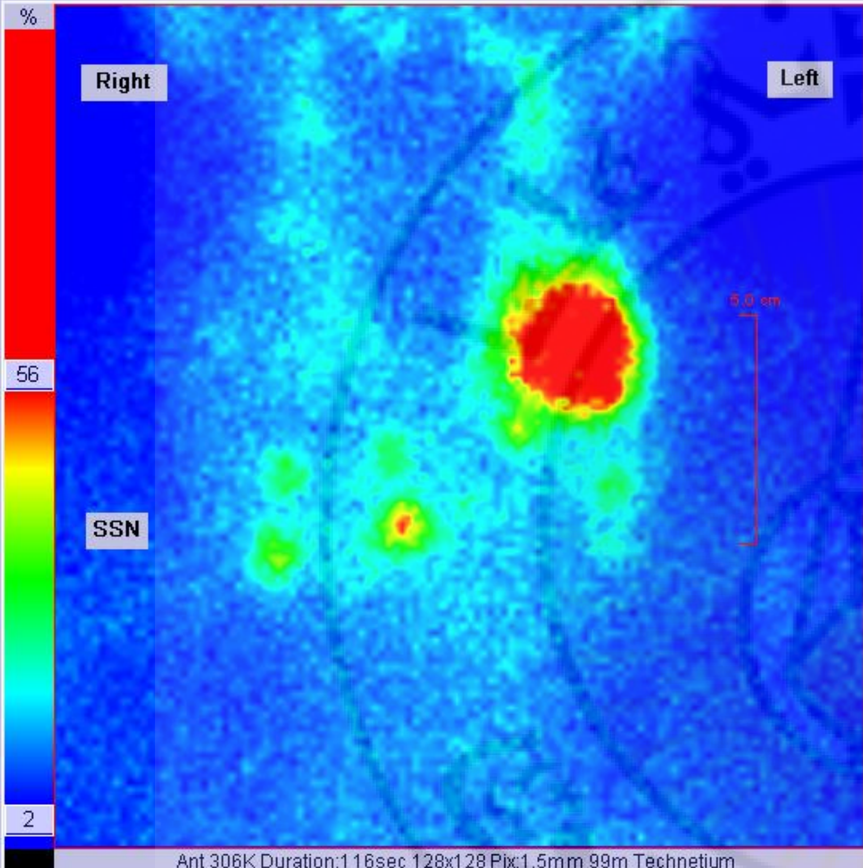
| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 433.8 | 359.8 | 14.6 |
| Number of Pixels : | 3299 | 3660 | 388 |

Calibration Information

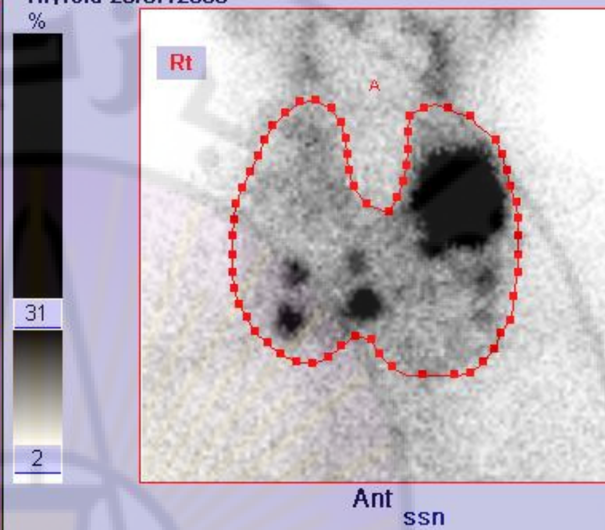
Isotope : 99m Technetium

| | |
|---|---|
| Injected dose (Kcpm): | 952.0 |
| Full Syringe Activity (Kcpm): | 1006.2 |
| Empty Syringe Activity (Kcpm): | 54.2 |
| Antecubital Activity (Kcpm): | |

Patient Name: Shehada, Nadia　　Patient ID: 2567　　DOB: 23/07/1973　　Study Name: Thyroid Scan
Study Date: 23/07/2008




Thyroid 23/07/2008




Thyroid　　99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

## Calibration Information

Isotope : 99m Technetium

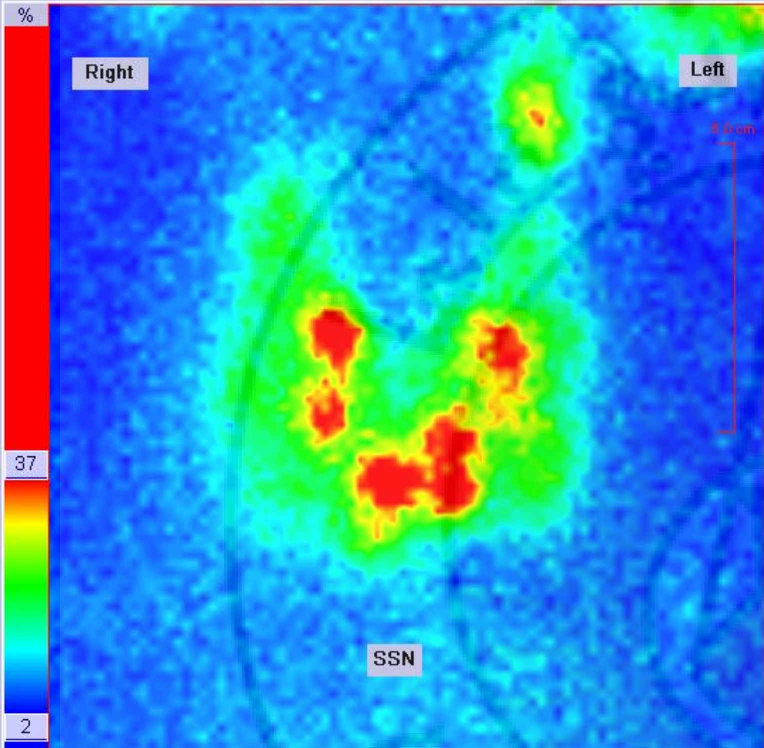
| | |
|---|---|
| Injected dose ( mCi ): | 6.0 |
| Full Syringe Activity ( mCi ): | 6.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/mCi ): | 1111.0 |

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 2.7 | 0.8 | 1.9 | 0.4 |
| Uptake Rate/Pixel (%/Pixel) : | 6.4e-004 | 4.0e-004 | 8.7e-004 | 0.5 |
| Vert. Length (cm) : | | 10.2 | 11.3 | 0.9 |
| Hor. Length (cm) : | | 5.3 | 5.5 | 1.0 |
| Area (cm²) : | 95.3 | 45.5 | 49.9 | 0.9 |
| Volume (cm³) : | 329.9 | 149.5 | 180.3 | 0.8 |
| Ohkubo | | | | |
| Weight (g) : | 286.8 | 129.5 | 157.3 | 0.8 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 28.4 | 68.4 | 4.5 |
| Number of Pixels : | 2025 | 2220 | 316 |

Patient Name: Salman, Rozen Patient ID: 2604 DOB: 11/06/1948 Study Name: Thyroid Scan
Study Date: 11/06/2008



Ant 423K Duration:171sec 128x128 Pix:1.5mm 99m Technetium

Thyroid 11/06/2008

Ant
ssn

Thyroid
185.0 MBq (5.00 mCi) Pertechnetate

99m Technetium

Calibration Information

Isotope : 99m Technetium

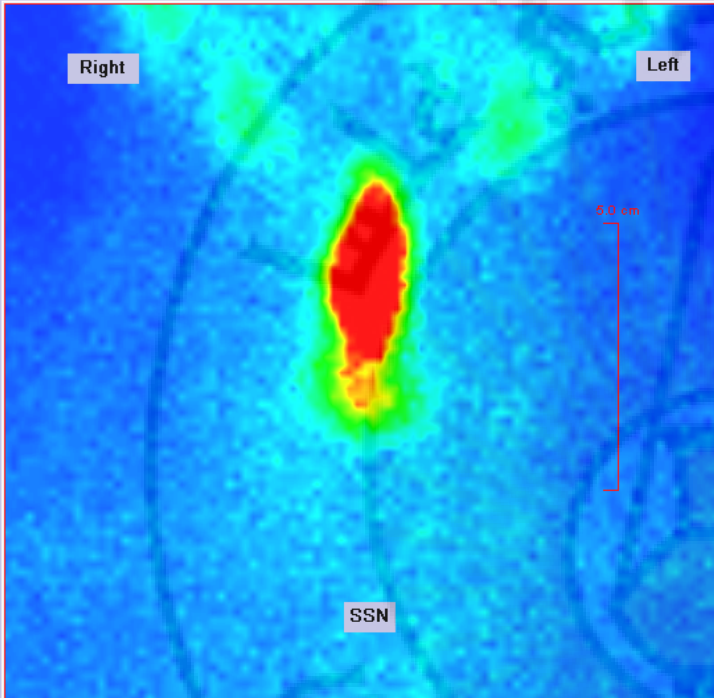
| | |
|---|---|
| Injected dose ( mCi ): | 44.0 |
| Full Syringe Activity ( mCi ): | 44.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/mCi ): | 111.0 |

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 1.9 | 1.1 | 0.9 | 1.2 |
| Uptake Rate/Pixel (%/Pixel) : | 1.0e-003 | 9.2e-004 | 1.1e-003 | 0.8 |
| Vert. Length (cm) : | | 7.5 | 5.8 | 1.3 |
| Hor. Length (cm) : | | 3.7 | 3.5 | 1.1 |
| Area ($cm^2$) : | 43.0 | 26.0 | 17.0 | 1.5 |
| Volume ($cm^3$) : | 90.9 | 54.2 | 36.7 | 1.5 |
| Ohkubo | | | | |
| Weight (g) : | 82.1 | 54.6 | 27.5 | 2.0 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 41.1 | 33.4 | 4.1 |
| Number of Pixels : | 1158 | 756 | 212 |

Patient Name: Kholi, Rinaet Patient ID: 5322 DOB: 13/11/1958 Study Name: Thyroid Scan
Study Date: 13/11/2008




Ant 438K Duration:205sec 128x128 Pix:1.5mm 99m Technetium

Thyroid 13/11/2008



Ant ssn

Thyroid
185.0 MBq (5.00 mCi) Pertechnetate

99m Technetium

## Calibration Information

Isotope : 99m Technetium

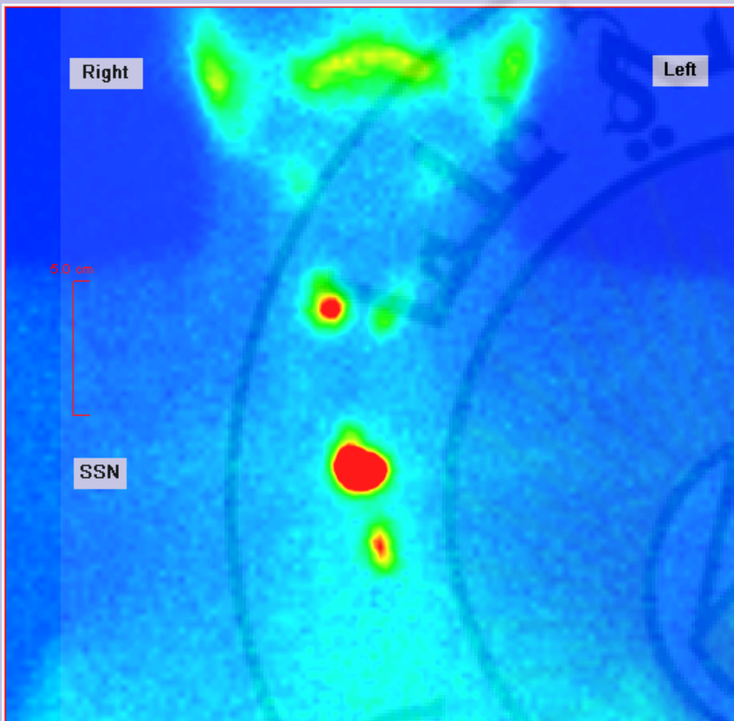
| | |
|---|---|
| Injected dose ( mCi ): | 5.0 |
| Full Syringe Activity ( mCi ): | 5.0 |
| Empty Syringe Activity ( mCi ): | |
| Calibration Factor (Kcpm/mCi ): | 999.0 |

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 0.9 | 0.0 | 0.9 | 0.0 |
| Uptake Rate/Pixel (%/Pixel) : | 3.9e-003 | 5.5e-005 | 3.9e-003 | 0.0 |
| Vert. Length (cm) : | | 0.4 | 3.6 | 0.1 |
| Hor. Length (cm) : | | 0.2 | 1.5 | 0.2 |
| Area ($cm^2$) : | 5.0 | 0.1 | 4.9 | 0.0 |
| Volume ($cm^3$) : | 4.1 | 0.0 | 4.1 | 0.0 |
| Ohkubo | | | | |
| Weight (g) : | 4.9 | 0.0 | 4.9 | 0.0 |
| Pixel Size (mm) : | 1.5 | | | |

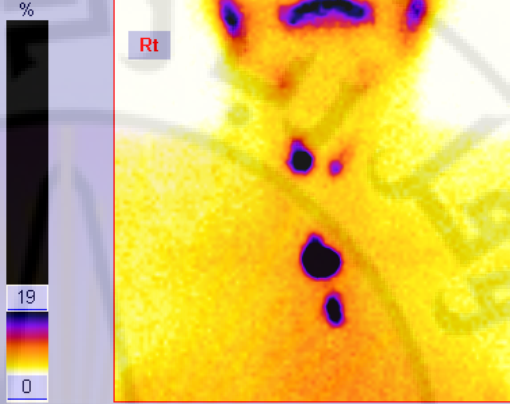
| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 0.0 | 43.9 | 2.6 |
| Number of Pixels : | 4 | 218 | 56 |

Patient Name: Mohamad, Jinan Ahmad    Patient ID: 7585    DOB: 07/09/1990
Study Name: Thyroid Scan    Study Date: 07/09/2008




Ant 800K Duration:182sec 128x128 Pix:2.4mm 99m Technetium

Thyroid 07/09/2008




Ant
ssn

Thyroid
185.0 MBq (5.00 mCi) Pertechnetate

99m Technetium

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 0.4 | 0.0 | 0.3 | 0.2 |
| Uptake Rate/Pixel (%/Pixel) : | 1.7e-003 | 1.6e-003 | 1.7e-003 | 1.0 |
| Vert. Length (cm) : | | 2.1 | 1.9 | 1.1 |
| Hor. Length (cm) : | | 1.5 | 5.0 | 0.3 |
| Area ($cm^2$) : | 12.3 | 1.8 | 10.5 | 0.2 |
| Volume ($cm^3$) : | 27.7 | 2.5 | 25.2 | 0.1 |
| Ohkubo | | | | |
| Weight (g) : | 6.6 | 1.0 | 5.6 | 0.2 |
| Pixel Size (mm) : | 2.4 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 7.8 | 48.2 | 4.5 |
| Number of Pixels : | 31 | 183 | 54 |

Calibration Information

Isotope : 99m Technetium

Injected dose ( mCi ): 5.0

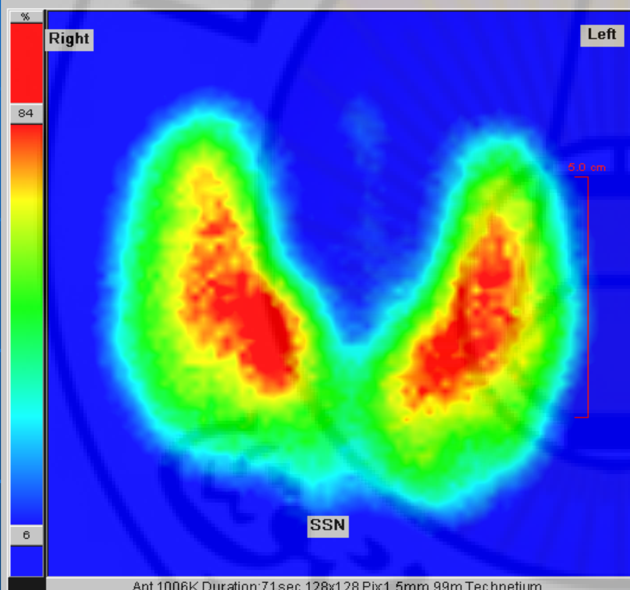
Full Syringe Activity ( mCi ): 5.0

Empty Syringe Activity ( mCi ):

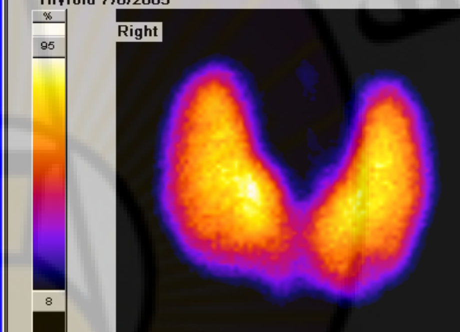
Calibration Factor (Kcpm/mCi ): 7777.0

# معالجة فرط نشاط الدرق
# باليود المشع ١٣١

Patient Name: Ebrahim, Ali Kaser  Patient ID: 8360  DOB: 7/6/1958
Study Name: Thyroid Scan  Study Date: 7/6/2005




Thyroid 7/6/2005




Thyroid  99m Technetium
185.0 MBq (5.00 mCi) Pertechnetate

Calibration Information

Isotope : 99m Technetium
Injected dose (Kcpm): 1151.1
Full Syringe Activity (Kcpm): 1181.3
Empty Syringe Activity (Kcpm): 30.2
Antecubital Activity (Kcpm):

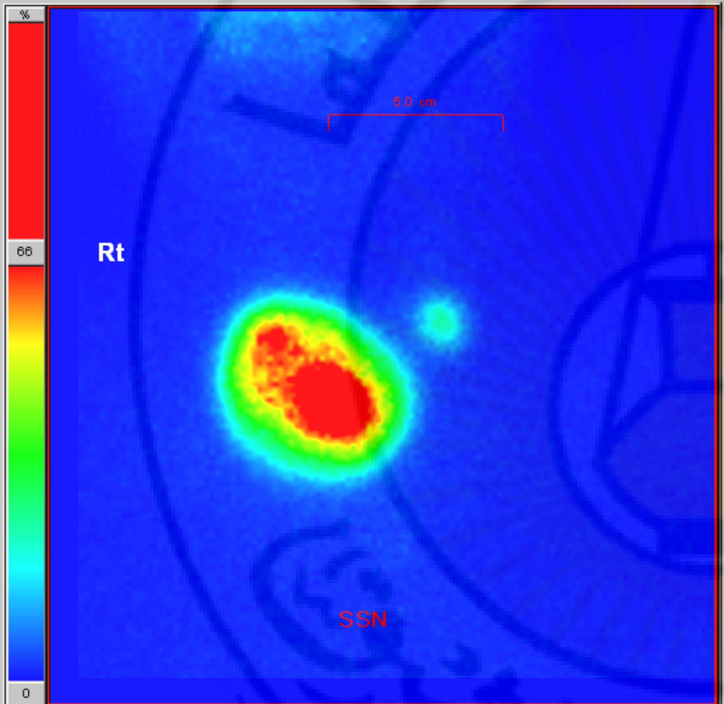
Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 60.4 | 31.3 | 29.1 | 1.1 |
| Uptake Rate/Pixel (%/Pixel) : | 2.2e-002 | 2.3e-002 | 2.2e-002 | 1.0 |
| Vert. Length (cm) : | | 8.1 | 8.0 | 1.0 |
| Hor. Length (cm) : | | 4.6 | 4.5 | 1.0 |
| Area (cm²) : | 61.4 | 31.2 | 30.2 | 1.0 |
| Volume (cm³) : | 175.0 | 90.4 | 84.6 | 1.1 |
| Ohkubo | | | | |
| Weight(g) : | 138.9 | 71.2 | 67.7 | 1.1 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 426.8 | 397.3 | 54 |
| Number of Pixels : | 1391 | 1344 | 255 |

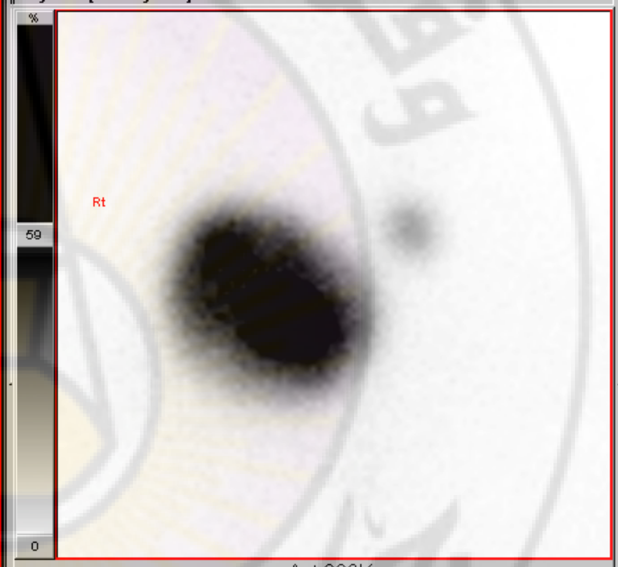
# معالجة الأدينوم الدرقي السام باليود المشع ١٣١

Patient Name: Dawood, Mouna    Patient ID: 5704    DOB: 3/31/1973    Study Name: Thyroid Scan
Study Date: 3/31/2005



Ant 603K Duration:249sec 128x128 Pix:1.5mm 99m Technetium

Thyroid [ - Thyroid] 3/31/2005



Ant 603K

(B:0%,T:59%)

Calibration Information

Isotope : 99m Technetium

Injected dose (Kcpm): 455.5

Full Syringe Activity (Kcpm): 497.3

Empty Syringe Activity (Kcpm): 41.7

Antecubital Activity (Kcpm):

Result Statistics

| | Total | Right | Left | Right/Left |
|---|---|---|---|---|
| Uptake Rate (%) : | 18.0 | 17.3 | 0.7 | 24.5 |
| Uptake Rate/Pixel (%/Pixel) : | 1.3e-002 | 1.6e-002 | 2.0e-003 | 8.1 |
| Vert. Length (cm) : | | 6.3 | 3.9 | 1.6 |
| Hor. Length (cm) : | | 4.9 | 2.0 | 2.4 |
| Area (cm²) : | 32.1 | 24.1 | 8.0 | 3.0 |
| Volume (cm³) : | 89.0 | 80.5 | 8.5 | 9.5 |
| Allen | | | | |
| Weight (g) : | 59.3 | 49.3 | 10.0 | 4.9 |
| Pixel Size (mm) : | 1.5 | | | |

| | Right | Left | Bkgd. |
|---|---|---|---|
| Total Count (KCounts) : | 325.8 | 13.3 | 4.7 |
| Number of Pixels : | 1073 | 355 | 150 |

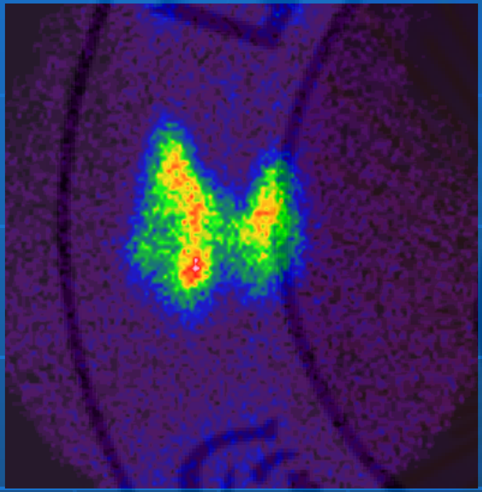
# معالجة الكارسينوما الدرقية

## THYROID CARCINOMAS

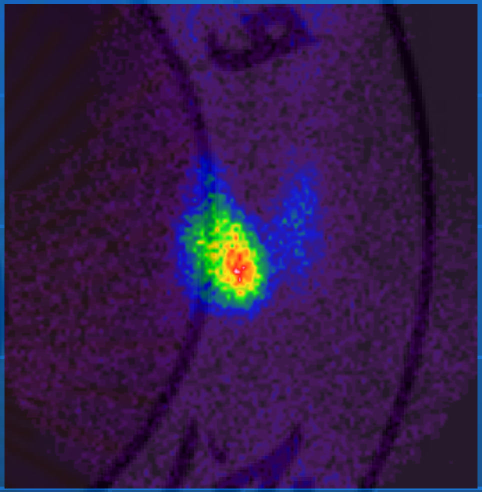
EnForCé

- treatment of thyroid carcinomas by
  - surgery
  - radioiodide therapy
  - TSH-suppressive T4-application
  - (chemotherapy, external radiation)
- usually good prognosis
- dedifferentiated thyroid carcinomas (~ 30 %) resistant to standard therapy due to loss of thyroid-specific functions
- anaplastic thyroid carcinomas: mean survival ≤ 8 m
- alternative therapeutic concepts desirable

# Thyroid Scanning with Tc-99m-Pertechnetate Well Established, Unequaled Performance



Thyroid Ca



Autonomous Adenoma

Indications: Hyperthyroidism, Dx. of autonomous nodules

Competitor: Practically none, ultrasound complementary

Advantage: Information on rate of hormone synthesis

## RADIOIODINE TREATMENT OF THYROID CANCER

## المعالجة باليود المشع لسرطان الدرق

Radioactive iodine is also used in the treatment of differentiated thyroid cancer. It is not useful for treating anaplastic and medullary tumors. It is fair to say that there is a vast divergence of opinion on how and when to employ radioactive iodine.

Metastatic disease is most common locally in the neck. Distant metastases are most common in the lung and skeleton. An initial dose of 150 to 200 mCi is administered after appropriate patient preparation. Repeated doses up to a total of 1 Ci may be required. Skeletal metastases are more difficult to eradicate than lung metastases

المسح الومضاني لكامل الجسم باليود المشع ١٣١

## Box 13-6 I-131 Whole Body Imaging in Thyroid Cancer: Protocol Summary

Discontinue thyroid hormone for a sufficient period (Ti for 6 wk, T., for 2-3 wk) to ensure an endogenous TSH response.

DOSAGE AND ROUTE OF ADMINISTRATION

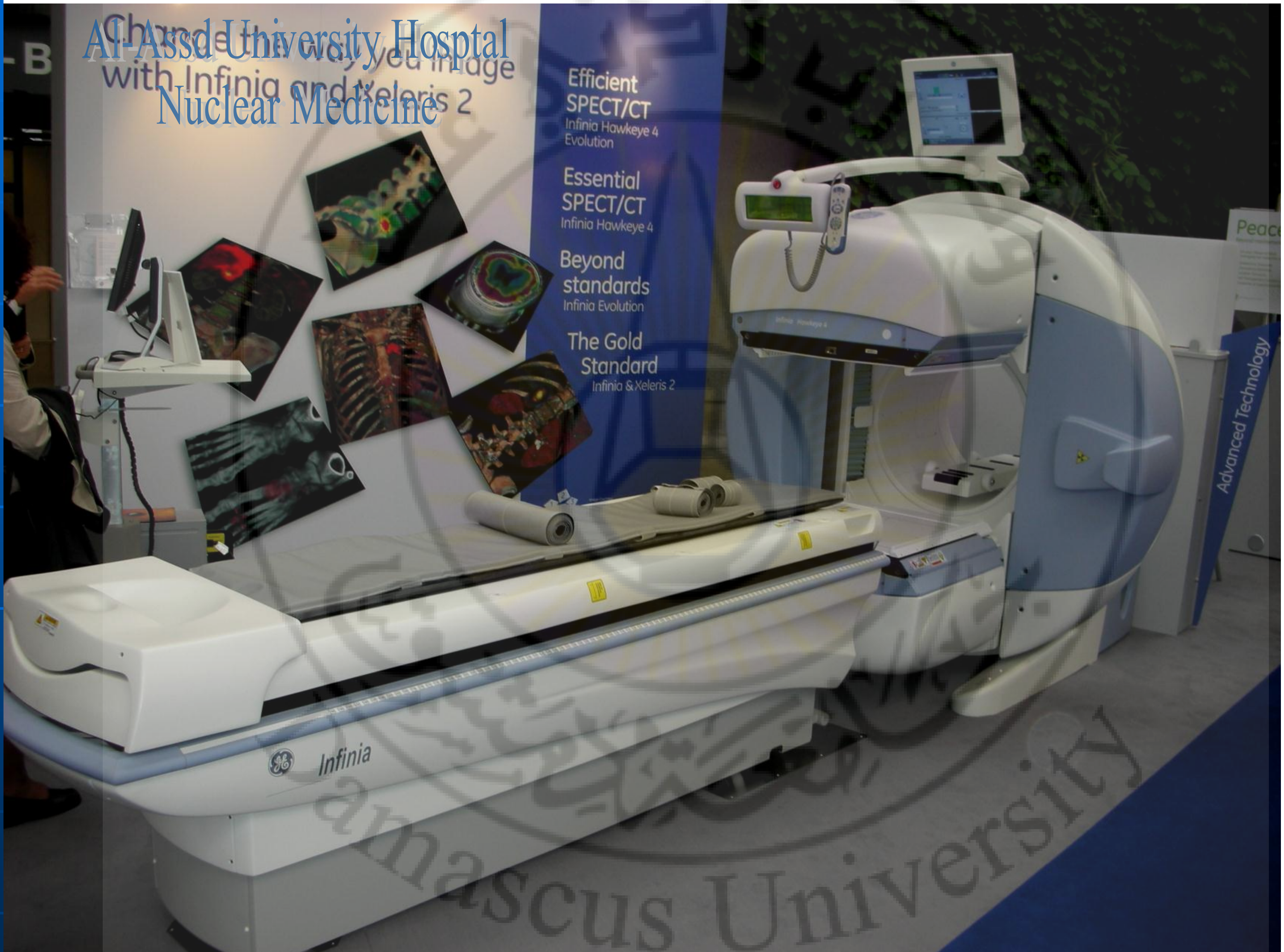
2-5 mCi (74-185 IVII3q) administered orally. IMAGING TIME

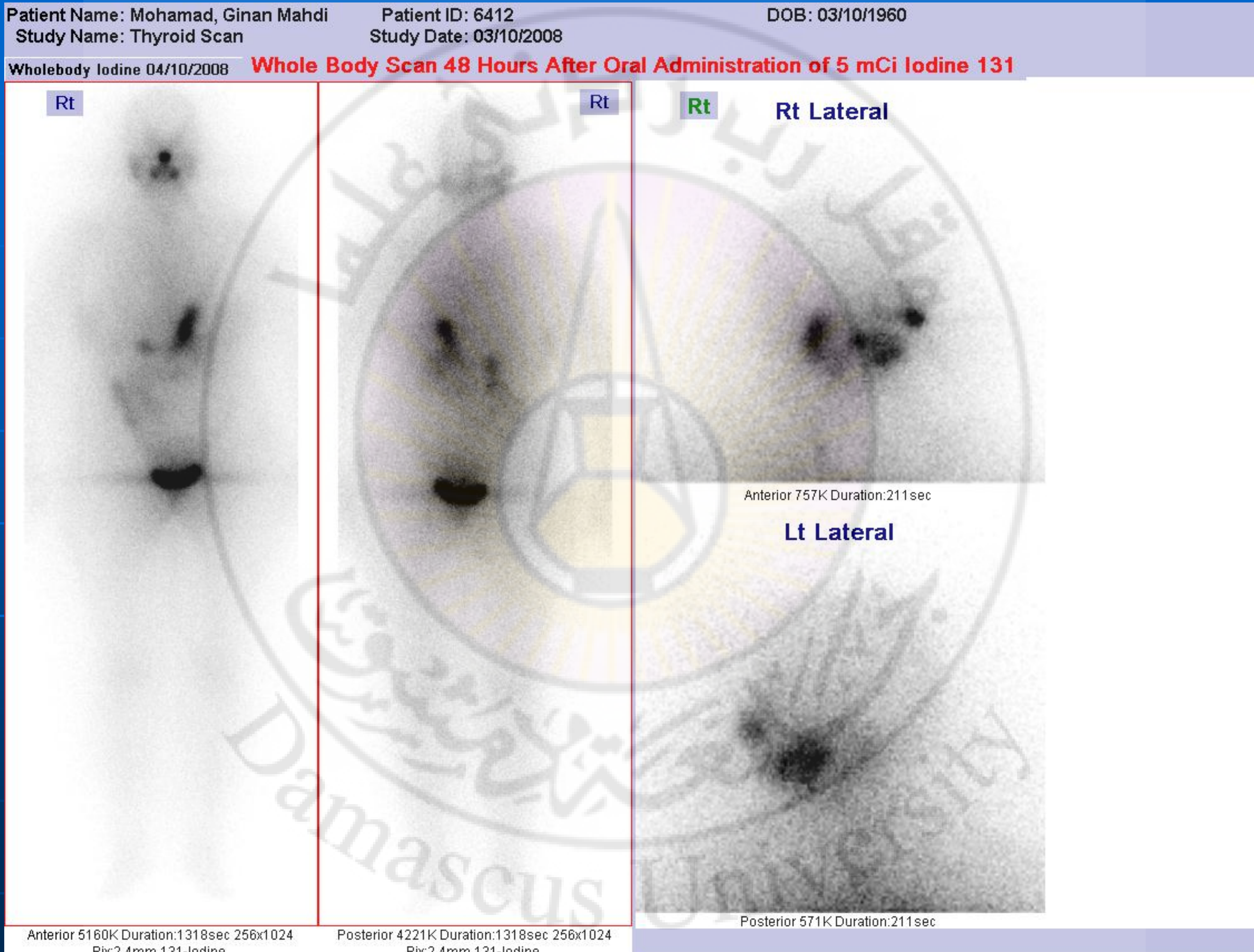
Image at 24 hr Repeat at 48 and 72 hr for equivocal findings.

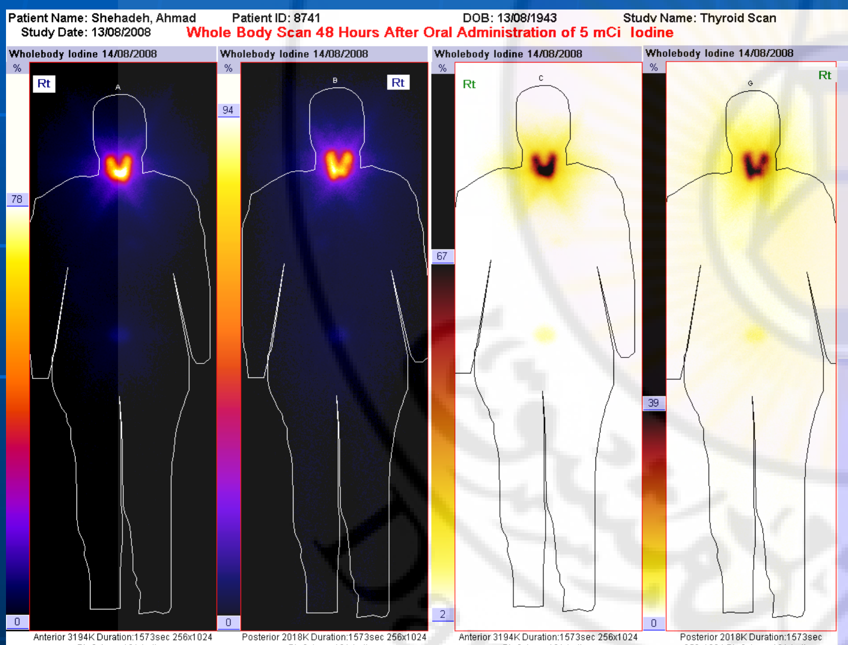
PROCEDURE

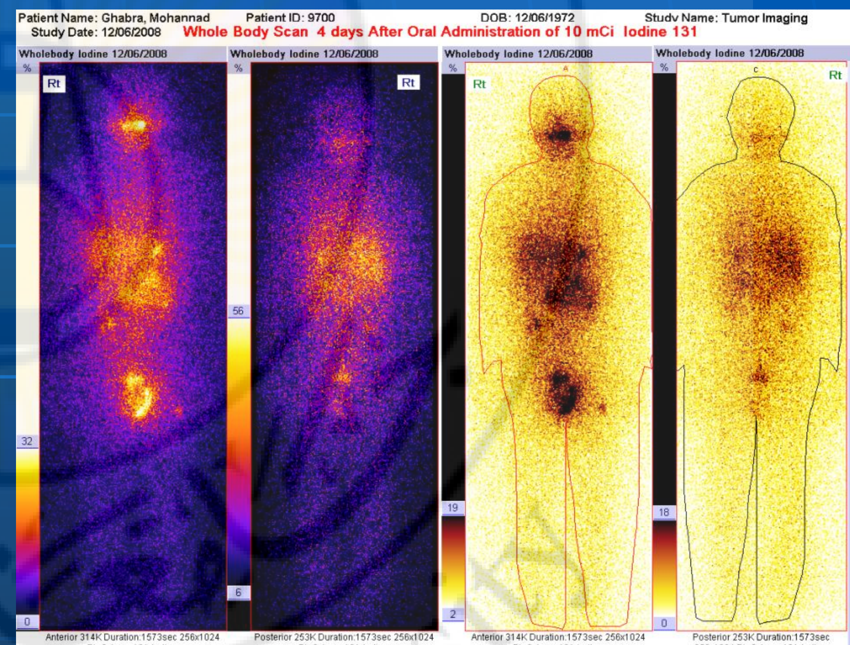
Use a wide field of view gamma camera.

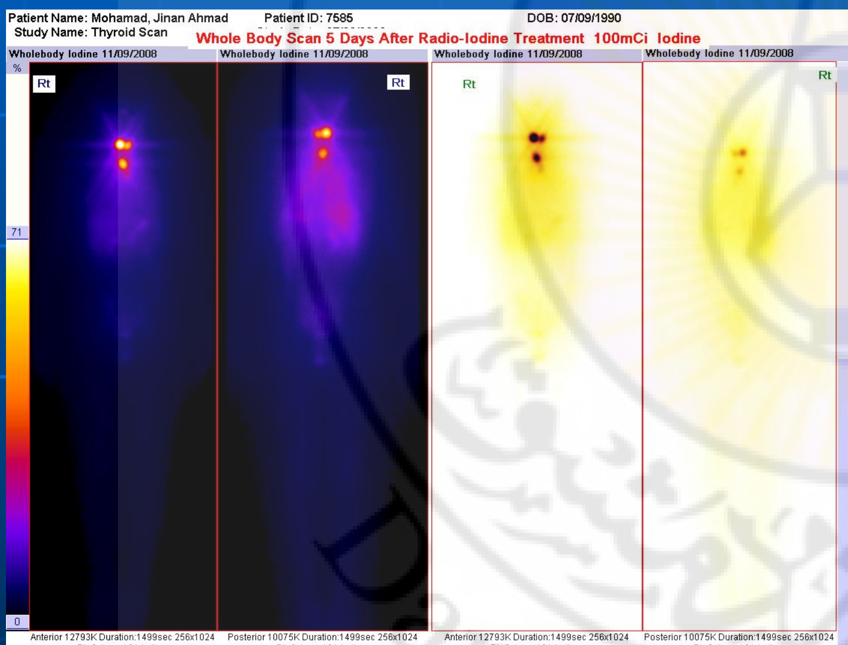
# Al-Assd University Hospital
# Nuclear Medicine

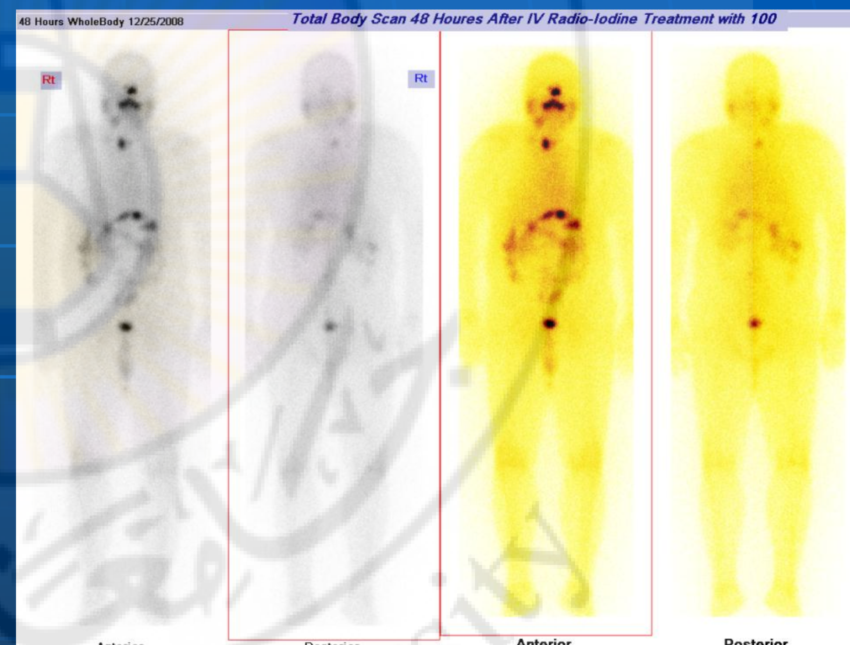


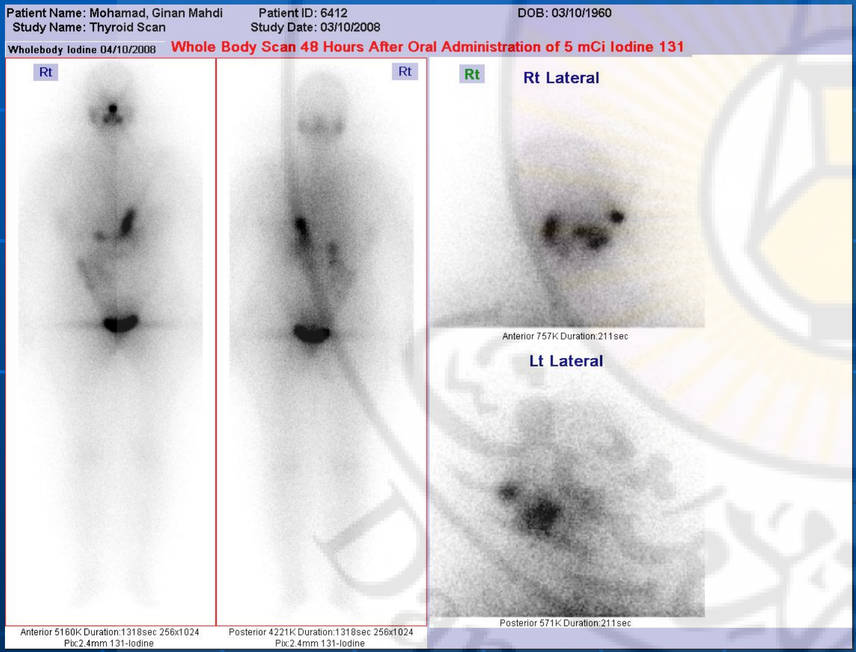

Patient Name: Mohamad, Ginan Mahdi
Patient ID: 6412
DOB: 03/10/1960
Study Name: Thyroid Scan
Study Date: 03/10/2008
Wholebody Iodine 04/10/2008
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine 131
Rt
Rt
Rt
Rt Lateral
Anterior 757K Duration:211sec
Lt Lateral
Posterior 571K Duration:211sec
Anterior 5160K Duration:1318sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 4221K Duration:1318sec 256x1024
Pix:2.4mm 131-Iodine

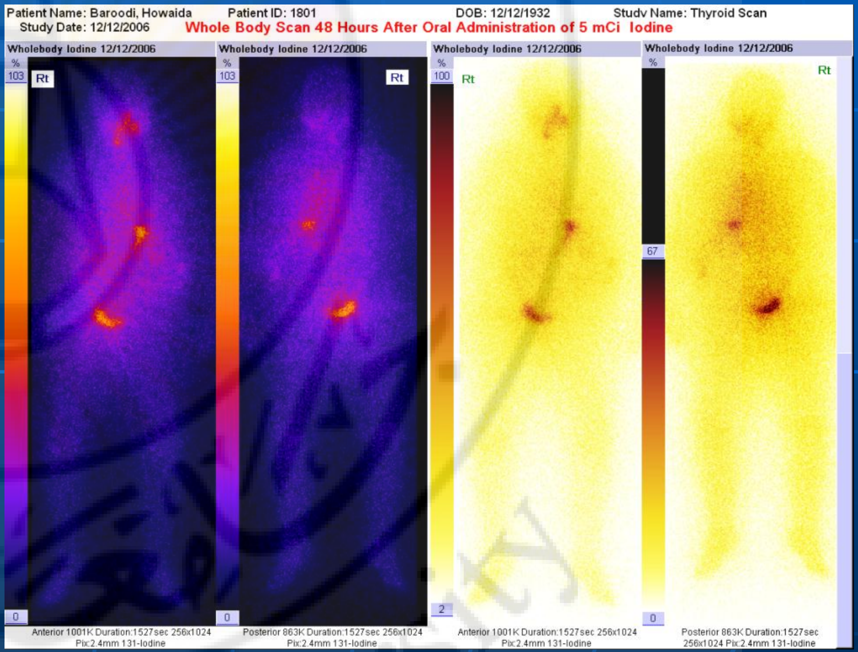

Patient Name: Shehadeh, Ahmad
Patient ID: 8741
DOB: 13/08/1943
Study Name: Thyroid Scan
Study Date: 13/08/2008
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine
Wholebody Iodine 14/08/2008
Rt
Anterior 3194K Duration:1573sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 2018K Duration:1573sec 256x1024 Pix:2.4mm 131-Iodine

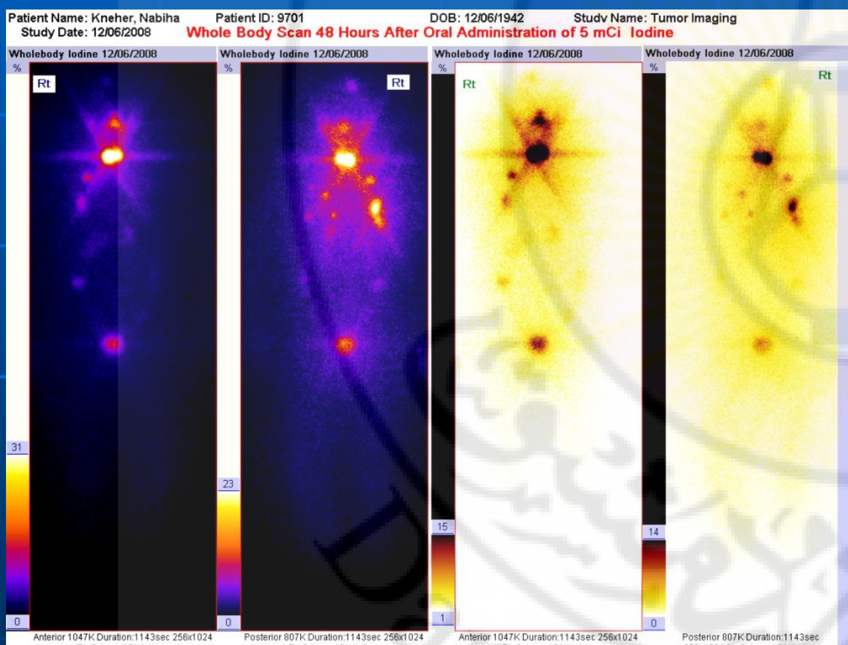

Patient Name: Ghabra, Mohannad
Patient ID: 9700
DOB: 12/06/1972
Study Name: Tumor Imaging
Study Date: 12/06/2008
Whole Body Scan 4 days After Oral Administration of 10 mCi Iodine 131
Wholebody Iodine 12/06/2008
Rt
Anterior 314K Duration:1573sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 253K Duration:1573sec 256x1024 Pix:2.4mm 131-Iodine

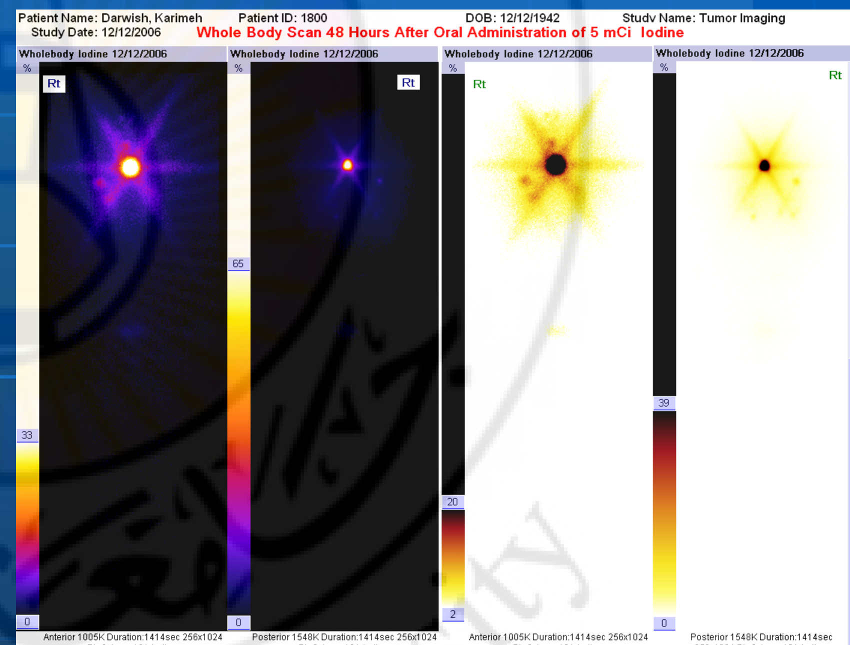

Patient Name: Mohamad, Jinan Ahmad
Patient ID: 7585
DOB: 07/09/1990
Study Name: Thyroid Scan
Whole Body Scan 5 Days After Radio-Iodine Treatment 100mCi Iodine
Wholebody Iodine 11/09/2008
Wholebody Iodine 11/09/2008
Wholebody Iodine 11/09/2008
Wholebody Iodine 11/09/2008
%
71
0
Rt
Rt
Rt
Rt
Anterior 12793K Duration:1499sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 10075K Duration:1499sec 256x1024 Pix:2.4mm 131-Iodine
Anterior 12793K Duration:1499sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 10075K Duration:1499sec 256x1024 Pix:2.4mm 131-Iodine

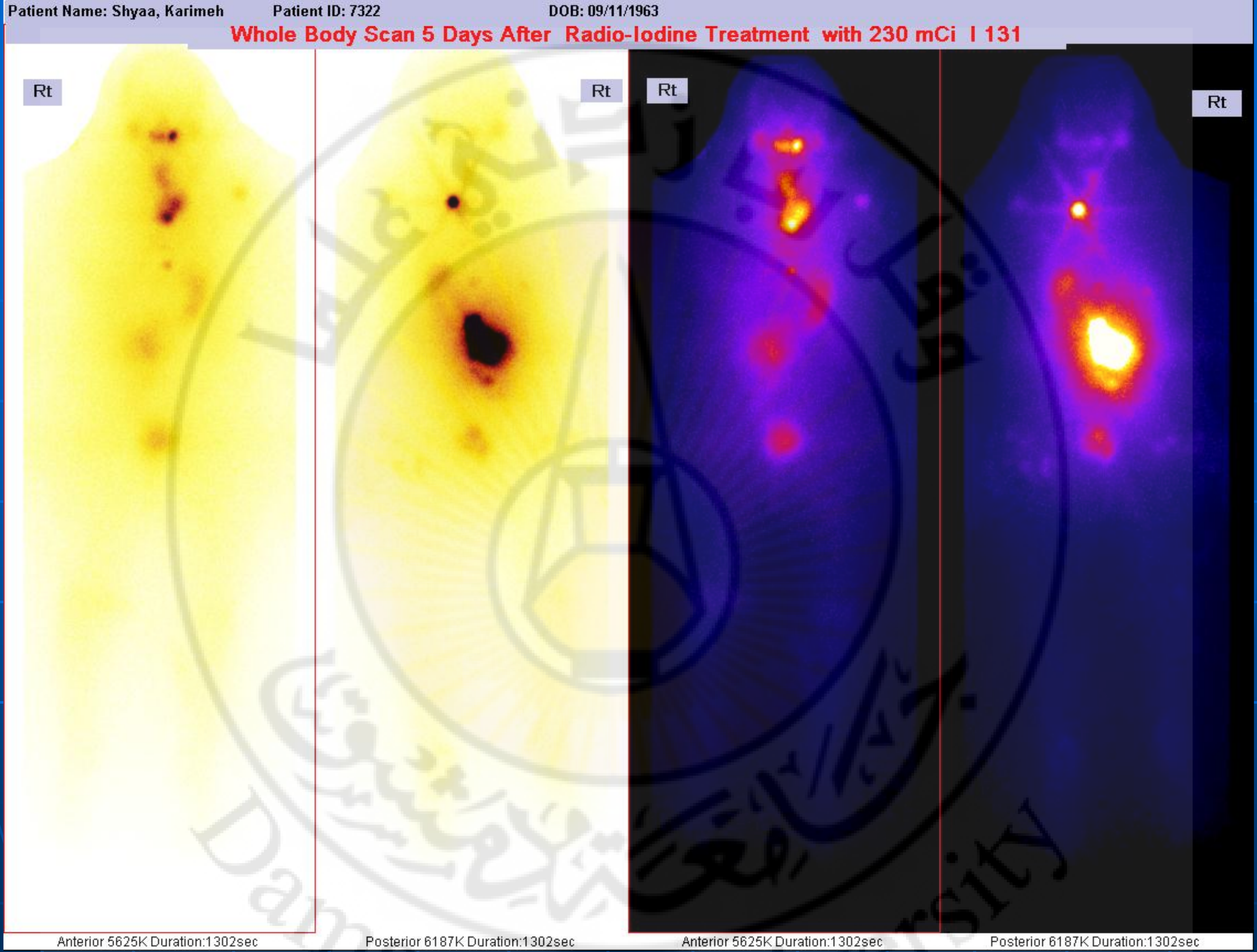

48 Hours WholeBody 12/25/2008
Total Body Scan 48 Houres After IV Radio-Iodine Treatment with 100
Rt
Rt
Anterior
Posterior
Anterior
Posterior


Patient Name: Mohamad, Ginan Mahdi
Patient ID: 6412
DOB: 03/10/1960
Study Name: Thyroid Scan
Study Date: 03/10/2008
Wholebody Iodine 04/10/2008
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine 131
Rt
Rt
Rt
Rt Lateral
Anterior 757K Duration:211sec
Lt Lateral
Posterior 571K Duration:211sec
Anterior 5160K Duration:1318sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 4221K Duration:1318sec 256x1024
Pix:2.4mm 131-Iodine


Patient Name: Baroodi, Howaida
Patient ID: 1801
DOB: 12/12/1932
Study Name: Thyroid Scan
Study Date: 12/12/2006
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Rt
Rt
Rt
Rt
Anterior 1001K Duration:1527sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 863K Duration:1527sec 256x1024
Pix:2.4mm 131-Iodine
Anterior 1001K Duration:1527sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 863K Duration:1527sec
256x1024 Pix:2.4mm 131-Iodine


Patient Name: Kneher, Nabiha
Patient ID: 9701
DOB: 12/06/1942
Studv Name: Tumor Imaging
Study Date: 12/06/2008
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine
Wholebody Iodine 12/06/2008
Wholebody Iodine 12/06/2008
Wholebody Iodine 12/06/2008
Wholebody Iodine 12/06/2008
Rt
Rt
Rt
Rt
Anterior 1047K Duration:1143sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 807K Duration:1143sec 256x1024 Pix:2.4mm 131-Iodine
Anterior 1047K Duration:1143sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 807K Duration:1143sec 256x1024 Pix:2.4mm 131-Iodine

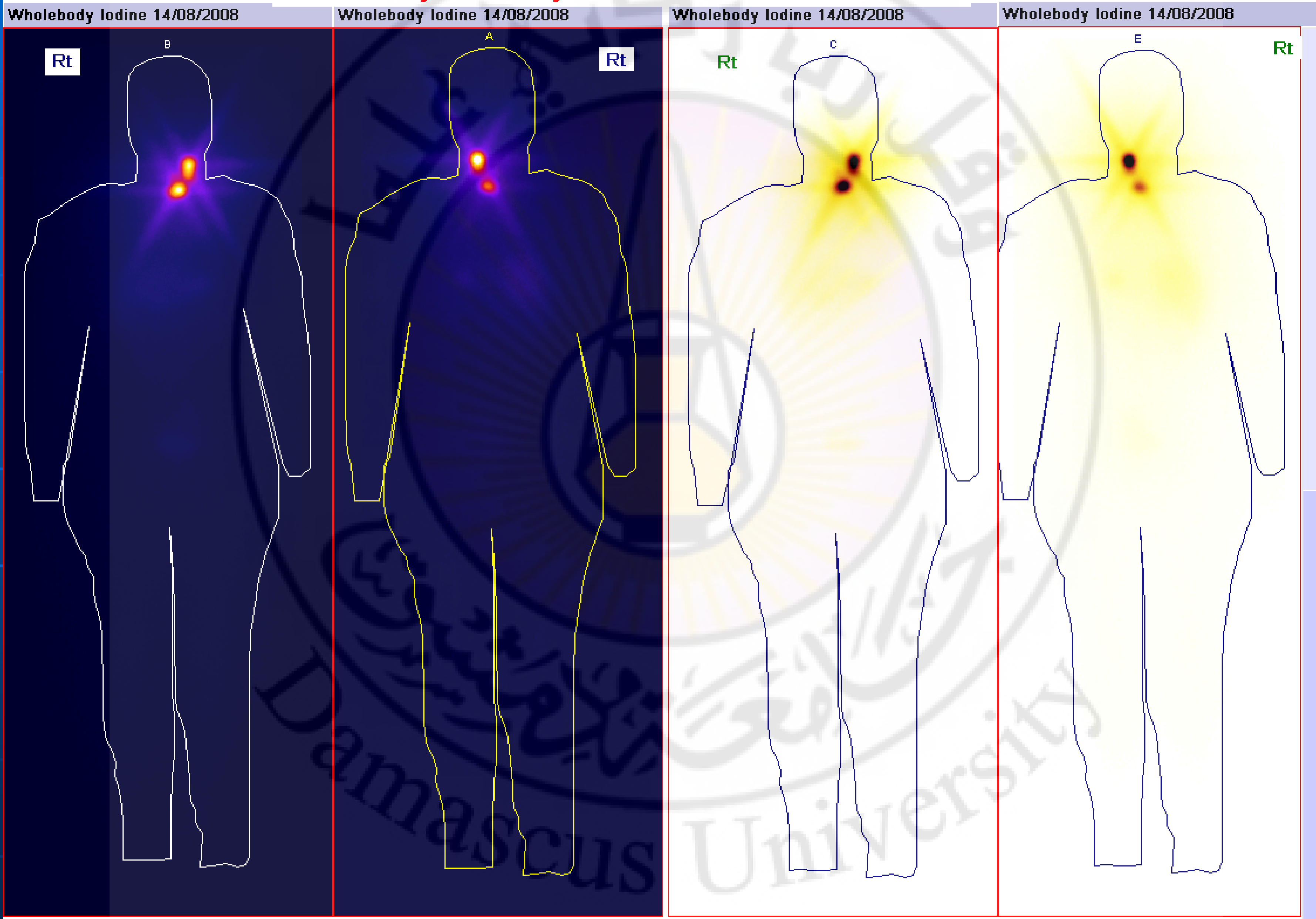

Patient Name: Darwish, Karimeh
Patient ID: 1800
DOB: 12/12/1942
Studv Name: Tumor Imaging
Study Date: 12/12/2006
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Rt
Rt
Rt
Rt
Anterior 1005K Duration:1414sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 1548K Duration:1414sec 256x1024 Pix:2.4mm 131-Iodine
Anterior 1005K Duration:1414sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 1548K Duration:1414sec 256x1024 Pix:2.4mm 131-Iodine


Patient Name: Shyaa, Karimeh
Patient ID: 7322
DOB: 09/11/1963
Whole Body Scan 5 Days After Radio-Iodine Treatment with 230 mCi I 131
Rt
Rt
Rt
Rt
Anterior 5625K Duration:1302sec
Posterior 6187K Duration:1302sec
Anterior 5625K Duration:1302sec
Posterior 6187K Duration:1302sec

Patient Name: Majed, Atiaf　Patient ID: 4121　DOB: 14/08/1986　Study Name: Tumor Imaging

Study Date: 14/08/2008

## Whole Body Scan 5 Days After Radio-Iodine 131 treatment

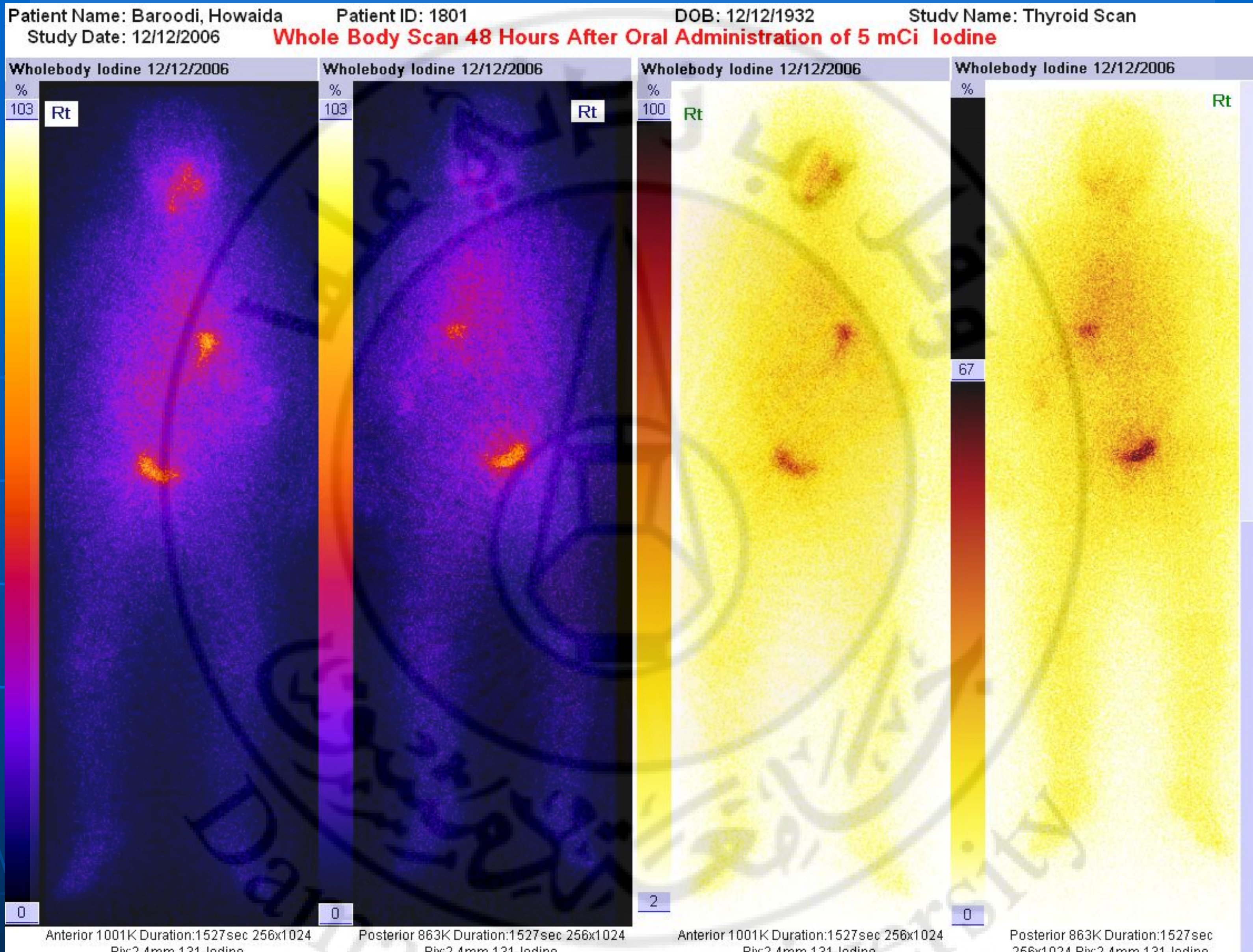



Anterior 14227K Duration:1278sec 256x1024 Pix:2.4mm 131-Iodine

Posterior 11471K Duration:1278sec 256x1024 Pix:2.4mm 131-Iodine

Anterior 14227K Duration:1278sec 256x1024 Pix:2.4mm 131-Iodine

Posterior 11471K Duration:1278sec 256x1024 Pix:2.4mm 131-Iodine


Patient Name: Baroodi, Howaida
Patient ID: 1801
DOB: 12/12/1932
Study Name: Thyroid Scan
Study Date: 12/12/2006
Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Wholebody Iodine 12/12/2006
Rt
Rt
Rt
Rt
Anterior 1001K Duration:1527sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 863K Duration:1527sec 256x1024 Pix:2.4mm 131-Iodine
Anterior 1001K Duration:1527sec 256x1024 Pix:2.4mm 131-Iodine
Posterior 863K Duration:1527sec 256x1024 Pix:2.4mm 131-Iodine

# Isolation Ward – Controlled Area (cont)

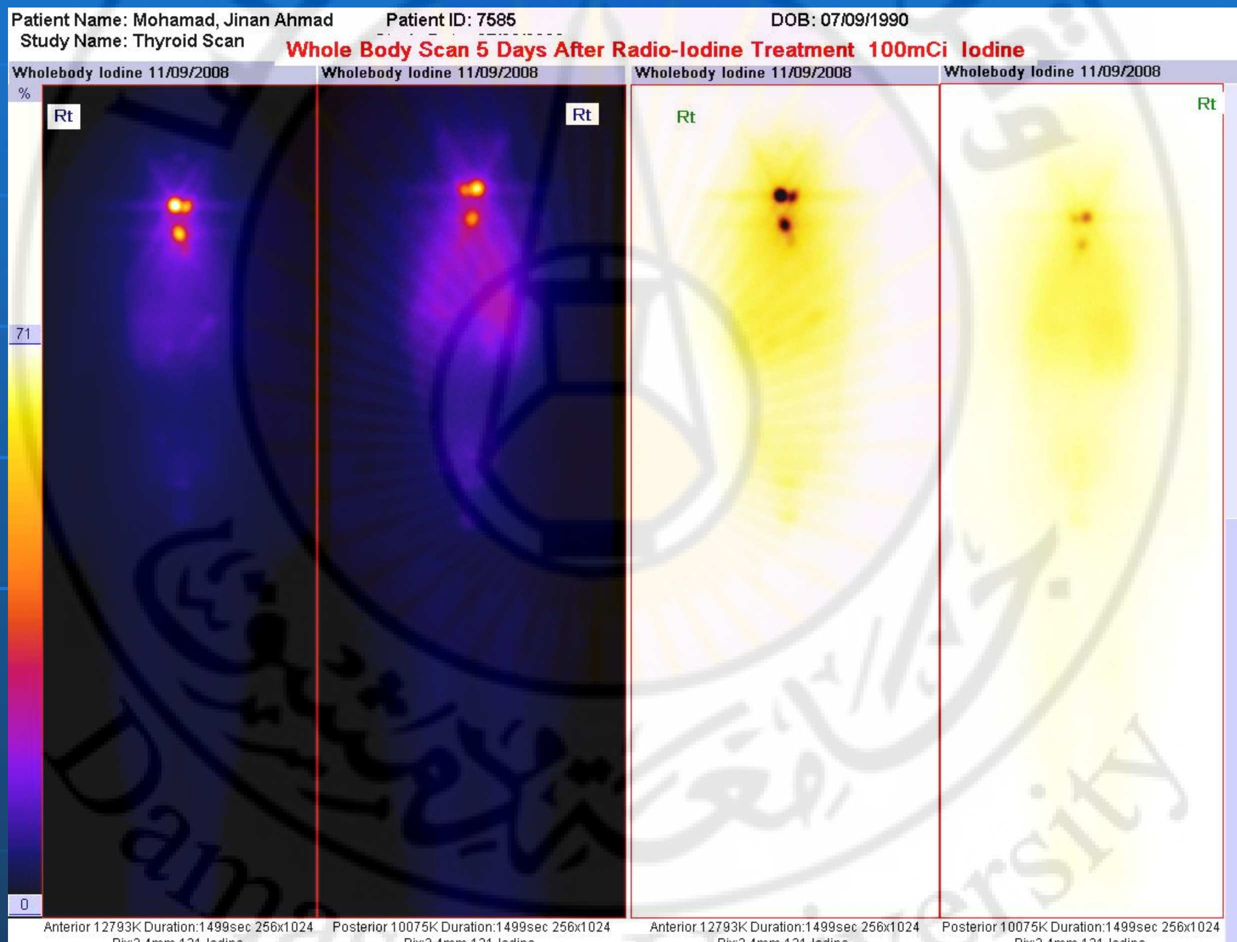

Areas are covered with plastic backed absorbent material.

- King Faisal Specialist Hospital and Research Center, Riyadh

# Patient Instructions

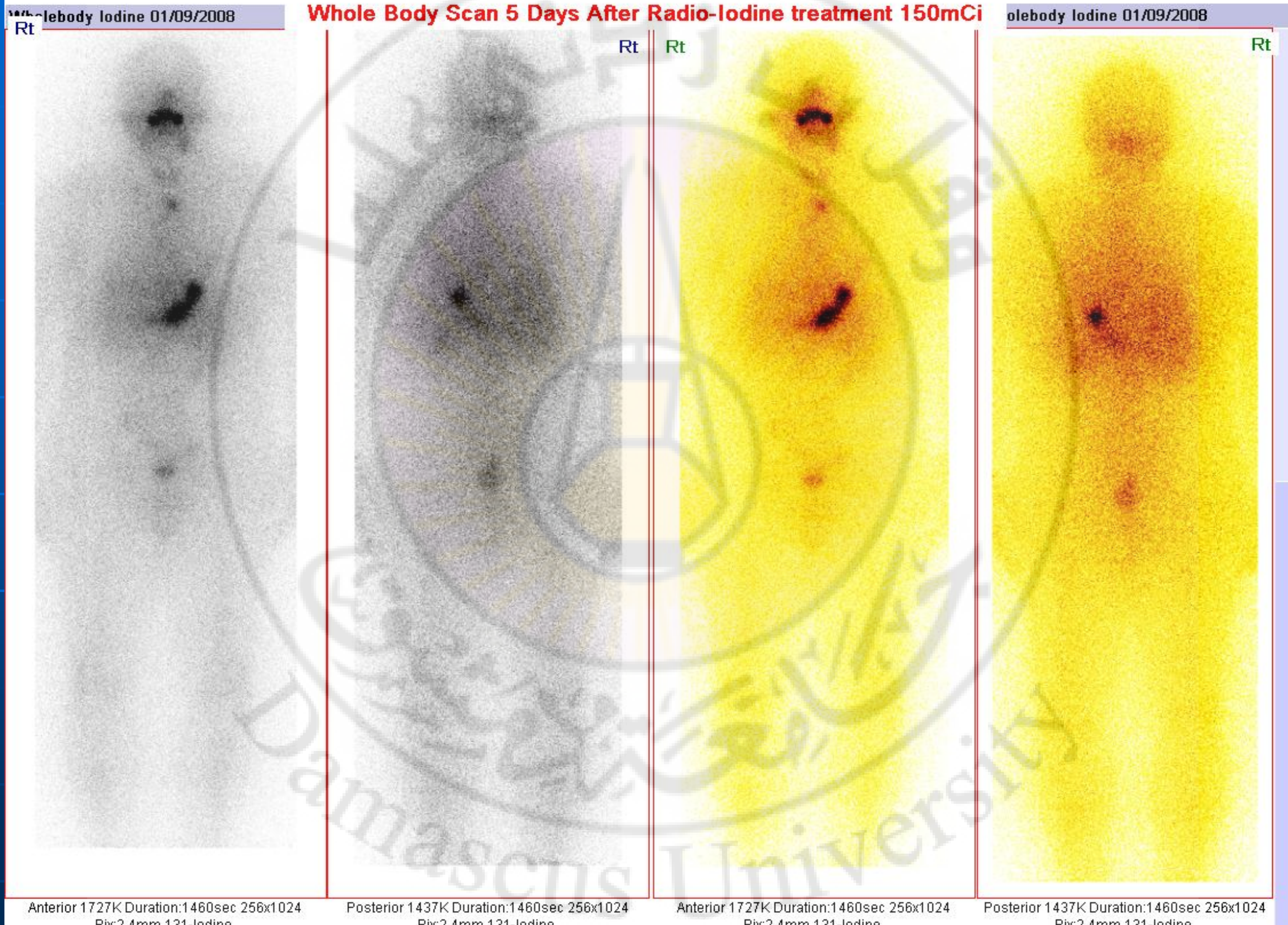
- Stay in the room
- Drink as much as possible.
- Eat lemon slices.
- Use only the private toilet and flush 3 times. (Males should sit down to avoid splashing.)
- Wash hands well in soapy water after using toilet.
- Wear footwear when leaving the bed.
- In event of vomiting or incontinence notify the nurse immediately.

# Herthel's cell Ca.



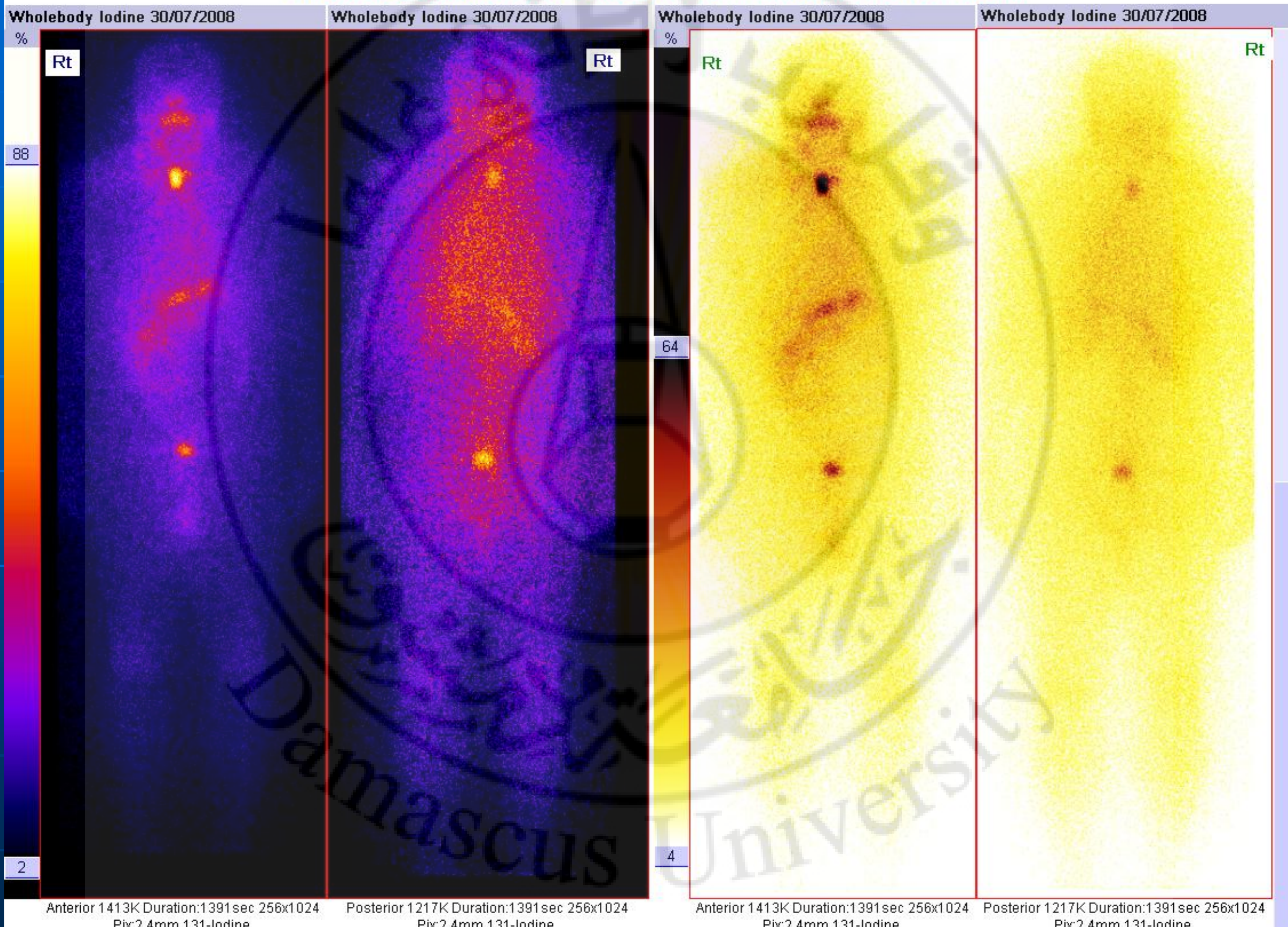
Patient Name: Hammoud Ali, Fuad Patient ID: 6522 DOB: 01/09/1967 Study Name: Tumor Imaging
Study Date: 01/09/2008

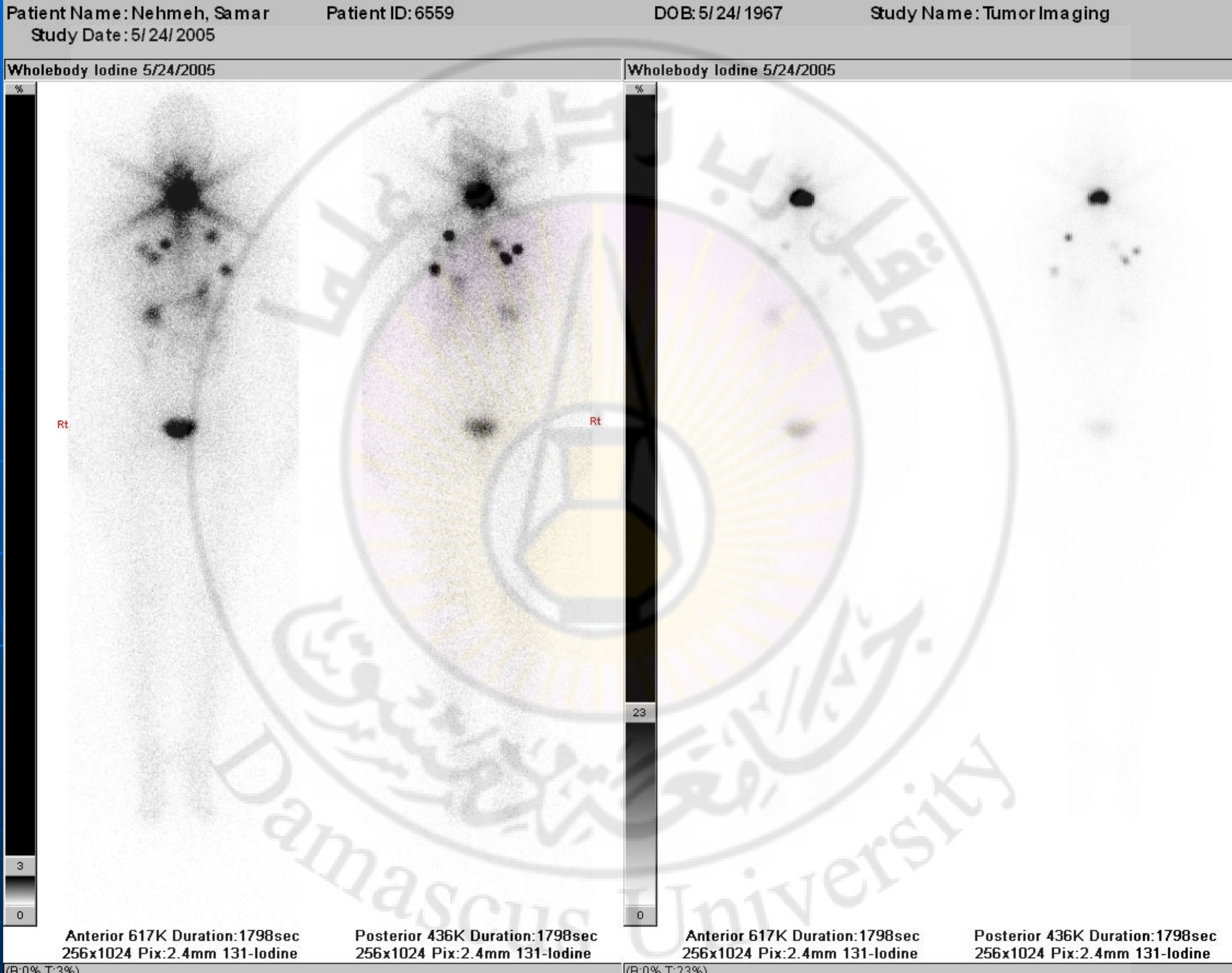
## Whole Body Scan 5 Days After Radio-Iodine treatment 150mCi



Patient Name: Abdulla, Ahmad Nariman Patient ID: 6441 DOB: 30/07/1958

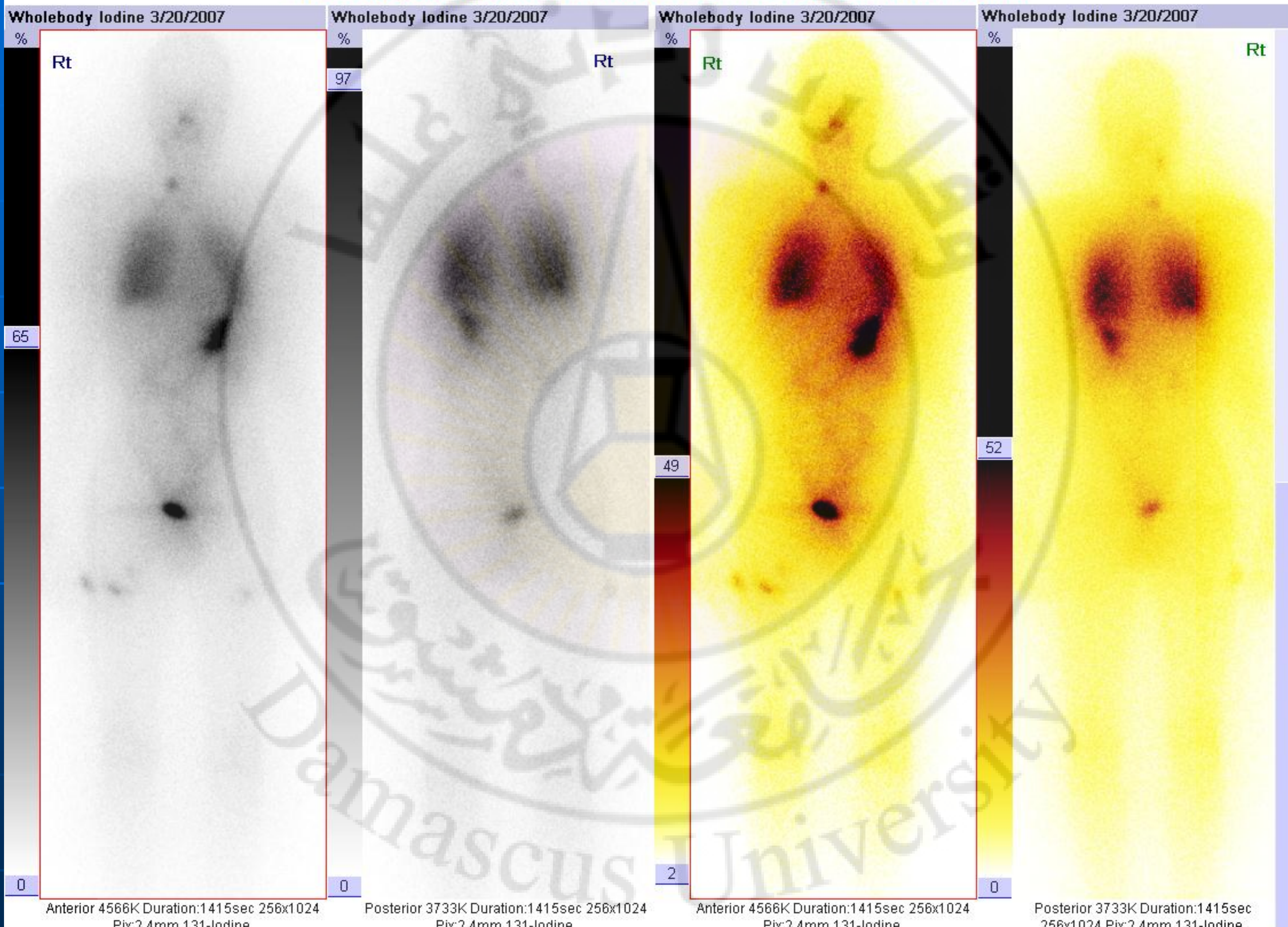
Study Name: Tumor Imagin **Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine**




Patient Name: Nehmeh, Samar
Patient ID: 6559
DOB: 5/24/1967
Study Name: Tumor Imaging
Study Date: 5/24/2005
Wholebody Iodine 5/24/2005
Wholebody Iodine 5/24/2005
%
Rt
3
0
%
Rt
23
0
Anterior 617K Duration:1798sec
256x1024 Pix:2.4mm 131-Iodine
Posterior 436K Duration:1798sec
256x1024 Pix:2.4mm 131-Iodine
Anterior 617K Duration:1798sec
256x1024 Pix:2.4mm 131-Iodine
Posterior 436K Duration:1798sec
256x1024 Pix:2.4mm 131-Iodine
(B:0%,T:3%)
(B:0%,T:23%)

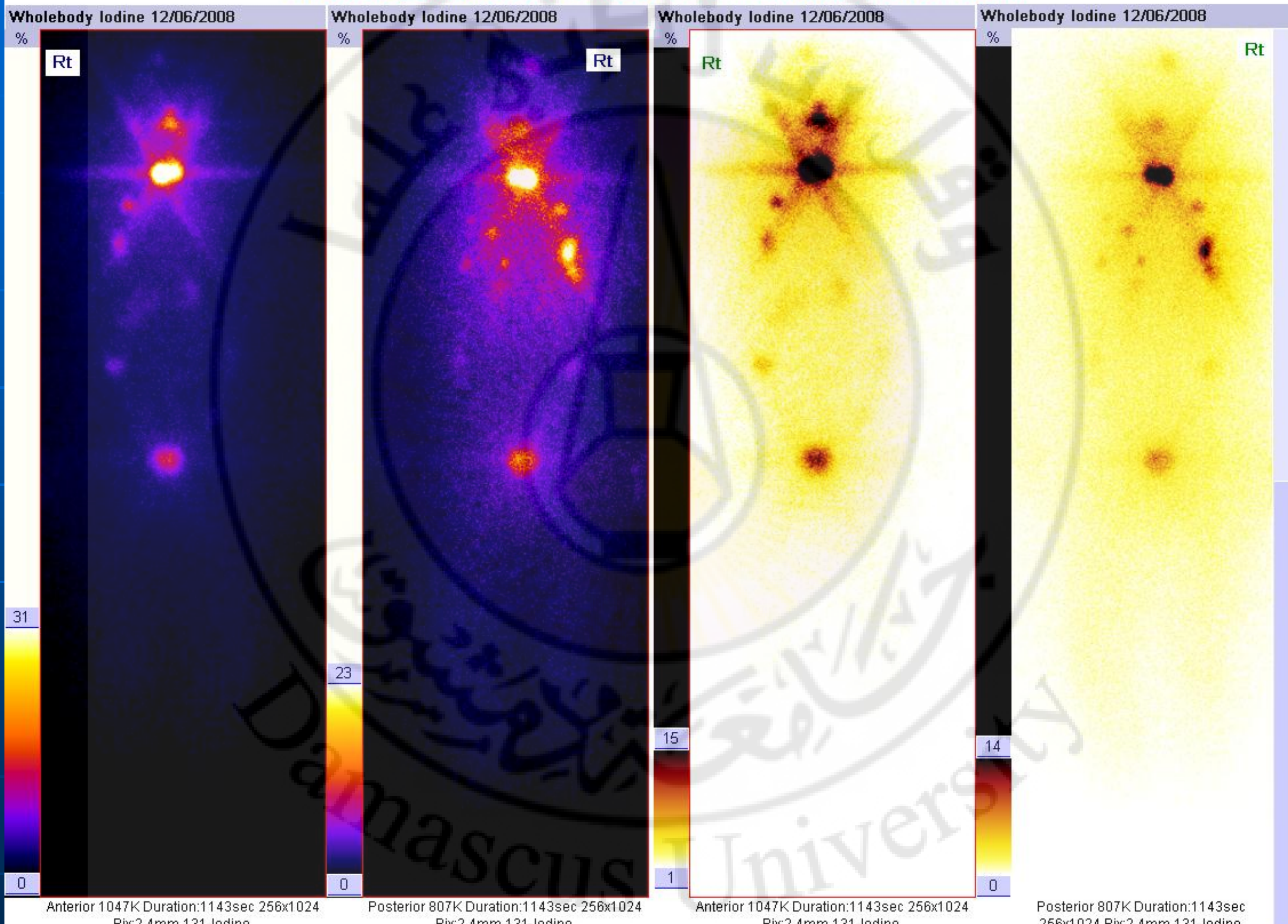
Patient Name: Mohamad, Qutaiba Patient ID: 787 DOB: 3/20/1988 Studv Name: Tumor Imaging
Study Date: 3/20/2007

**Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine**



Patient Name: Kneher, Nabiha  Patient ID: 9701  DOB: 12/06/1942  Studv Name: Tumor Imaging

Study Date: 12/06/2008  **Whole Body Scan 48 Hours After Oral Administration of 5 mCi Iodine**

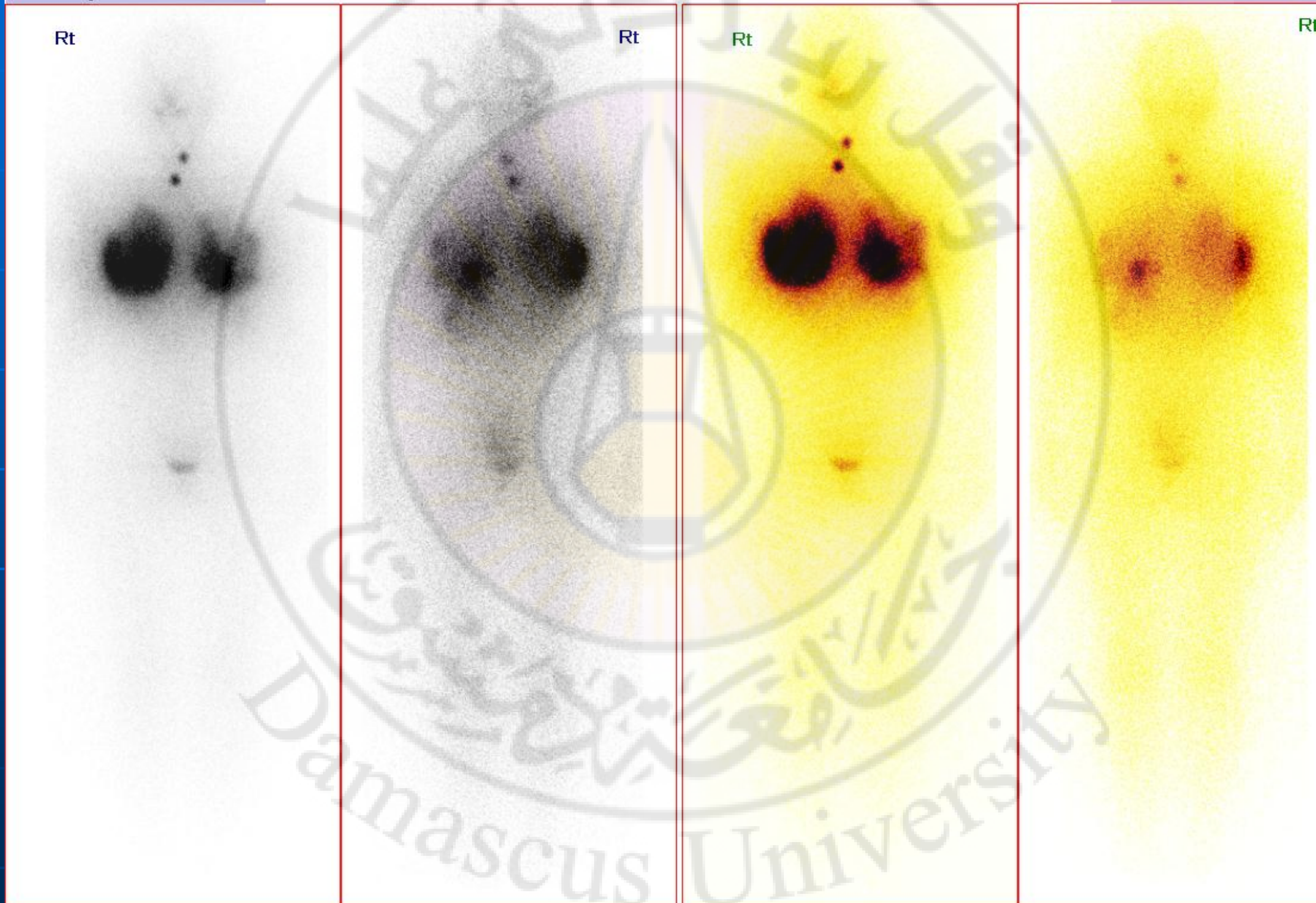


Patient Name: Abbas, Ramia    Patient ID: 6798    DOB: 20/09/1980    Study Name: Tumor Imaging
Study Date: 20/09/2008

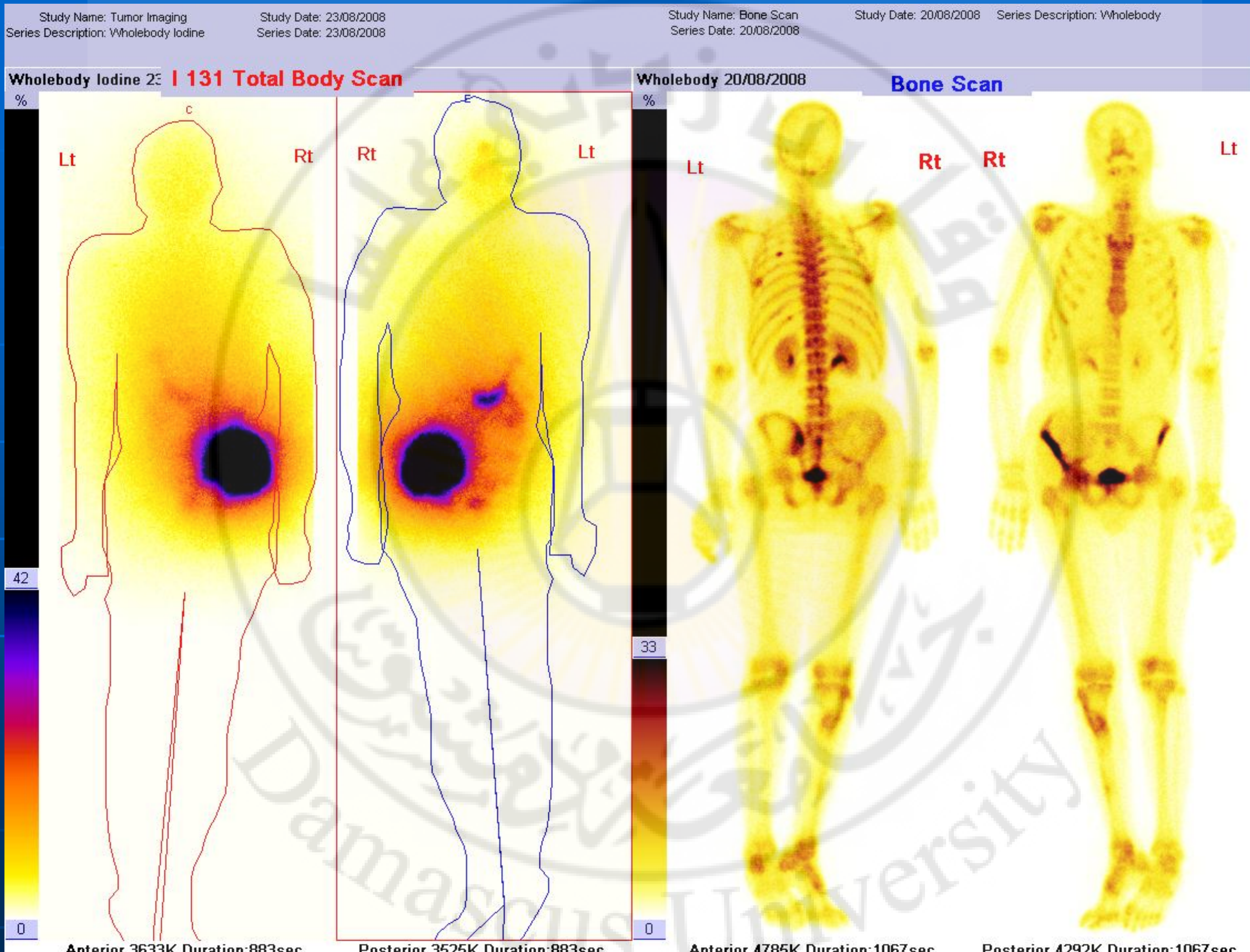
Wholebody Iodine 20/09/2008

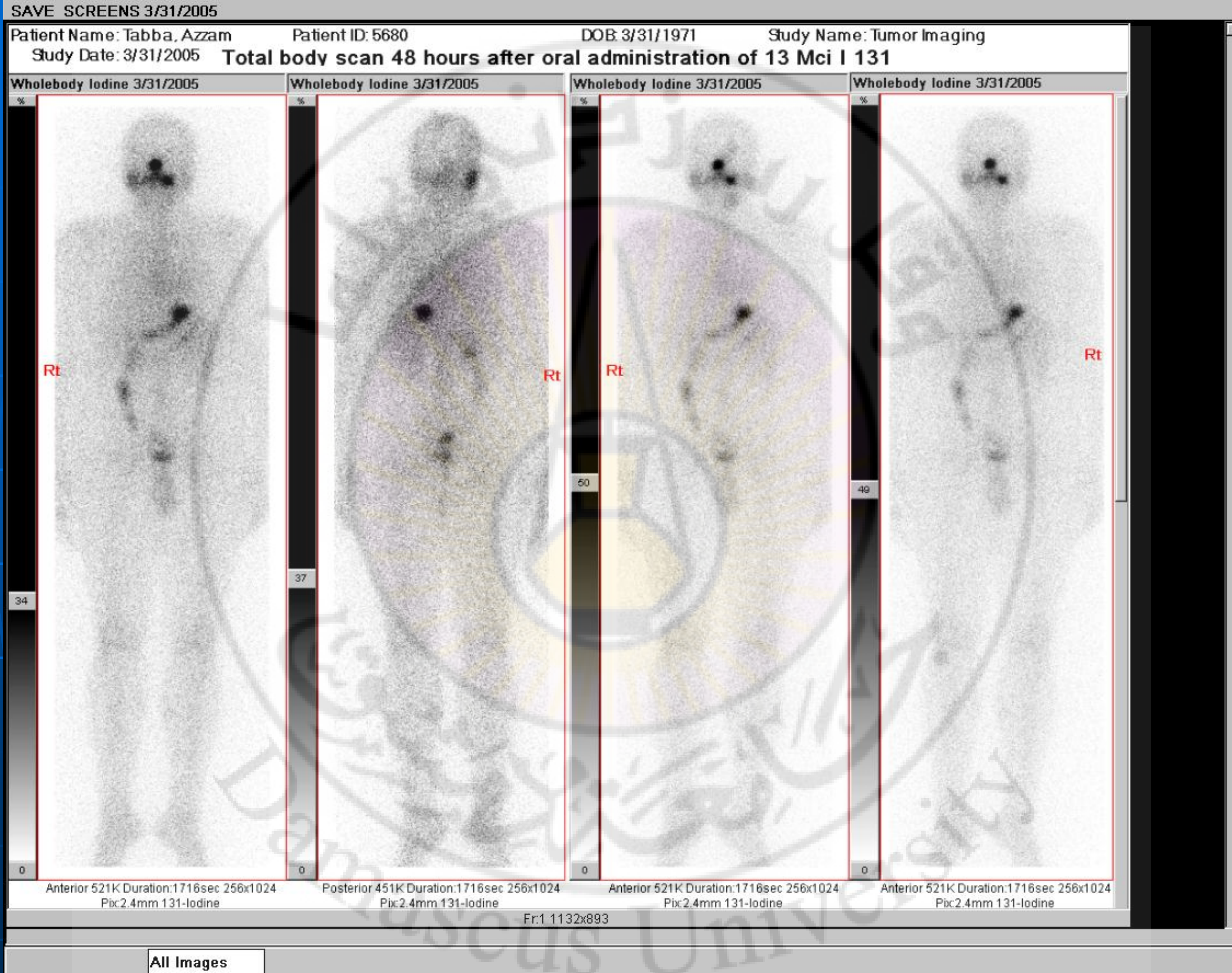
## Whole Body Scan 72 Hours After Oral Administration of 5 mCi Iodine 131

Iodine 20/09/2008

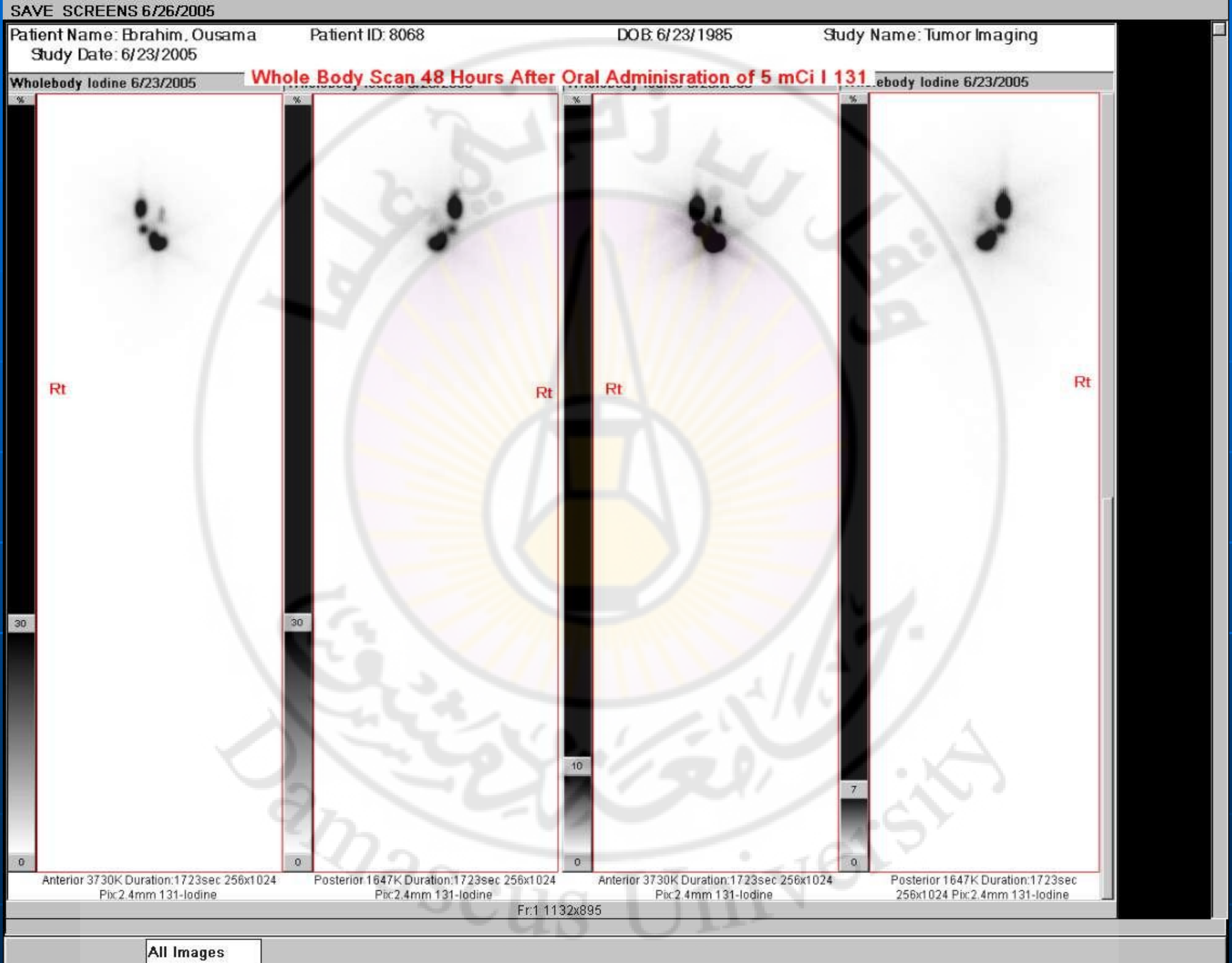



Anterior 1927K Duration:1296sec 256x1024 Pix:2.4mm 131-Iodine | Posterior 1110K Duration:1296sec 256x1024 Pix:2.4mm 131-Iodine | Anterior 1927K Duration:1296sec 256x1024 Pix:2.4mm 131-Iodine | Posterior 1110K Duration:1296sec 256x1024 Pix:2.4mm 131-Iodine


Study Name: Tumor Imaging
Series Description: Wholebody Iodine
Study Date: 23/08/2008
Series Date: 23/08/2008
Study Name: Bone Scan
Series Date: 20/08/2008
Study Date: 20/08/2008
Series Description: Wholebody
Wholebody Iodine 23
I 131 Total Body Scan
Wholebody 20/08/2008
Bone Scan
Lt
Rt
Rt
Lt
Lt
Rt
Rt
Lt
42
0
33
0
Anterior 3633K Duration:883sec
Posterior 3525K Duration:883sec
Anterior 4785K Duration:1067sec
Posterior 4292K Duration:1067sec

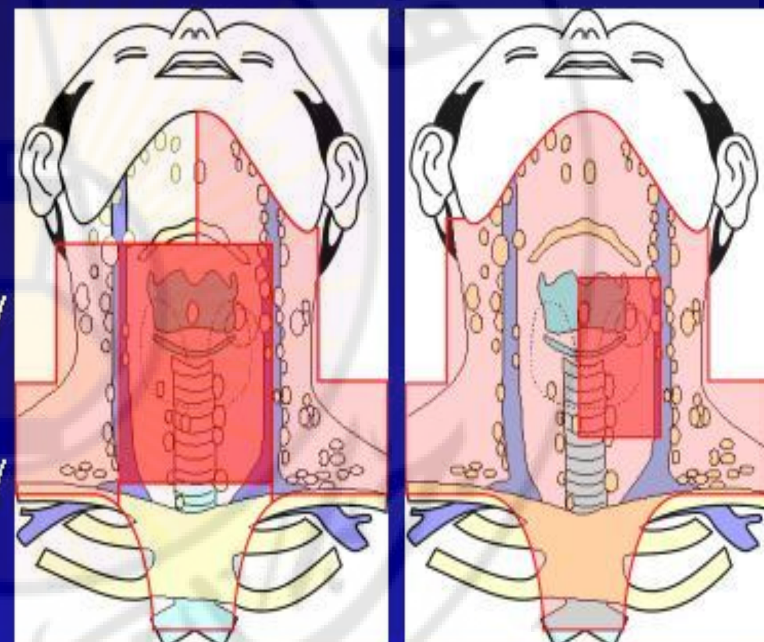

SAVE SCREENS 3/31/2005
Patient Name: Tabba, Azzam
Patient ID: 5680
DOB: 3/31/1971
Study Name: Tumor Imaging
Study Date: 3/31/2005
Total body scan 48 hours after oral administration of 13 Mci I 131
Wholebody Iodine 3/31/2005
Wholebody Iodine 3/31/2005
Wholebody Iodine 3/31/2005
Wholebody Iodine 3/31/2005
Rt
Rt
Rt
Rt
Anterior 521K Duration:1716sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 451K Duration:1716sec 256x1024
Pix:2.4mm 131-Iodine
Anterior 521K Duration:1716sec 256x1024
Pix:2.4mm 131-Iodine
Anterior 521K Duration:1716sec 256x1024
Pix:2.4mm 131-Iodine
Fr:1 1132x893
All Images

Whole Body Scan 48 Hours After Oral Adminisration of 5 mCi I 131



# Radiotherapy protocols

| | N Am. | Ger. |
|---|---|---|
| • Target volume | | |
| – thyroid bed | 60 | 60-70 Gy |
| – lymph nodes | 50 | 50-60 Gy |
| ipsilateral | (+) | + |
| contralateral | ((+)) | + |
| mediastinal | ((+)) | + |
| contra. submand. | - | + |
| • Timing | after 1st I-131 Tx | after neg. I-131 scan |



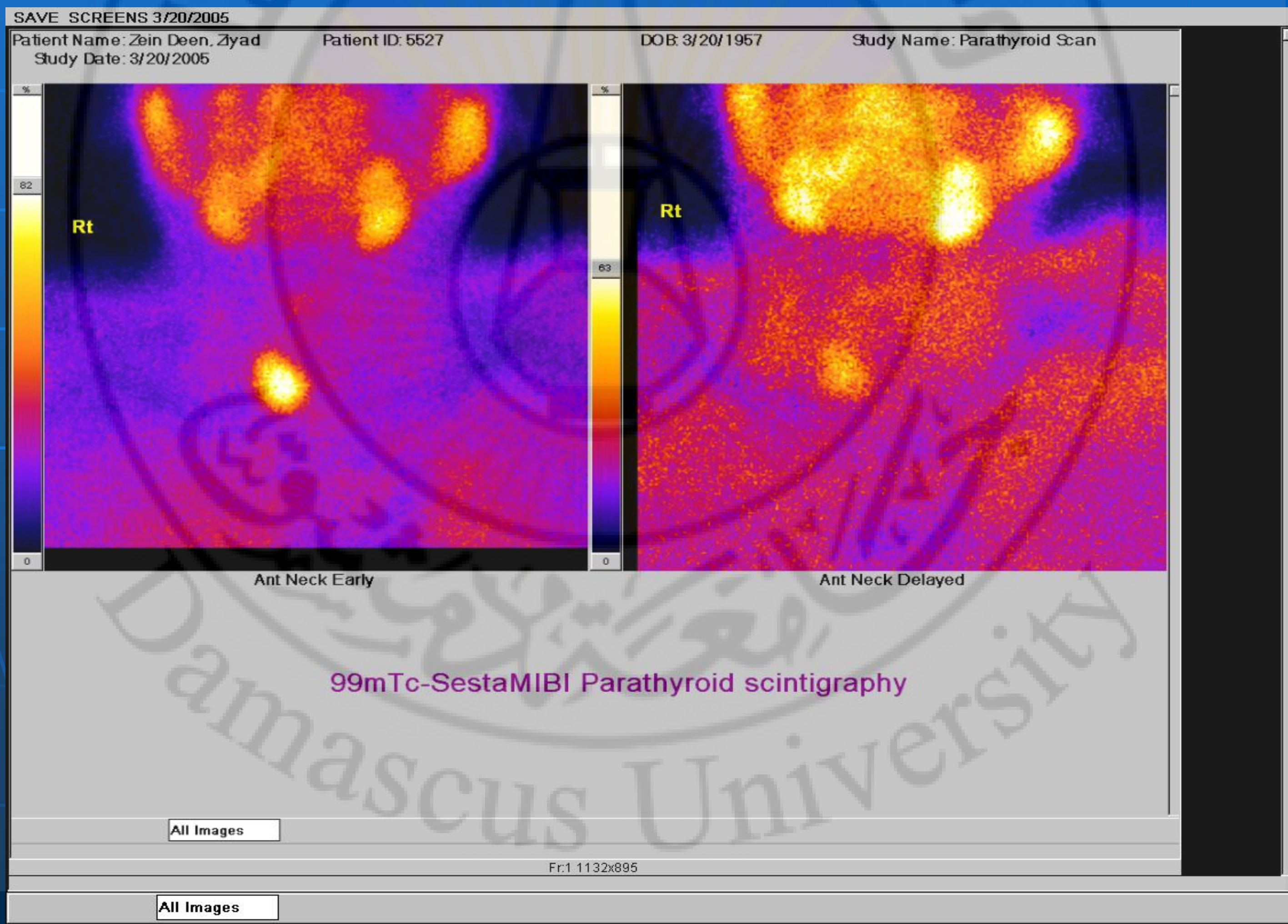
N America — Germany

Simpson in: Cox (ed.): Moss' radiation oncology, 1996, p. 280-304.

DEGRO guidelines, http://www.awml-online.de

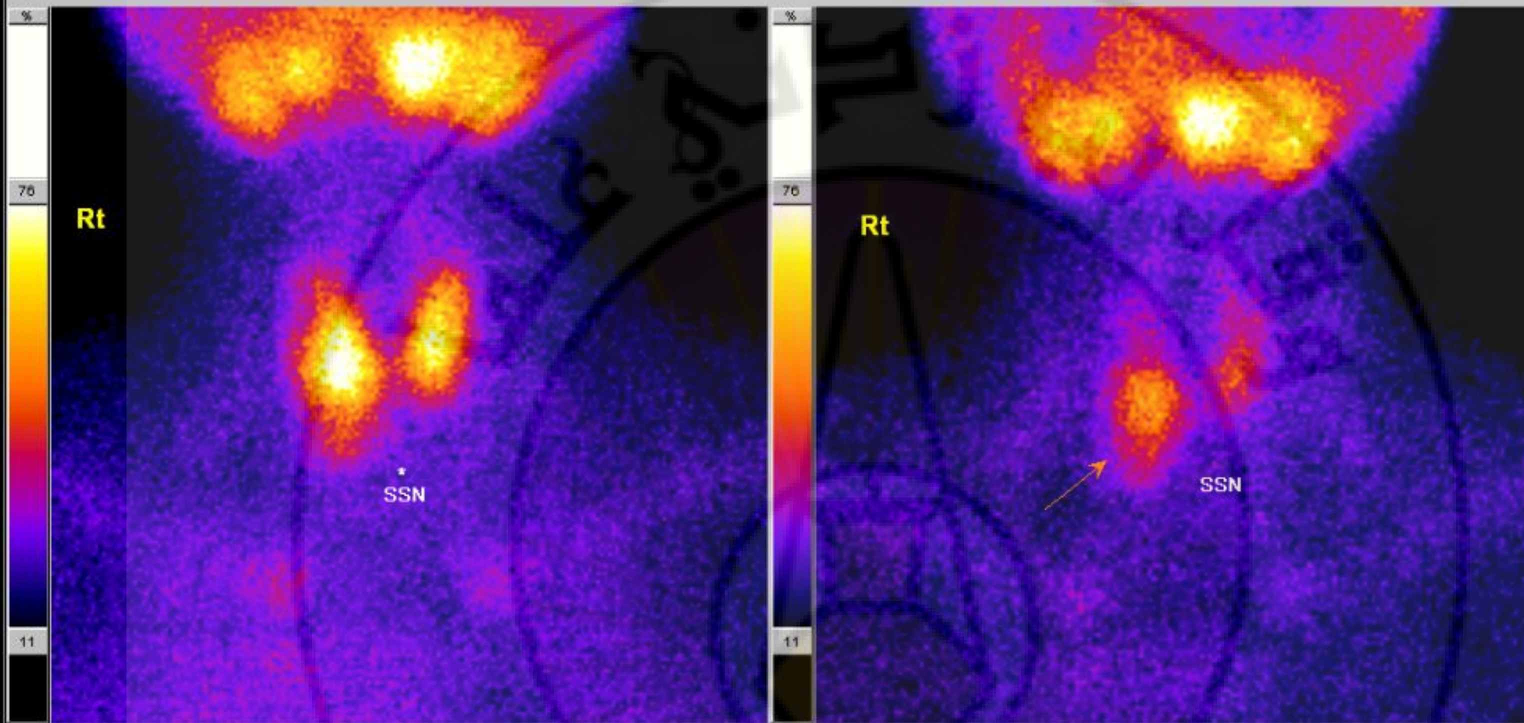
# PARATHYROID SCINTIGRAPHY

## ومضان جارات الدرق



SAVE SCREENS 3/23/2005

Patient Name: Yousef, Rooa | Patient ID: 5582 | DOB: 3/23/1983 | Study Name: Parathyroid Scan
Study Date: 3/23/2005




Ant Neck Early | Ant Neck Delayed

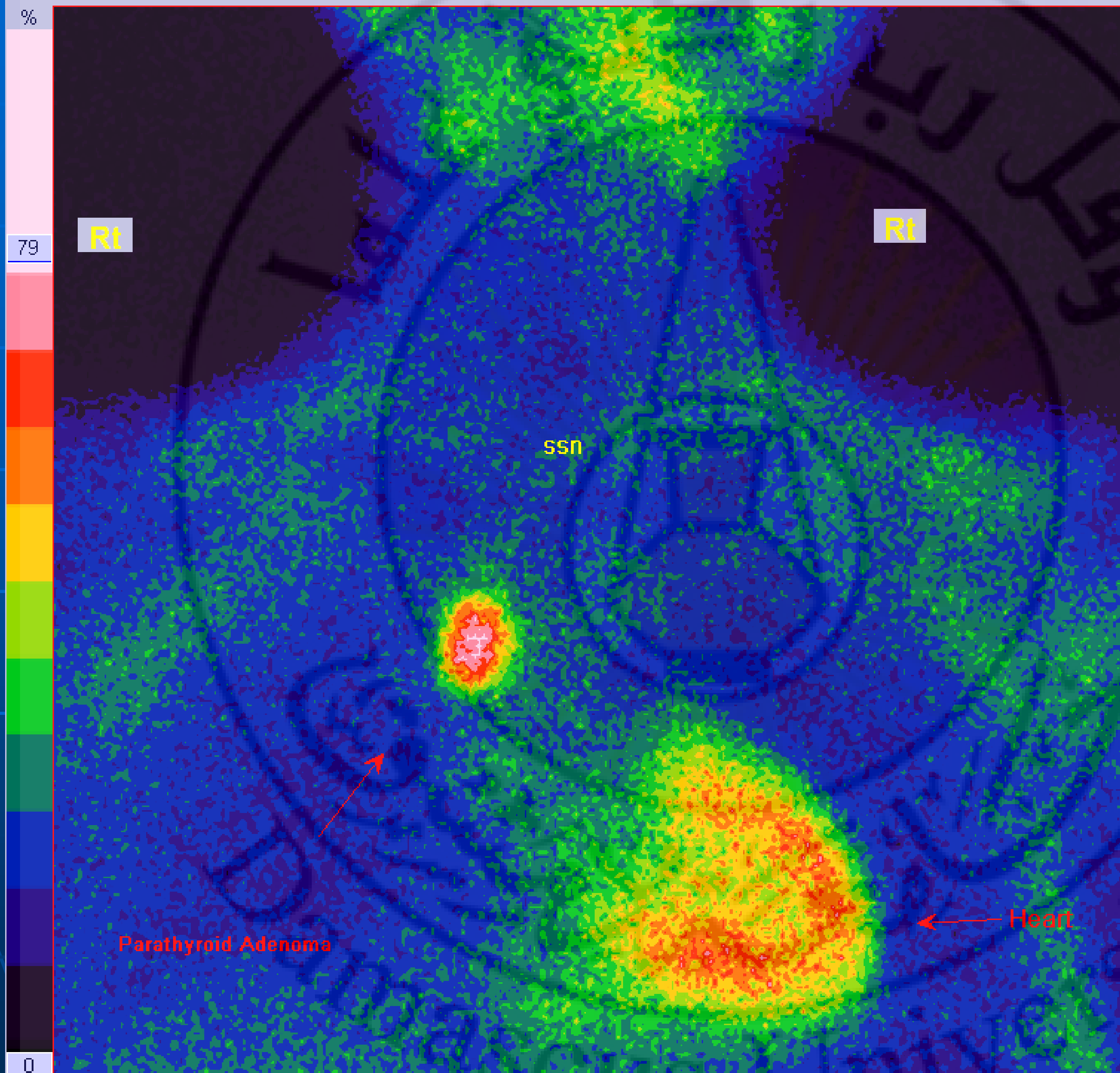
## 99mTc-Sesta MIBI Parathyroid Scintigraphy

All Images

Fr:1 1132x895

All Images

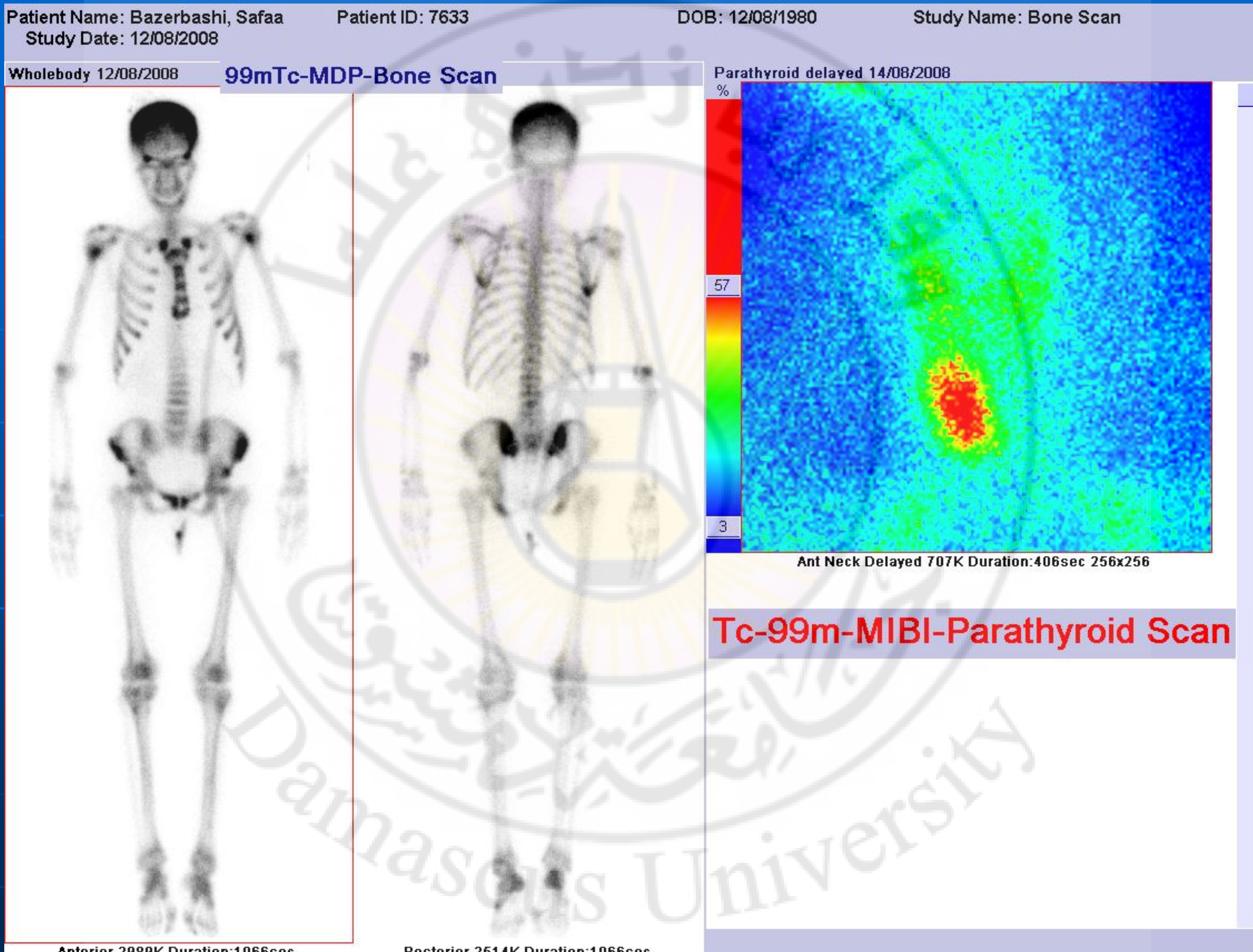
Patient Name: Azzawi, Fares Patient ID: 970 DOB: 2/14/1991 Study Name: Parathyroid Scan
Study Date: 2/14/2007




Post Neck Delayed

All Images

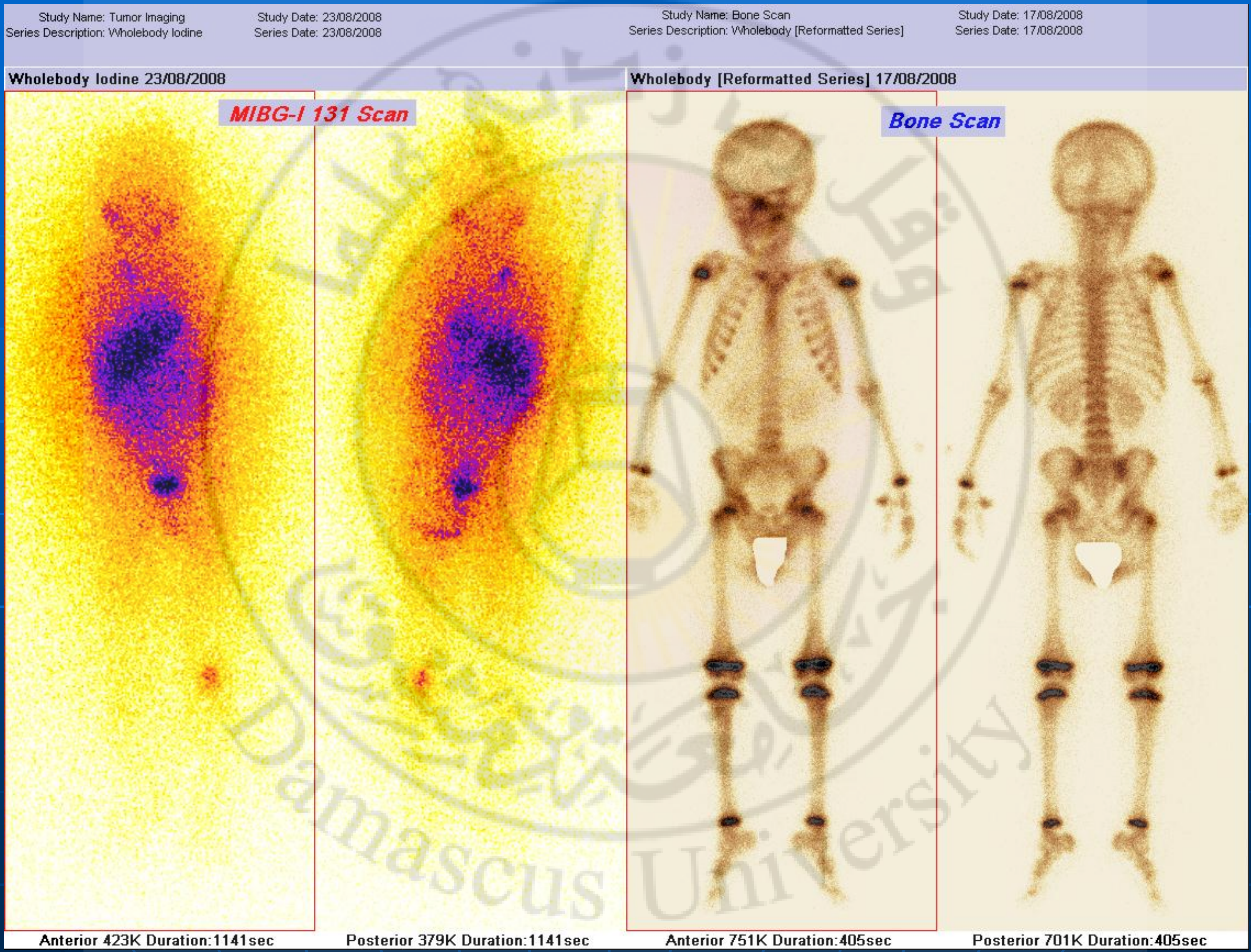
# 99mTc-Sesta MIBI Parathyroid Scintigraphy

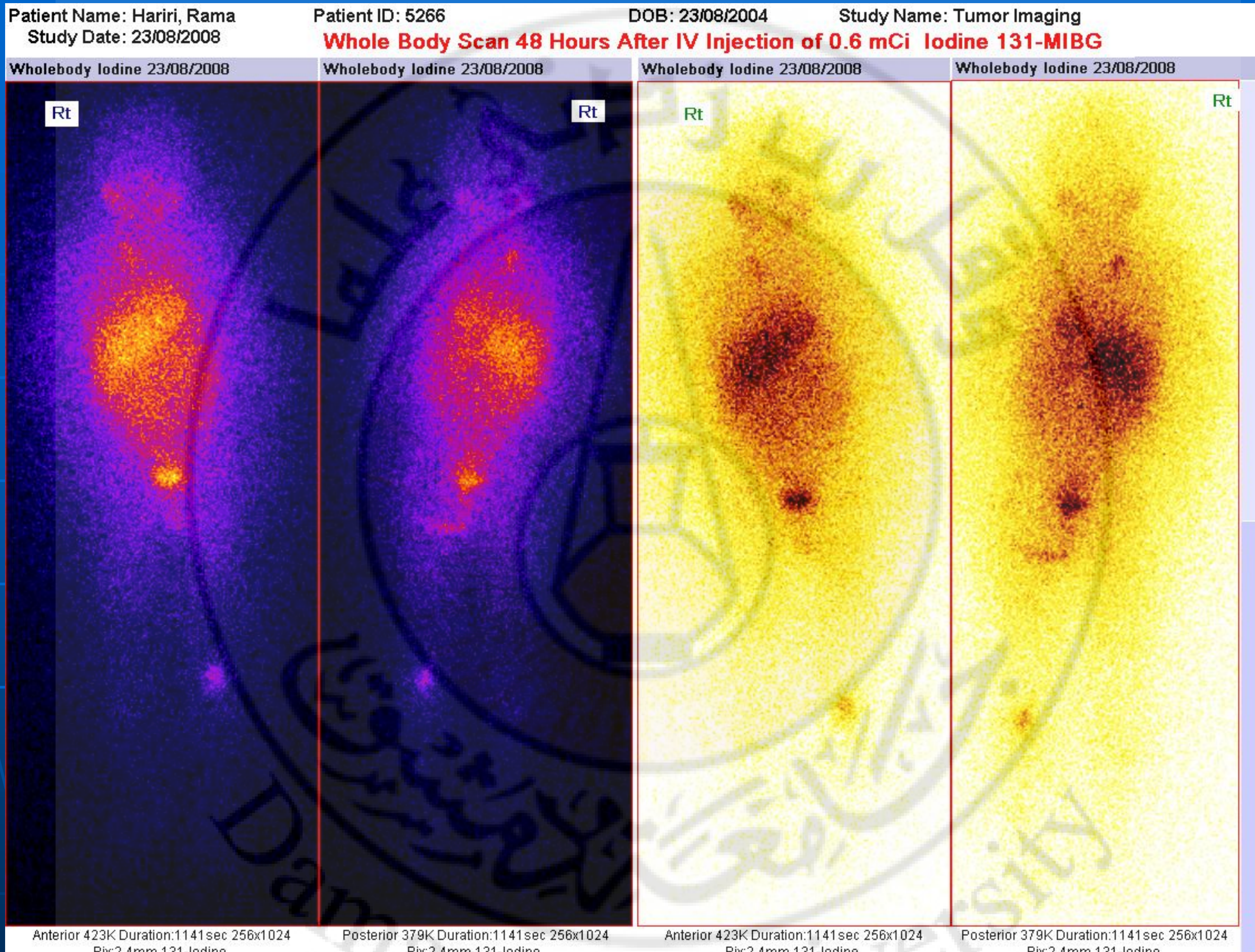

Patient Name: Bazerbashi, Safaa
Patient ID: 7633
DOB: 12/08/1980
Study Name: Bone Scan
Study Date: 12/08/2008
Wholebody 12/08/2008
99mTc-MDP-Bone Scan
Parathyroid delayed 14/08/2008
%
57
3
Ant Neck Delayed 707K Duration:406sec 256x256
Tc-99m-MIBI-Parathyroid Scan
Anterior 2989K Duration:1066sec
Posterior 2514K Duration:1066sec

# ADRENAL SCINTIGRAPHY

## ومضان الكظرين

To detect pheochromocytoma
extraadrenal pheochromocytoma (paraganglioma).
With I-123 MIBG or I-131 MIBG

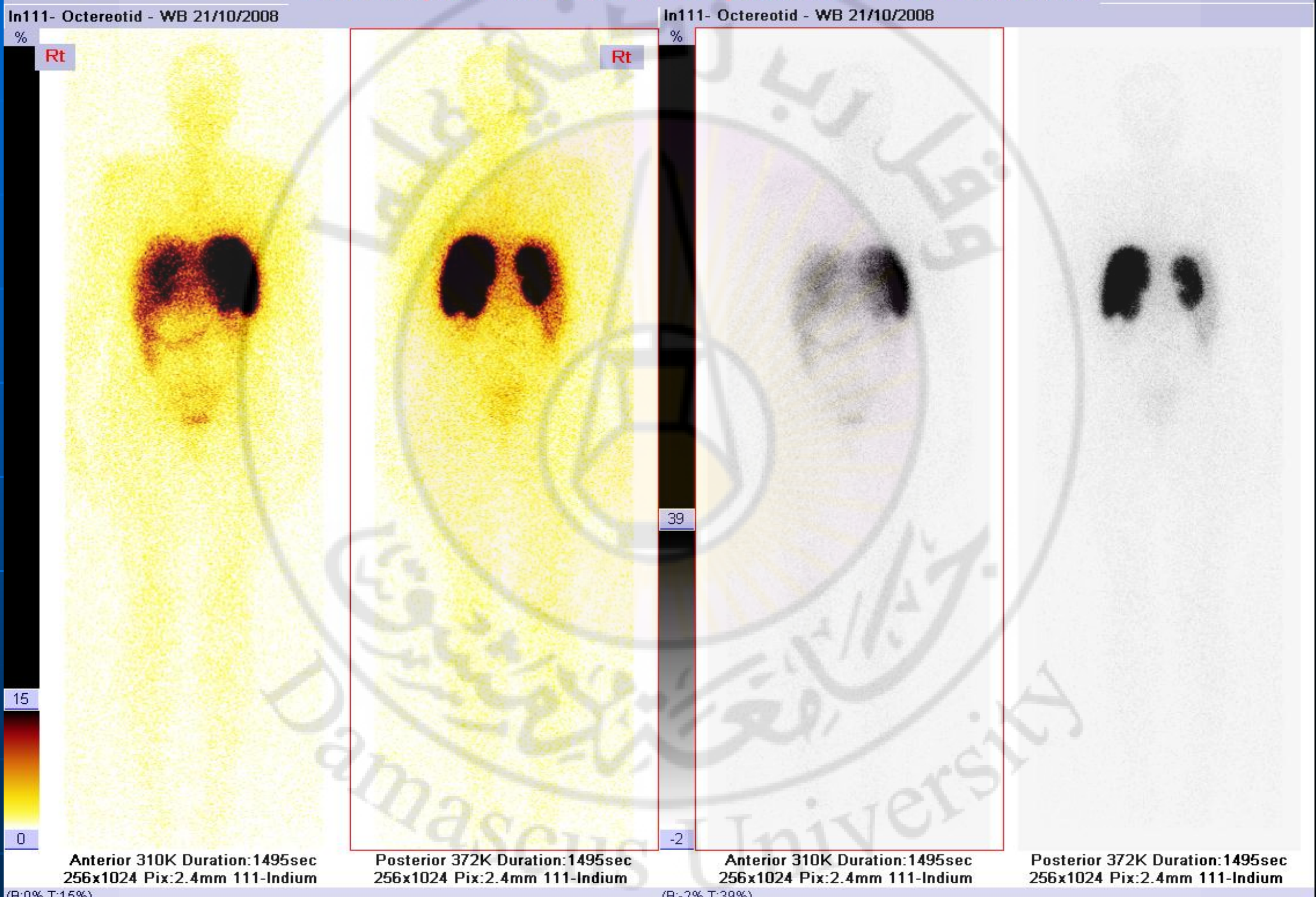

Study Name: Tumor Imaging
Series Description: Wholebody Iodine
Study Date: 23/08/2008
Series Date: 23/08/2008
Study Name: Bone Scan
Series Description: Wholebody [Reformatted Series]
Study Date: 17/08/2008
Series Date: 17/08/2008
Wholebody Iodine 23/08/2008
Wholebody [Reformatted Series] 17/08/2008
MIBG-I 131 Scan
Bone Scan
Anterior 423K Duration:1141sec
Posterior 379K Duration:1141sec
Anterior 751K Duration:405sec
Posterior 701K Duration:405sec


Patient Name: Hariri, Rama
Study Date: 23/08/2008
Patient ID: 5266
DOB: 23/08/2004
Study Name: Tumor Imaging
Whole Body Scan 48 Hours After IV Injection of 0.6 mCi Iodine 131-MIBG
Wholebody Iodine 23/08/2008
Wholebody Iodine 23/08/2008
Wholebody Iodine 23/08/2008
Wholebody Iodine 23/08/2008
Rt
Rt
Rt
Rt
Anterior 423K Duration:1141sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 379K Duration:1141sec 256x1024
Pix:2.4mm 131-Iodine
Anterior 423K Duration:1141sec 256x1024
Pix:2.4mm 131-Iodine
Posterior 379K Duration:1141sec 256x1024
Pix:2.4mm 131-Iodine

Patient Name: Mahamid, Ebtisam | Patient ID: 7631 | DOB: 21/10/1961 | Study Name: Tumor Imaging

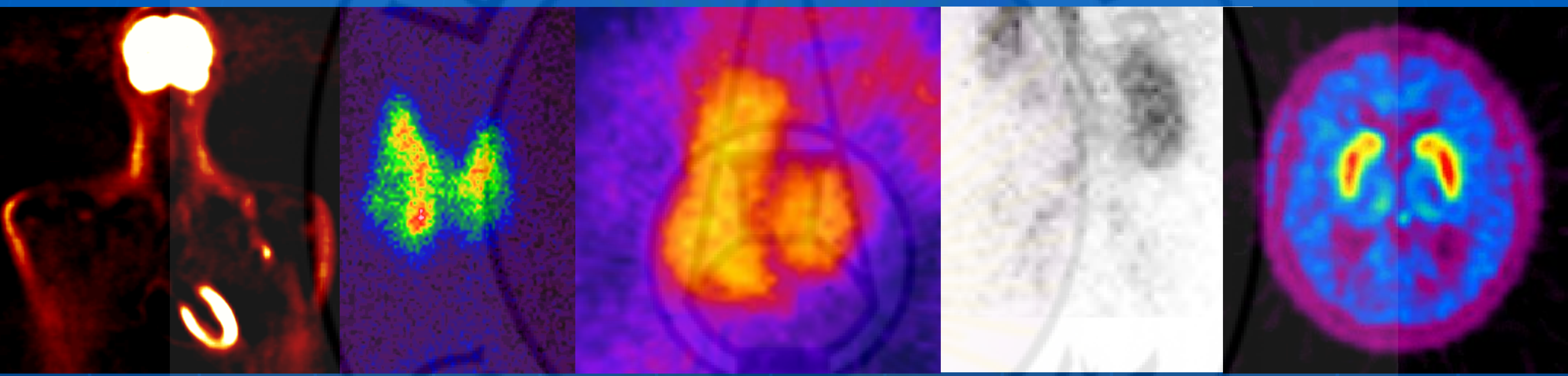
Study Date: 21/10/2008

**Whole Body Scan 38 Hours After IV. Injection Of 3 mCi In 111Octriotide**



# BONE SCAN

*Skeletal System*




الدكتور مجــدي زيــن

**Ph.D. M.D. in Nuclear Medicine**

رئيس قسم الطب النووي في مستشفى الأسد الجامعي بدمشق

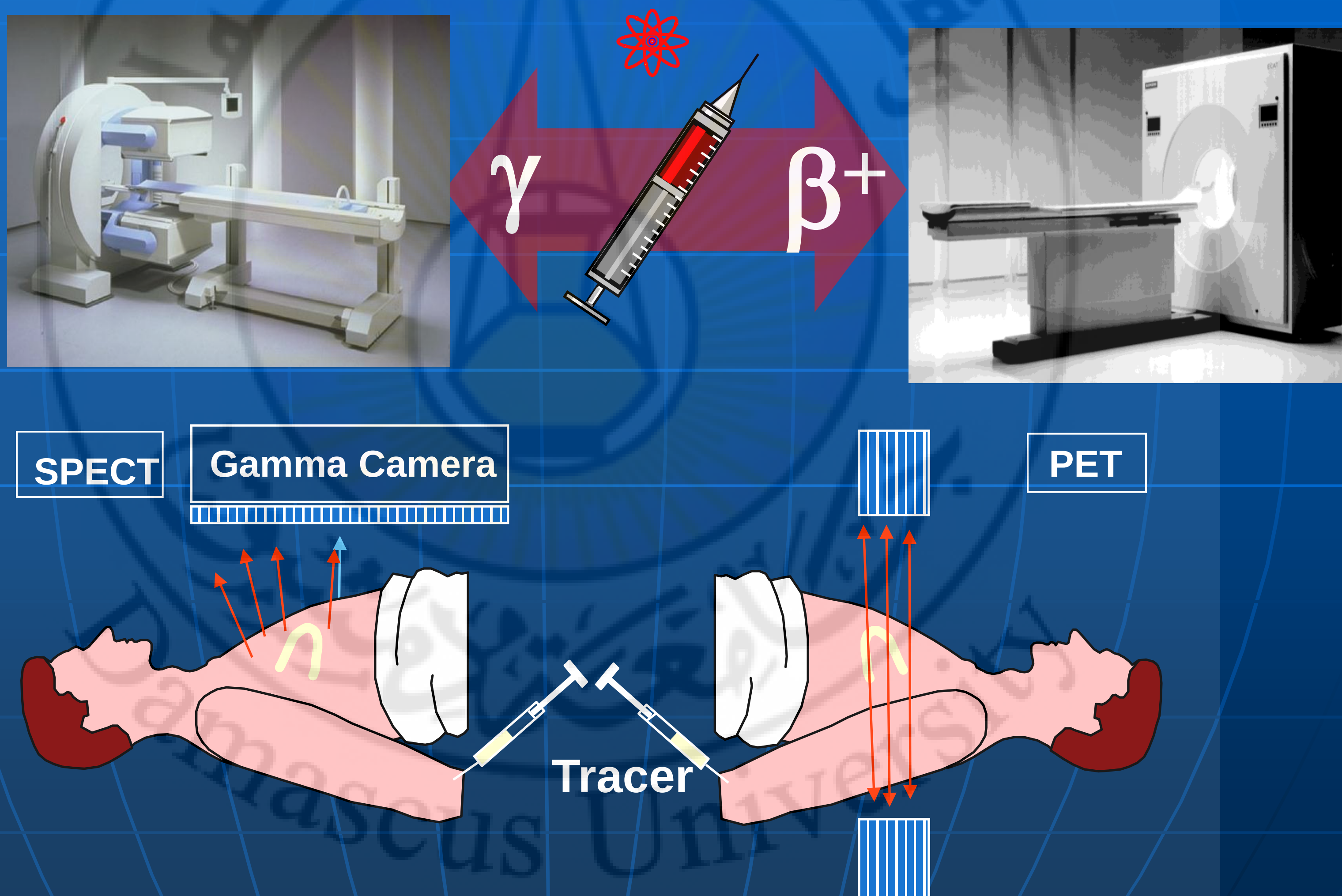
أستاذ في كلية الطب

## Bone Scanning with Tc-99m-DPD: Well Established, Cost Effective

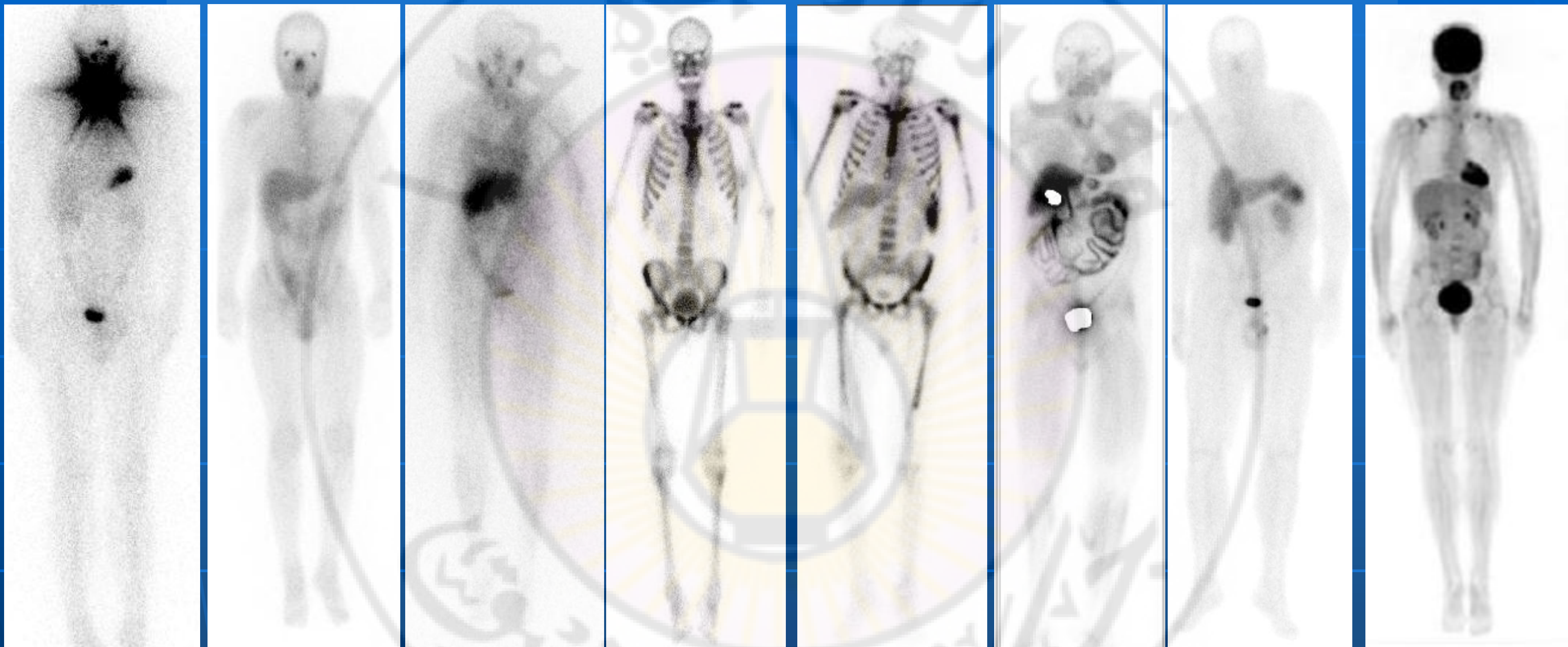
Indications:
Screening for bone metastases, inflammation, fractures …

Advantage:
Whole body view functional information

# Emission (from Patient) - Detection



# Different Tracers - Different Images



I-131 | Ga-67 | I-123-MIBG | Tc-99m-DPD | Tc-99m Antibody | Tc-99m-MIBI | In-111-SMS | F-18 FDG

Radiopharmaceuticals
Preparation of Tc-99m-labeled bone imaging agents .
Pharmacokinetics after intravenous administration of Tc-99m-diphosphonate
Mechanisms of tracer localization
Dosimetry
Technique
Clinical Applications of Skeletal Scintigraphy
Normal appearance of the skeletal scintigram
Metastatic disease
Pathophysiology: basis of scitigraphic and radio- graphic detection
Scintigraphic patterns Scintigraphy in specific tumors
Extraskeletat uptake in soft tissue neoplasms
Primary bone tumors Multiple myeloma
Benign bone tumors Osteoid osteoma Other benign bone tumors
Skeletal trauma
Detection of fractures Iatrogenic trauma Athletic injuries Child abuse
Bone infarction—osteonecrosis
Legg-Calve-Perth.es disease
Steroid-induced osteonecrosis
Sickle cell anemia Osteomyelitis
Three-phase scintigraphy
Prosthesis evaluation Metabolic bone disease Osteoporosis
Pagers disease
Bone dysplasias
Arthritis

# RADIOPHARMACEUTICALS

Tc-99m label diphosphonates

Tc-99m -<u>**M**</u>ethyline <u>**d**</u>iphos<u>**p**</u>honates

**Tc-99m -MDP**

# Mechanisms of Tracer Localization

For Tc-99m diphosphonates:

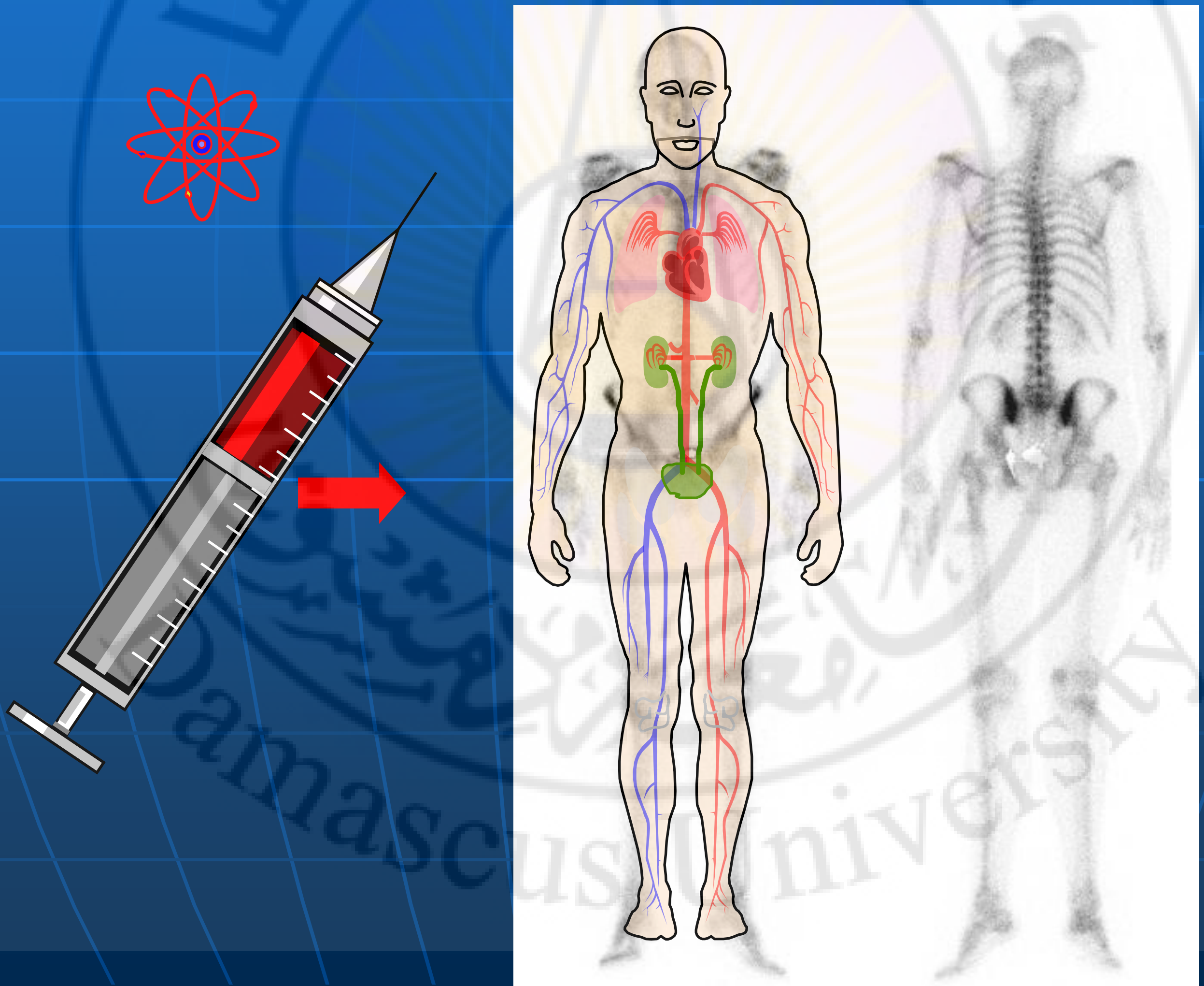
1-Adsorption is primarily to the mineral phase of bone, with little binding to the organic phase. The uptake is significantly higher in amorphous calcium phosphate than in mature crystalline hydroxyapatite, which helps explain the avidity of the tracer for areas of increased osteogenic activity.

2-Local blood flow. More radiopharmaceuti-cal is delivered to hyperemic areas

**Nuclear Medicine** is the Use of Radioactive Isotopes for Diagnosis and Therapy

# الطــب النــووي

استخدام المنابع المشعة المفتوحة في تشخيص الآفات التي تصيب مختلف أعضاء و أجهزة الجسم و معالجة بعض الآفات الورمية و غير الورمية




Infinia Hawkeye 4
Evolution
Essential
SPECT/CT
Infinia Hawkeye 4
Beyond
standards
Infinia Evolution
The Gold
Standard
Infinia & Xeleris 2
Infinia
Advanced Techn

## Box 5-1 Skeletal Scintigraphy: Protocol Summary for Whole Body Survey

PATIENT PREPARATION AND FOLLOW-UP

Patient should be well hydrated.

Patient should void immediately prior to study.

DOSAGE AND ROUTE OF ADMINISTRATION

20 mCi Tc-99m diphosphonate (adult dose, standard).

IV injection.

TIME OF INTAGING

Begin imaging 2-4 hr after tracer administration.

PROCEDURE

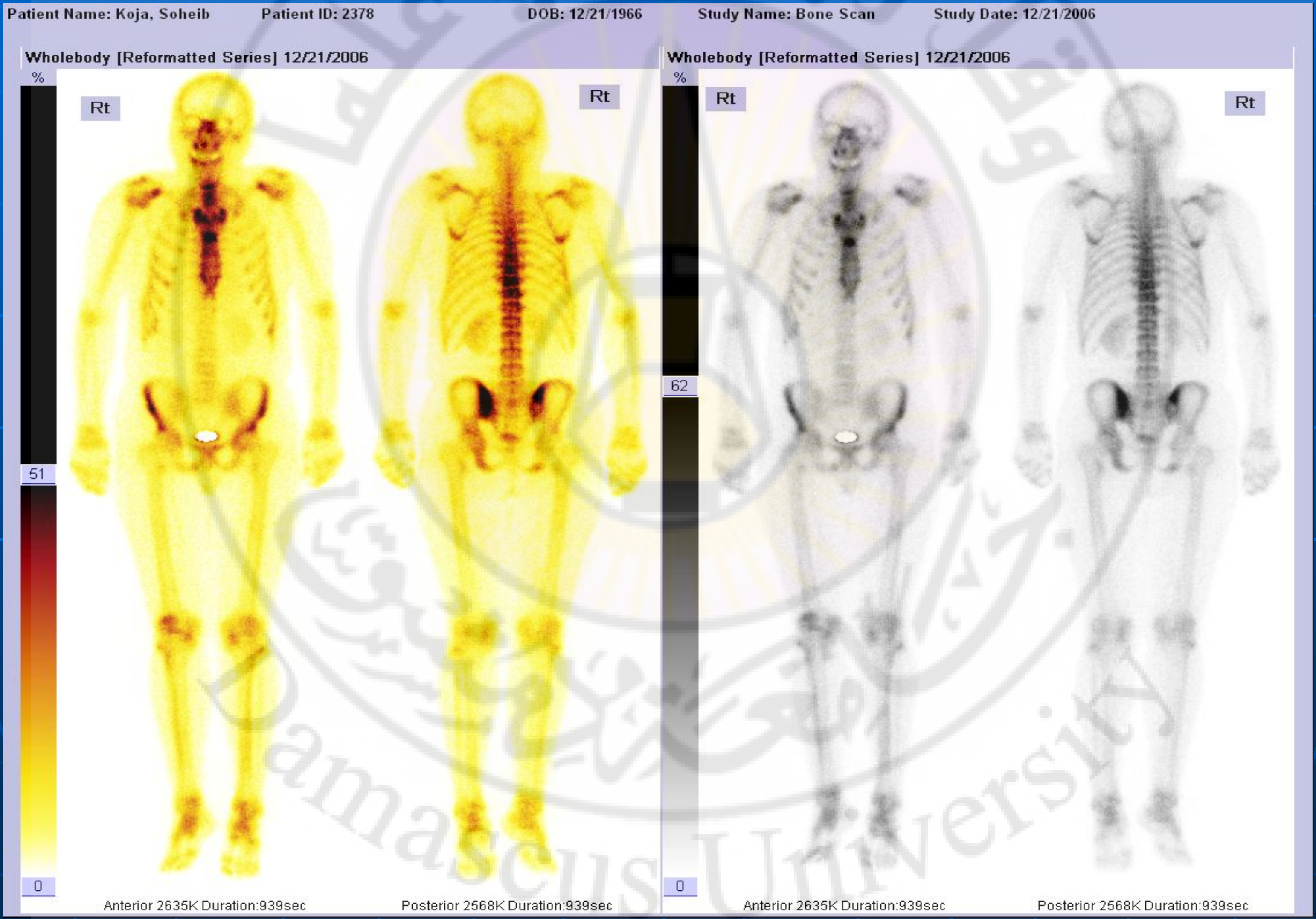
Obtain anterior and posterior views of the entire skelet, spot views or use SPECT for more detail.

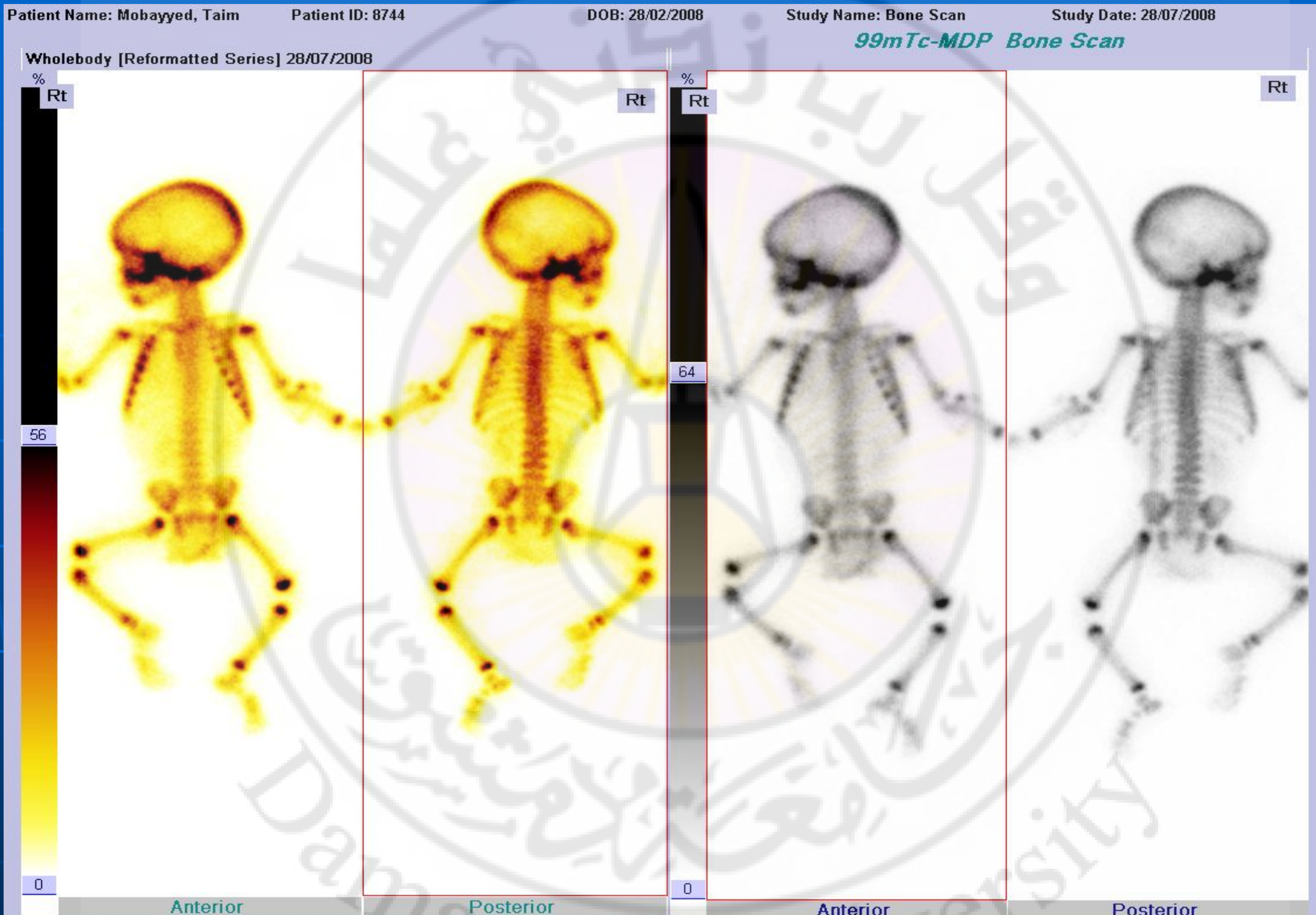
# CLINICAL APPLICATIONS

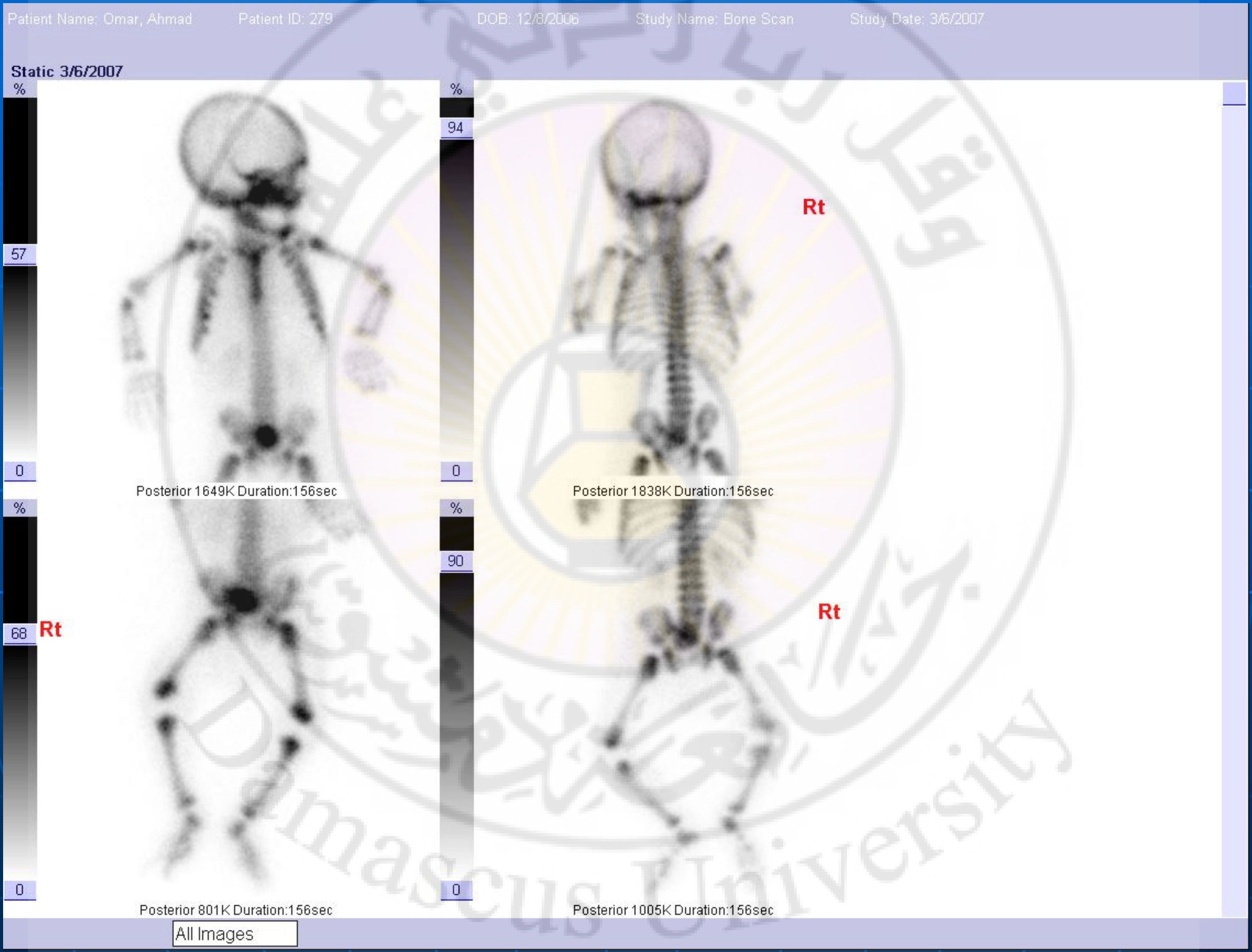
**Normal skeletal scintigram :**

The appearance of the normal skeletal scintigram changes dramatically from infancy to childhood, adolescence, and mature adulthood

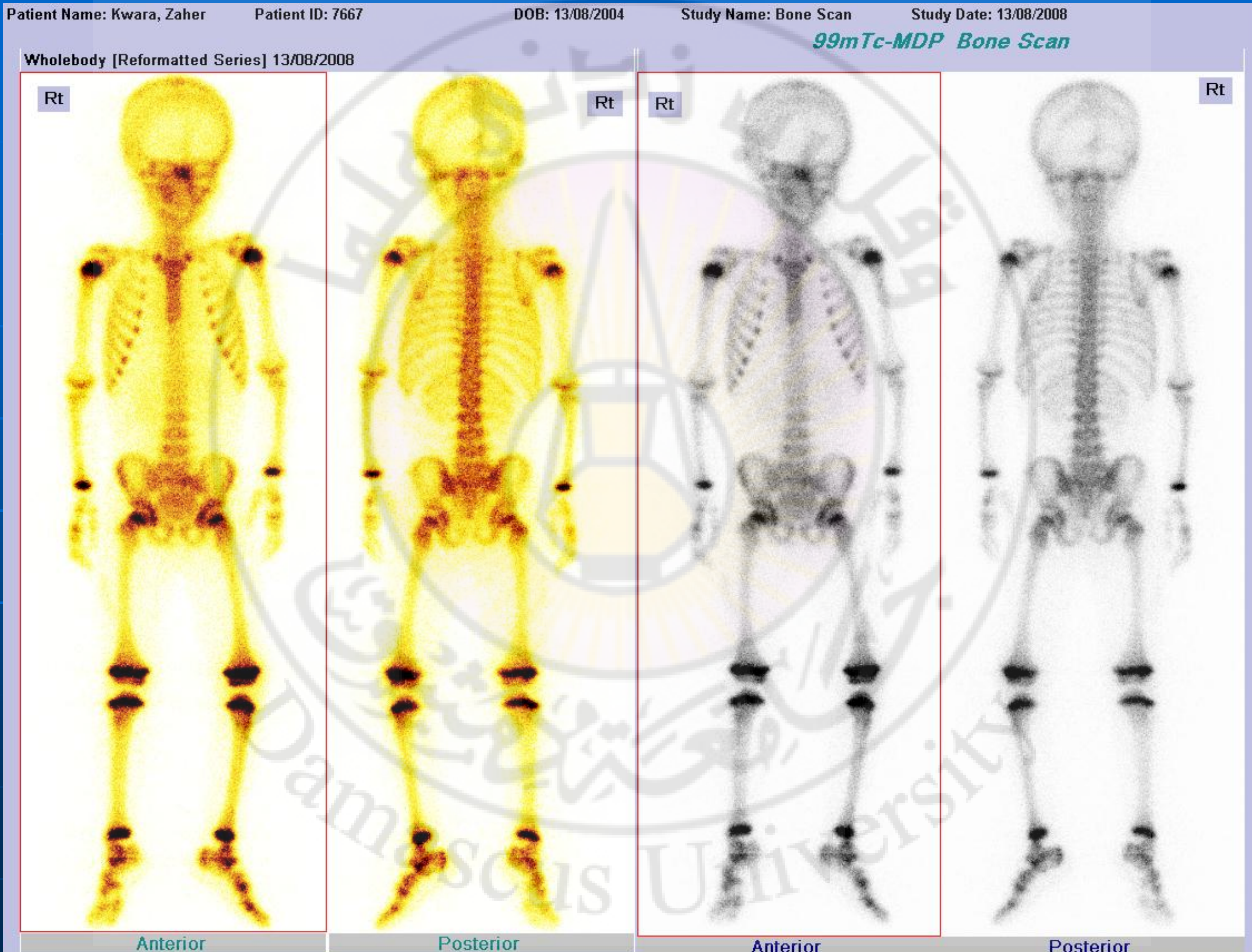
# ومضان العظام الطبيعي

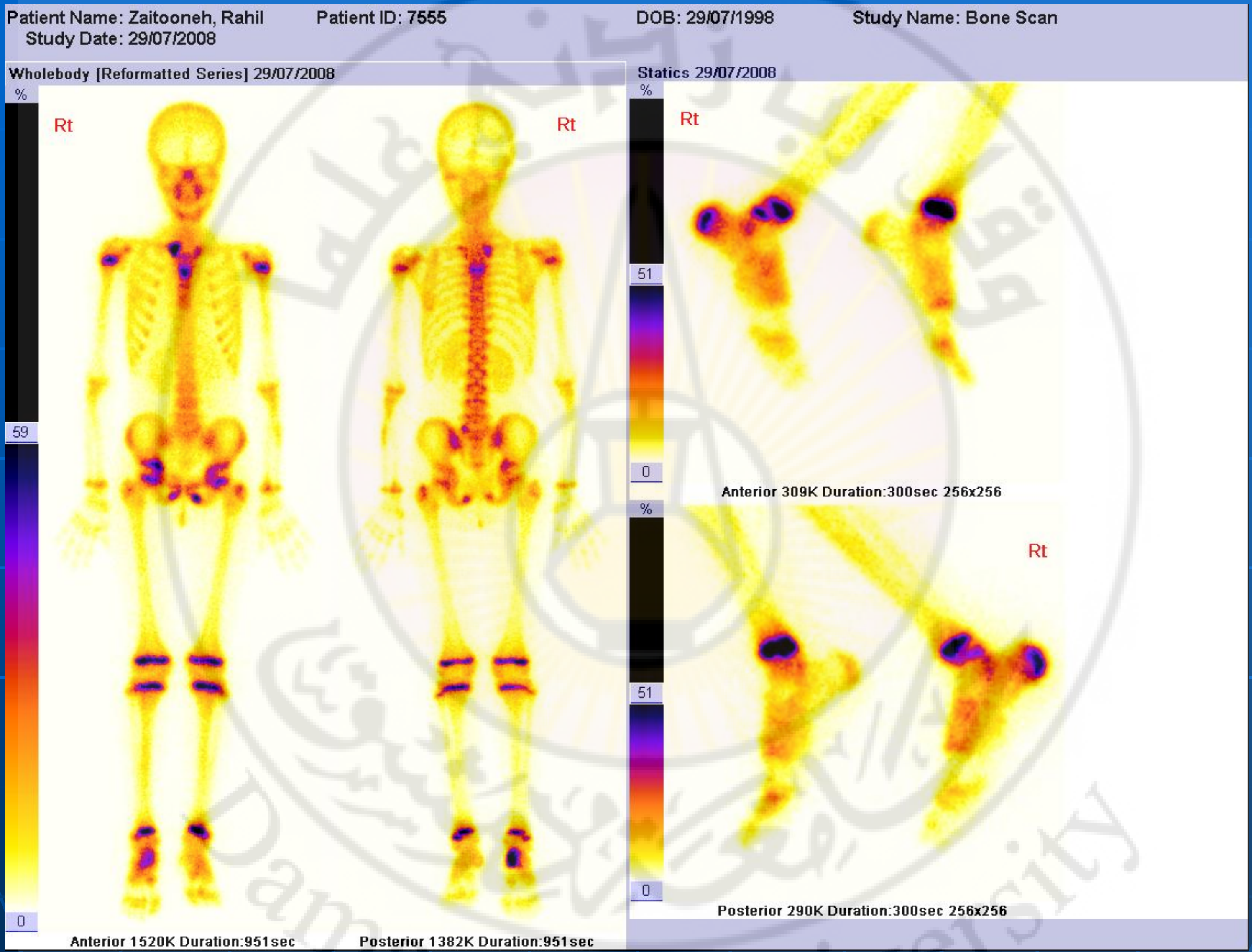



Patient Name: Mobayyed, Taim
Patient ID: 8744
DOB: 28/02/2008
Study Name: Bone Scan
Study Date: 28/07/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 28/07/2008
%
Rt
56
0
Rt
%
Rt
64
0
Rt
Anterior
Posterior
Anterior
Posterior

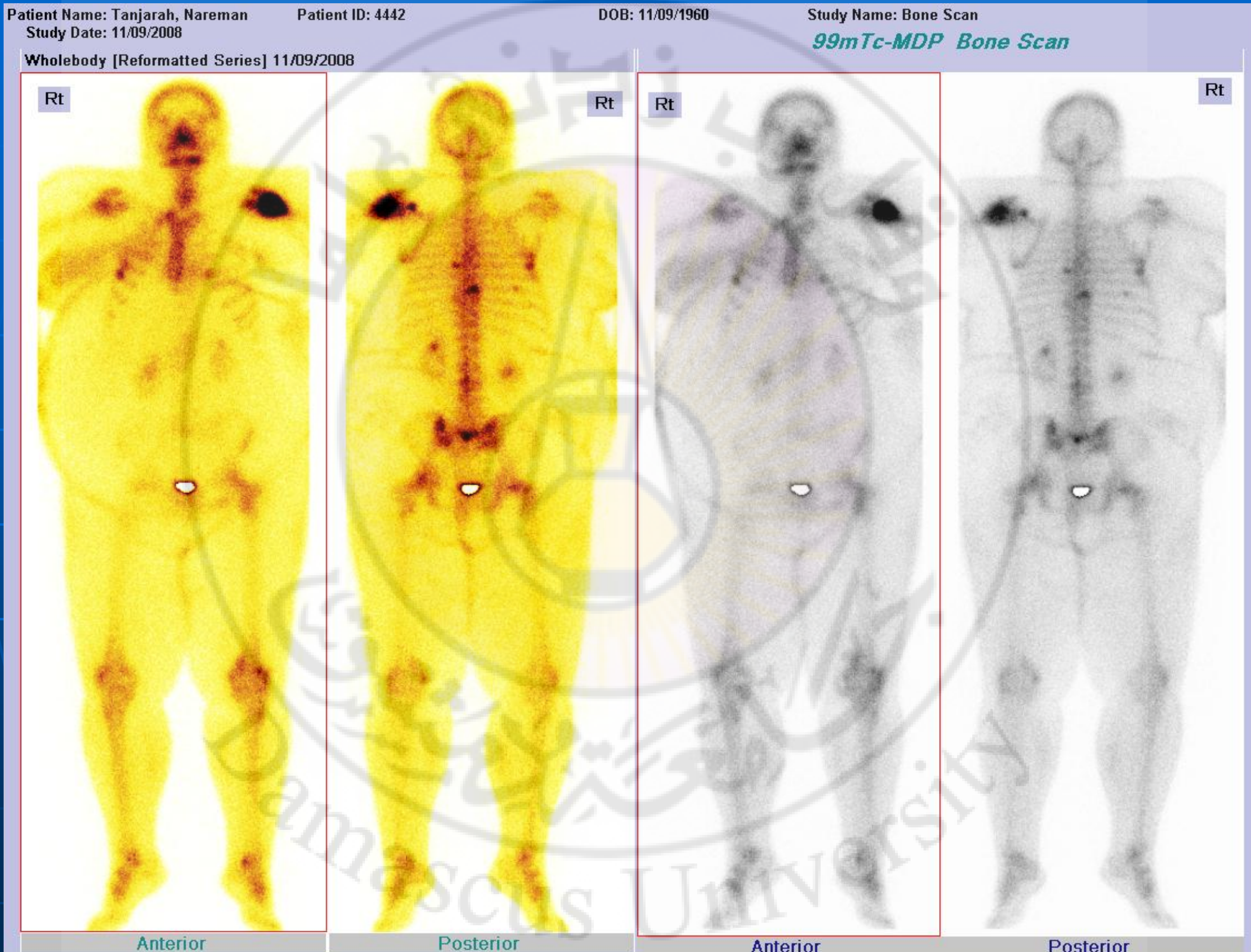


Patient Name: Omar, Ahmad
Patient ID: 279
DOB: 12/8/2006
Study Name: Bone Scan
Study Date: 3/6/2007
Static 3/6/2007
%
57
0
Posterior 1649K Duration:156sec
%
94
0
Rt
Posterior 1838K Duration:156sec
%
68
Rt
0
Posterior 801K Duration:156sec
%
90
0
Rt
Posterior 1005K Duration:156sec
All Images


Patient Name: Kwara, Zaher
Patient ID: 7667
DOB: 13/08/2004
Study Name: Bone Scan
Study Date: 13/08/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 13/08/2008
Rt
Rt
Rt
Rt
Anterior
Posterior
Anterior
Posterior



Patient Name: Zaitooneh, Rahil
Patient ID: 7555
DOB: 29/07/1998
Study Name: Bone Scan
Study Date: 29/07/2008
Wholebody [Reformatted Series] 29/07/2008
Statics 29/07/2008
Rt
Anterior 1520K Duration:951sec
Posterior 1382K Duration:951sec
Anterior 309K Duration:300sec 256x256
Posterior 290K Duration:300sec 256x256


Patient Name: Tanjarah, Nareman
Patient ID: 4442
DOB: 11/09/1960
Study Name: Bone Scan
Study Date: 11/09/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 11/09/2008
Rt
Rt
Rt
Rt
Anterior
Posterior
Anterior
Posterior
Damascus University

# Metastatic Disease

- The most common clinical application of skeletal scintigraphy is in the evaluation of patients with extraskeletal primary malignancies for the presence of metastatic disease

## Box 5-3 Skeletal Imaging: Applications in Patients with Extraskeletal Malignancies

1-Initial staging: Metastatic skeletal survey.

2-Protocol monitoring: Response to chemotherapy and decision to change therapy.

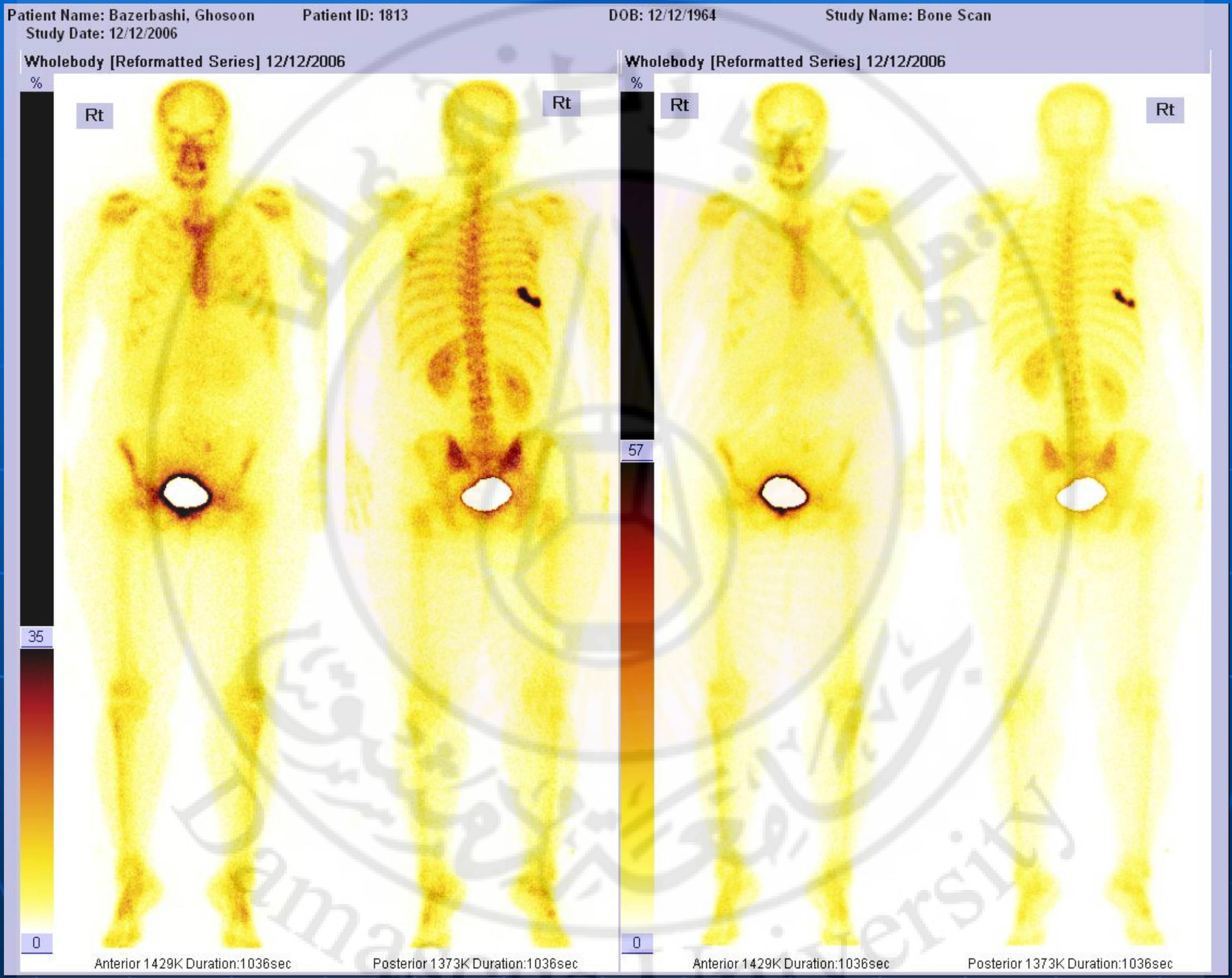
3- Radiation therapy treatment field planning and response to radiation therapy.

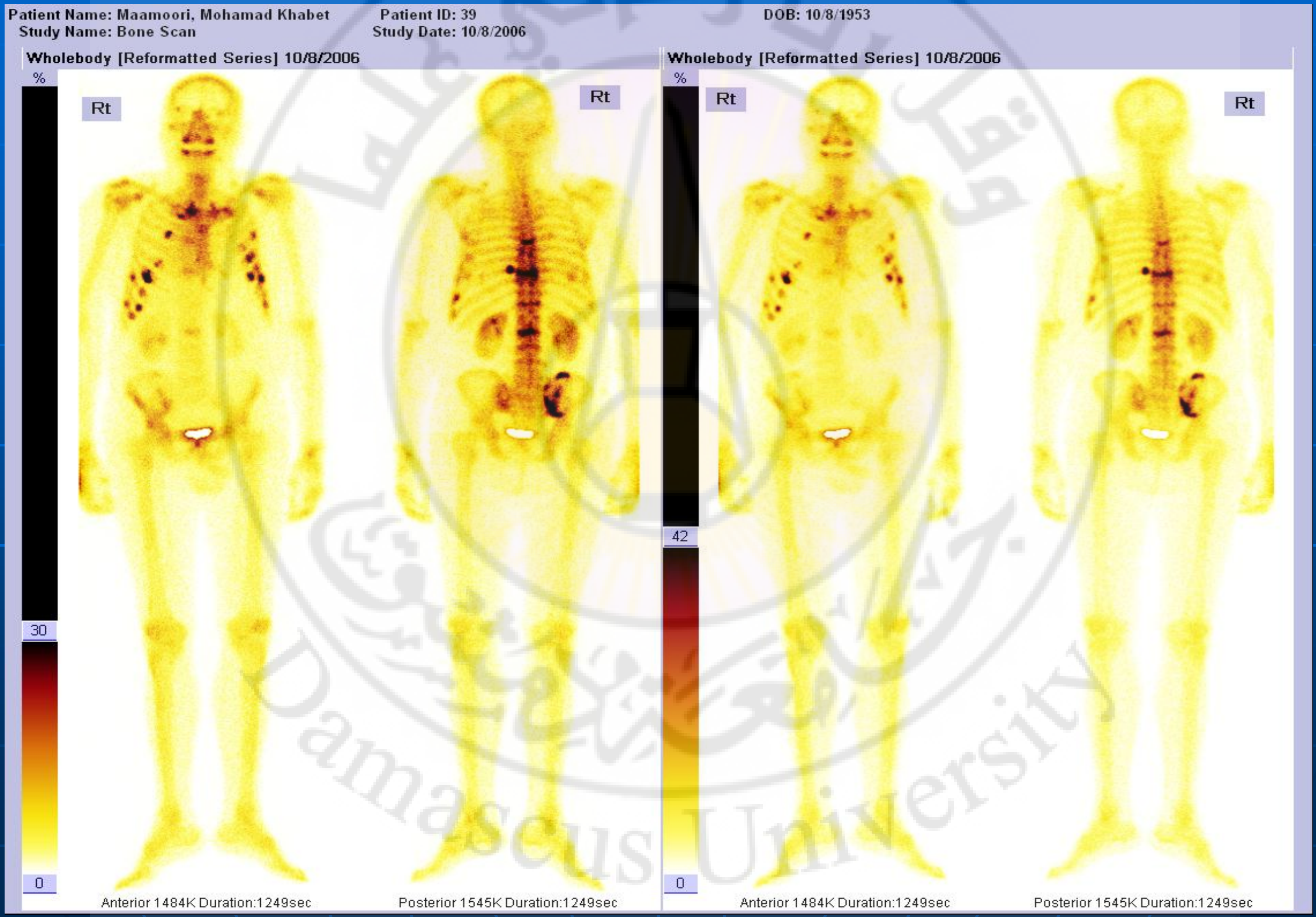
4- Detection of areas at risk for pathologic fracture.

# Initial skeletal scintigram in a patient with multiple skeletal metastases

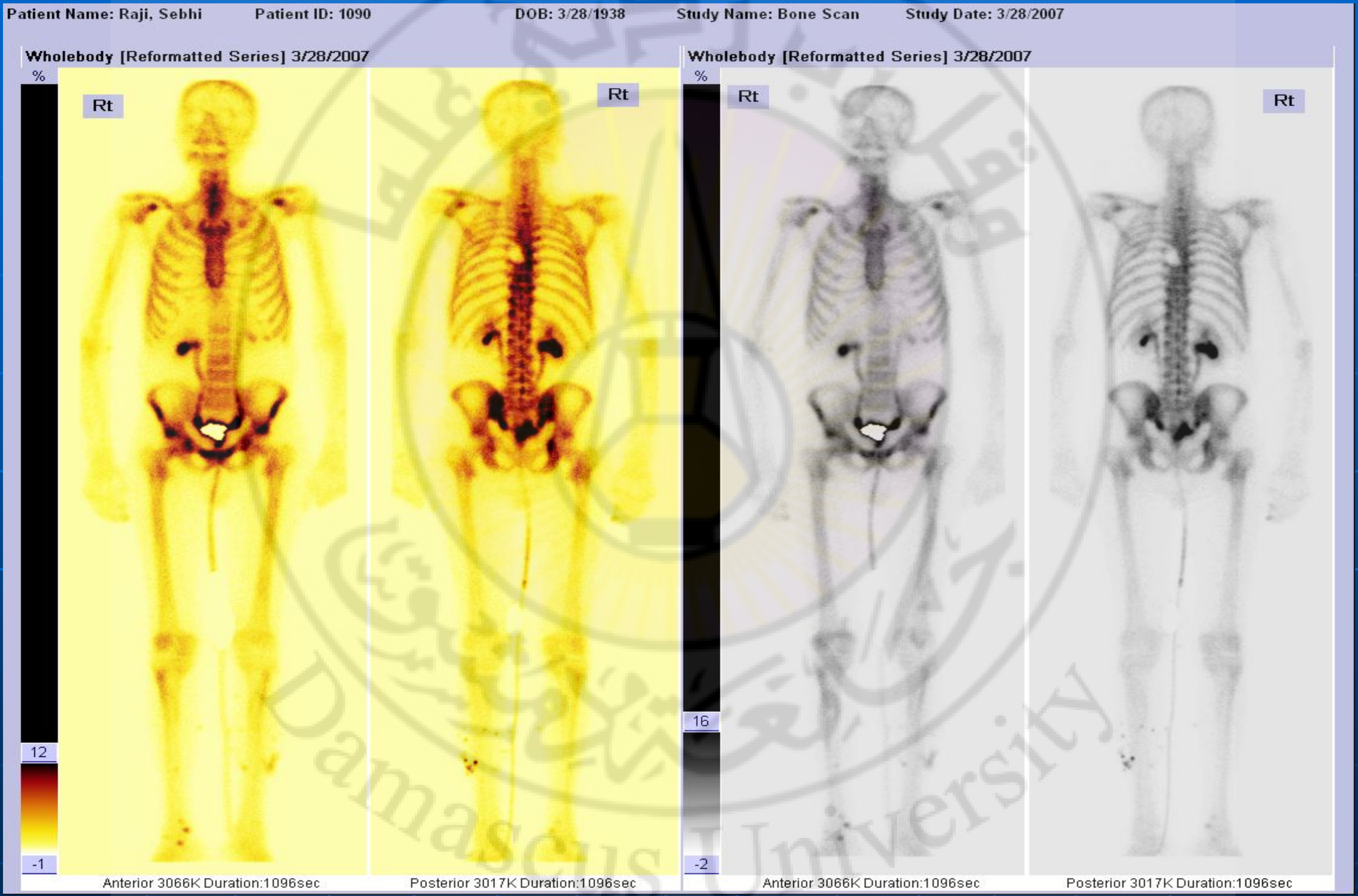
# Scintigraphic patterns in skeletal metastatic disease

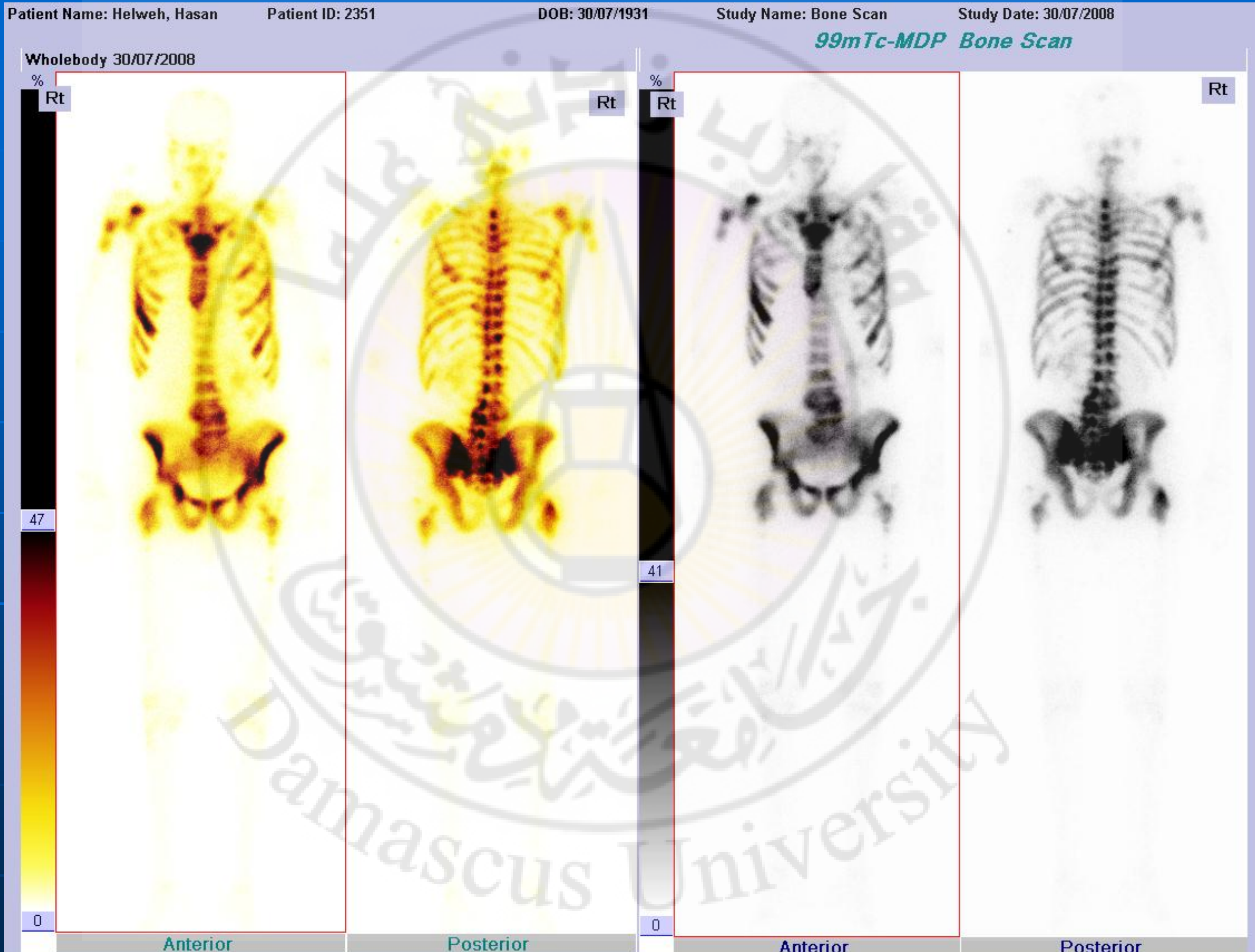
- Solitary focal lesions
- Multiple focal lesions
- Diffuse involvement (super scan). -
- Photon-deficient lesions ("cold' lesions) -
- Normal (false negative) -
- "Flare" phenomenon (follow-up studies) -
- Soft tissue lesions (tracer uptake in - tumor


Patient Name: Bazerbashi, Ghosoon
Patient ID: 1813
DOB: 12/12/1964
Study Name: Bone Scan
Study Date: 12/12/2006
Wholebody [Reformatted Series] 12/12/2006
%
Rt
Rt
35
0
Anterior 1429K Duration:1036sec
Posterior 1373K Duration:1036sec
Wholebody [Reformatted Series] 12/12/2006
%
Rt
Rt
57
0
Anterior 1429K Duration:1036sec
Posterior 1373K Duration:1036sec

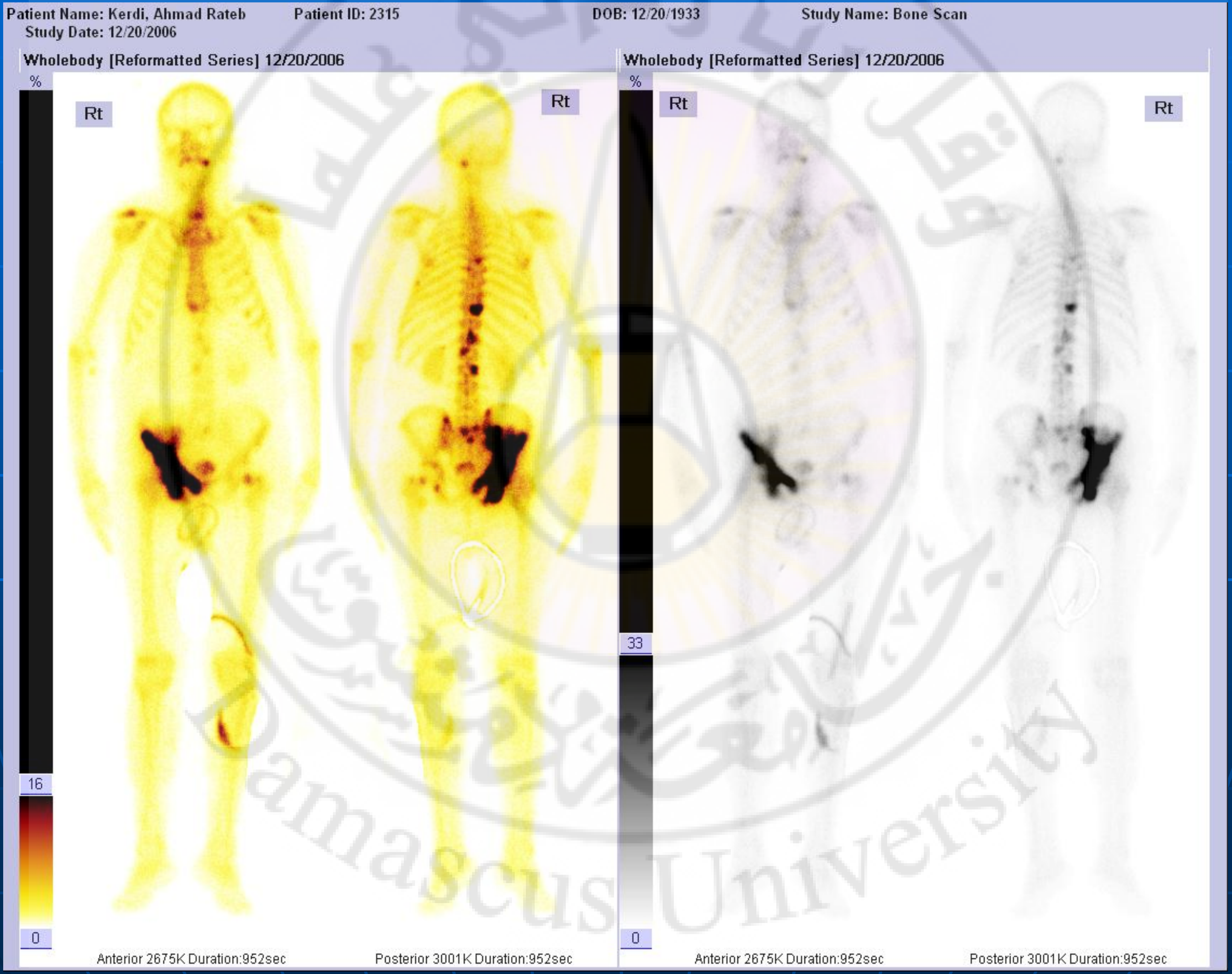

Patient Name: Maamoori, Mohamad Khabet
Patient ID: 39
DOB: 10/8/1953
Study Name: Bone Scan
Study Date: 10/8/2006
Wholebody [Reformatted Series] 10/8/2006
%
Rt
Rt
30
0
Anterior 1484K Duration:1249sec
Posterior 1545K Duration:1249sec
Wholebody [Reformatted Series] 10/8/2006
%
Rt
Rt
42
0
Anterior 1484K Duration:1249sec
Posterior 1545K Duration:1249sec

# Diffuse metastasis a case of first symptom breast ca

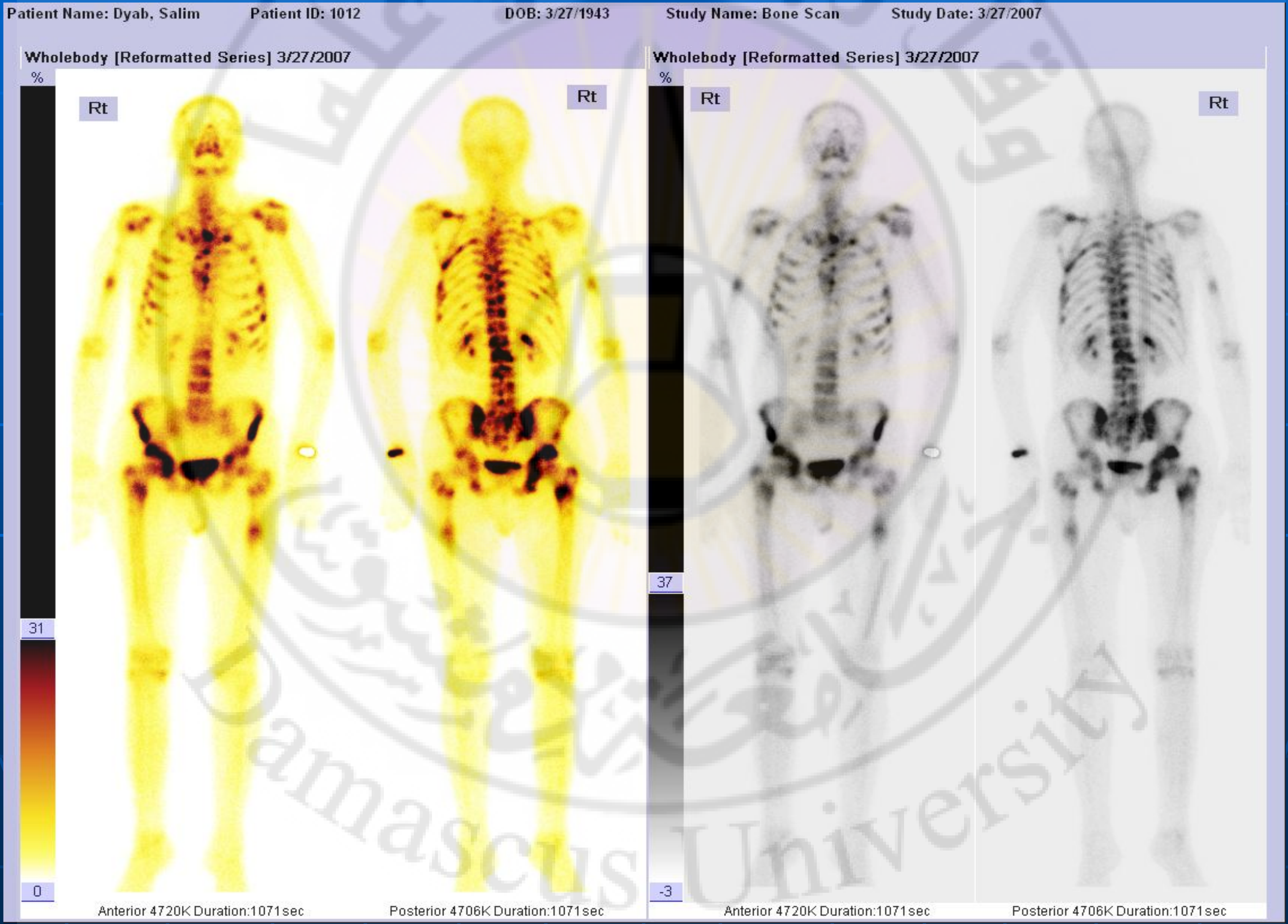

Patient Name: Raji, Sebhi
Patient ID: 1090
DOB: 3/28/1938
Study Name: Bone Scan
Study Date: 3/28/2007
Wholebody [Reformatted Series] 3/28/2007
%
Rt
Rt
12
-1
Anterior 3066K Duration:1096sec
Posterior 3017K Duration:1096sec
Wholebody [Reformatted Series] 3/28/2007
%
Rt
Rt
16
-2
Anterior 3066K Duration:1096sec
Posterior 3017K Duration:1096sec


Patient Name: Helweh, Hasan
Patient ID: 2351
DOB: 30/07/1931
Study Name: Bone Scan
Study Date: 30/07/2008
99mTc-MDP Bone Scan
Wholebody 30/07/2008
%
Rt
47
0
Anterior
Posterior
41
Damascus University

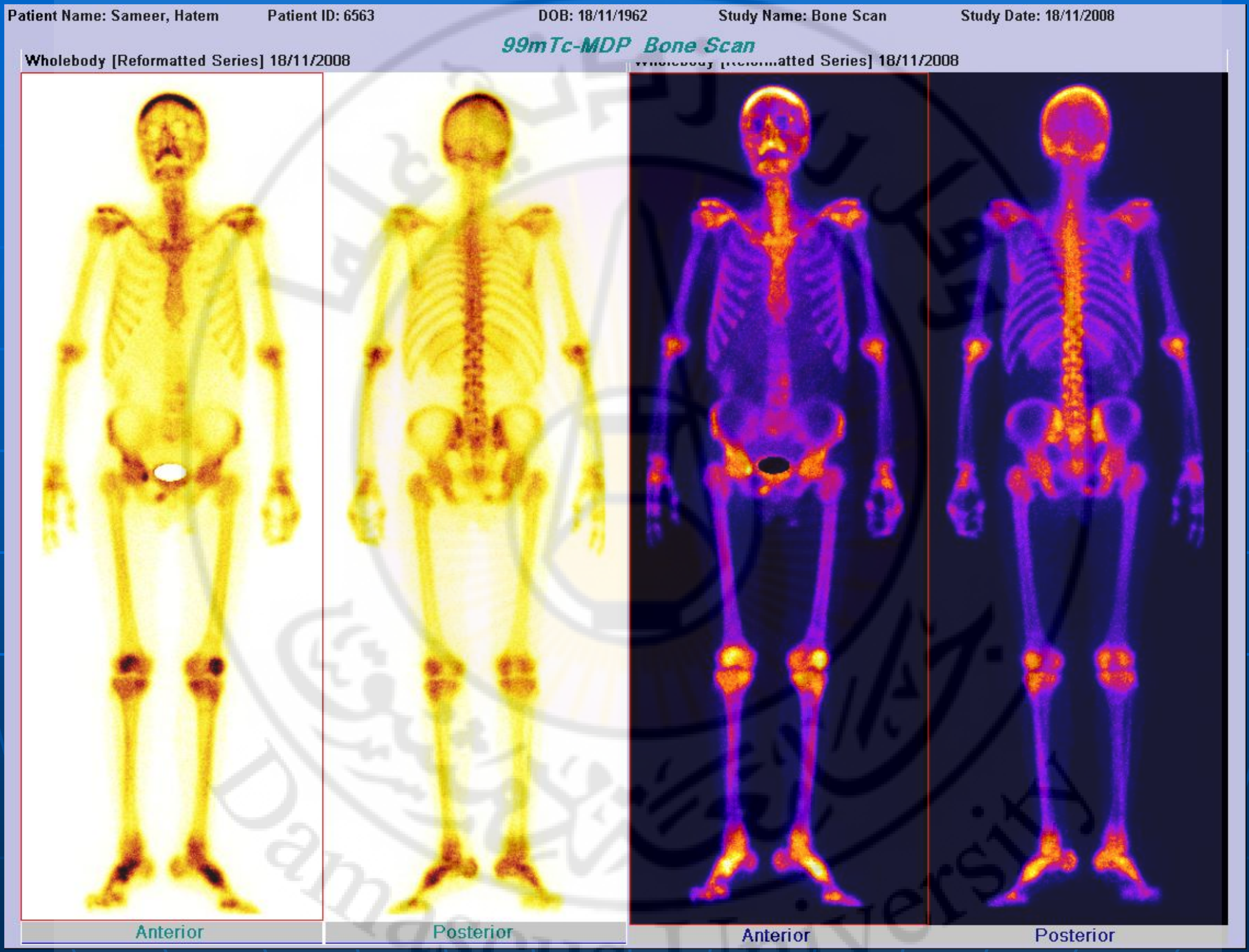
# Prostate Ca

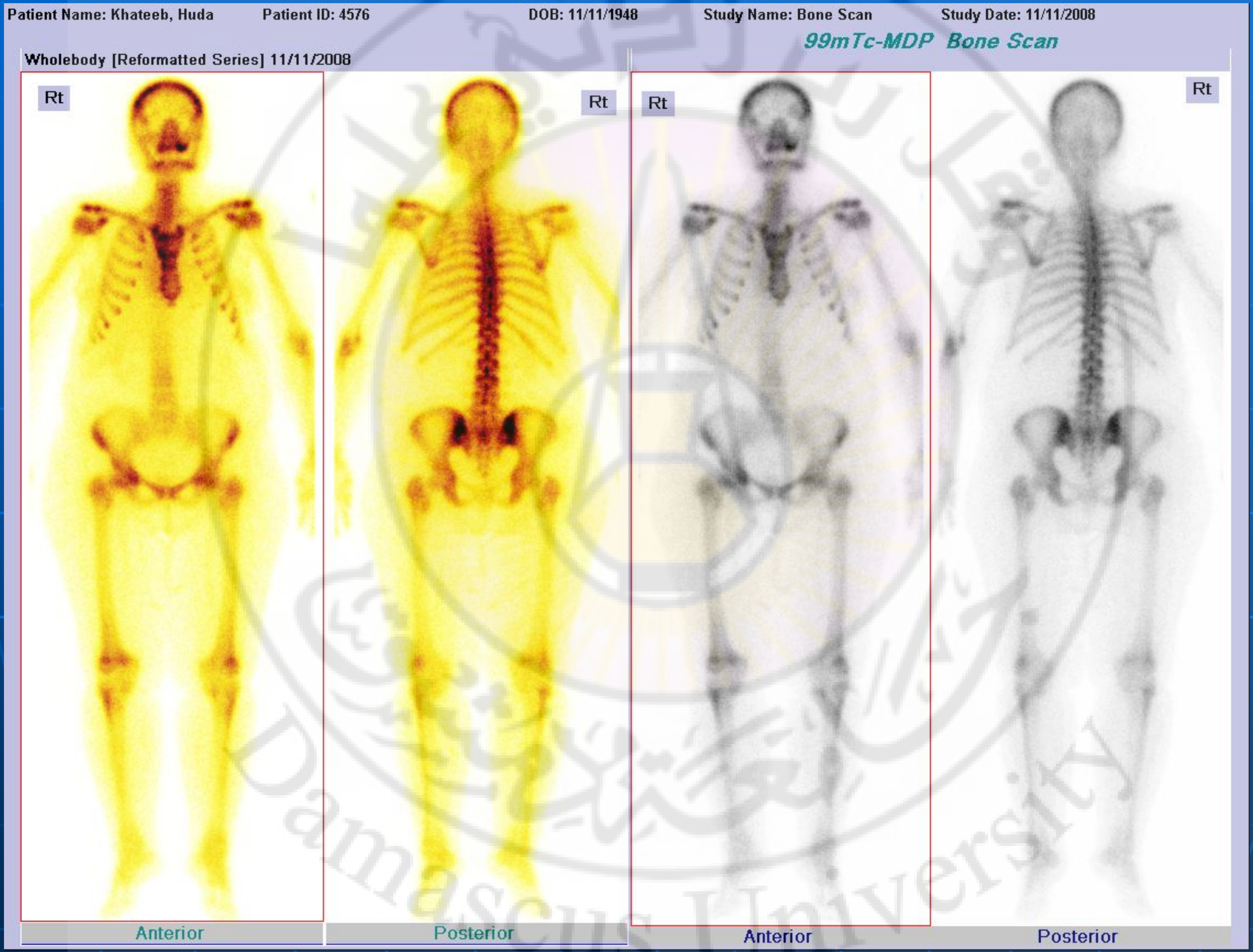

Patient Name: Kerdi, Ahmad Rateb
Patient ID: 2315
DOB: 12/20/1933
Study Name: Bone Scan
Study Date: 12/20/2006
Wholebody [Reformatted Series] 12/20/2006
Wholebody [Reformatted Series] 12/20/2006
%
Rt
Rt
16
0
%
Rt
Rt
33
0
Anterior 2675K Duration:952sec
Posterior 3001K Duration:952sec
Anterior 2675K Duration:952sec
Posterior 3001K Duration:952sec

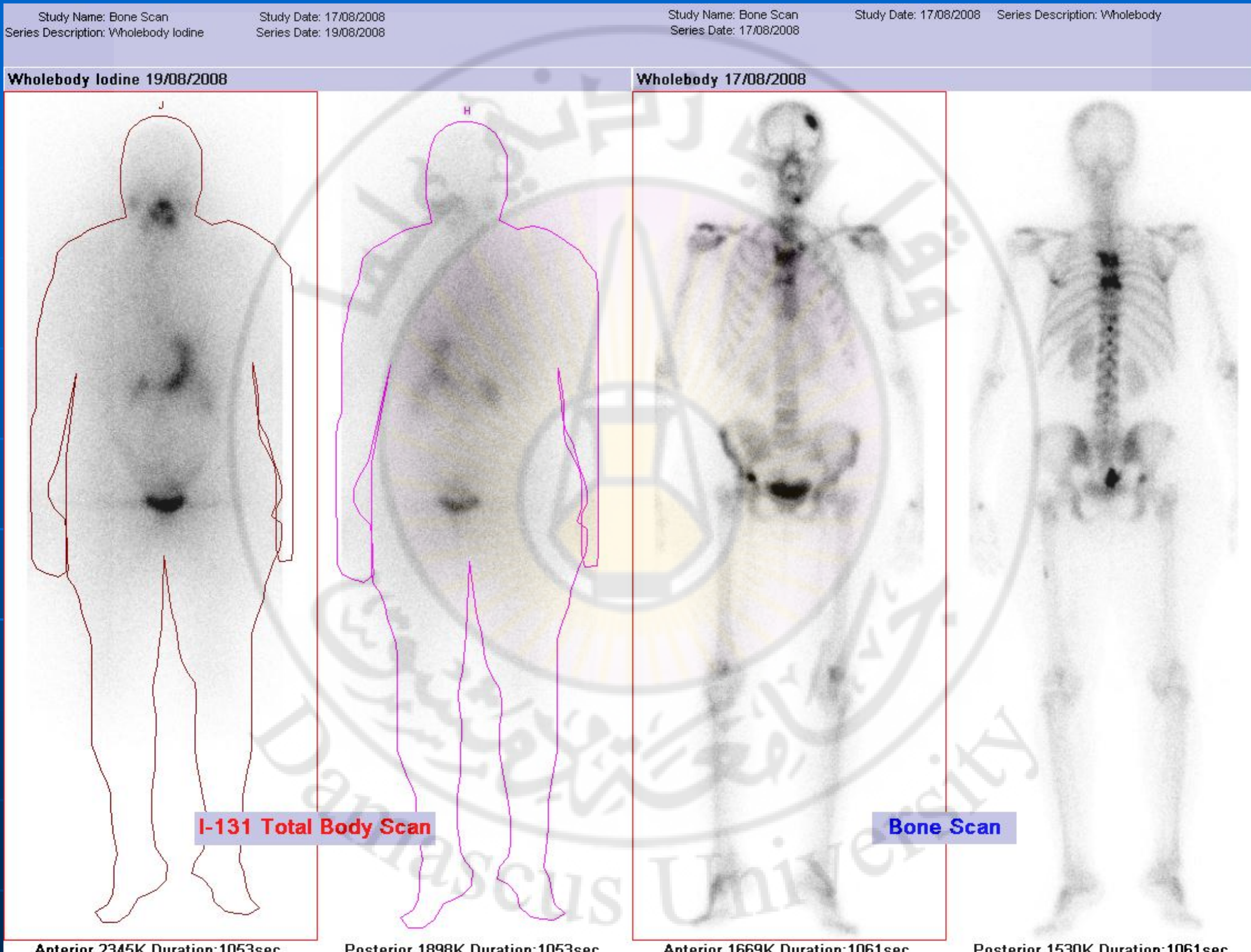
# Prostate Ca



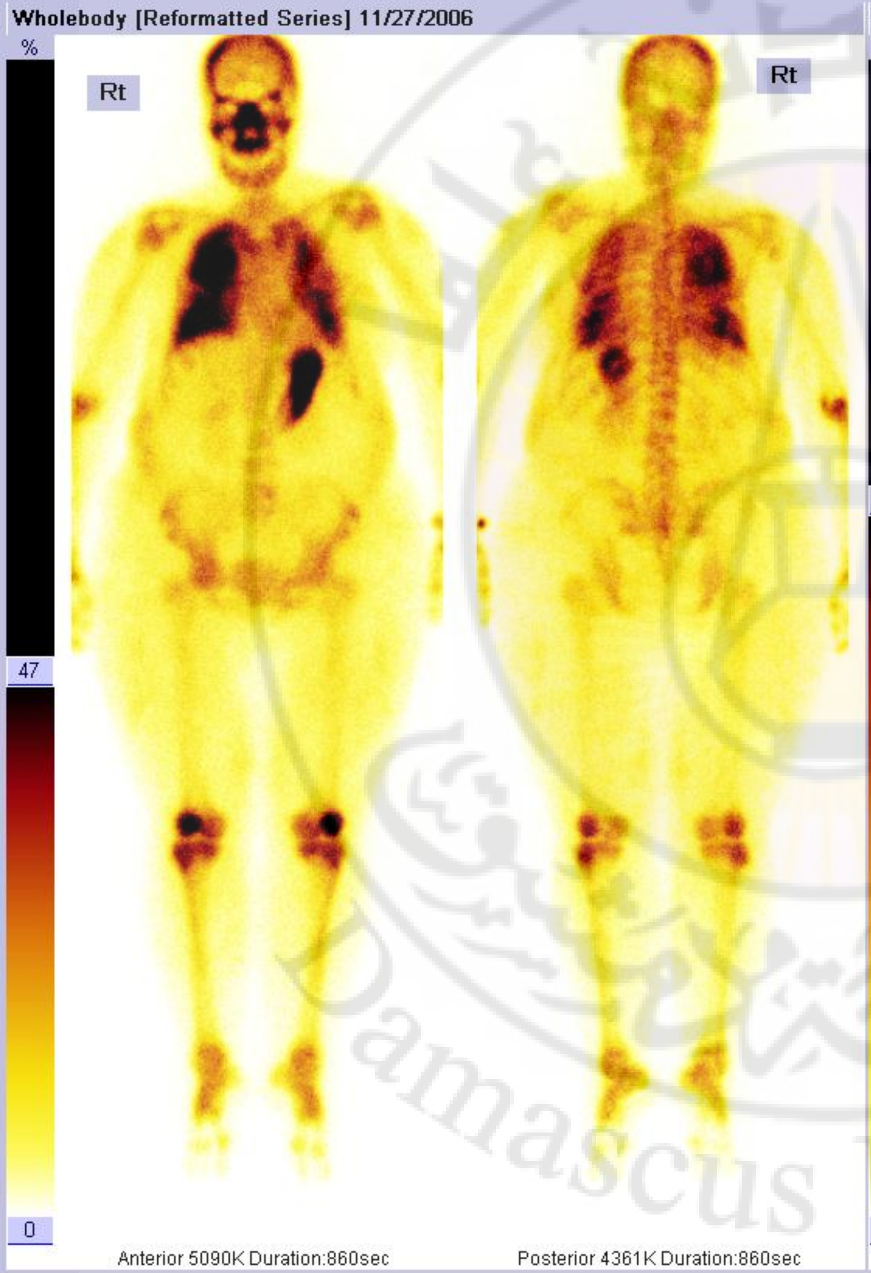
Patient Name: Dyab, Salim
Patient ID: 1012
DOB: 3/27/1943
Study Name: Bone Scan
Study Date: 3/27/2007
Wholebody [Reformatted Series] 3/27/2007
Wholebody [Reformatted Series] 3/27/2007
%
Rt
Rt
31
0
%
Rt
Rt
37
-3
Anterior 4720K Duration:1071sec
Posterior 4706K Duration:1071sec
Anterior 4720K Duration:1071sec
Posterior 4706K Duration:1071sec

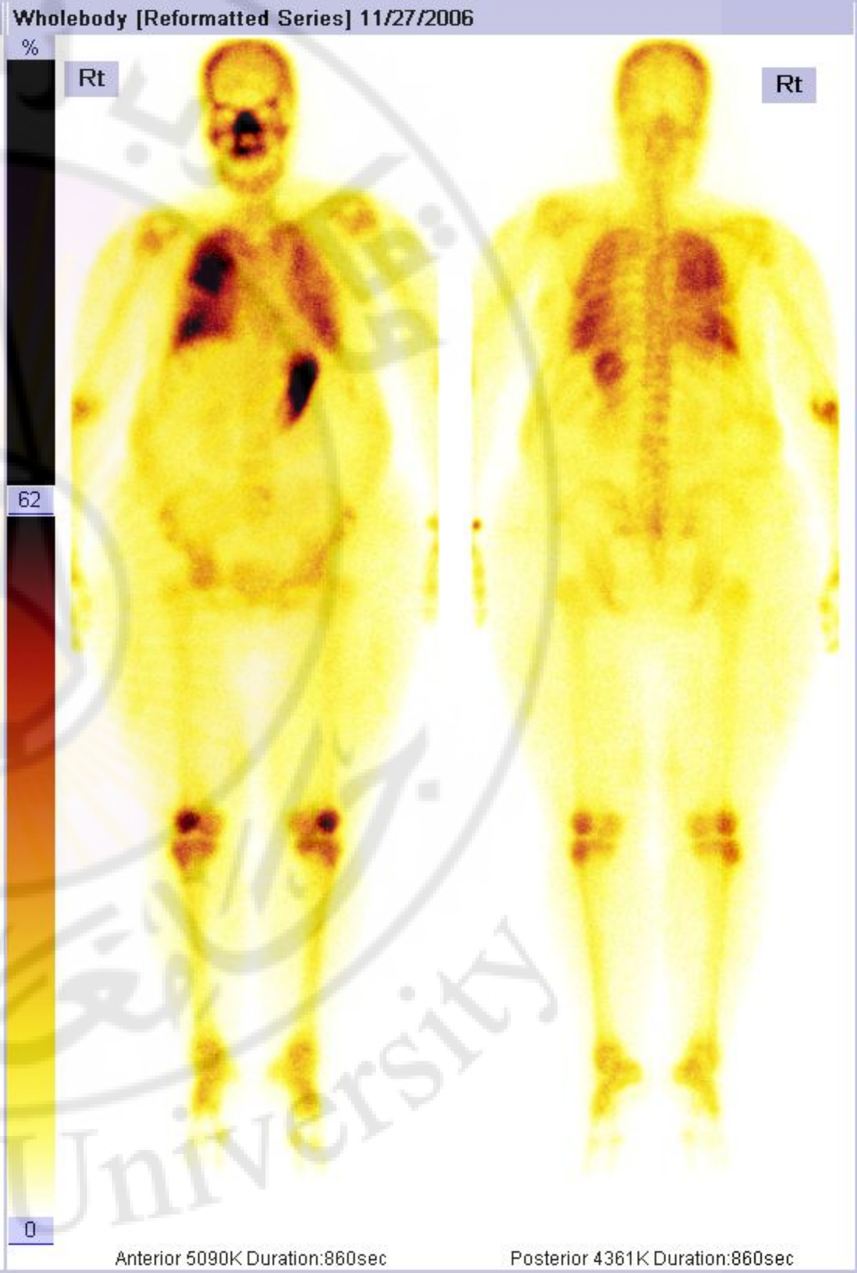

Patient Name: Sameer, Hatem
Patient ID: 6563
DOB: 18/11/1962
Study Name: Bone Scan
Study Date: 18/11/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 18/11/2008
Anterior
Posterior
Anterior
Posterior

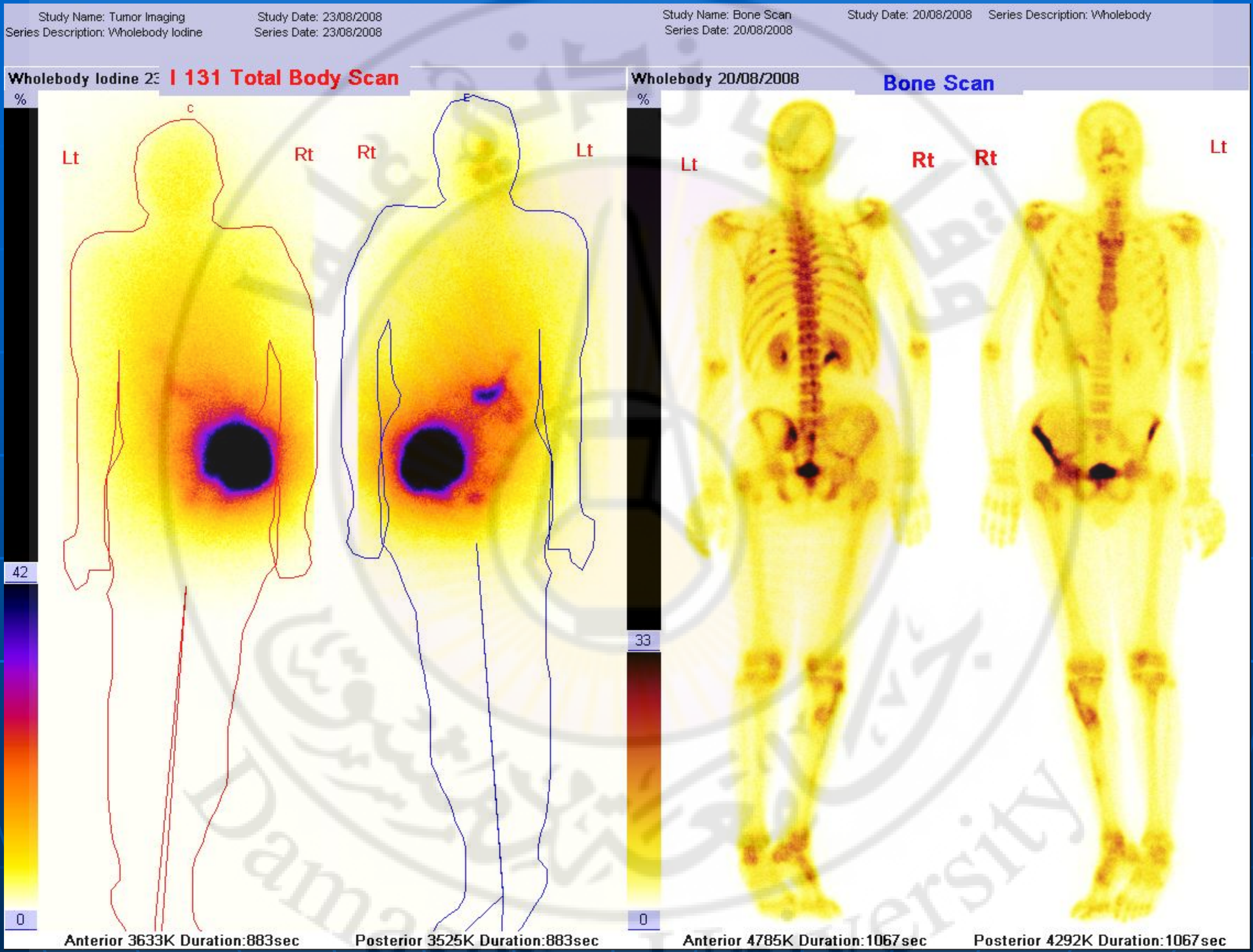

Patient Name: Khateeb, Huda
Patient ID: 4576
DOB: 11/11/1948
Study Name: Bone Scan
Study Date: 11/11/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 11/11/2008
Rt
Rt
Rt
Rt
Anterior
Posterior
Anterior
Posterior


Study Name: Bone Scan
Series Description: Wholebody Iodine
Study Date: 17/08/2008
Series Date: 19/08/2008
Study Name: Bone Scan
Series Date: 17/08/2008
Study Date: 17/08/2008
Series Description: Wholebody
Wholebody Iodine 19/08/2008
Wholebody 17/08/2008
J
H
I-131 Total Body Scan
Bone Scan
Anterior 2345K Duration:1053sec
Posterior 1898K Duration:1053sec
Anterior 1669K Duration:1061sec
Posterior 1530K Duration:1061sec

Patient Name: Faks, Salwa Patient ID: 1200 DOB: 11/27/1966 Study Name: Bone Scan Study Date: 11/27/2006





Study Name: Tumor Imaging
Series Description: Wholebody Iodine
Study Date: 23/08/2008
Series Date: 23/08/2008
Study Name: Bone Scan
Series Date: 20/08/2008
Study Date: 20/08/2008
Series Description: Wholebody
Wholebody Iodine 23
I 131 Total Body Scan
Wholebody 20/08/2008
Bone Scan
Lt
Rt
Rt
Lt
Lt
Rt
Rt
Lt
%
42
0
%
33
0
Anterior 3633K Duration:883sec
Posterior 3525K Duration:883sec
Anterior 4785K Duration:1067sec
Posterior 4292K Duration:1067sec

# Primary Bone Tumors

***osteosarcoma***

***Multiple myelorna***

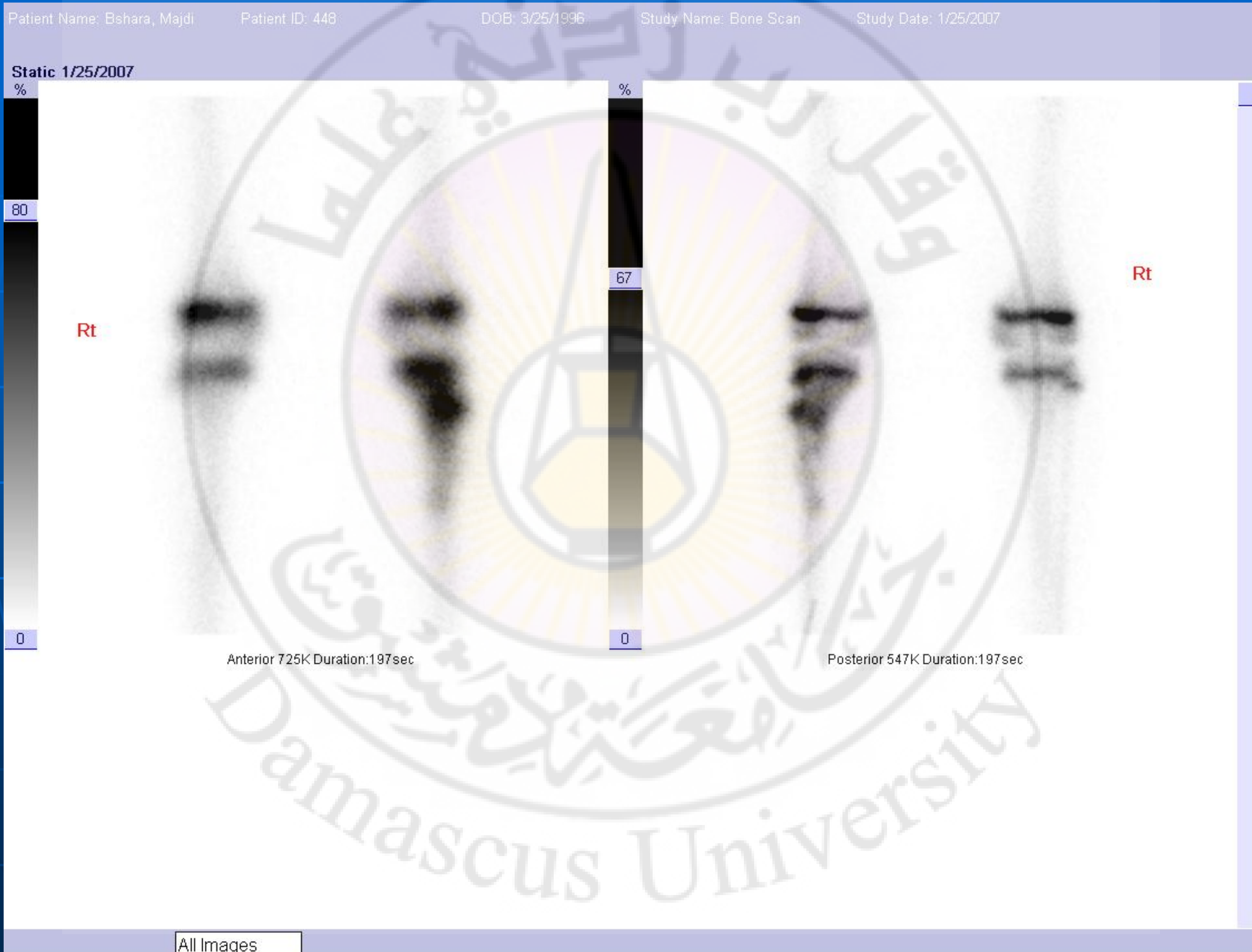
The most common primary malignant disease to involve bone is multiple myeloma.

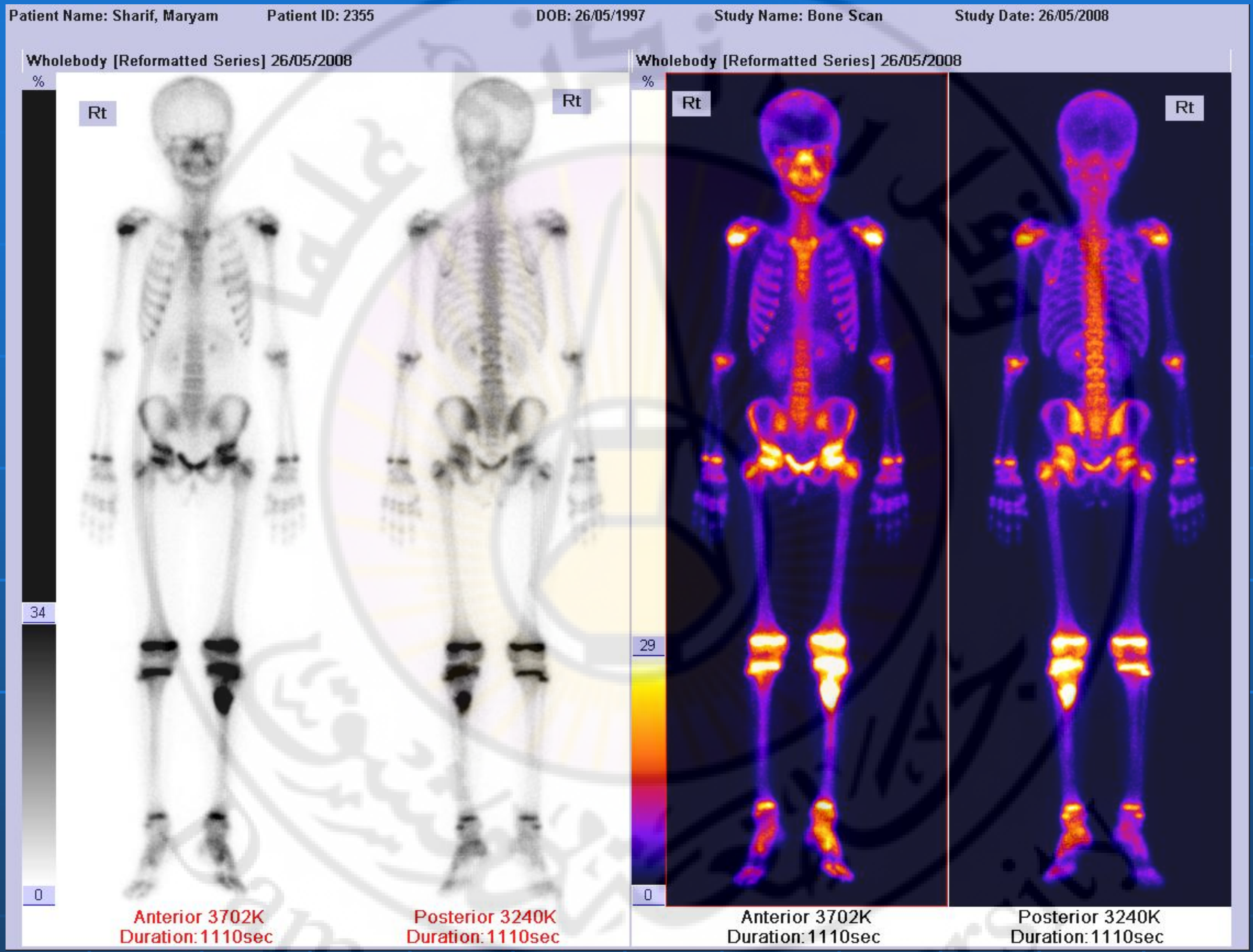
*Osteoid osteoma*

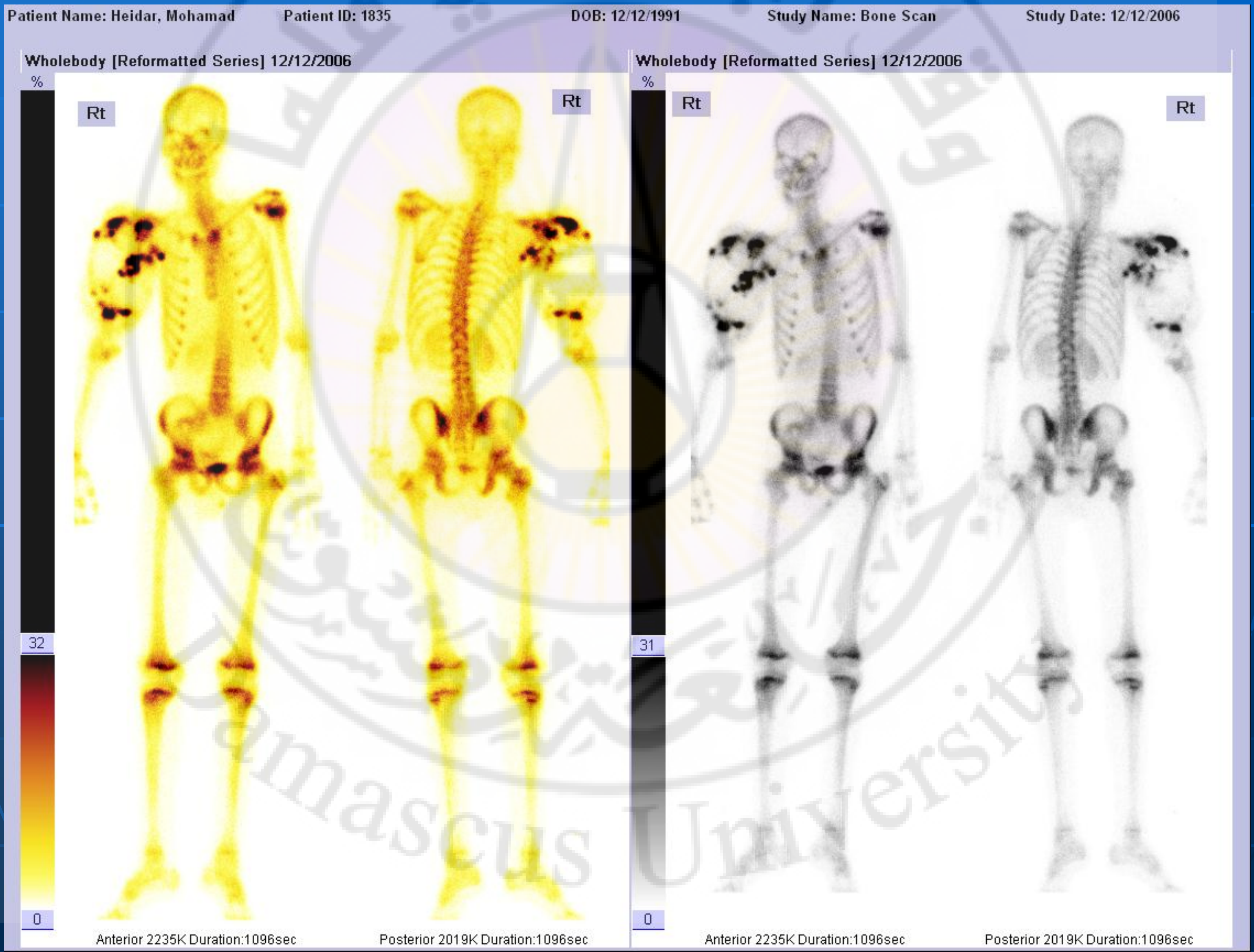
Osteoid osteomas are often associated With excruciating bone pain that classically is greater at night. They are most common in adolescents and young adults

- 

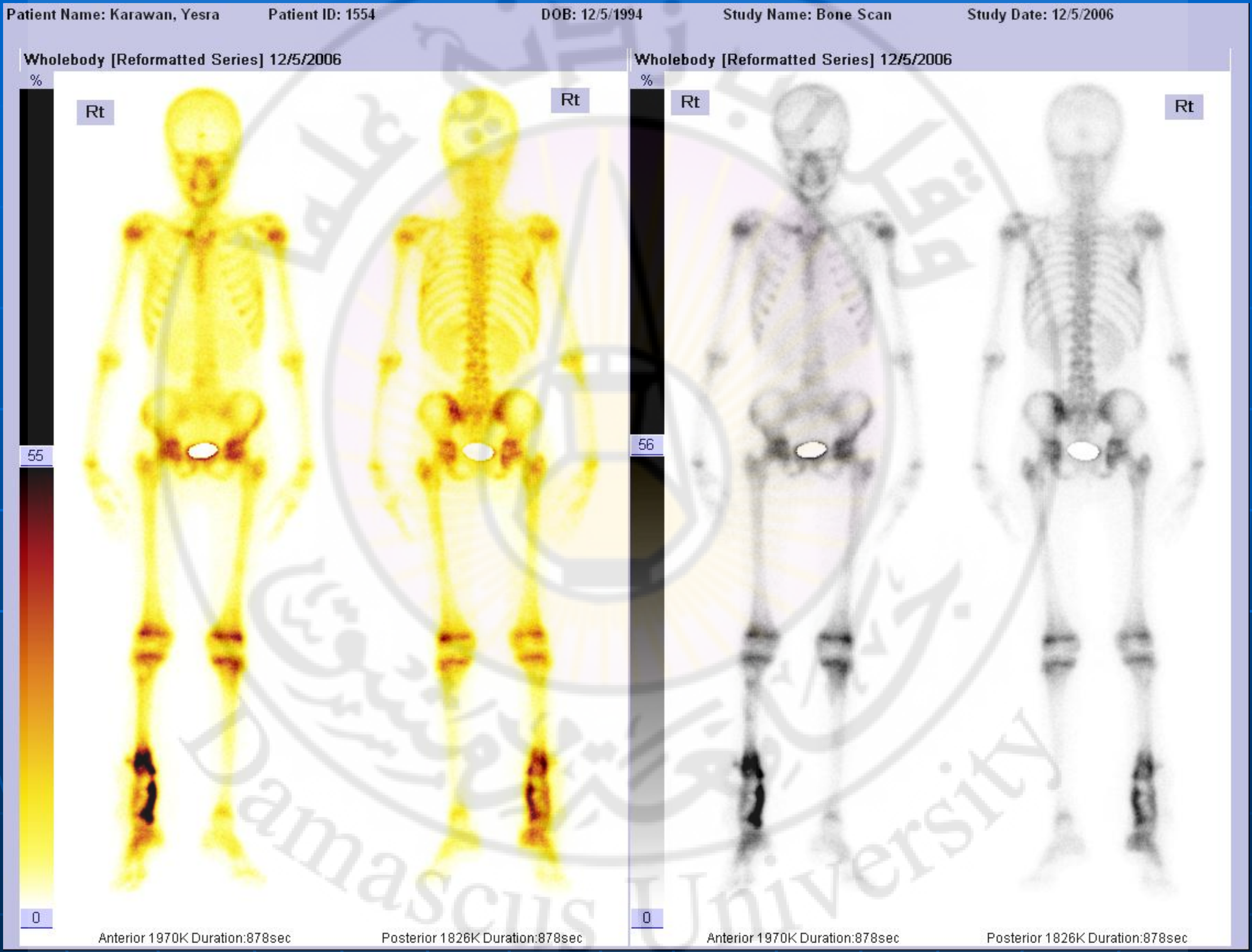
Beni

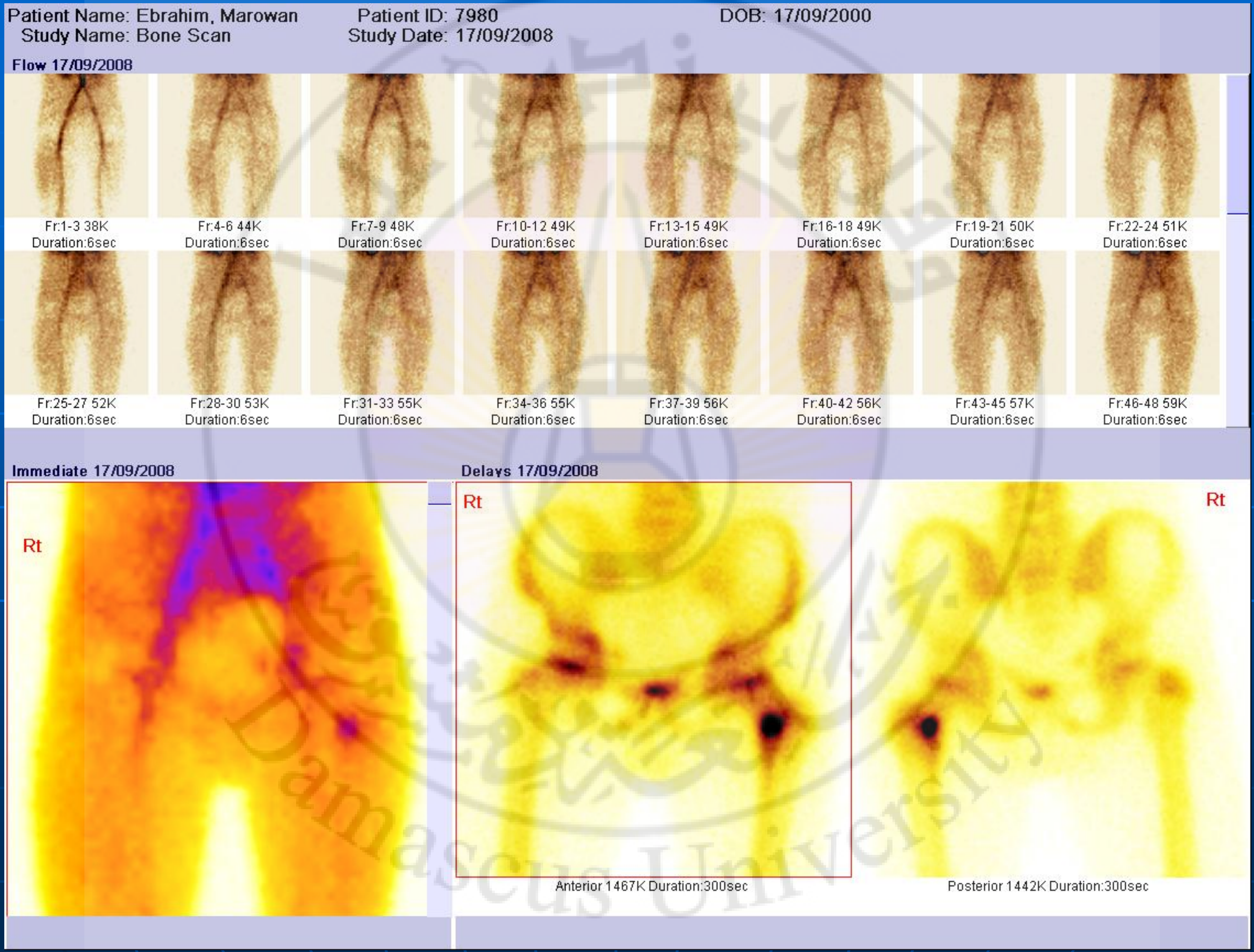

Patient Name: Bshara, Majdi
Patient ID: 448
DOB: 3/25/1996
Study Name: Bone Scan
Study Date: 1/25/2007
Static 1/25/2007
%
80
0
Rt
%
67
0
Rt
Anterior 725K Duration:197sec
Posterior 547K Duration:197sec
All Images


Patient Name: Sharif, Maryam
Patient ID: 2355
DOB: 26/05/1997
Study Name: Bone Scan
Study Date: 26/05/2008
Wholebody [Reformatted Series] 26/05/2008
%
Rt
Rt
34
0
Anterior 3702K
Duration:1110sec
Posterior 3240K
Duration:1110sec
Wholebody [Reformatted Series] 26/05/2008
%
Rt
Rt
29
0
Anterior 3702K
Duration:1110sec
Posterior 3240K
Duration:1110sec



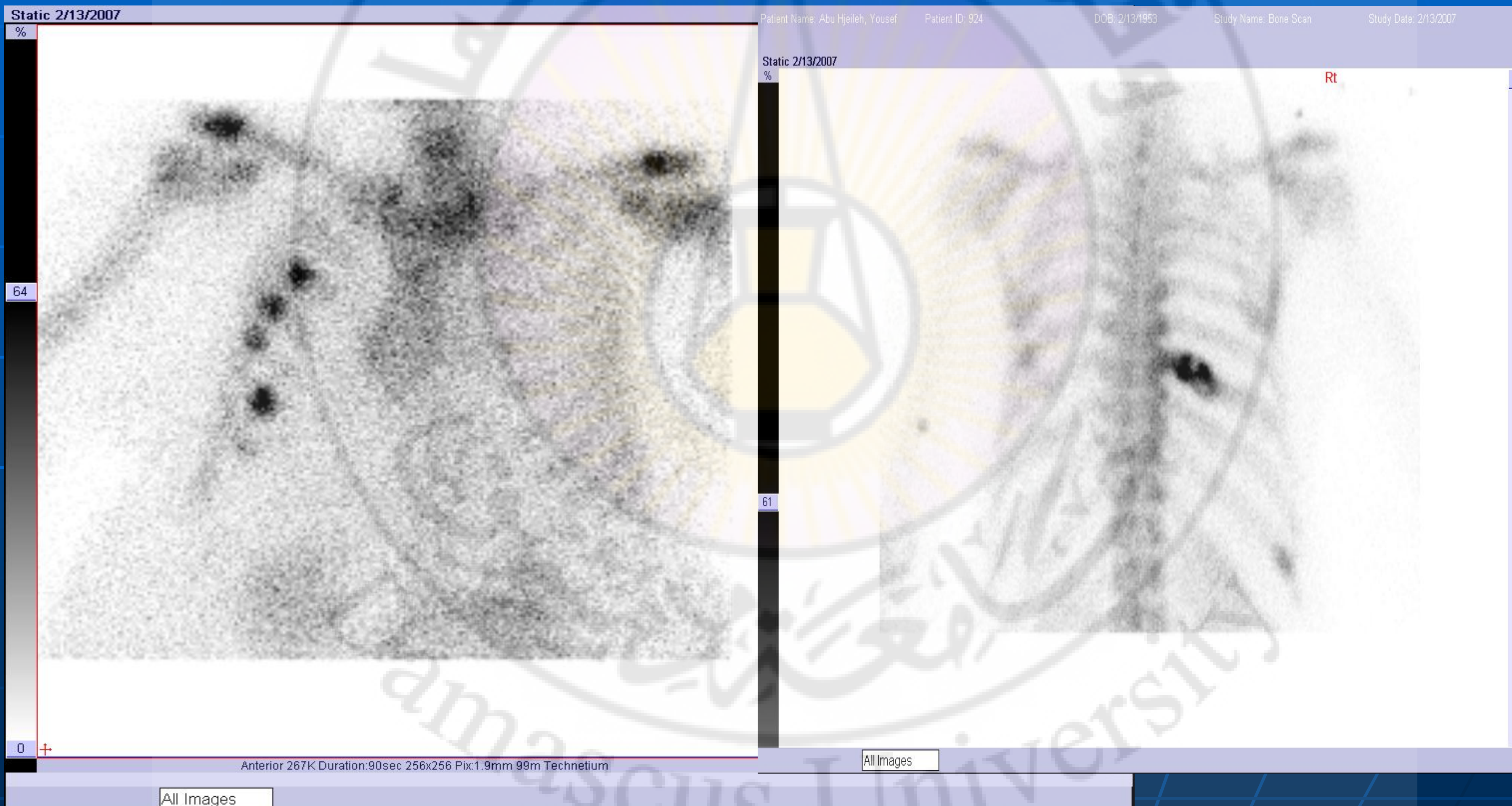
Patient Name: Heidar, Mohamad
Patient ID: 1835
DOB: 12/12/1991
Study Name: Bone Scan
Study Date: 12/12/2006
Wholebody [Reformatted Series] 12/12/2006
%
Rt
Rt
32
0
Anterior 2235K Duration:1096sec
Posterior 2019K Duration:1096sec
Wholebody [Reformatted Series] 12/12/2006
%
Rt
Rt
31
0
Anterior 2235K Duration:1096sec
Posterior 2019K Duration:1096sec


Patient Name: Karawan, Yesra
Patient ID: 1554
DOB: 12/5/1994
Study Name: Bone Scan
Study Date: 12/5/2006
Wholebody [Reformatted Series] 12/5/2006
%
Rt
55
0
Anterior 1970K Duration:878sec
Posterior 1826K Duration:878sec
Wholebody [Reformatted Series] 12/5/2006
%
Rt
56
0
Anterior 1970K Duration:878sec
Posterior 1826K Duration:878sec

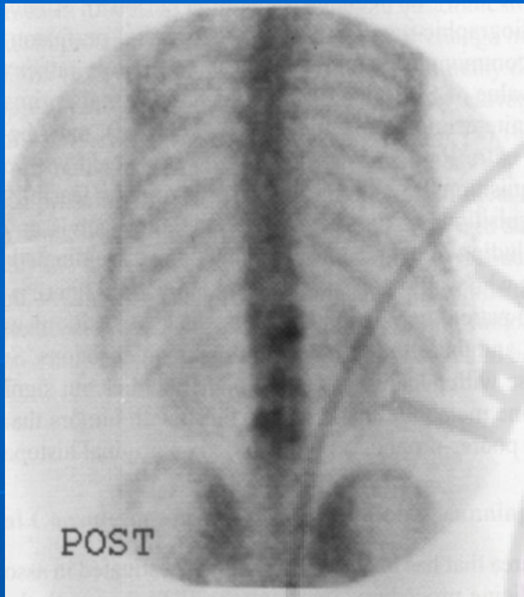


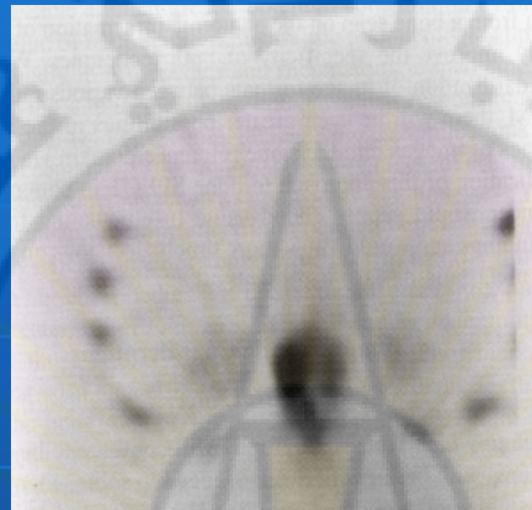
Patient Name: Ebrahim, Marowan
Patient ID: 7980
DOB: 17/09/2000
Study Name: Bone Scan
Study Date: 17/09/2008
Flow 17/09/2008
Fr:1-3 38K Duration:6sec
Fr:4-6 44K Duration:6sec
Fr:7-9 48K Duration:6sec
Fr:10-12 49K Duration:6sec
Fr:13-15 49K Duration:6sec
Fr:16-18 49K Duration:6sec
Fr:19-21 50K Duration:6sec
Fr:22-24 51K Duration:6sec
Fr:25-27 52K Duration:6sec
Fr:28-30 53K Duration:6sec
Fr:31-33 55K Duration:6sec
Fr:34-36 55K Duration:6sec
Fr:37-39 56K Duration:6sec
Fr:40-42 56K Duration:6sec
Fr:43-45 57K Duration:6sec
Fr:46-48 59K Duration:6sec
Immediate 17/09/2008
Rt
Delays 17/09/2008
Rt
Rt
Anterior 1467K Duration:300sec
Posterior 1442K Duration:300sec

# Skeletal Trauma

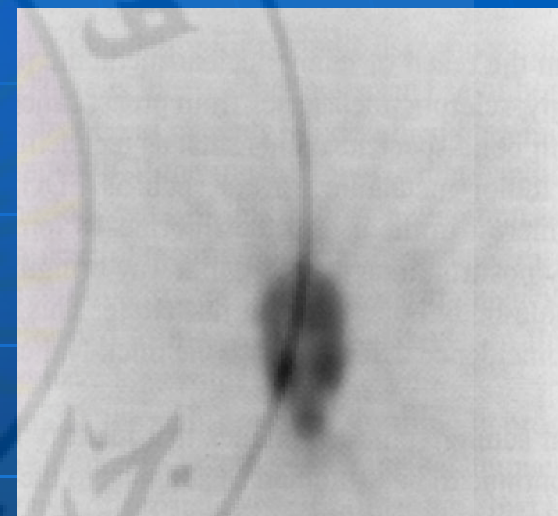


## Prostate Ca
(99mTc MDP)



**Trasaxial L2**
**susp. metastasis**

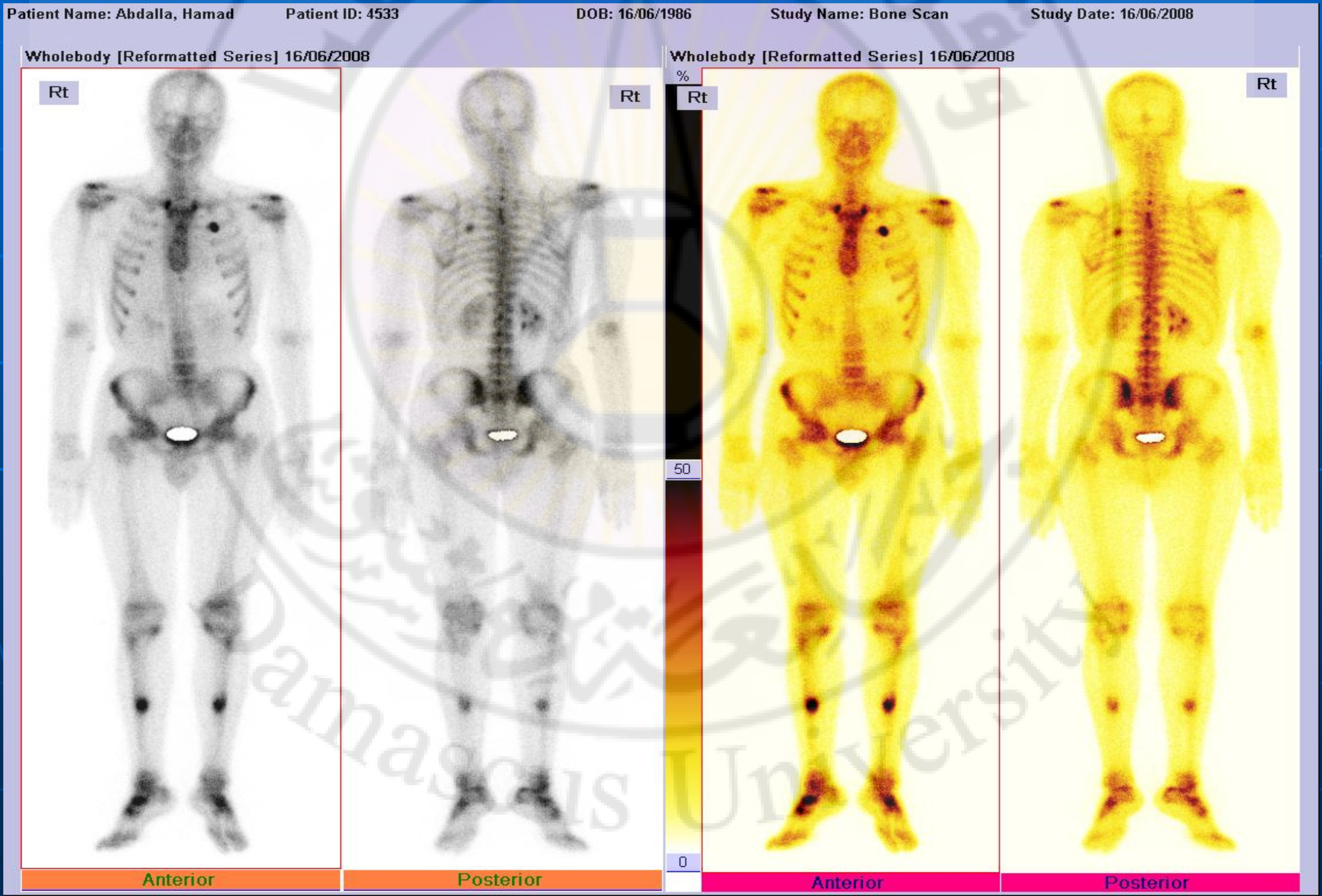


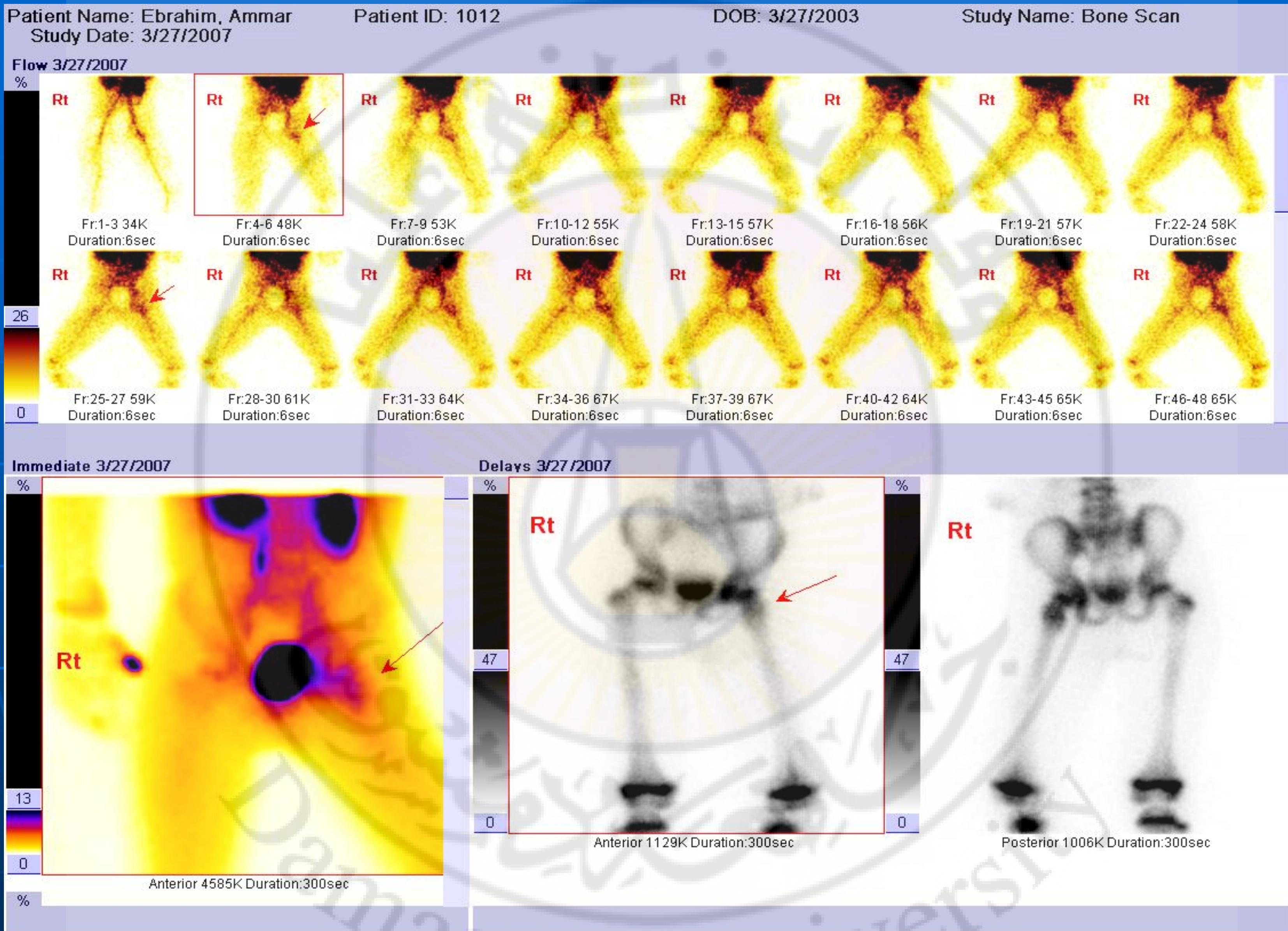
**Trasaxial L4**
**Facet joints disease**

**Sagittal**

# Athletic injuries : *Stress fractures*
# Child abuse

-

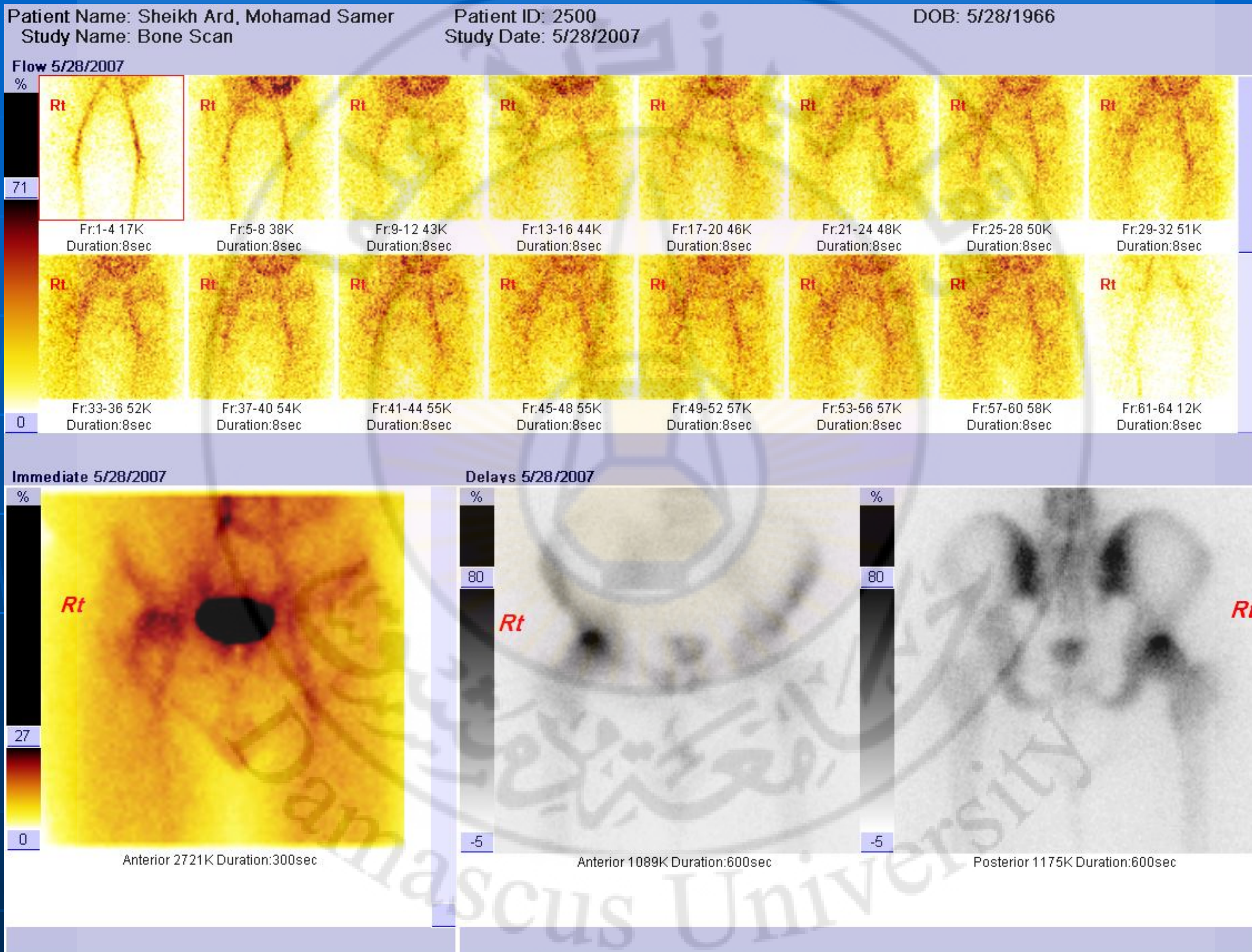



Patient Name: Ebrahim, Ammar
Patient ID: 1012
DOB: 3/27/2003
Study Name: Bone Scan
Study Date: 3/27/2007
Flow 3/27/2007
%
26
0
Rt
Fr:1-3 34K Duration:6sec
Fr:4-6 48K Duration:6sec
Fr:7-9 53K Duration:6sec
Fr:10-12 55K Duration:6sec
Fr:13-15 57K Duration:6sec
Fr:16-18 56K Duration:6sec
Fr:19-21 57K Duration:6sec
Fr:22-24 58K Duration:6sec
Fr:25-27 59K Duration:6sec
Fr:28-30 61K Duration:6sec
Fr:31-33 64K Duration:6sec
Fr:34-36 67K Duration:6sec
Fr:37-39 67K Duration:6sec
Fr:40-42 64K Duration:6sec
Fr:43-45 65K Duration:6sec
Fr:46-48 65K Duration:6sec
Immediate 3/27/2007
%
13
0
Rt
Anterior 4585K Duration:300sec
Delays 3/27/2007
%
47
0
Rt
Anterior 1129K Duration:300sec
Posterior 1006K Duration:300sec

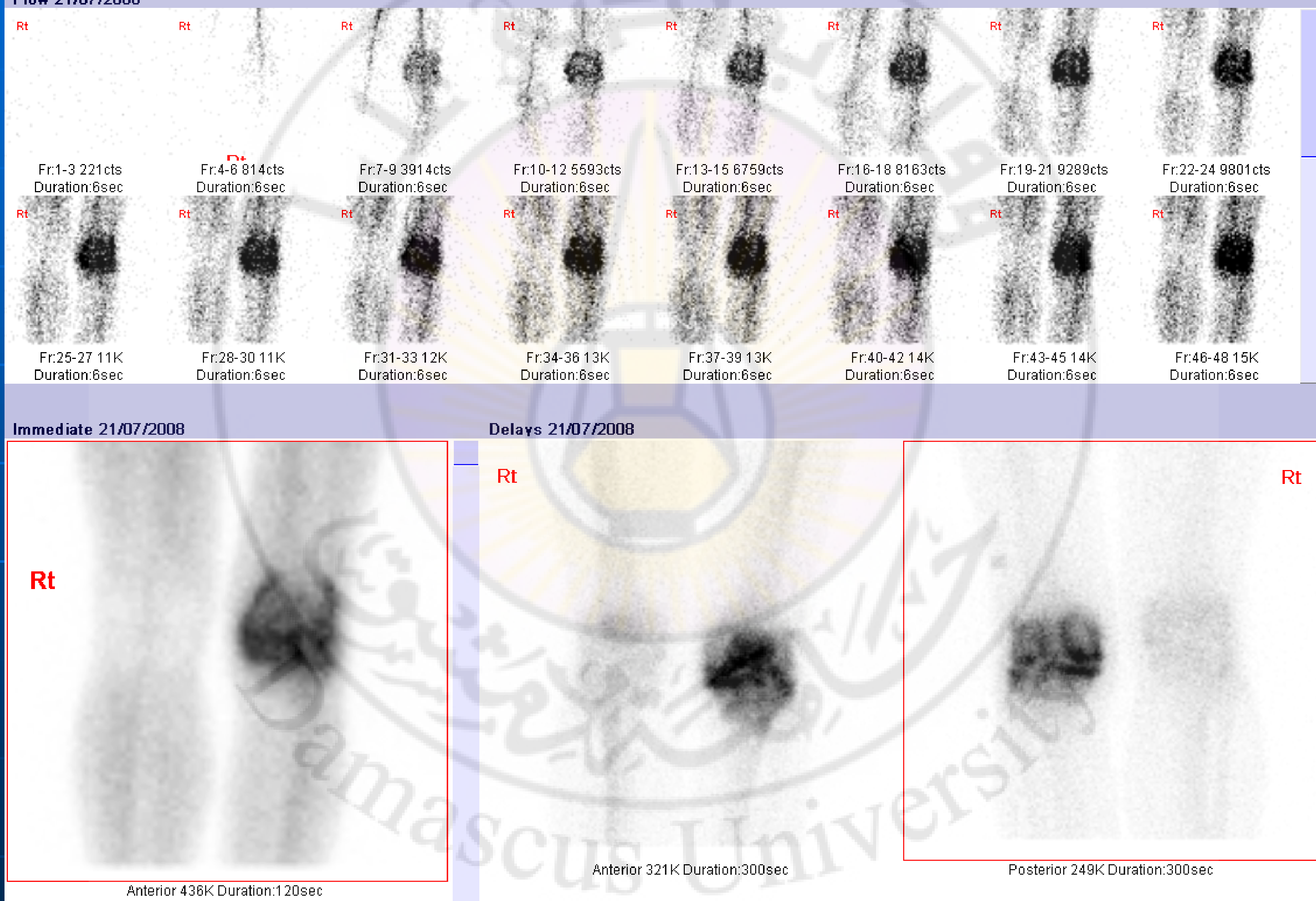
# Bone Infarction—Osteonecrosis

Legg-Calvë-Perthes disease :

most commonly affects children between the ages of 5 and 9 years

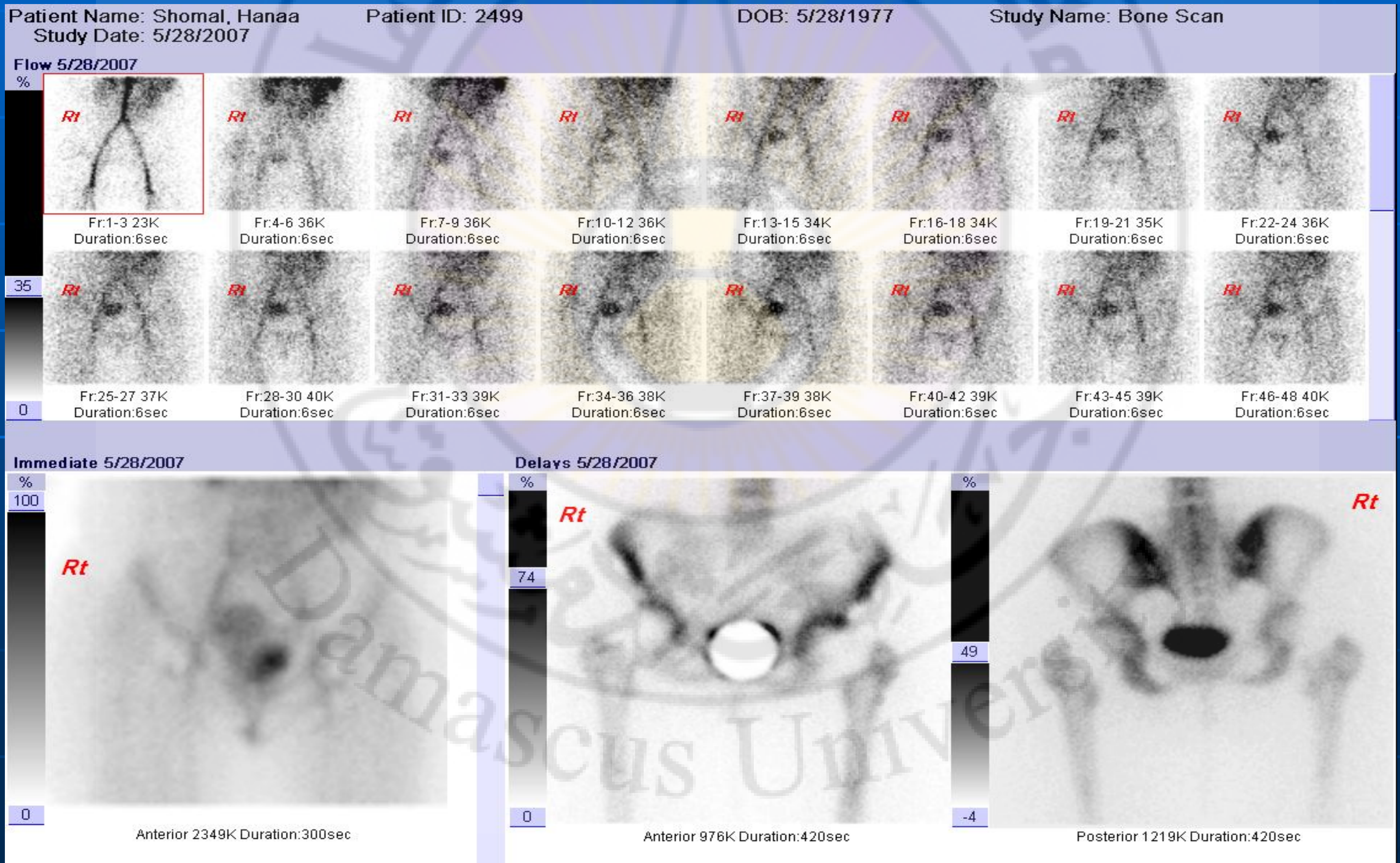

Patient Name: Sheikh Ard, Mohamad Samer
Study Name: Bone Scan
Patient ID: 2500
Study Date: 5/28/2007
DOB: 5/28/1966
Flow 5/28/2007
Fr:1-4 17K Duration:8sec
Fr:5-8 38K Duration:8sec
Fr:9-12 43K Duration:8sec
Fr:13-16 44K Duration:8sec
Fr:17-20 46K Duration:8sec
Fr:21-24 48K Duration:8sec
Fr:25-28 50K Duration:8sec
Fr:29-32 51K Duration:8sec
Fr:33-36 52K Duration:8sec
Fr:37-40 54K Duration:8sec
Fr:41-44 55K Duration:8sec
Fr:45-48 55K Duration:8sec
Fr:49-52 57K Duration:8sec
Fr:53-56 57K Duration:8sec
Fr:57-60 58K Duration:8sec
Fr:61-64 12K Duration:8sec
Immediate 5/28/2007
Anterior 2721K Duration:300sec
Delays 5/28/2007
Anterior 1089K Duration:600sec
Posterior 1175K Duration:600sec
Rt

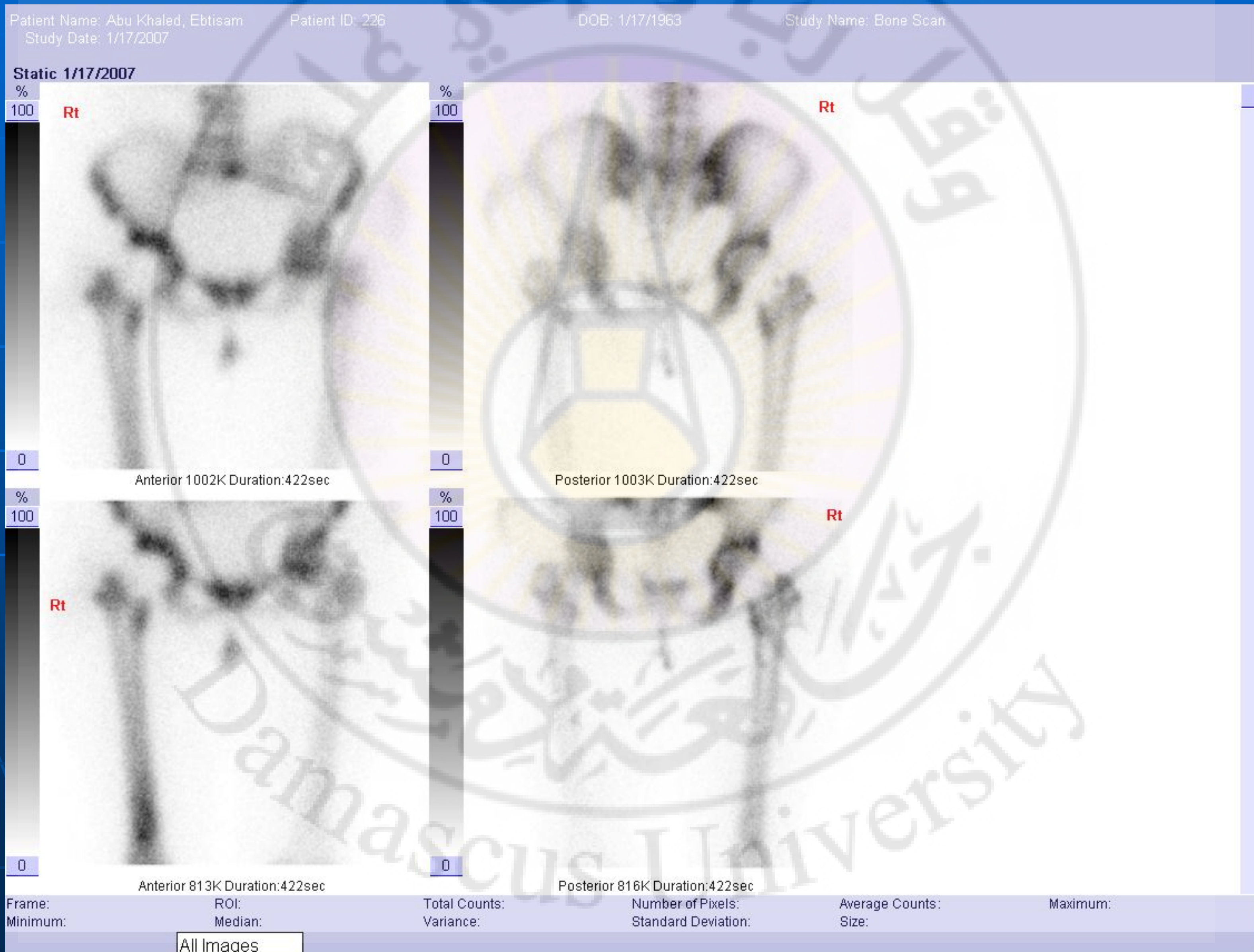
Patient Name: Seddek, Muhamad Patient ID: 6599 DOB: 21/07/1967
Study Name: Bone Scan Study Date: 21/07/2008

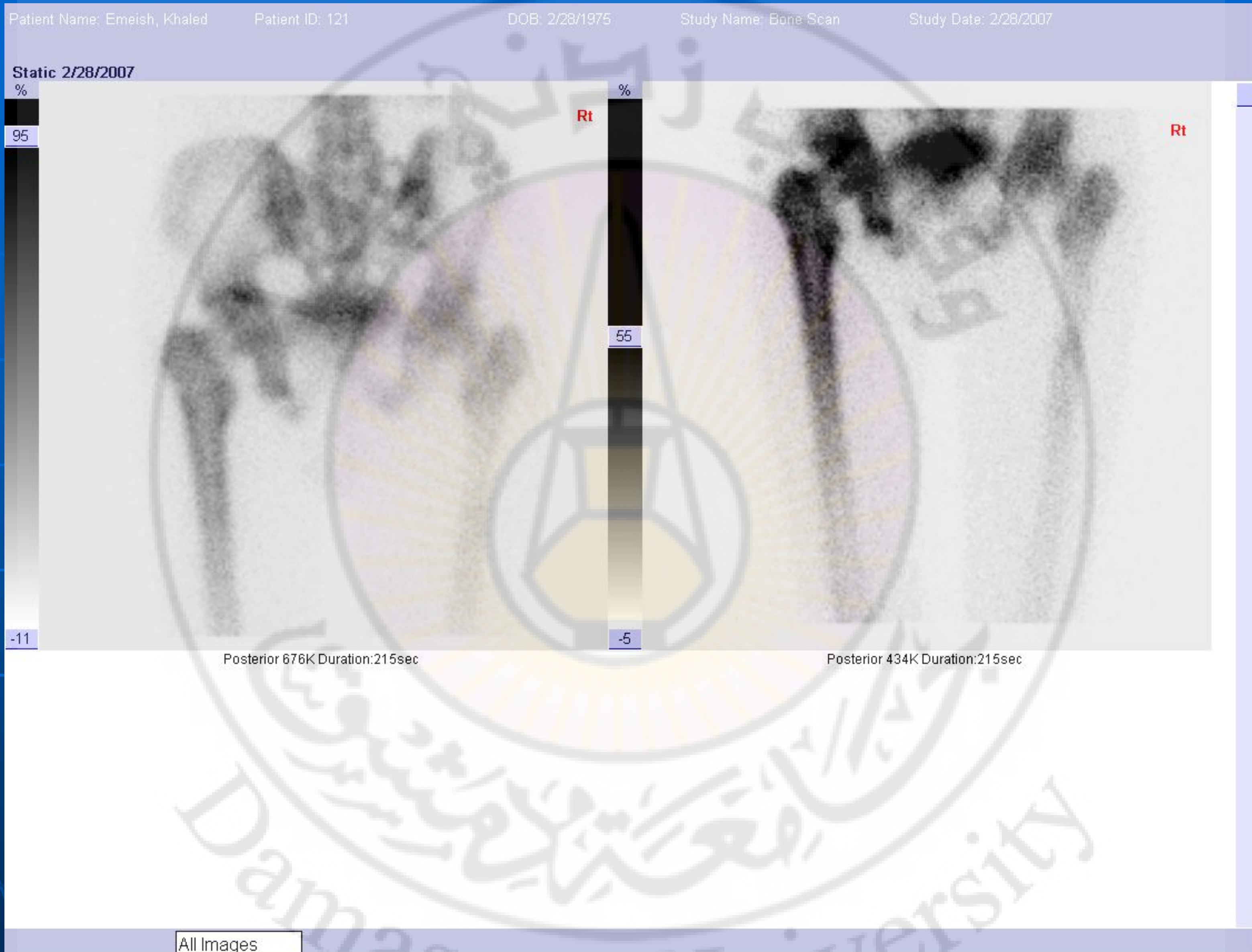


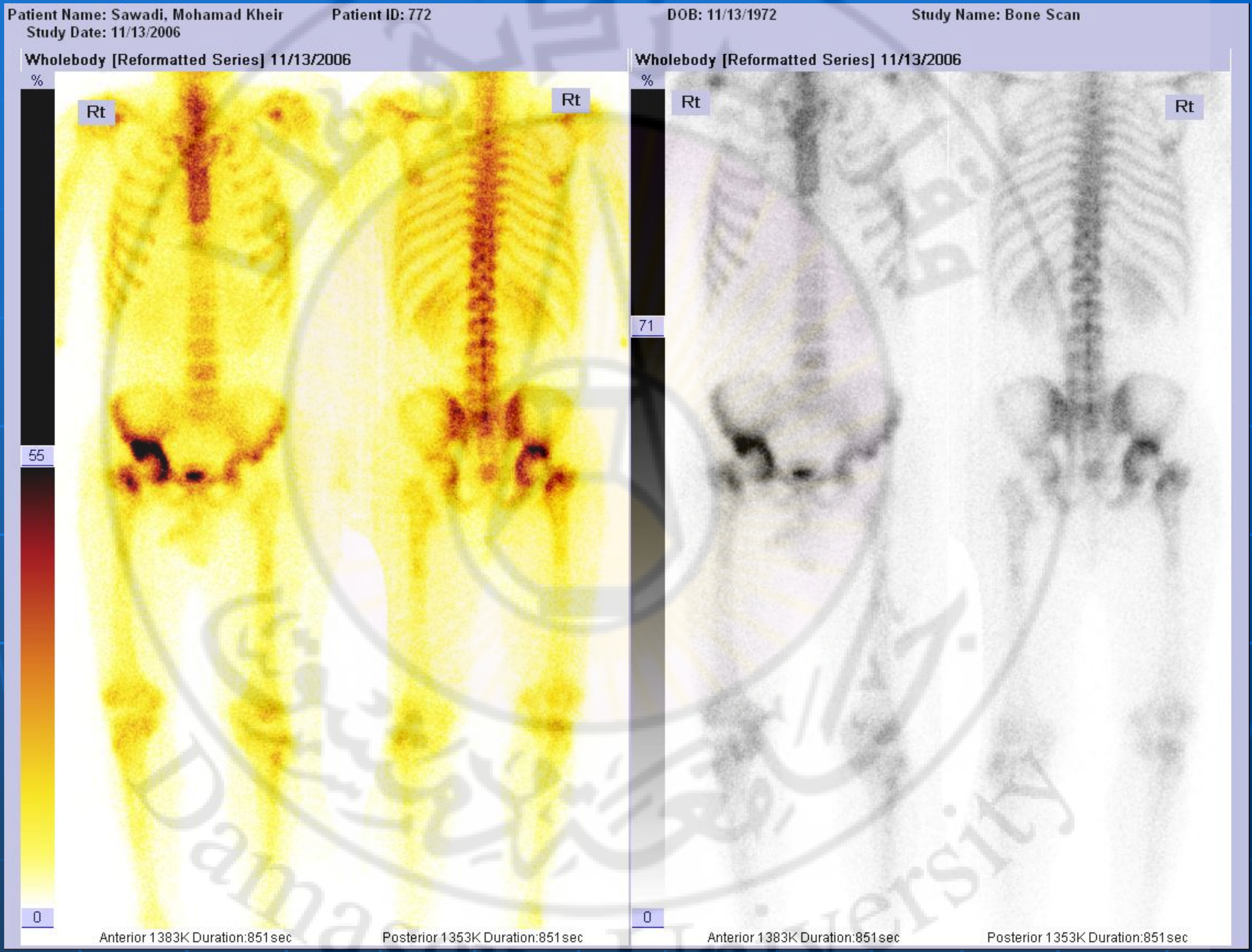
# Osteomyelitis

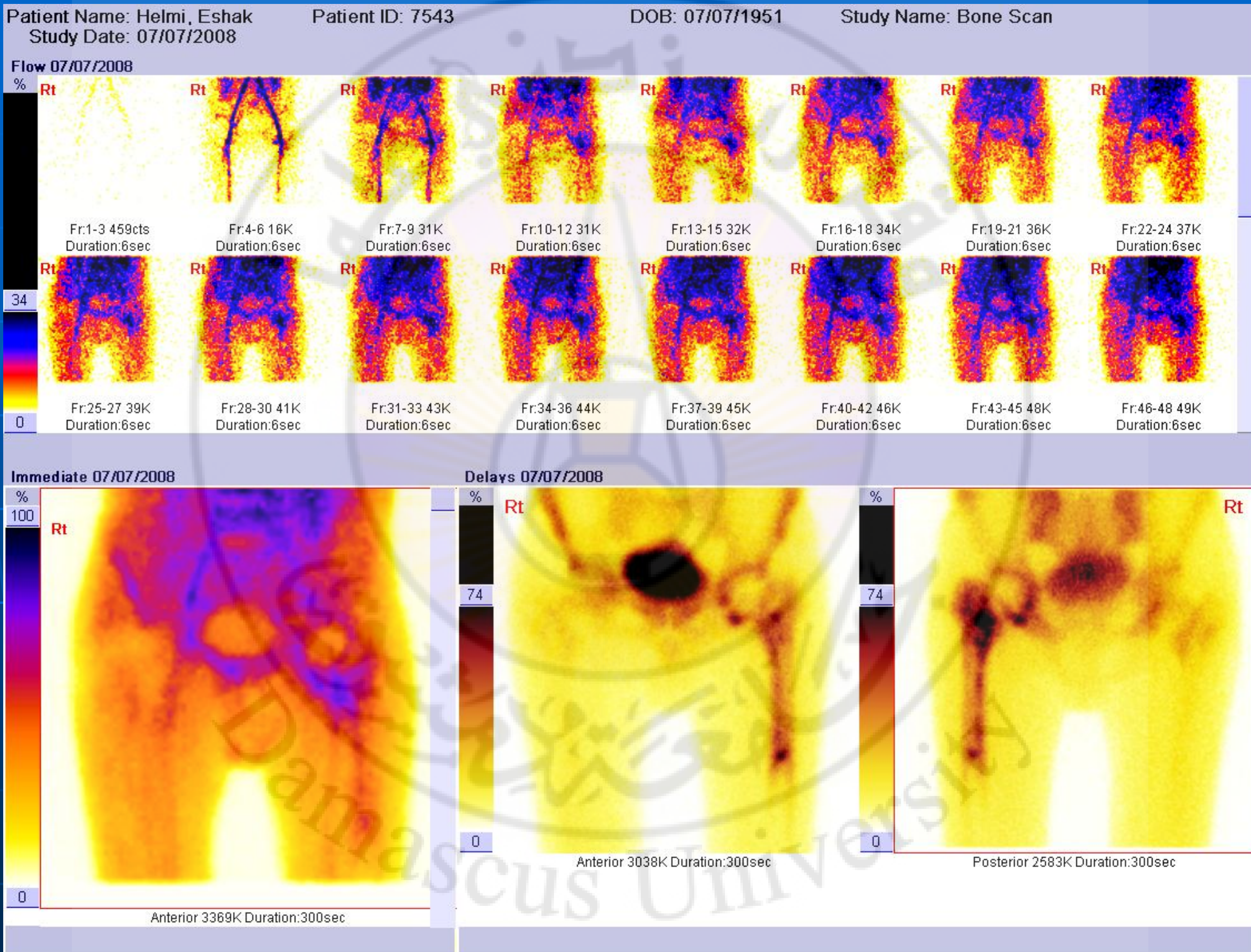
- Three-phase scintigraphy Dynamic

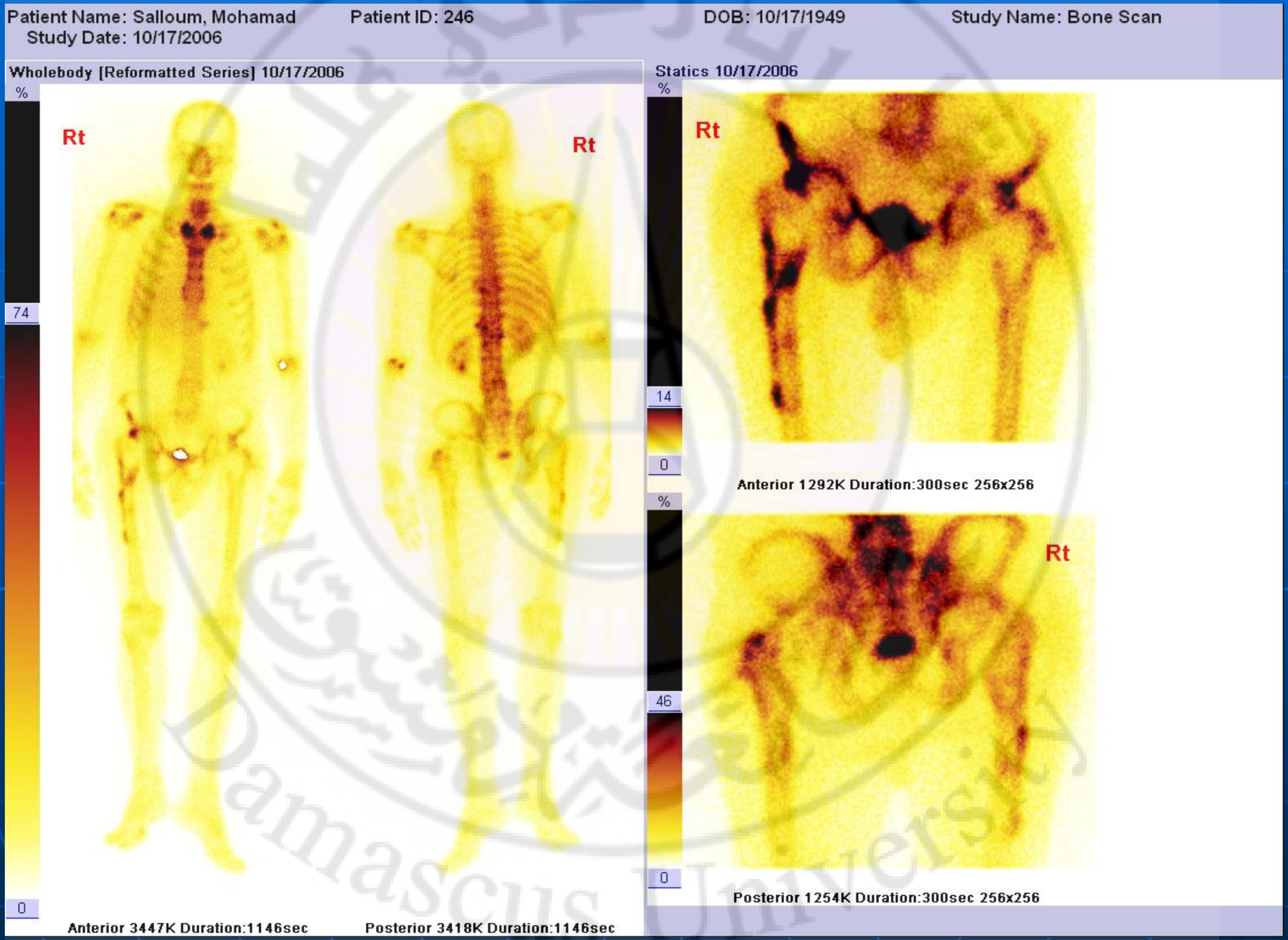


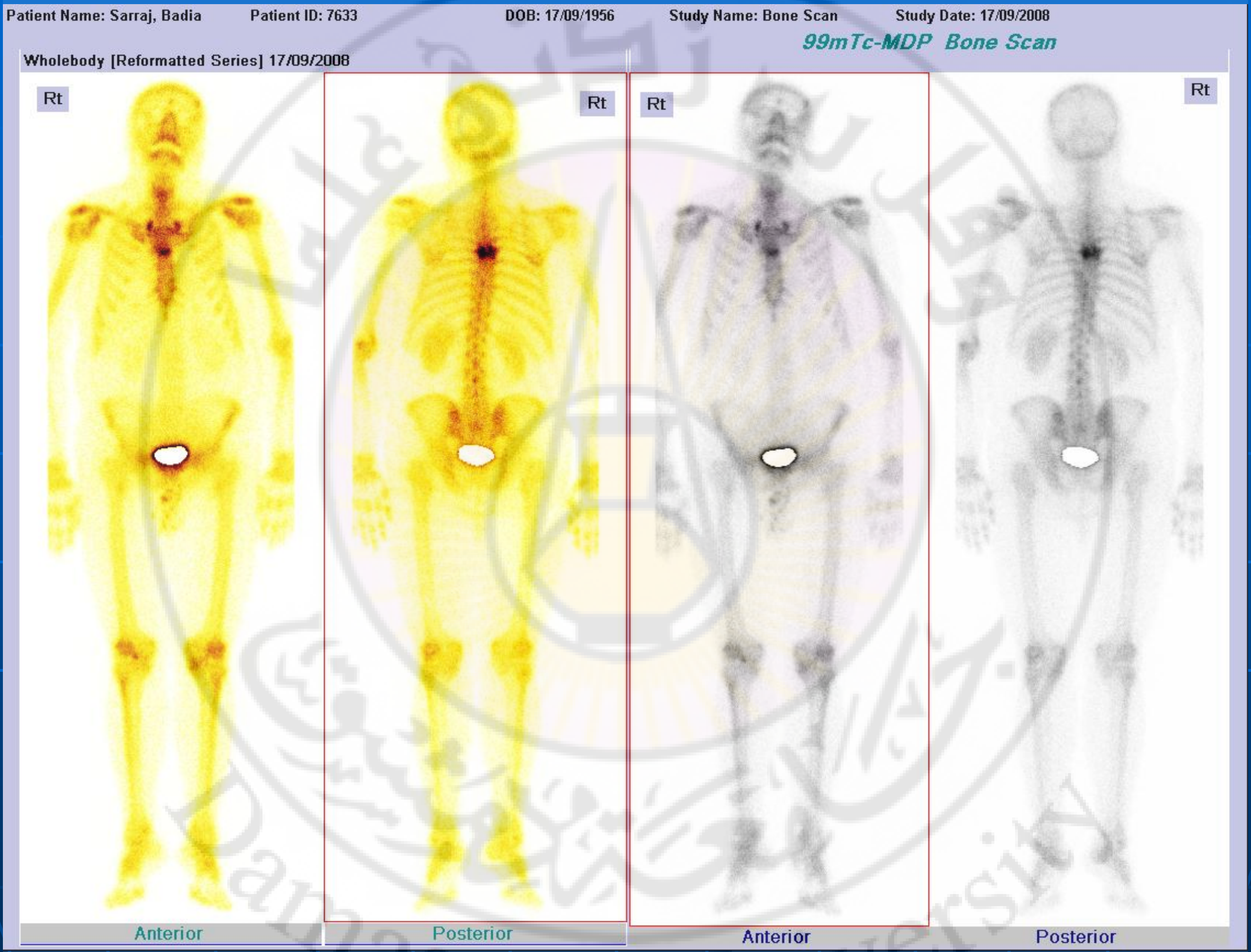

Patient Name: Abu Khaled, Ebtisam
Patient ID: 226
DOB: 1/17/1963
Study Name: Bone Scan
Study Date: 1/17/2007
Static 1/17/2007
Rt
Anterior 1002K Duration:422sec
Posterior 1003K Duration:422sec
Anterior 813K Duration:422sec
Posterior 816K Duration:422sec
Frame:
ROI:
Total Counts:
Number of Pixels:
Average Counts:
Maximum:
Minimum:
Median:
Variance:
Standard Deviation:
Size:
All Images

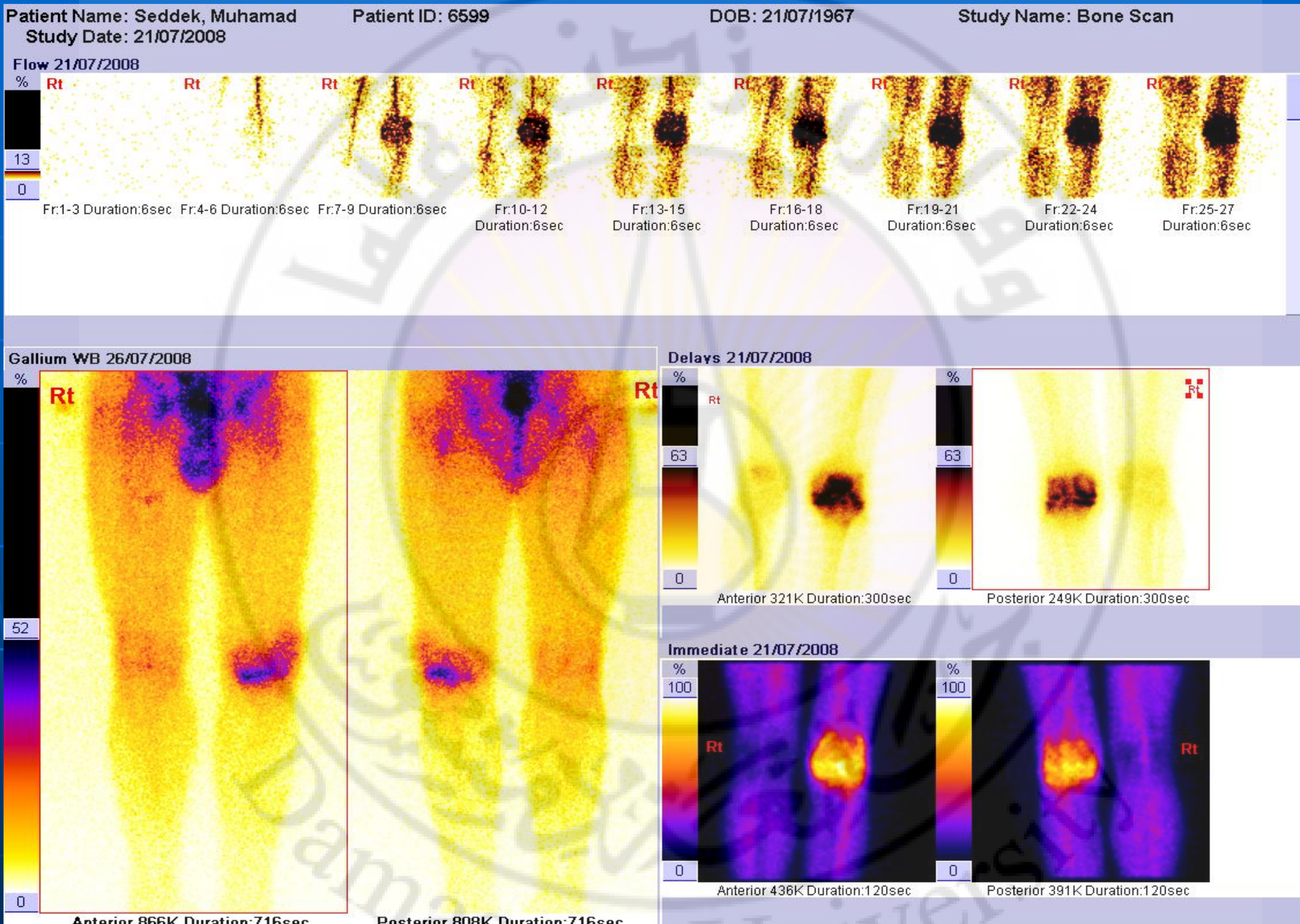

Patient Name: Emeish, Khaled
Patient ID: 121
DOB: 2/28/1975
Study Name: Bone Scan
Study Date: 2/28/2007
Static 2/28/2007
%
95
-11
Rt
%
55
-5
Rt
Posterior 676K Duration:215sec
Posterior 434K Duration:215sec
All Images


Patient Name: Sawadi, Mohamad Kheir
Patient ID: 772
DOB: 11/13/1972
Study Name: Bone Scan
Study Date: 11/13/2006
Wholebody [Reformatted Series] 11/13/2006
Wholebody [Reformatted Series] 11/13/2006
%
Rt
Rt
55
0
%
Rt
Rt
71
0
Anterior 1383K Duration:851sec
Posterior 1353K Duration:851sec
Anterior 1383K Duration:851sec
Posterior 1353K Duration:851sec

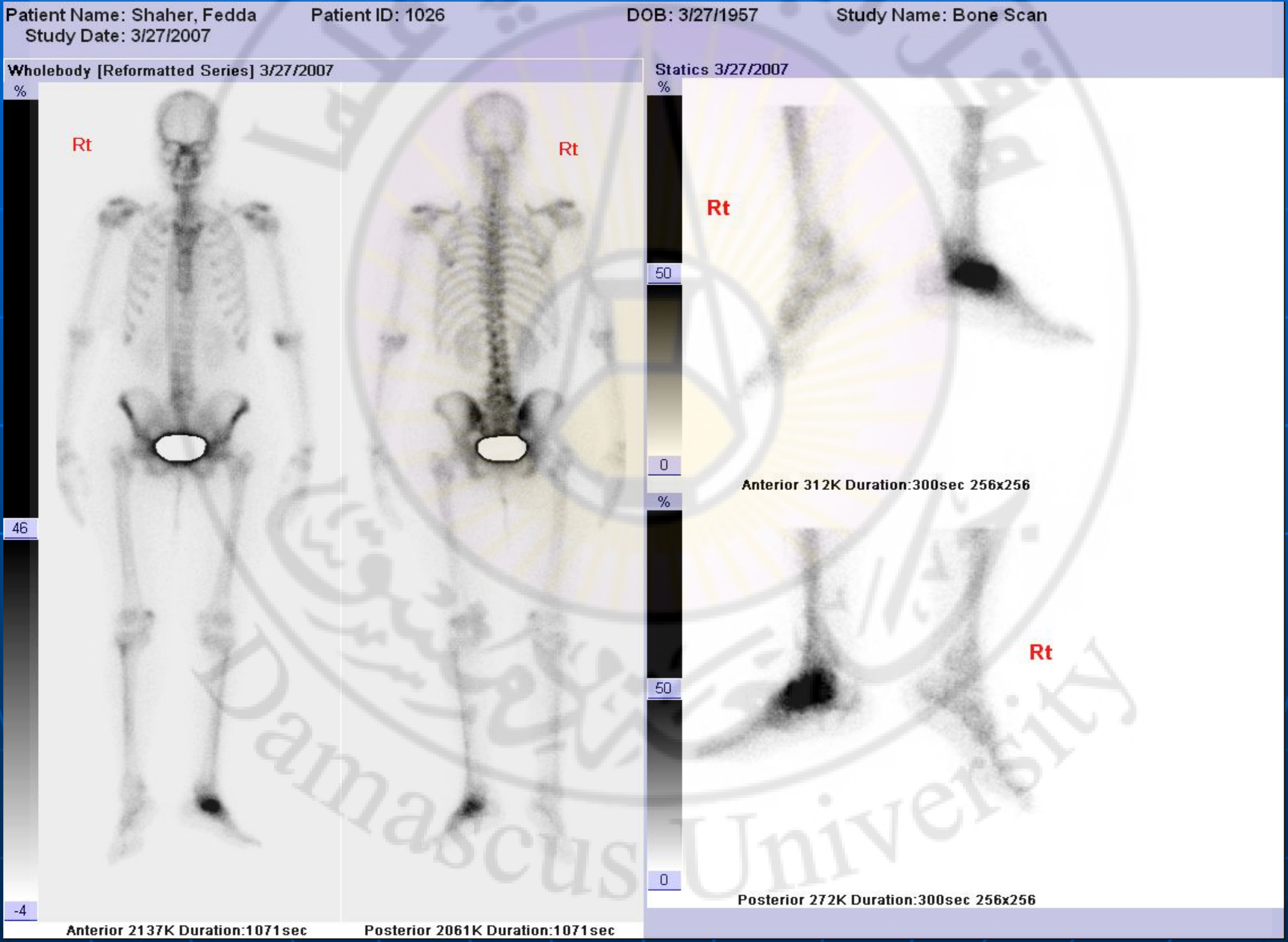

Patient Name: Helmi, Eshak
Study Date: 07/07/2008
Patient ID: 7543
DOB: 07/07/1951
Study Name: Bone Scan
Flow 07/07/2008
Fr:1-3 459cts Duration:6sec
Fr:4-6 16K Duration:6sec
Fr:7-9 31K Duration:6sec
Fr:10-12 31K Duration:6sec
Fr:13-15 32K Duration:6sec
Fr:16-18 34K Duration:6sec
Fr:19-21 36K Duration:6sec
Fr:22-24 37K Duration:6sec
Fr:25-27 39K Duration:6sec
Fr:28-30 41K Duration:6sec
Fr:31-33 43K Duration:6sec
Fr:34-36 44K Duration:6sec
Fr:37-39 45K Duration:6sec
Fr:40-42 46K Duration:6sec
Fr:43-45 48K Duration:6sec
Fr:46-48 49K Duration:6sec
Immediate 07/07/2008
Anterior 3369K Duration:300sec
Delays 07/07/2008
Anterior 3038K Duration:300sec
Posterior 2583K Duration:300sec


Patient Name: Salloum, Mohamad
Patient ID: 246
DOB: 10/17/1949
Study Name: Bone Scan
Study Date: 10/17/2006
Wholebody [Reformatted Series] 10/17/2006
Statics 10/17/2006
%
74
0
Rt
Rt
Anterior 3447K Duration:1146sec
Posterior 3418K Duration:1146sec
%
14
0
Rt
Anterior 1292K Duration:300sec 256x256
%
46
0
Rt
Posterior 1254K Duration:300sec 256x256


Patient Name: Sarraj, Badia
Patient ID: 7633
DOB: 17/09/1956
Study Name: Bone Scan
Study Date: 17/09/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 17/09/2008
Rt
Rt
Rt
Rt
Anterior
Posterior
Anterior
Posterior

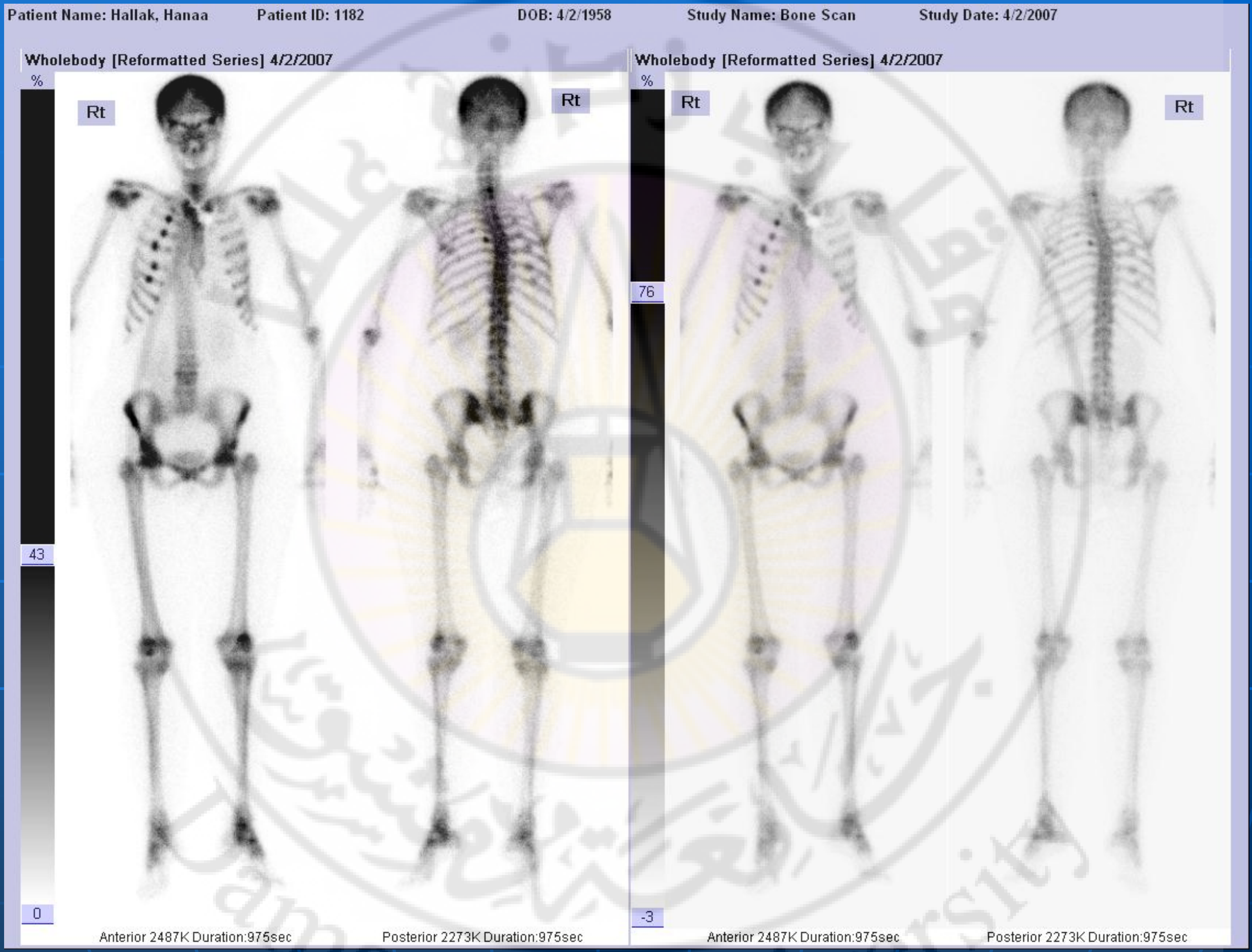

Patient Name: Seddek, Muhamad
Patient ID: 6599
DOB: 21/07/1967
Study Name: Bone Scan
Study Date: 21/07/2008
Flow 21/07/2008
Fr:1-3 Duration:6sec
Fr:4-6 Duration:6sec
Fr:7-9 Duration:6sec
Fr:10-12 Duration:6sec
Fr:13-15 Duration:6sec
Fr:16-18 Duration:6sec
Fr:19-21 Duration:6sec
Fr:22-24 Duration:6sec
Fr:25-27 Duration:6sec
Gallium WB 26/07/2008
Anterior 866K Duration:716sec
Posterior 808K Duration:716sec
Delays 21/07/2008
Anterior 321K Duration:300sec
Posterior 249K Duration:300sec
Immediate 21/07/2008
Anterior 436K Duration:120sec
Posterior 391K Duration:120sec

# التهاب المفاصل الإنتاني

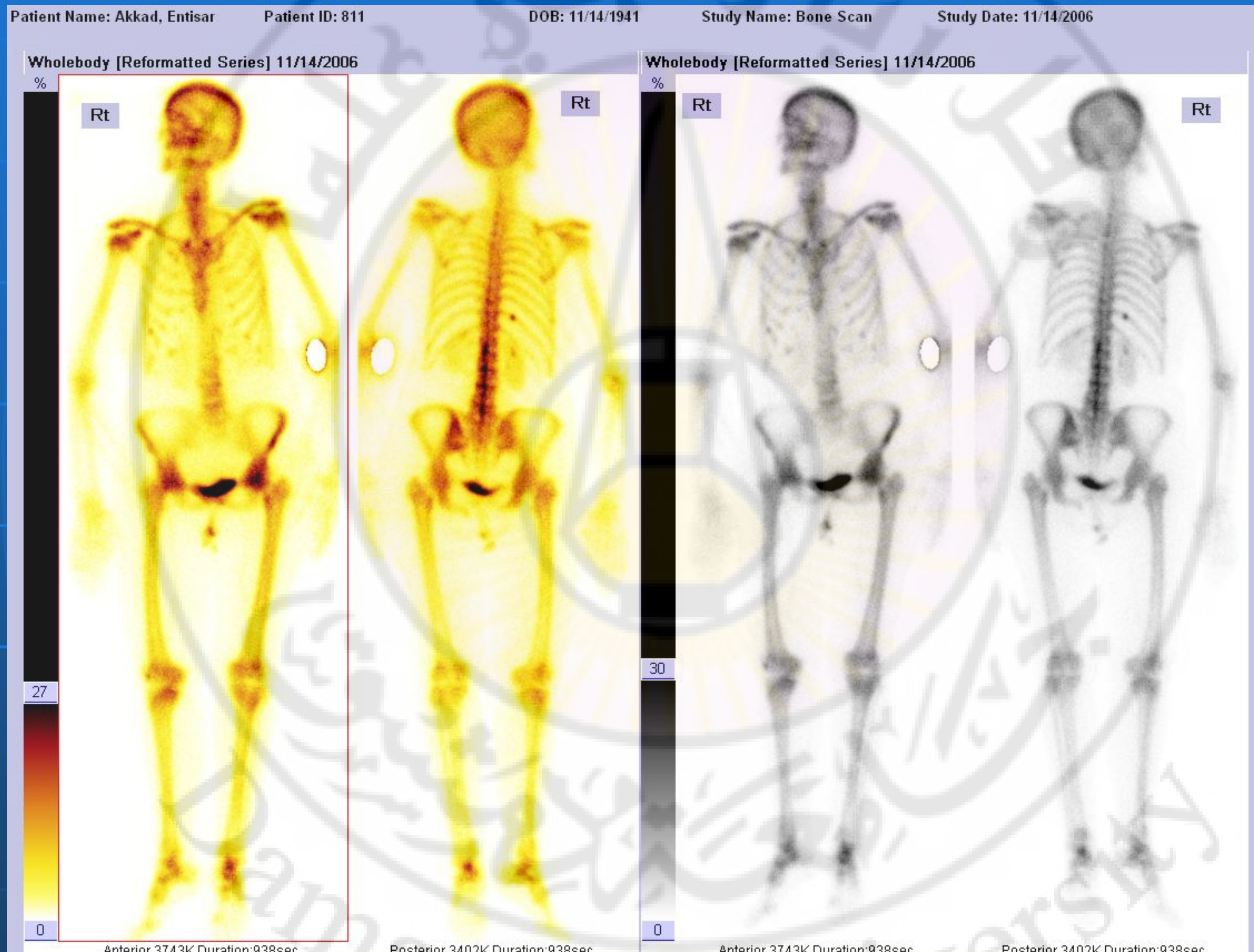


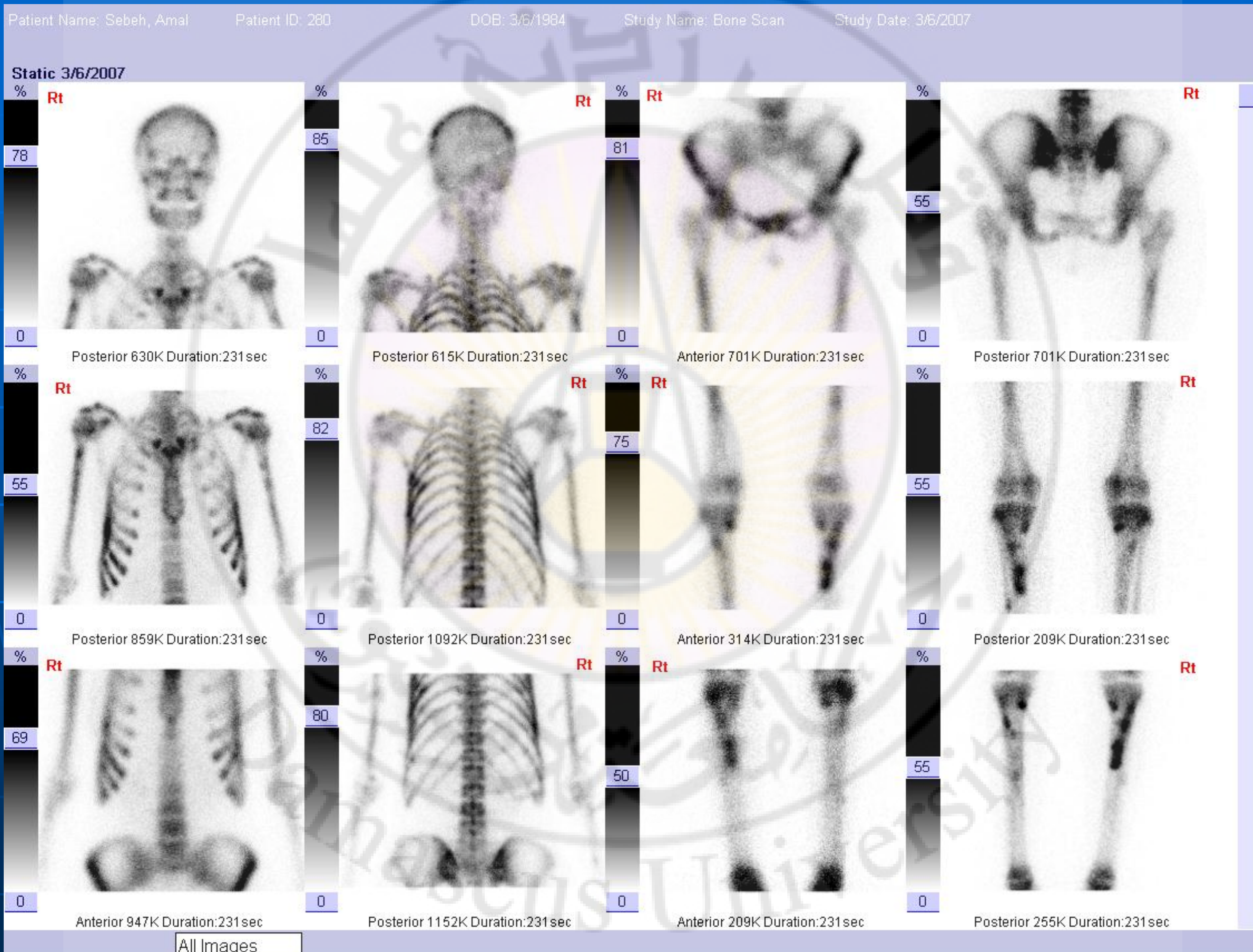
# Metabolic Bone Disease

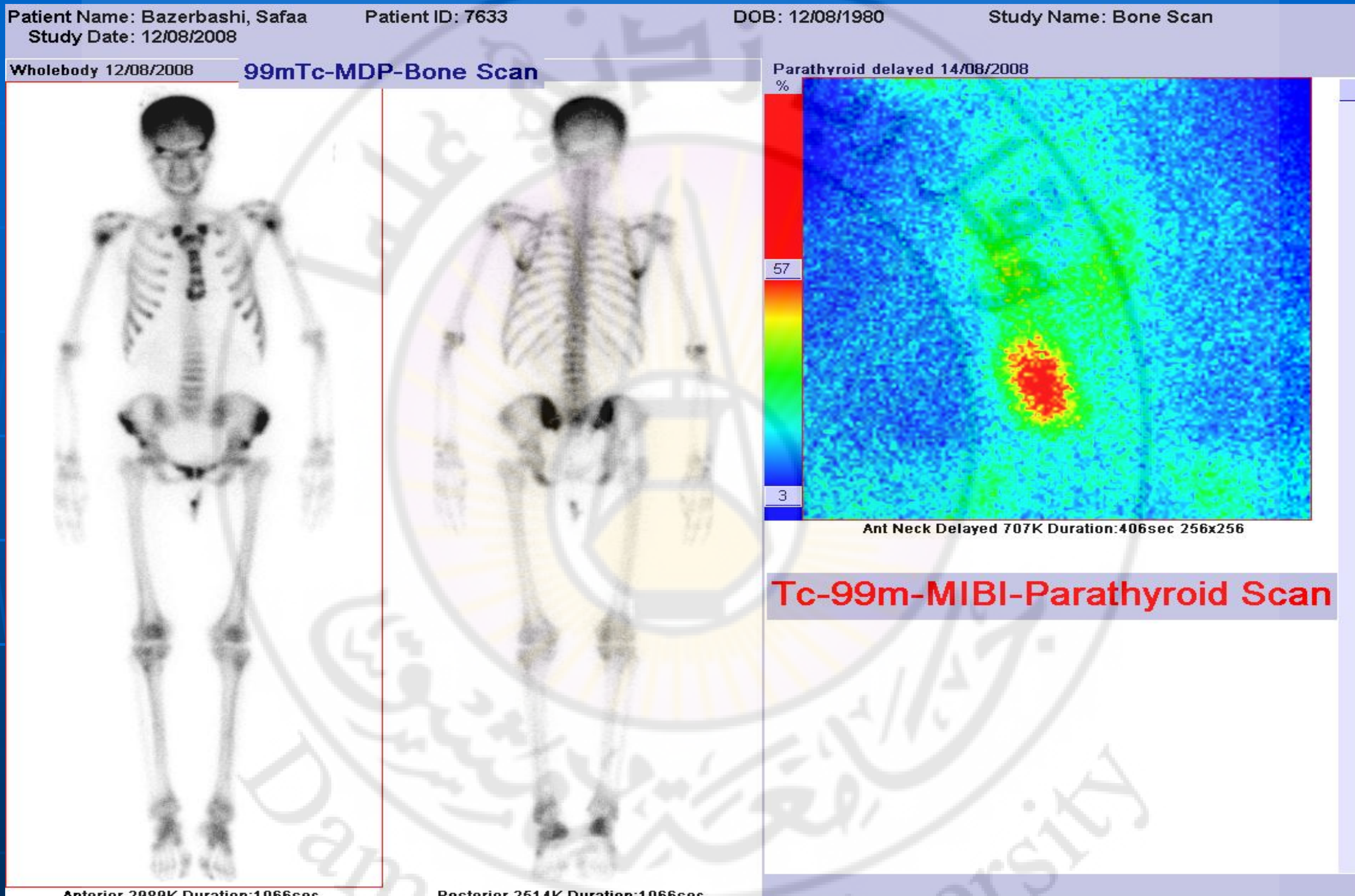
- Hyperthyroidism, primary hyperparathyroidism, renal osteodystrophy, osteomalacia, and hypervitaminosis D. can all result in generalized increased tracer uptake throughout the skeleton that has some features in common with the superscan seen in metastatic disease

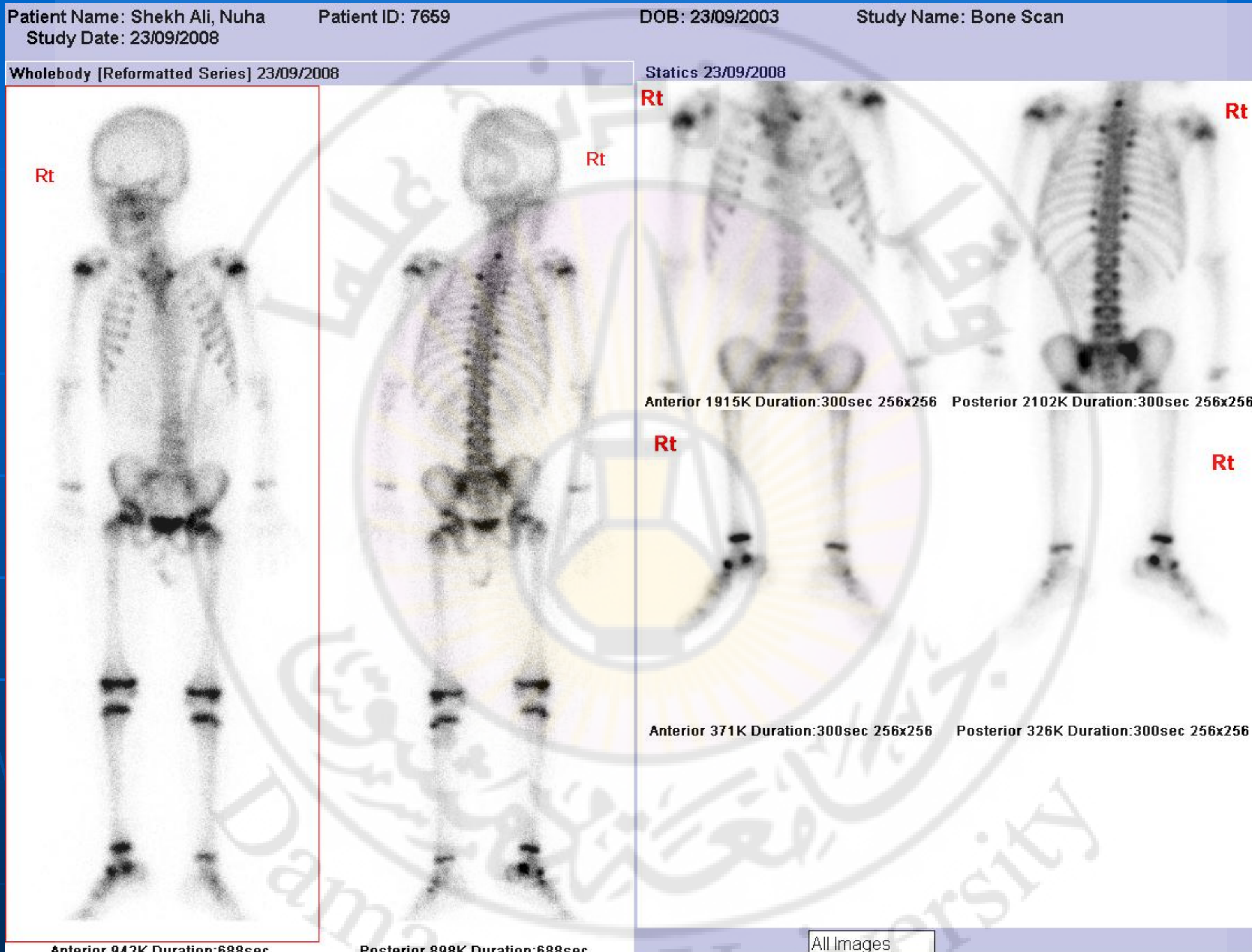


Patient Name: Hallak, Hanaa
Patient ID: 1182
DOB: 4/2/1958
Study Name: Bone Scan
Study Date: 4/2/2007
Wholebody [Reformatted Series] 4/2/2007
%
Rt
Rt
43
0
Anterior 2487K Duration:975sec
Posterior 2273K Duration:975sec
Wholebody [Reformatted Series] 4/2/2007
%
Rt
Rt
76
-3
Anterior 2487K Duration:975sec
Posterior 2273K Duration:975sec


Patient Name: Akkad, Entisar
Patient ID: 811
DOB: 11/14/1941
Study Name: Bone Scan
Study Date: 11/14/2006
Wholebody [Reformatted Series] 11/14/2006
%
Rt
Rt
27
0
Anterior 3743K Duration:938sec
Posterior 3402K Duration:938sec
Wholebody [Reformatted Series] 11/14/2006
%
Rt
Rt
30
0
Anterior 3743K Duration:938sec
Posterior 3402K Duration:938sec


Patient Name: Sebeh, Amal
Patient ID: 280
DOB: 3/6/1984
Study Name: Bone Scan
Study Date: 3/6/2007
Static 3/6/2007
Rt
Posterior 630K Duration:231sec
Posterior 615K Duration:231sec
Anterior 701K Duration:231sec
Posterior 701K Duration:231sec
Posterior 859K Duration:231sec
Posterior 1092K Duration:231sec
Anterior 314K Duration:231sec
Posterior 209K Duration:231sec
Anterior 947K Duration:231sec
Posterior 1152K Duration:231sec
Anterior 209K Duration:231sec
Posterior 255K Duration:231sec
All Images

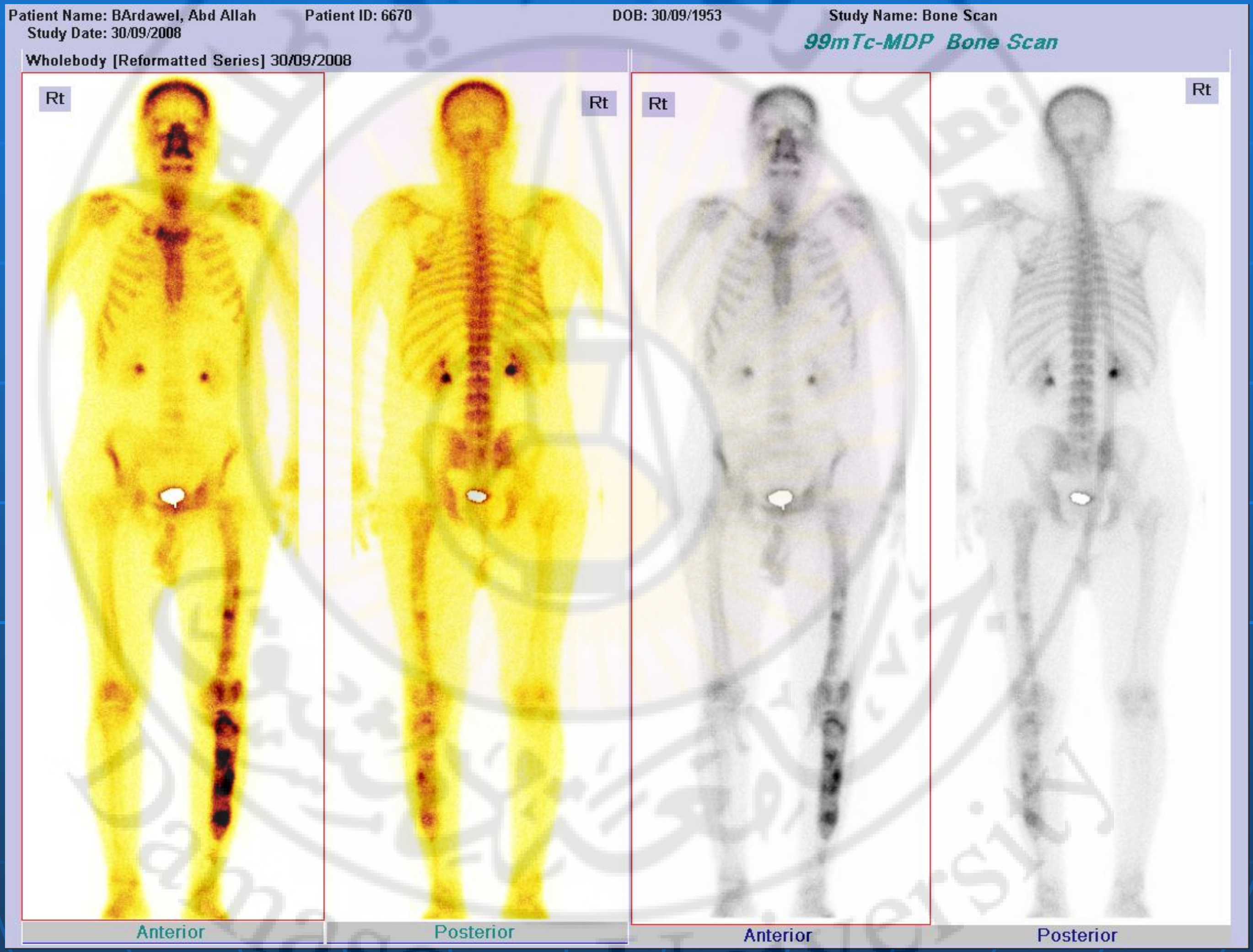

Patient Name: Bazerbashi, Safaa
Patient ID: 7633
DOB: 12/08/1980
Study Name: Bone Scan
Study Date: 12/08/2008
Wholebody 12/08/2008
99mTc-MDP-Bone Scan
Parathyroid delayed 14/08/2008
%
57
3
Ant Neck Delayed 707K Duration:406sec 256x256
Tc-99m-MIBI-Parathyroid Scan
Anterior 2989K Duration:1066sec
Posterior 2514K Duration:1066sec

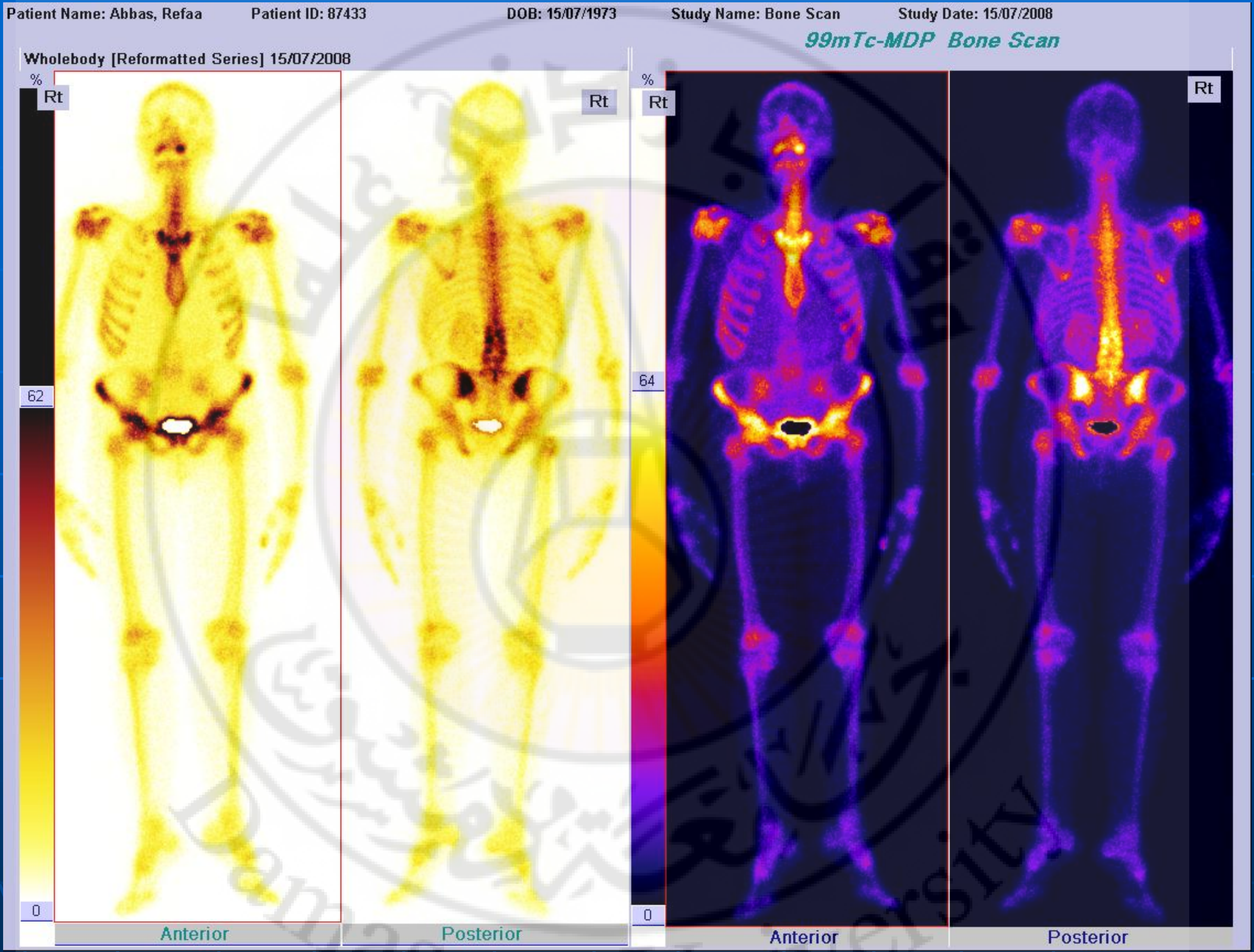


Patient Name: Shekh Ali, Nuha
Study Date: 23/09/2008
Patient ID: 7659
DOB: 23/09/2003
Study Name: Bone Scan
Wholebody [Reformatted Series] 23/09/2008
Statics 23/09/2008
Rt
Rt
Anterior 942K Duration:688sec
Posterior 898K Duration:688sec
Rt
Rt
Anterior 1915K Duration:300sec 256x256
Posterior 2102K Duration:300sec 256x256
Rt
Rt
Anterior 371K Duration:300sec 256x256
Posterior 326K Duration:300sec 256x256
All Images

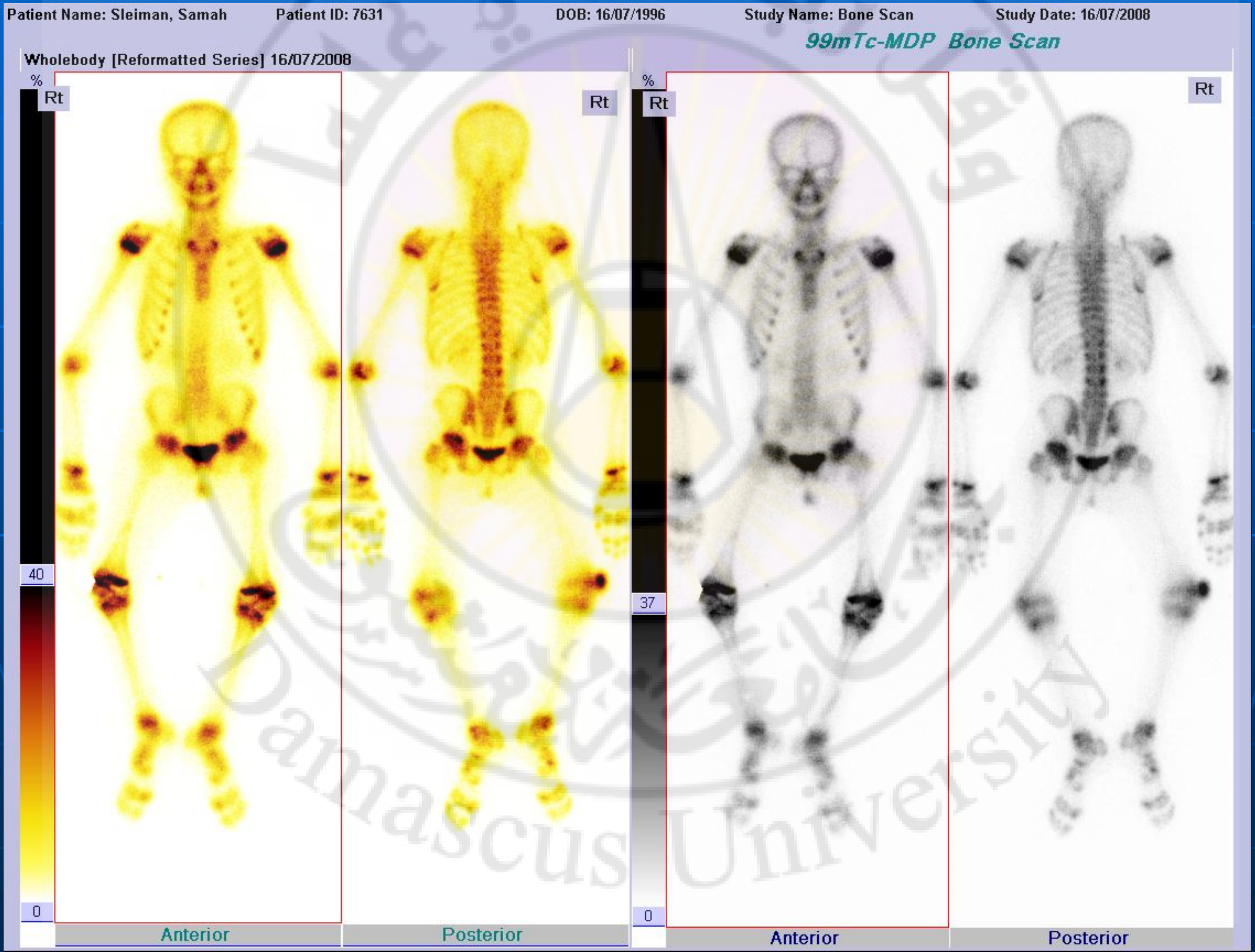
# Bone Dysplasias

- Fibrous dysplasia is the most commonly encountered of these and may be monostotic or polyostotic.


Patient Name: BArdawel, Abd Allah
Patient ID: 6670
DOB: 30/09/1953
Study Name: Bone Scan
Study Date: 30/09/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 30/09/2008
Rt
Rt
Rt
Rt
Anterior
Posterior
Anterior
Posterior

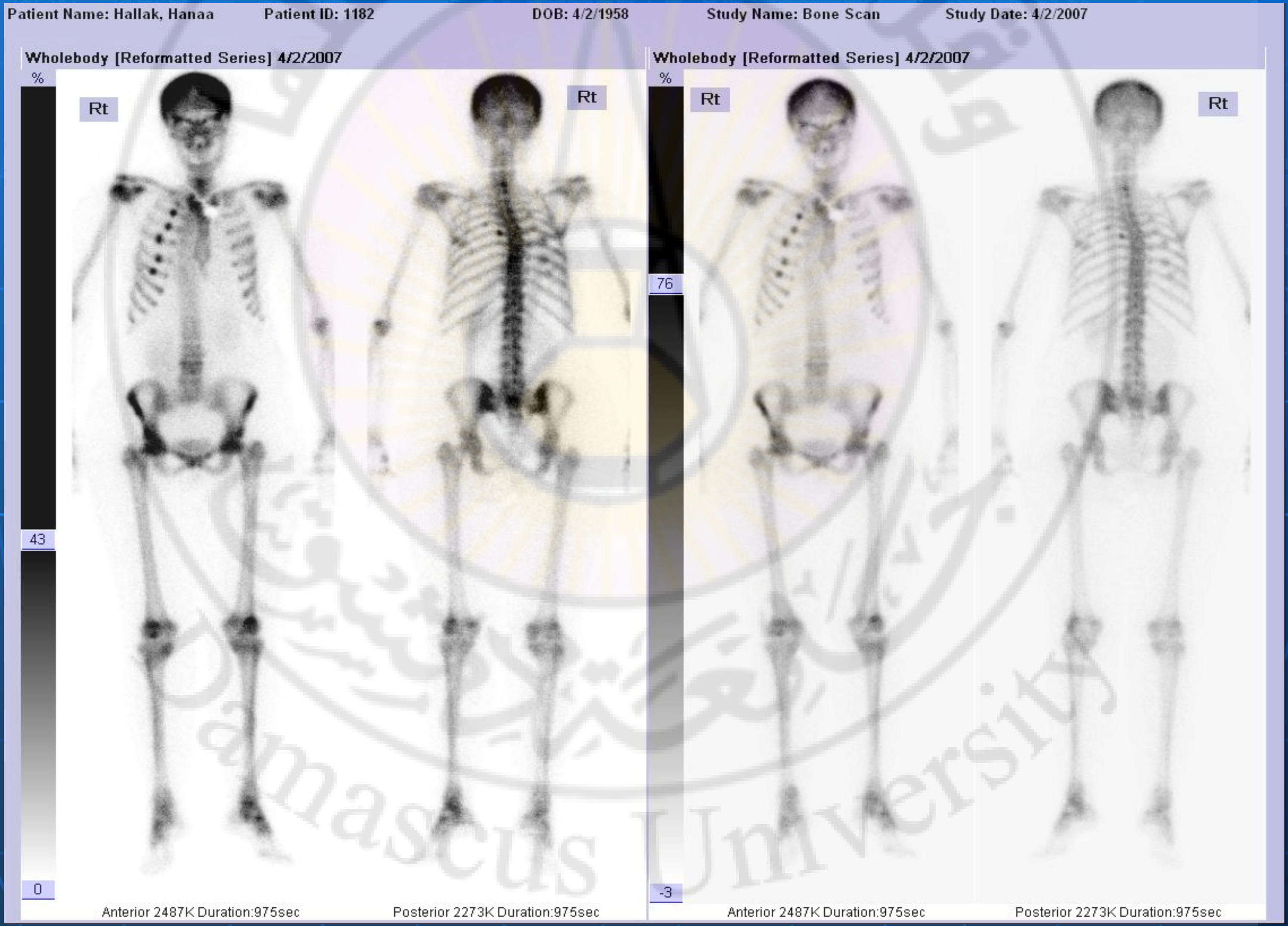

Patient Name: Abbas, Refaa
Patient ID: 87433
DOB: 15/07/1973
Study Name: Bone Scan
Study Date: 15/07/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 15/07/2008
%
Rt
Rt
62
0
Anterior
Posterior
%
Rt
Rt
64
0
Anterior
Posterior

# Arthritis


Patient Name: Sleiman, Samah
Patient ID: 7631
DOB: 16/07/1996
Study Name: Bone Scan
Study Date: 16/07/2008
99mTc-MDP Bone Scan
Wholebody [Reformatted Series] 16/07/2008
%
Rt
40
0
Rt
%
Rt
37
0
Rt
Anterior
Posterior
Anterior
Posterior

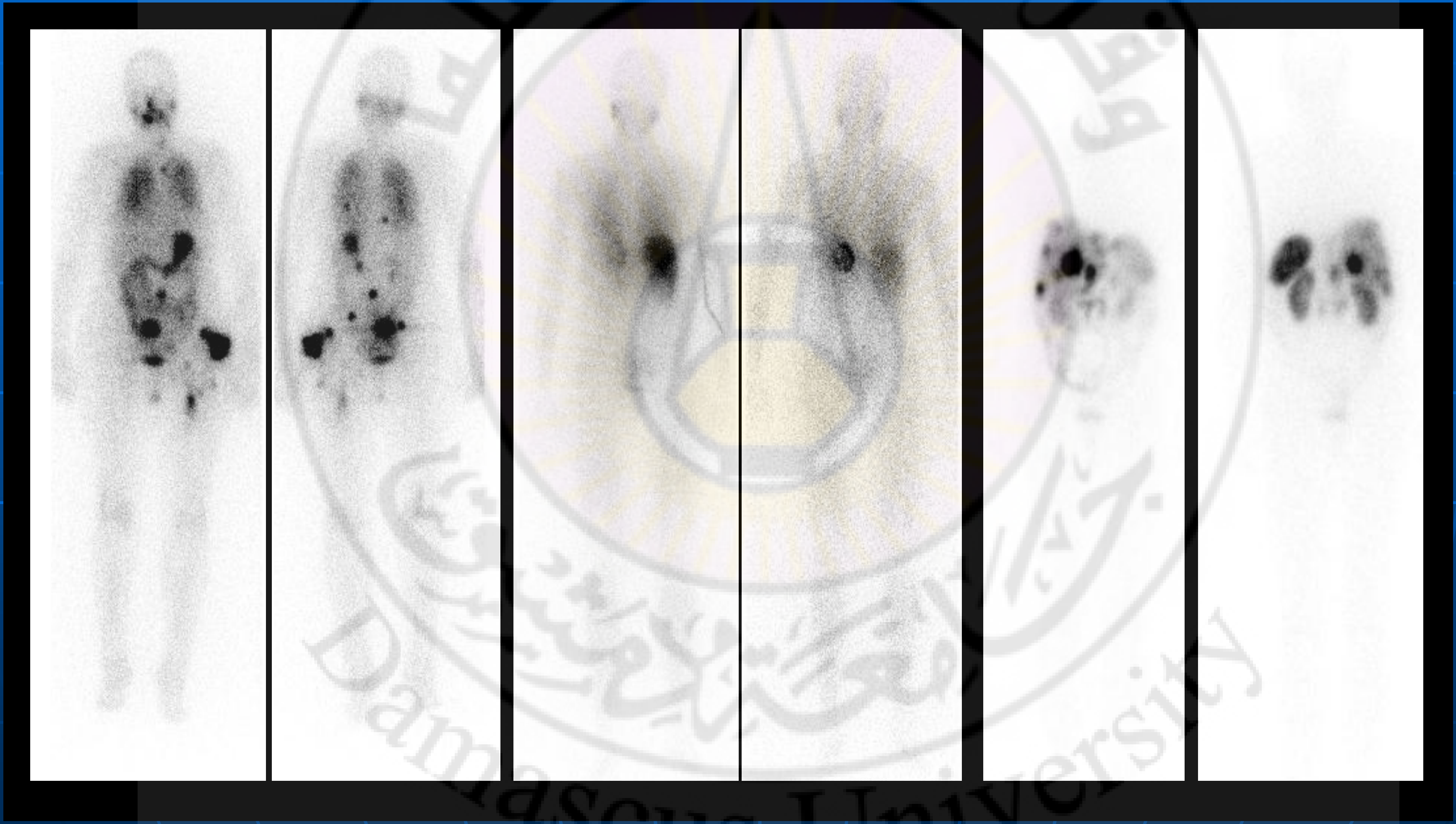
# الأورام العظمية البدئية Bone Tumor

# آلام هيكلية مجهولة السبب مترافقة مع ارتفاع سرعة التثفل و الفوسفاتاز القلوية
# فرط نشاط جارات الدرق



# Oncology الكشف عن الأورام و انتقالاتها

## Iodine-131, Iodine-123-MIBG, Indium-111-SMS



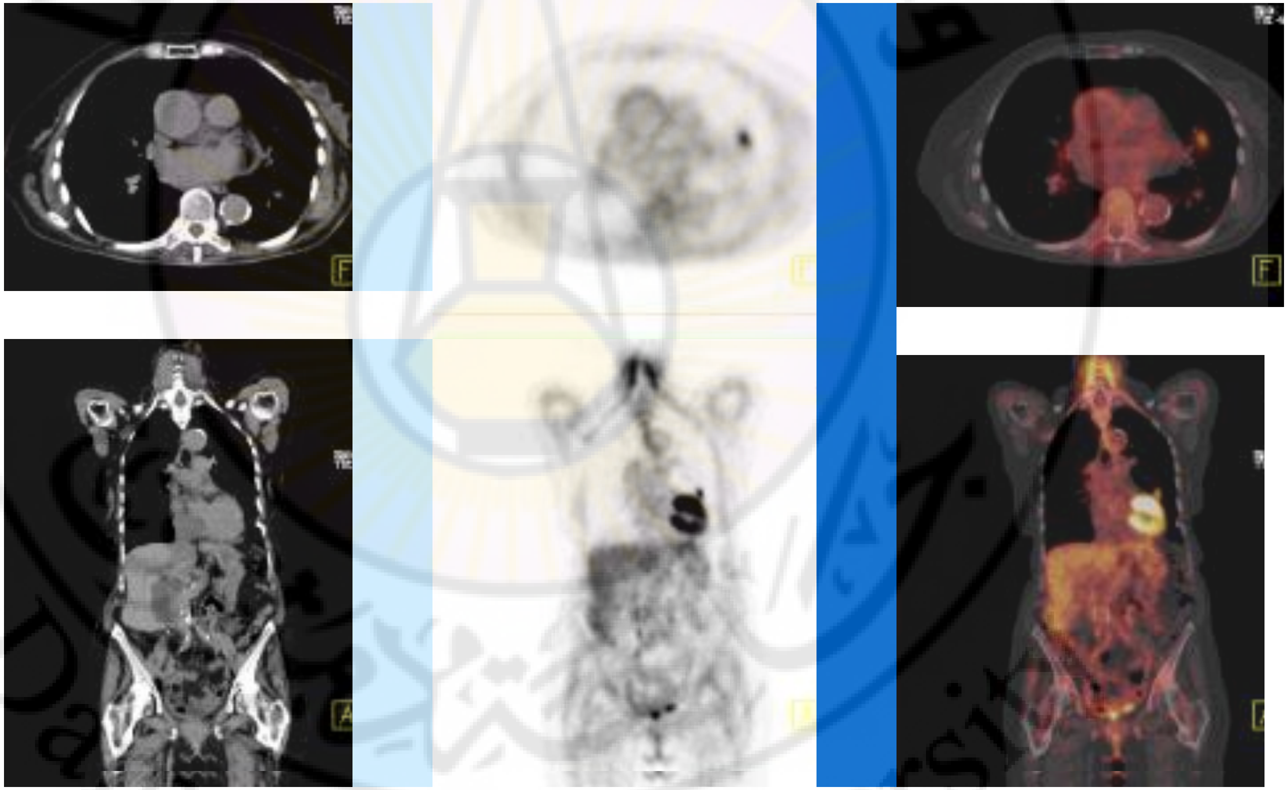
Thyroid Cancer Pheochromocytoma Gastrinoma

# PET/CT- The Future for NM = Fusion PET

# Oncological Imaging with FDG-PET Indications

- Staging
- Therapy planning
- Integration RTx
- Therapy monitoring
- Detection of recurrence

# Structure + Function → PET/CT



University of Tennessee

# المعالجة بالنظائر و المواد المشعة

- المعالجة باليود المشع ١٣١
  - ❖ فرط نشاط الدرق
  - ❖ سرطان الدرق جيد التمايز
- معالجة الانتقالات الثانوية إلى العظام :

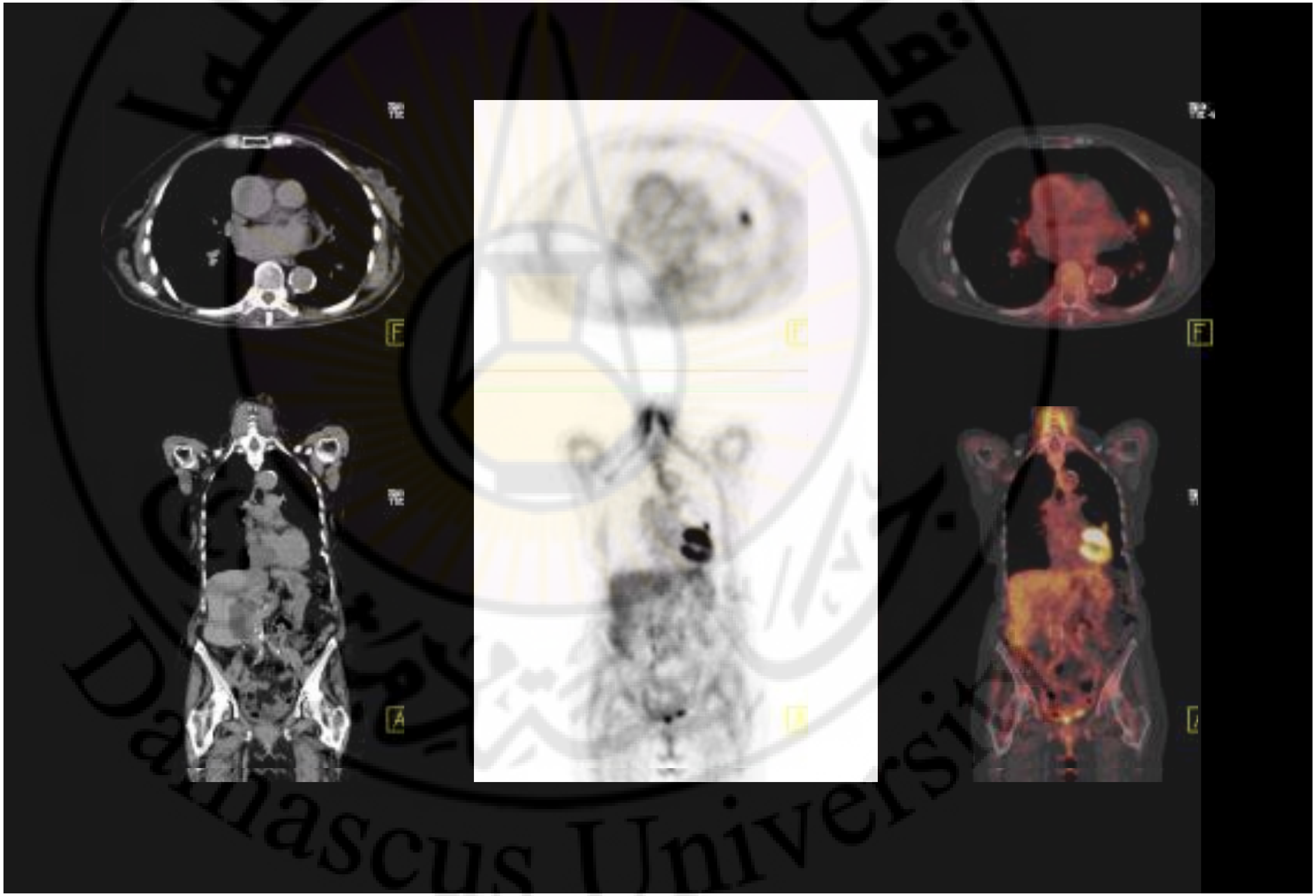
السترنسيوم ٨٩ – السماريوم ١٥٣- الرينيوم ١٨٨

- معالجة الفيوكروموسايتوما

بالـ MIBG-I 131


THANK YOU

## Structure + Function → PET/CT



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