

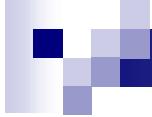


SPECT/CT INSTRUMENTATION AND CLINICAL APPLICATIONS

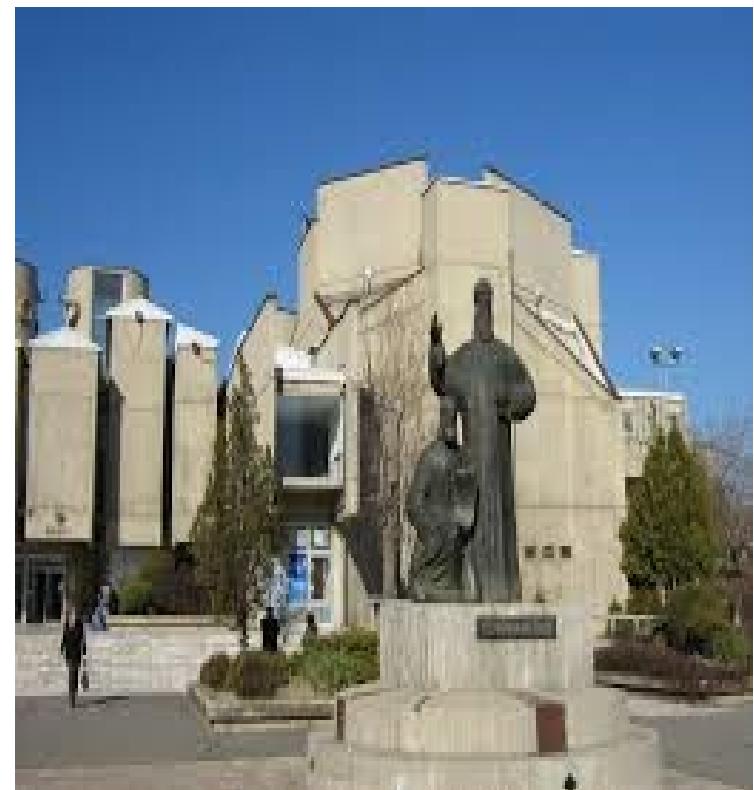
Daniela Miladinova, MD PhD
Institute of Pathophysiology and Nuclear Medicine
Academ.Isak S.Tadzer, Faculty of Medicine,
University "Ss Cyril and Methodius"

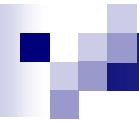
Medical Physics Workshop
PET Development and Applications

Ohrid, 6th september 2015



www.ukim.edu.mk

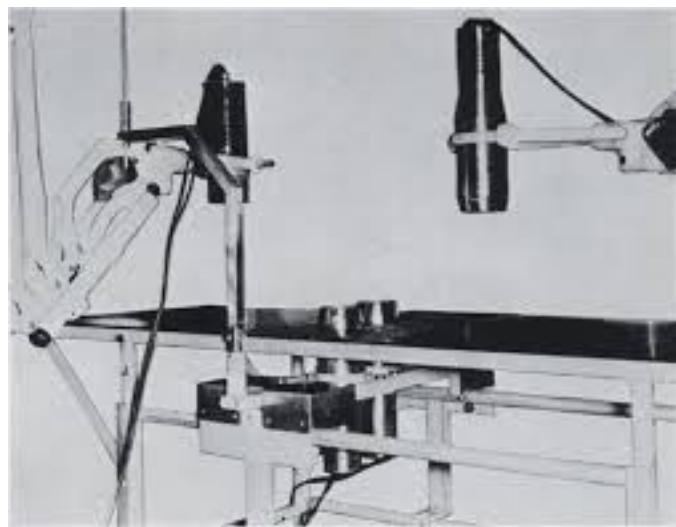




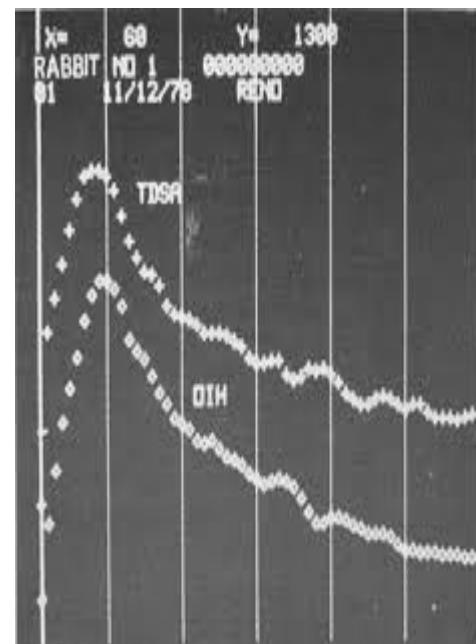
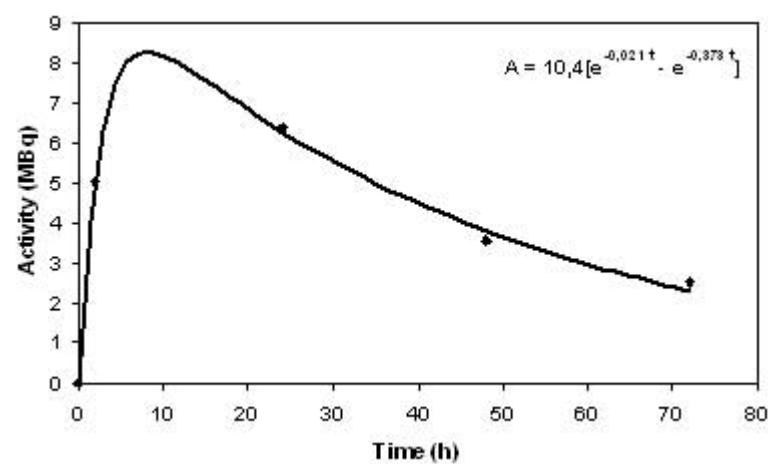
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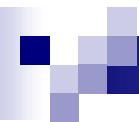


SCINTILATION PROBES

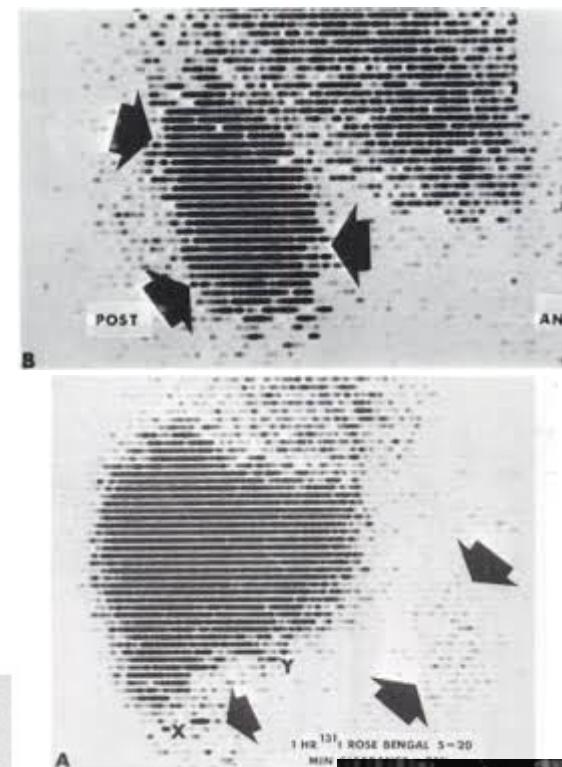


TIME ACTIVITY CURVES

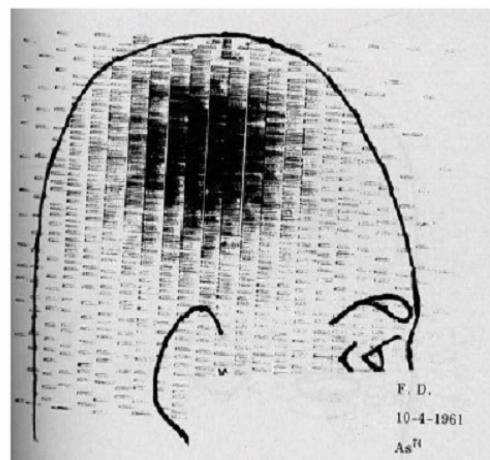


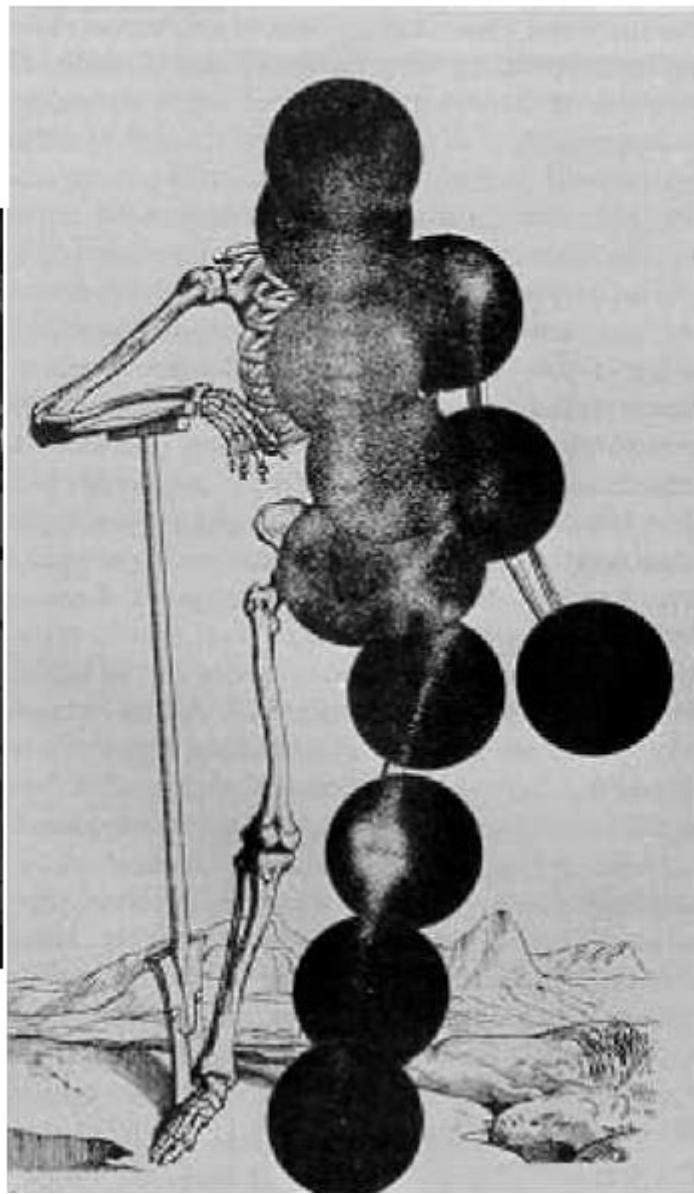


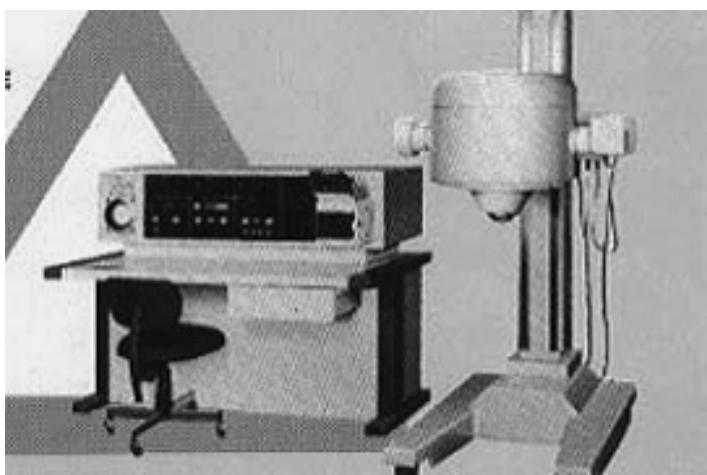
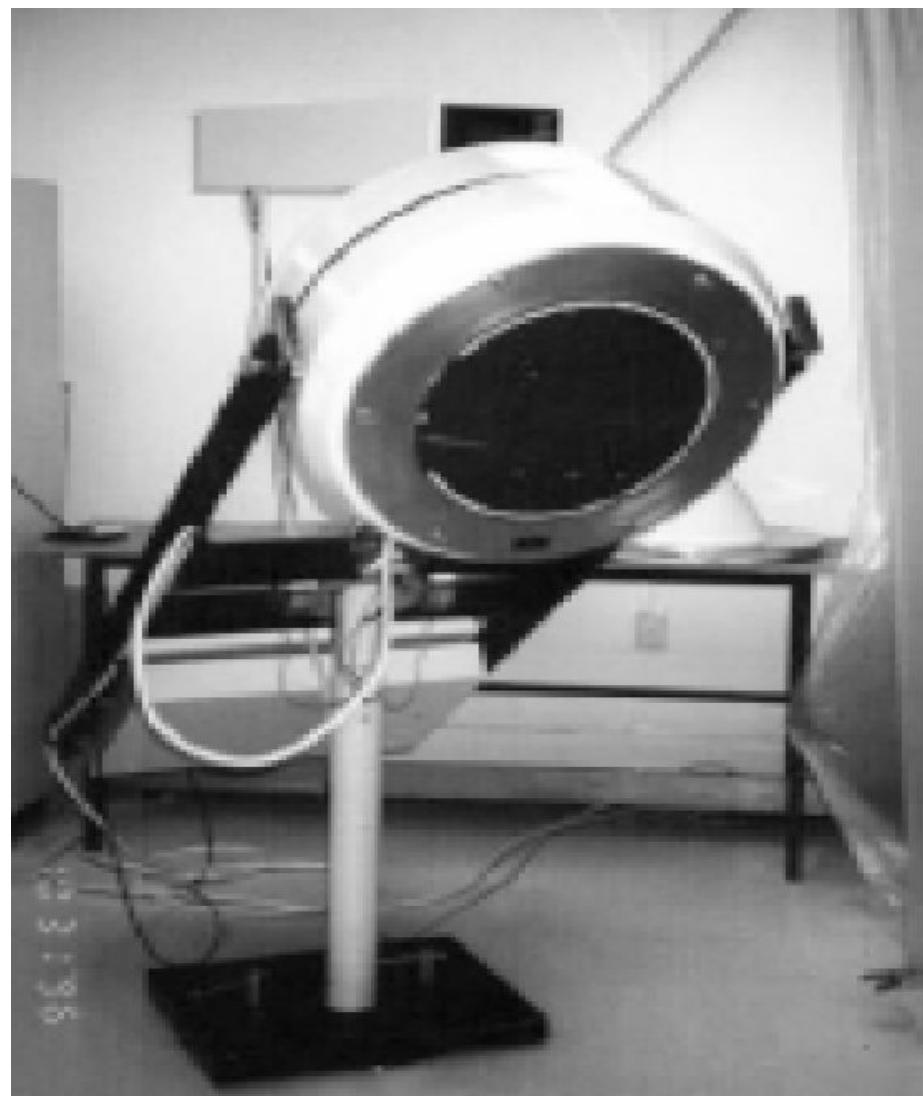
RECTILINEAR SCANNER

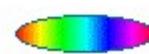
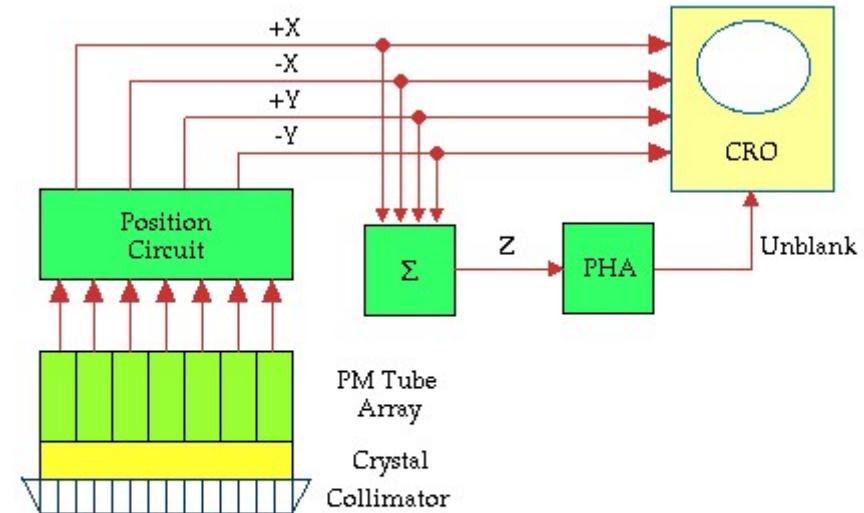
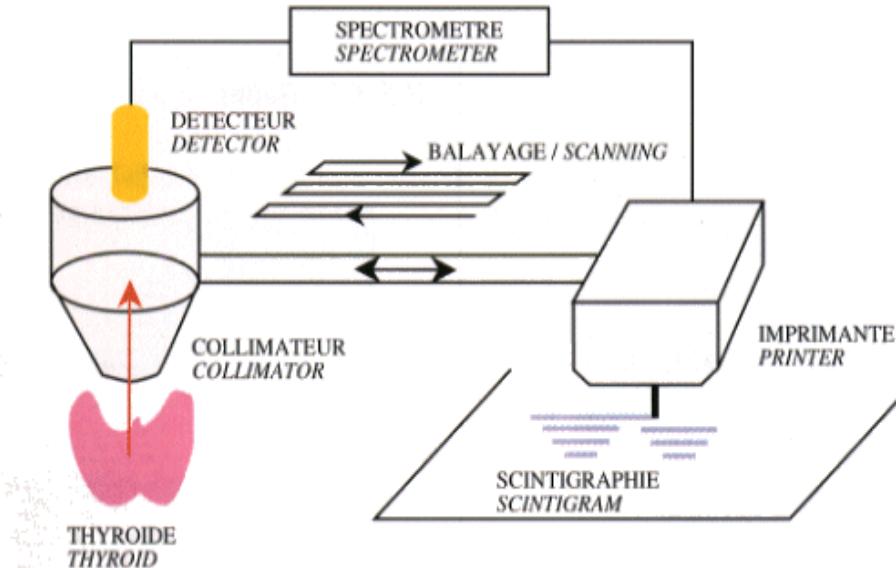


CORRELATIVE IMAGE

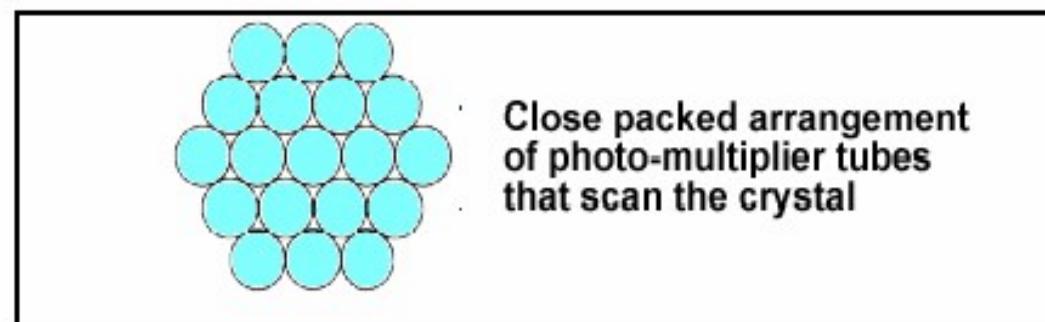
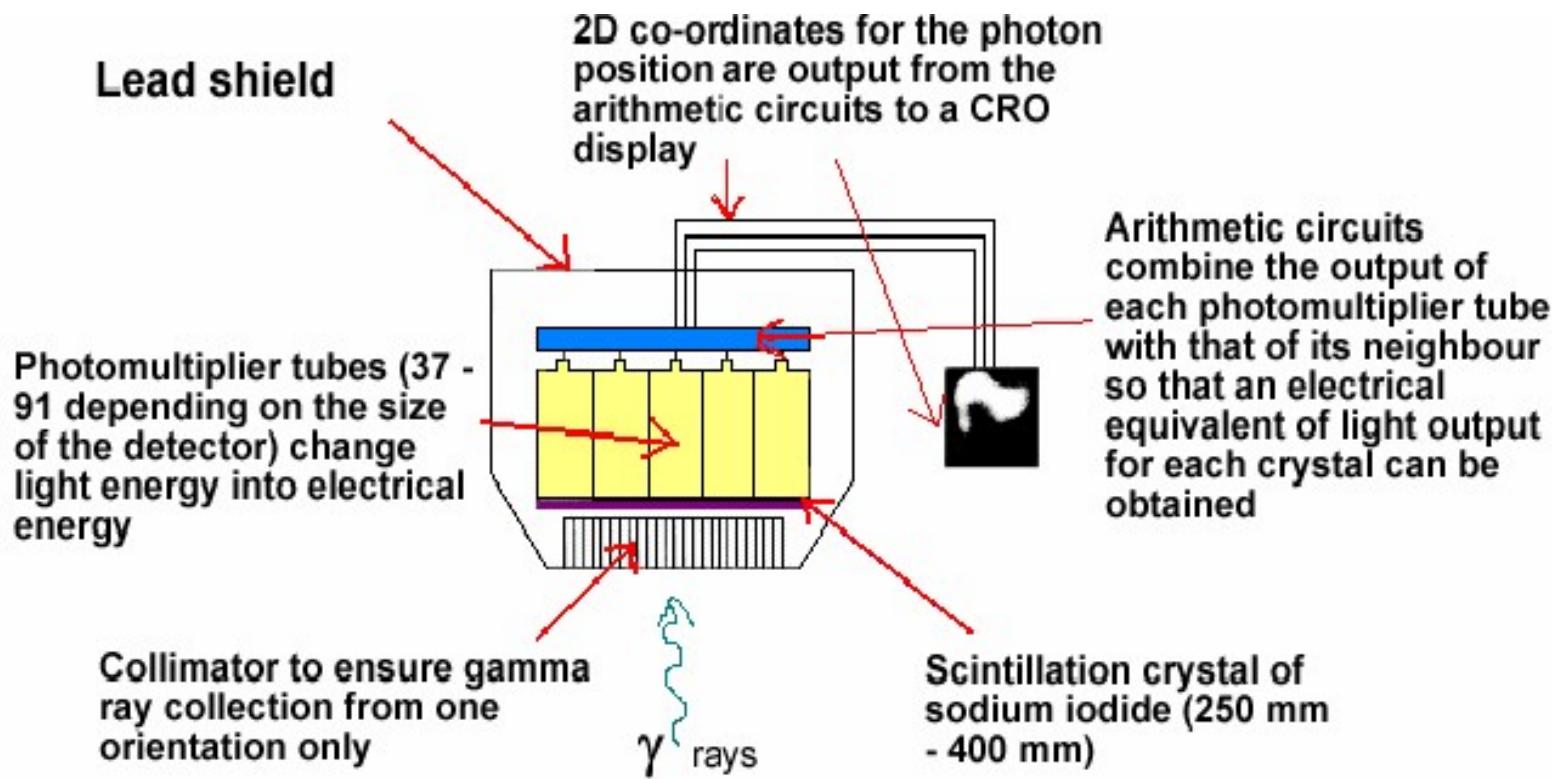








Organ containing
radiopharmaceutical



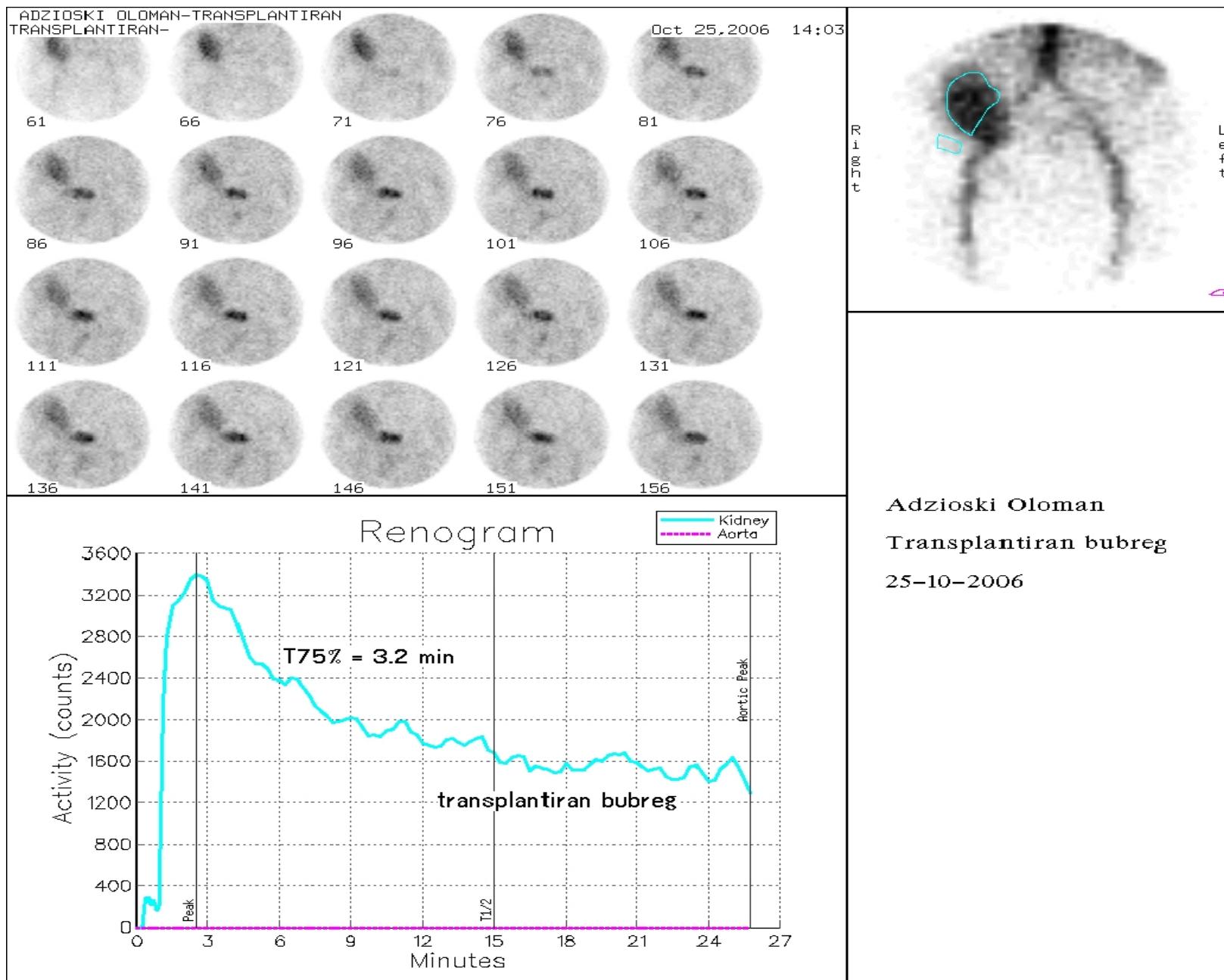
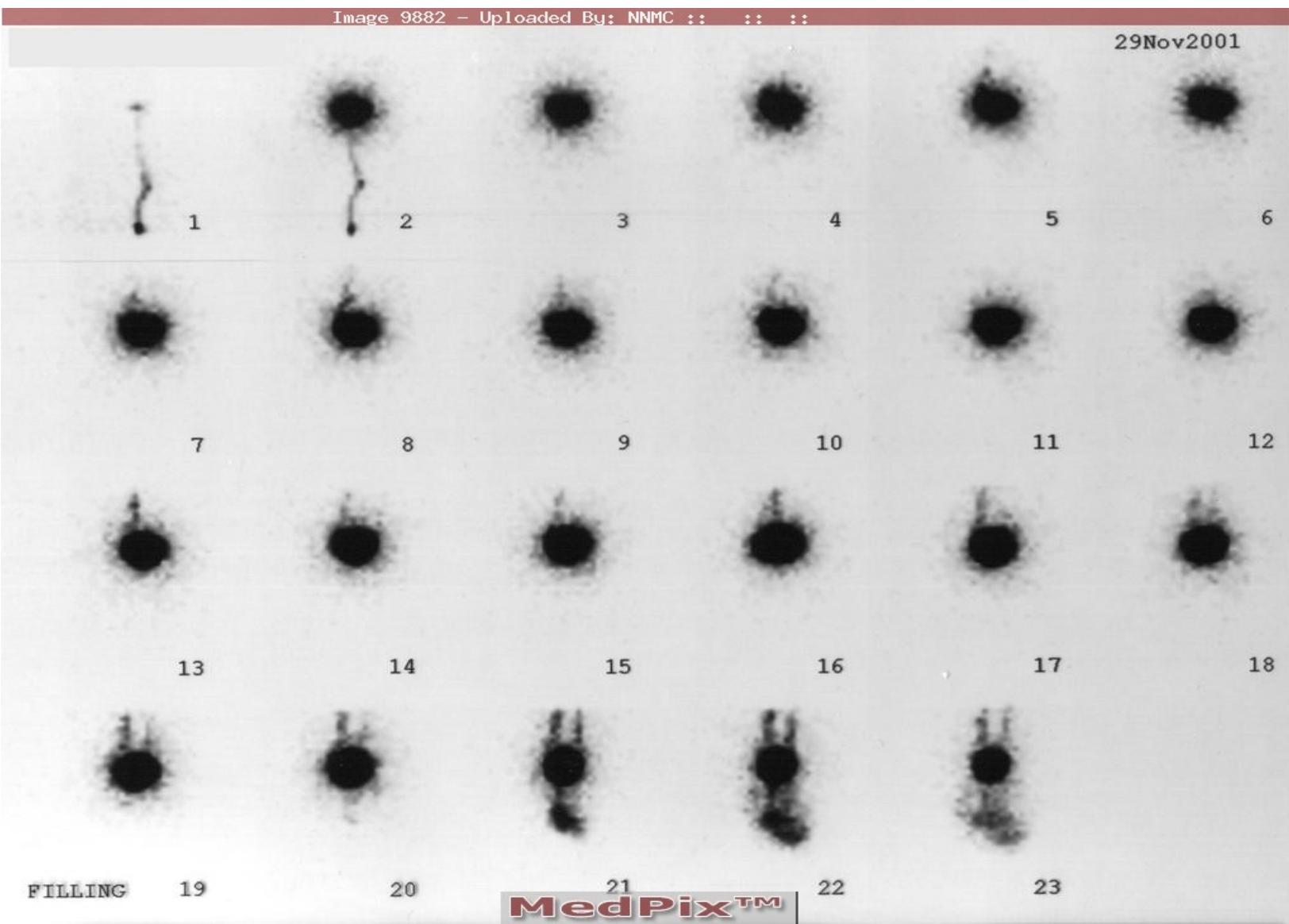
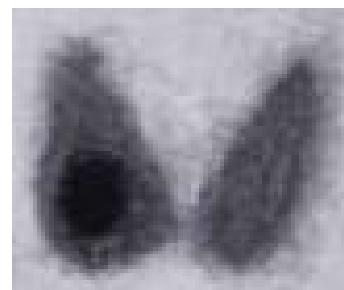
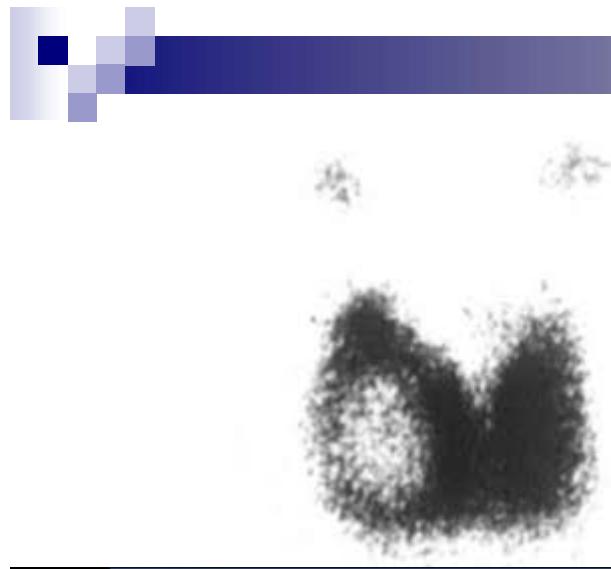


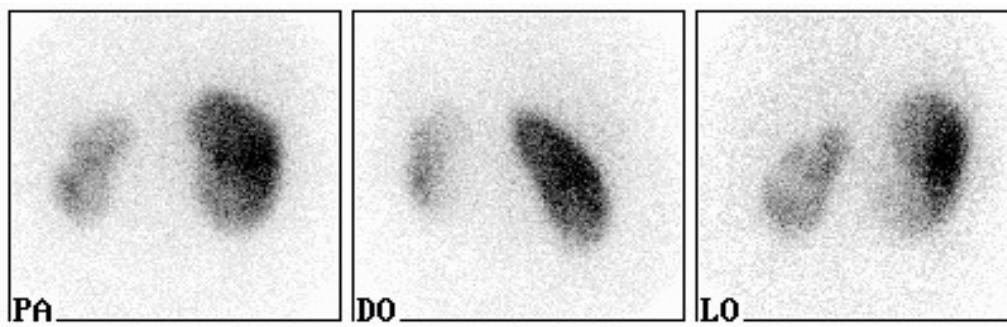
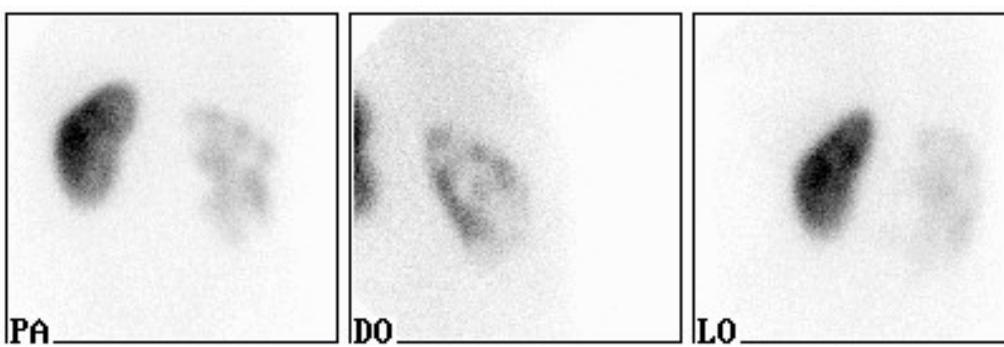
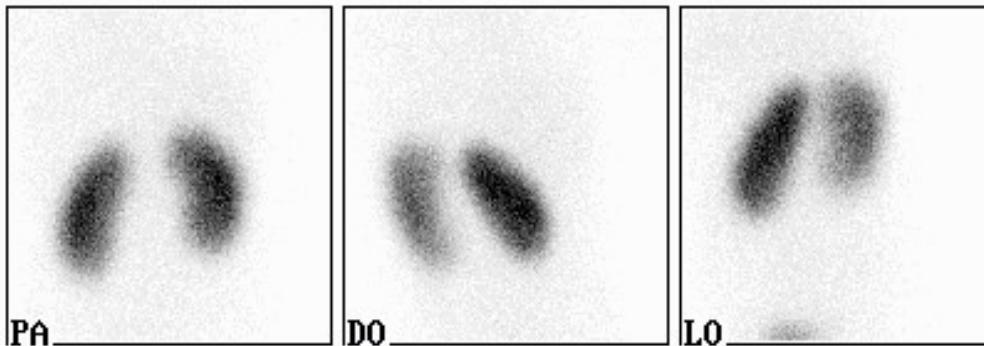
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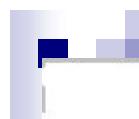
29Nov2001





0MIN_H1[1]	AP 2MIN_H1[1]	AP.4MIN_H1[1]
1	2	3
AP.6MIN_H1[1]	AP.8MIN_H1[1]	AP.10MIN_H1[1]
4	5	6
AP.10=2MIN_H1[1]	AP.15MIN_H1[1]	PA.7_H2[1]
7	8	9





Patient ID:

Study Name: Skelet

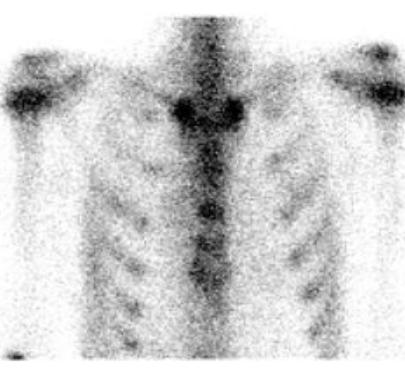
Study Date: 31.08.2005



DL GLAVA 150K



LL GLAVA 150K



AP RAMENJA 300K



AP KARLICA 799K



AP KOLENA 149K



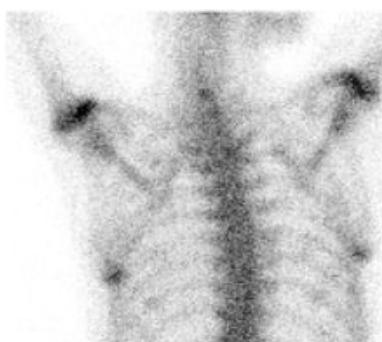
AP STAPALA 100K



PA KARLICA 799K



PA KICMA 301K



PA RAMENJA 300K



pool 496K

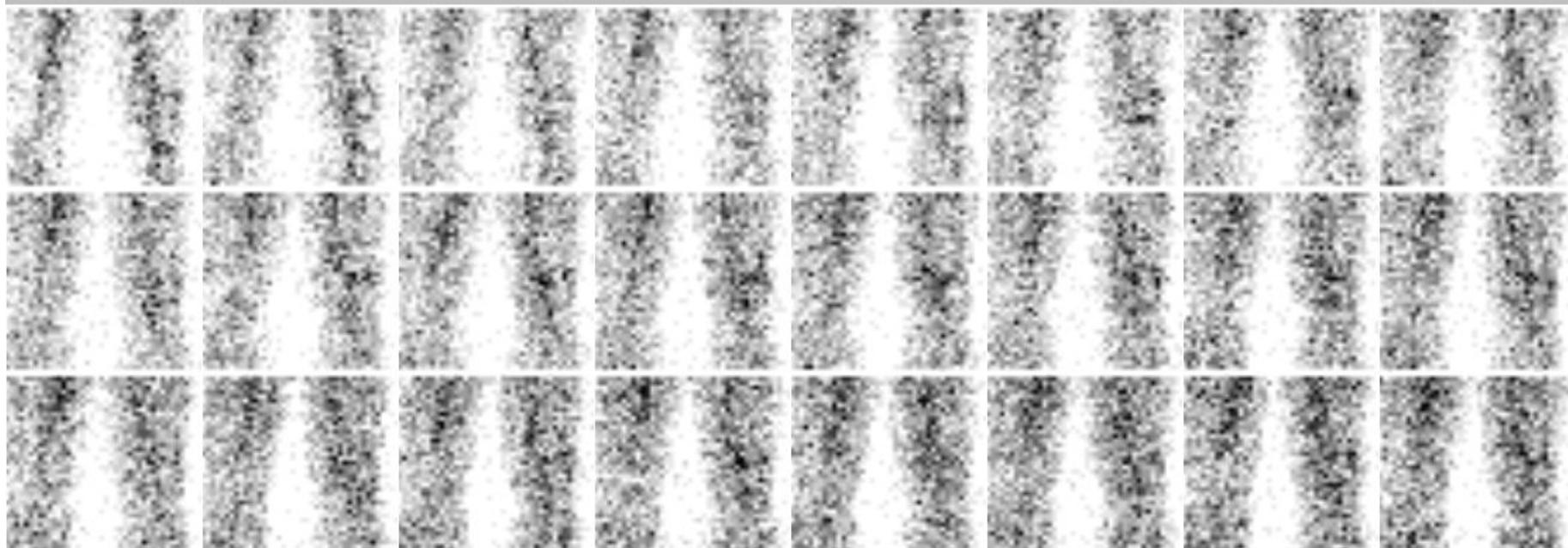
Patient Name: azemi, durmiss

Patient ID: 2487

Study Name: Skelet

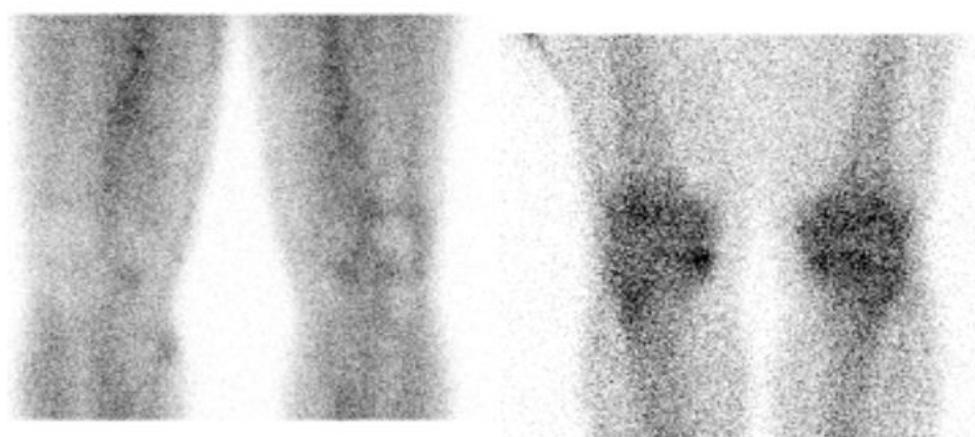
Study Date: 04.02.2005

vaskularna 04.02.2005



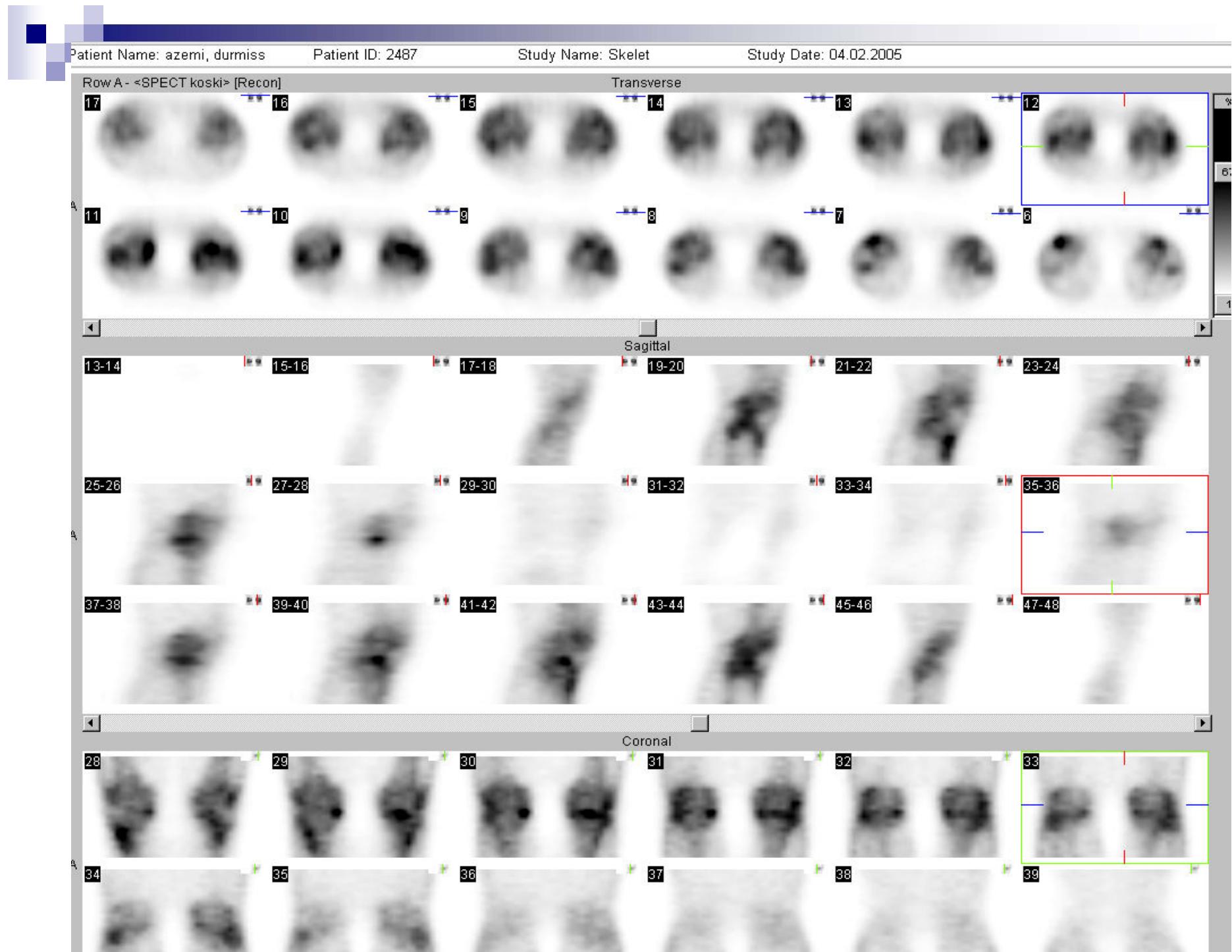
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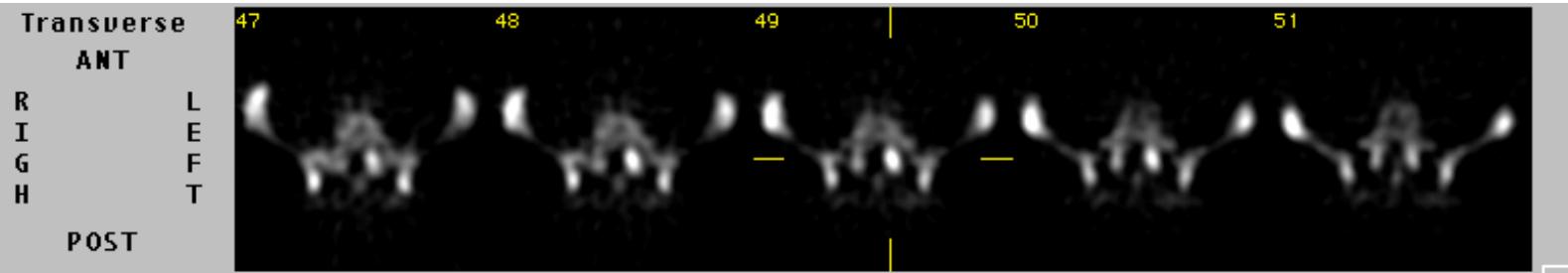
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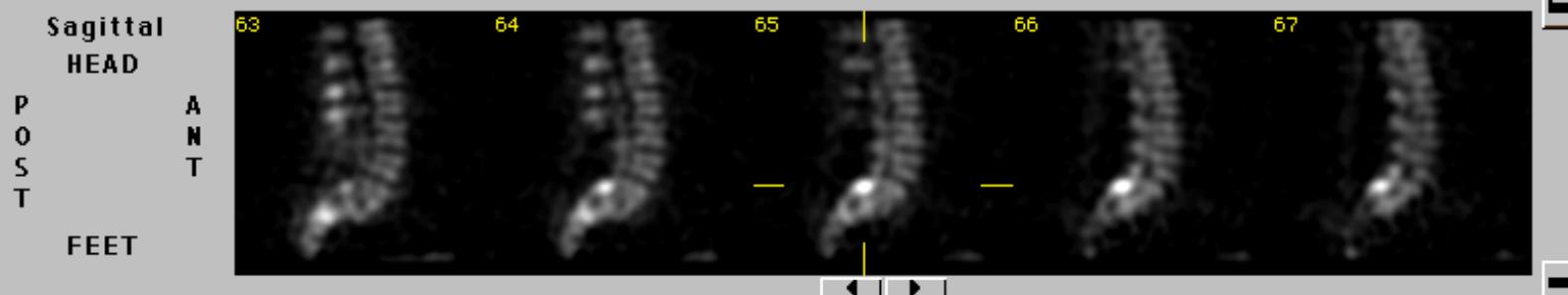
pool 500K Duration:134sec

AP 152K Duration:124sec

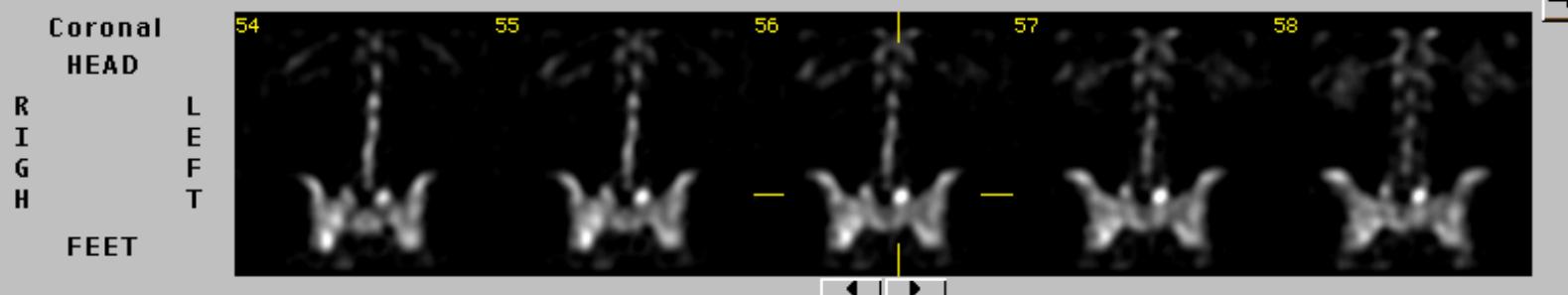




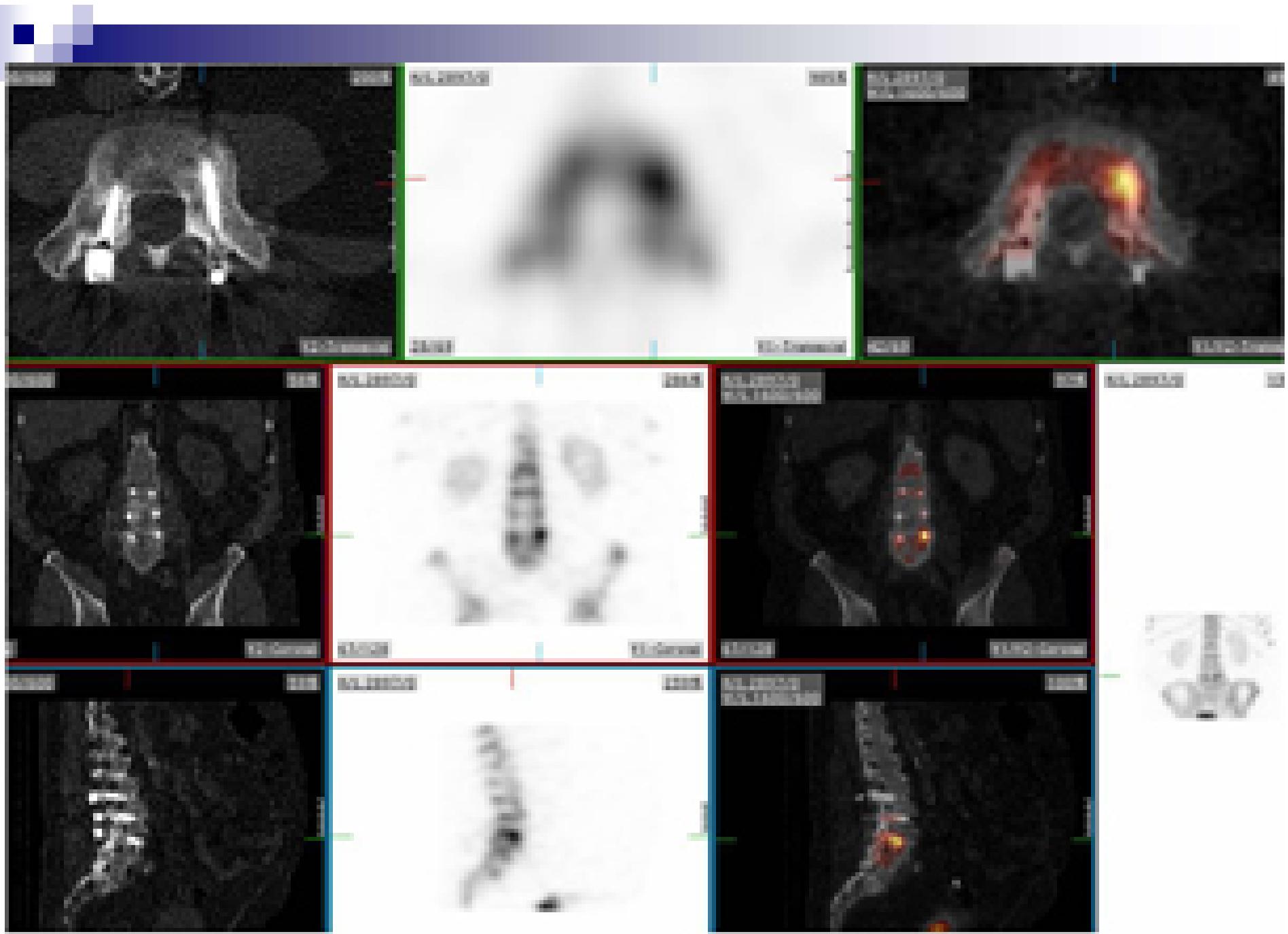
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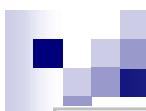


TU



TU



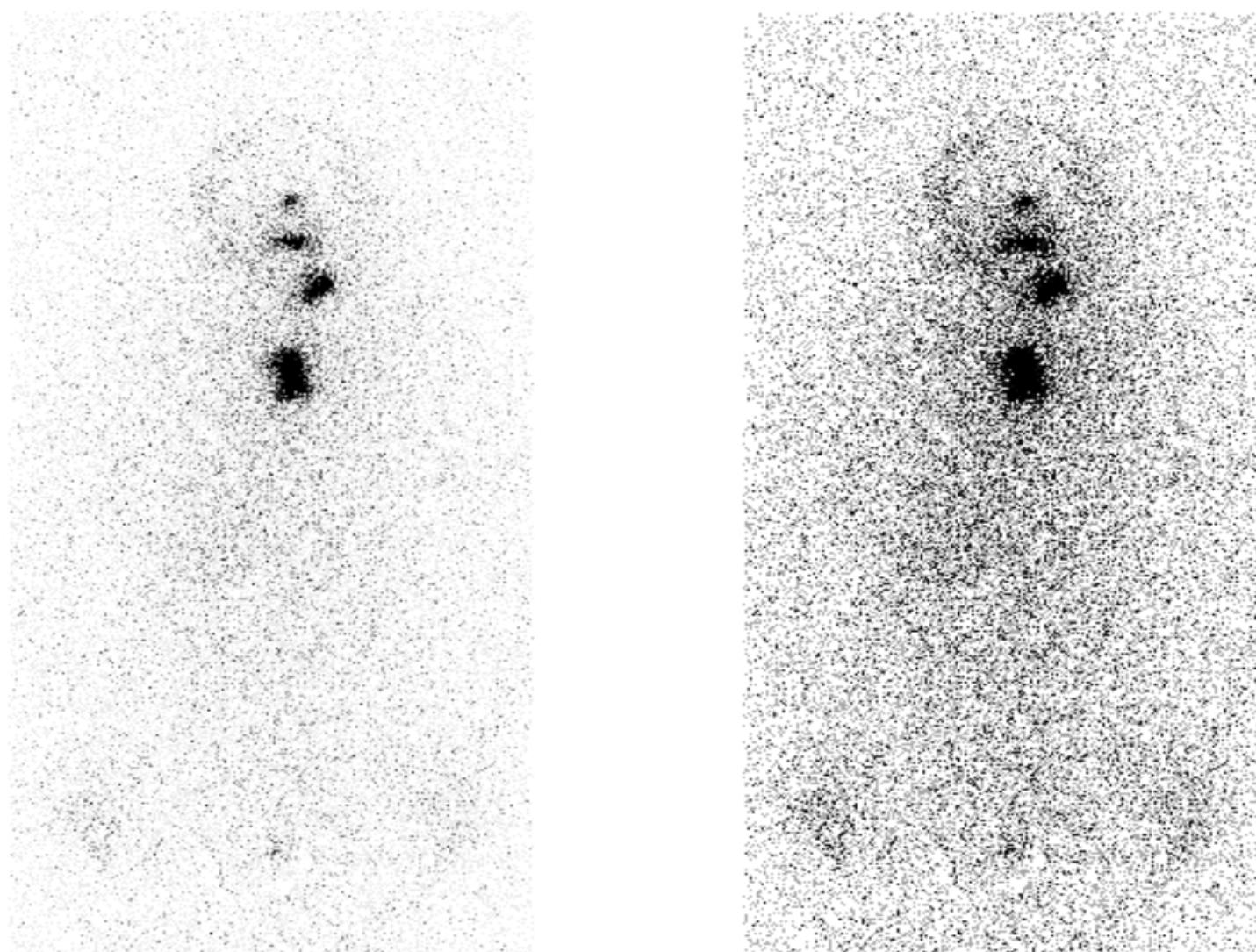


Patient Name: josifoska, dobrica

Patient ID: 13665

Study Date: 04.03.2011

Study Time: 08:37:24





SPECT/CT

- SPECT principles
- Iterative SPECT reconstruction
- Advantage of SPECT/CT hybrid imaging
- Current clinical applications of SPECT/CT

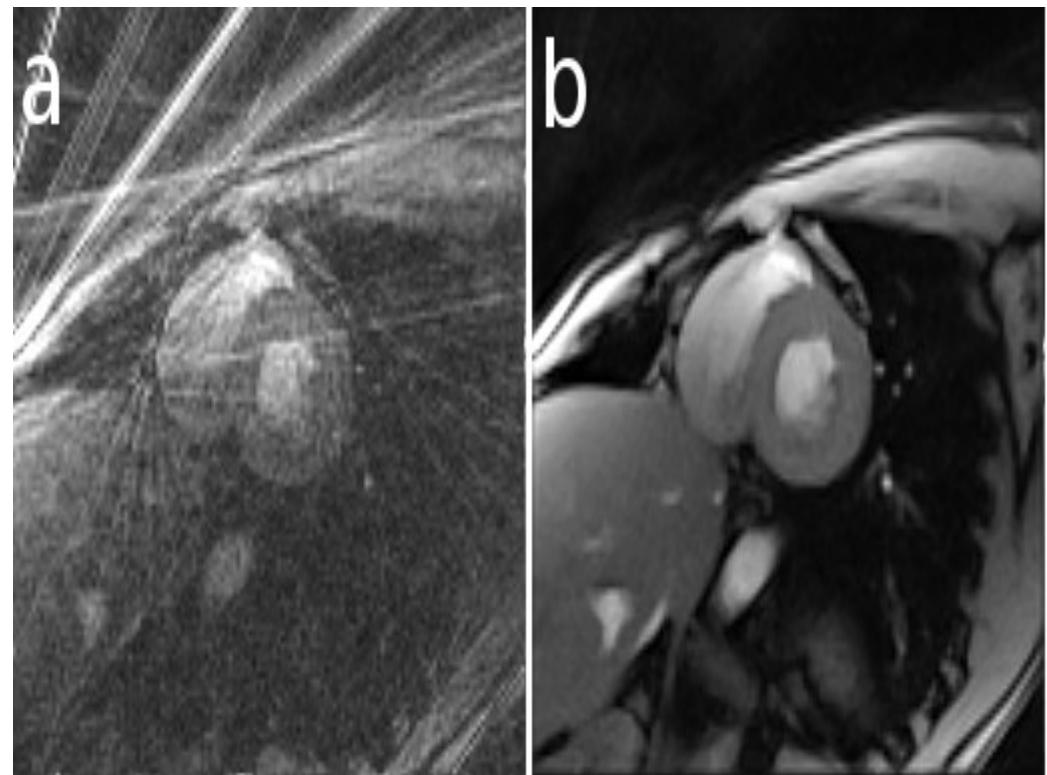
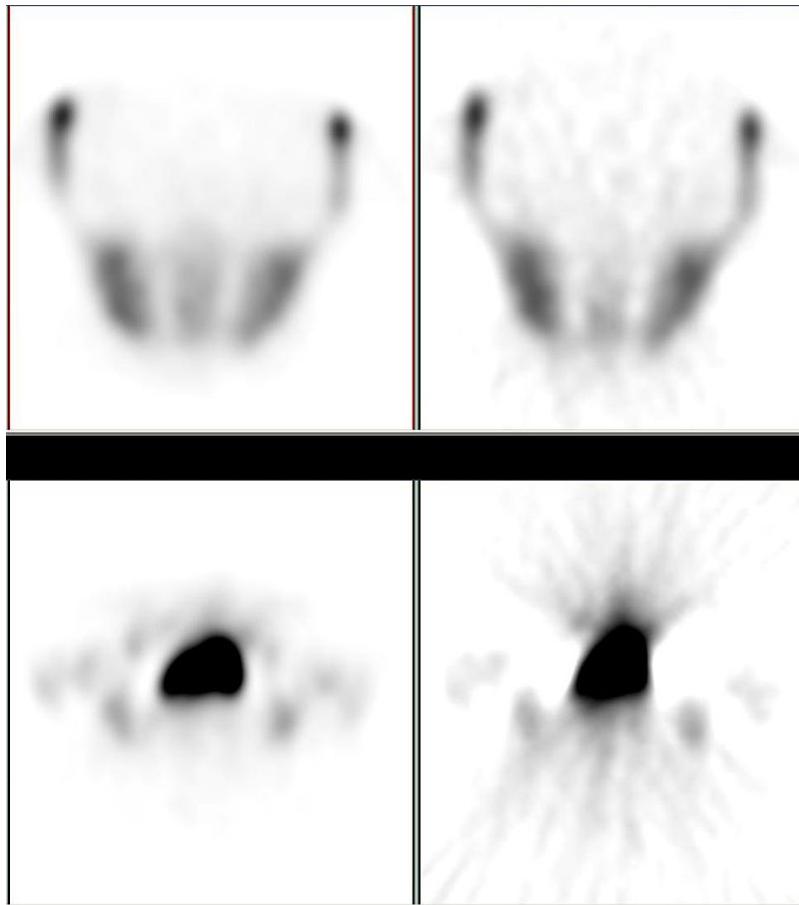
SPECT principles

- Flat panel *head* used for detection
- Acquisition time depending on
 - detector, collimator
 - size of the imaging region
 - amount of activity available

Data Acquisition - low energy all purpose collimator/high resolution; 30sec/projection in 64 projections over 360 degrees on single-headed gamma camera

- acquisition processing
- uniformity correction
- filtered backprojection

Iterative reconstruction / filtered back projection



Dual Isotope Imaging with SPECT

- Bone scan with ^{99m}Tc -MDP and Thyroid imaging with ^{123}I /thyroid and parathyroid imaging
- ^{99m}Tc (140.5 keV)
- ^{123}I (159.0 keV)

Energy window (^{99m}Tc)

140 keV

Energy window (^{123}I)

160 keV

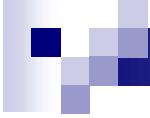
SPECT radionuclides

- **^{99m}Tc** T1/2 = 6 hr, γ = 140 keV
- **^{111}In** T1/2 = 67 hr; γ 's = 172, 245 keV
- **^{123}I** T1/2 = 13 hr, γ = 159 keV
- **^{67}Ga** T1/2 = 78 hr; γ 's = 93, 184, 296 keV
- **^{201}Tl** T1/2 = 73 hr, 70 keV X-rays, γ = 167 keV
- **^{131}I** T1/2 = 193 hr, γ = 364 keV*
- **^{153}Sm** T1/2 = 46 hr, γ = 103 keV*

* used for internal therapy (β -) as well!!!

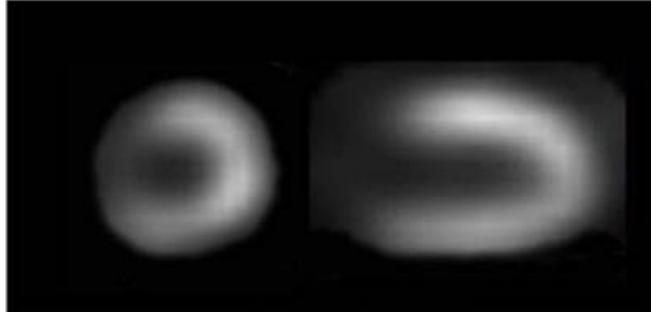
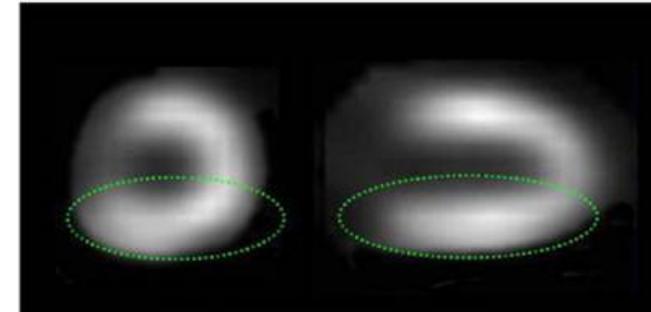
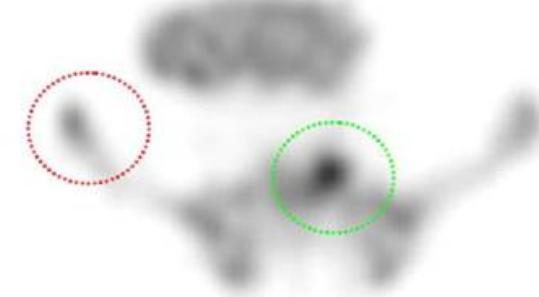
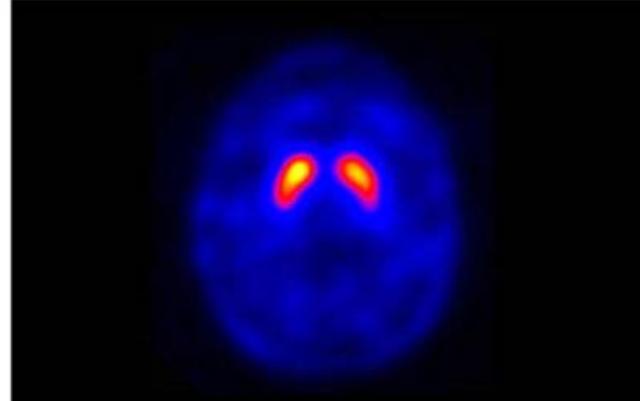
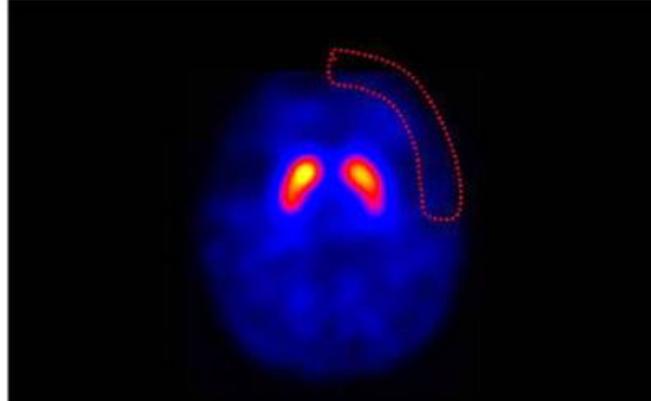






BENEFITS OF FUSION IMAGING

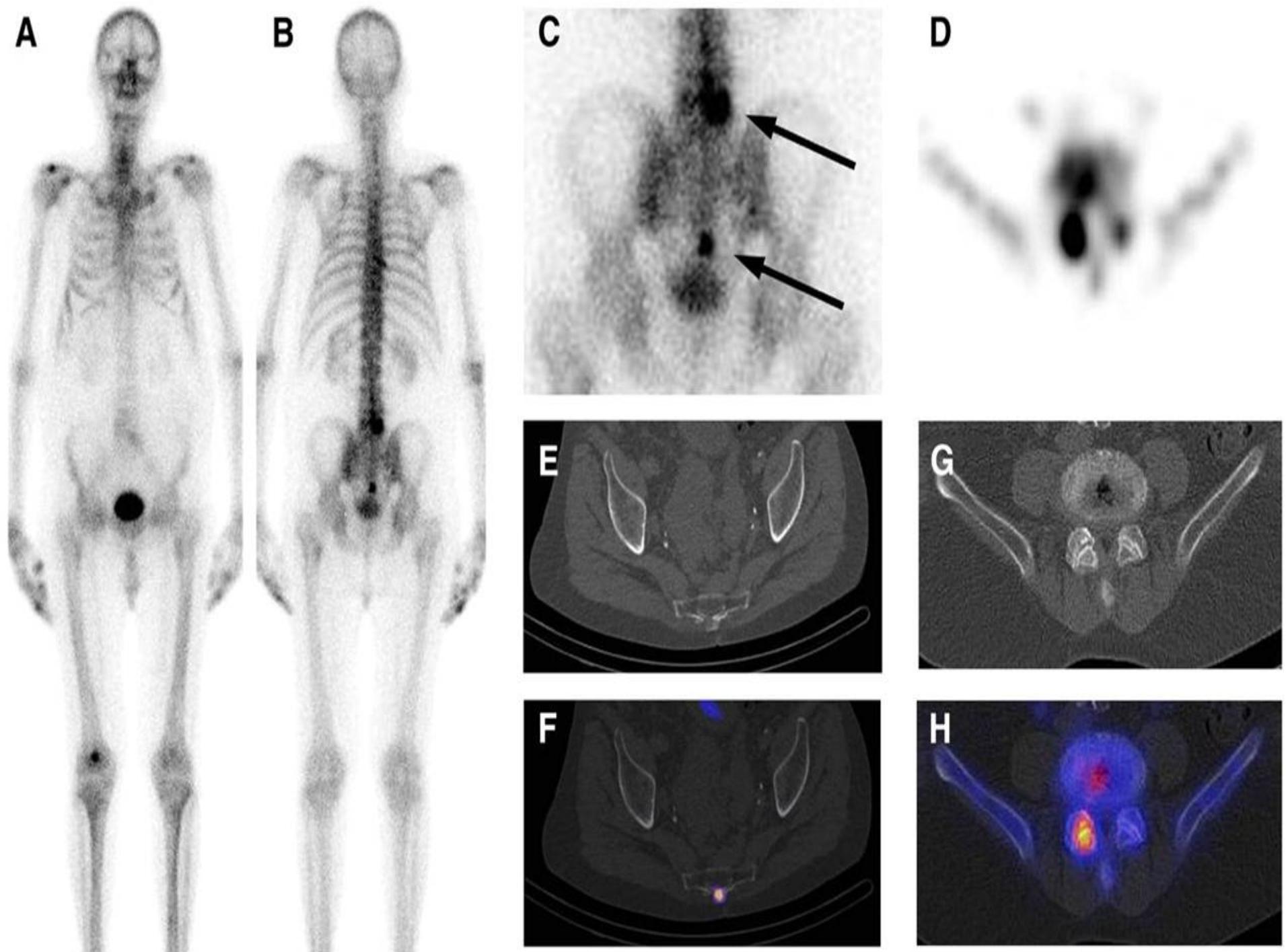
- Increased sensitivity and specificity
- Precise anatomic localization of findings seen in nuclear imaging
- Identify normal physiologic activity which can be misinterpreted as disease
- Patient convenience. Eliminates need for multi-day imaging protocol

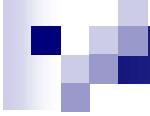
	without CT attenuation correction	with CT attenuation correction
cardiac		
skeletal		
brain		



MAIN INDICATIONS FOR SPECT/CT

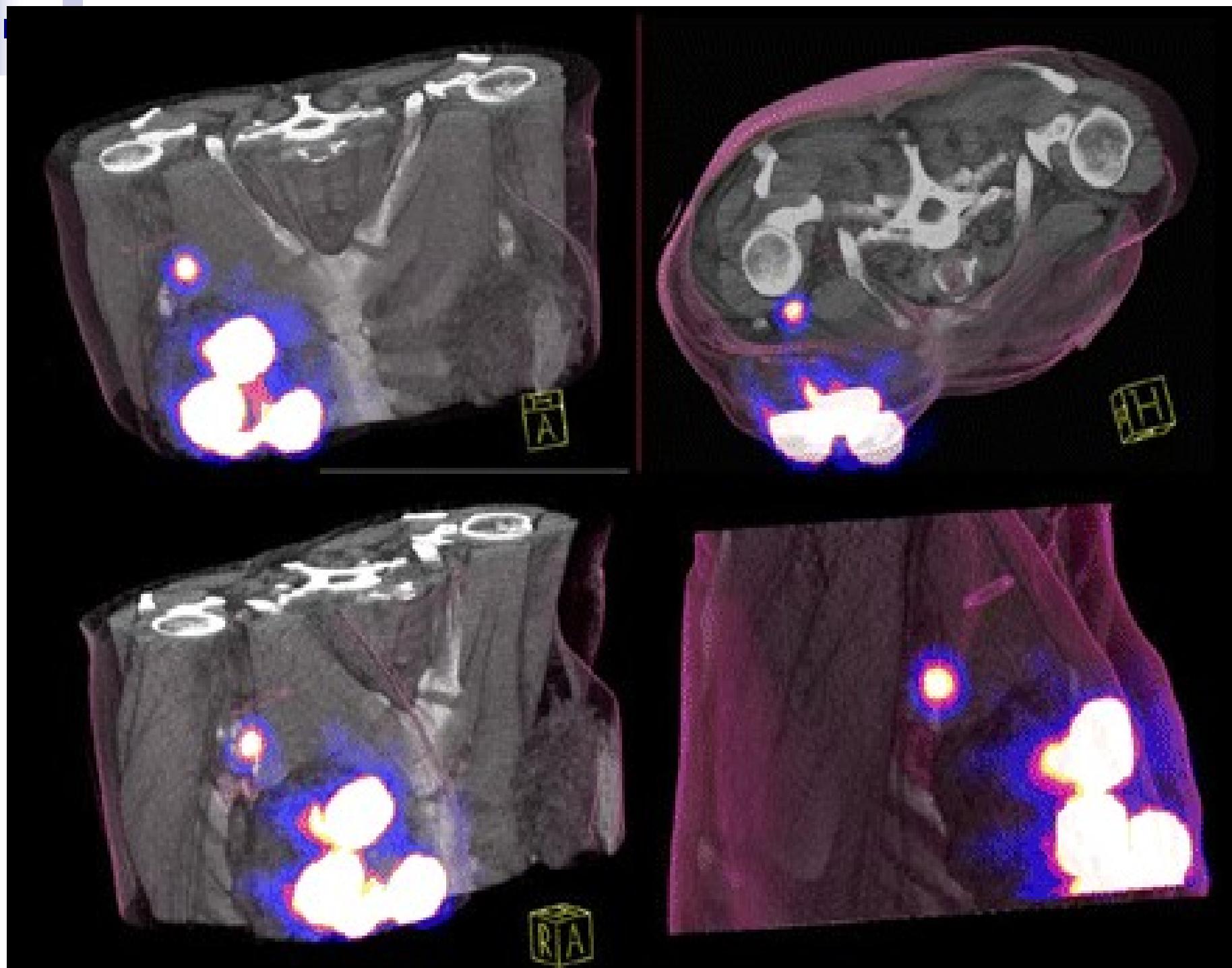
- Bone Scanning
- Graft Infections
- Cardiac Imaging
- Parathyroid Imaging
- Lymphoscintigraphy
- Tumor and mass localization
- Patients with abdominal pain
- Thyroid Cancer Staging

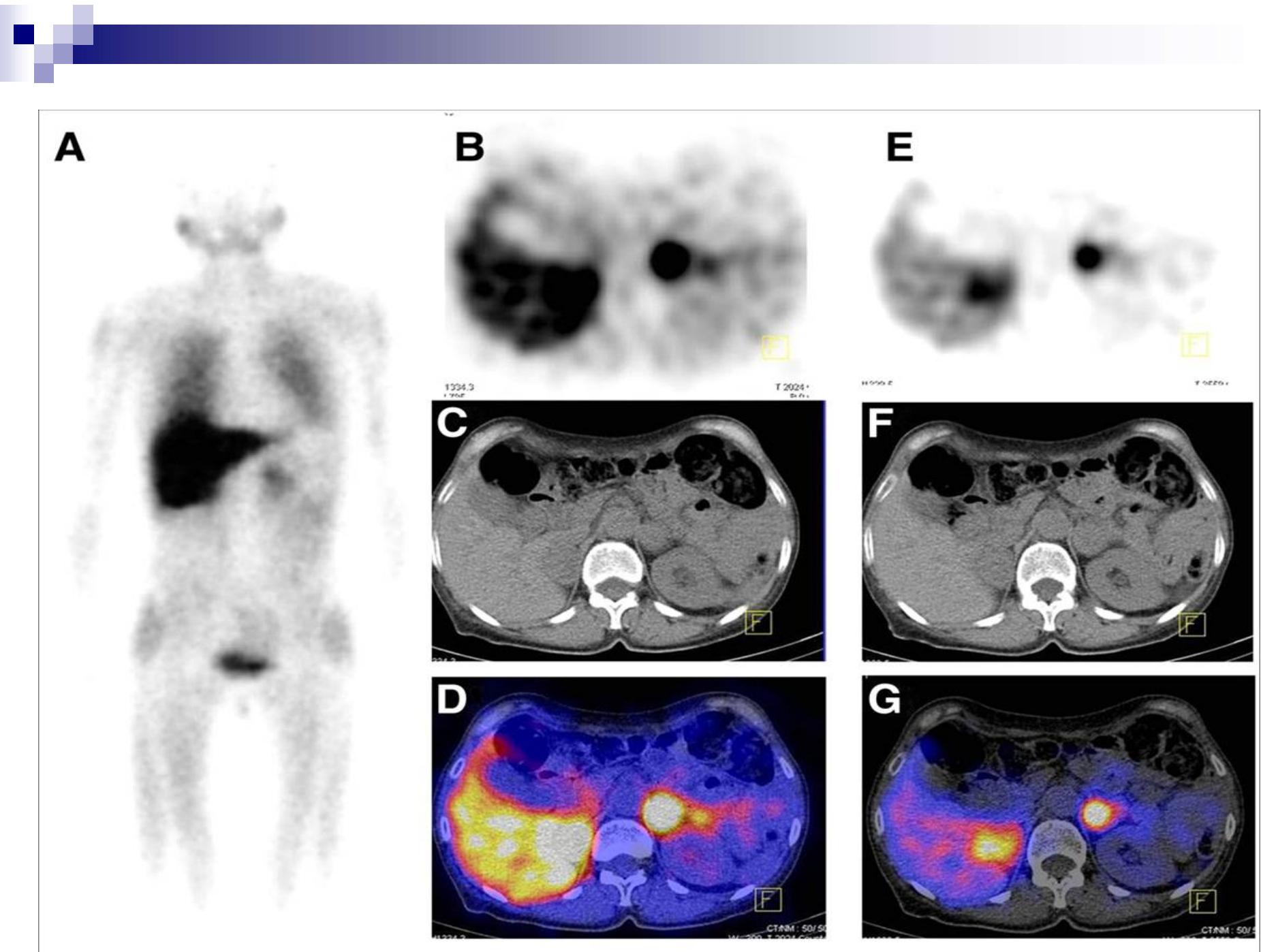


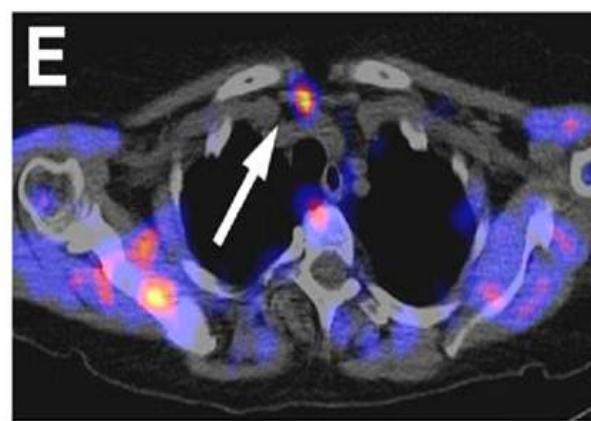
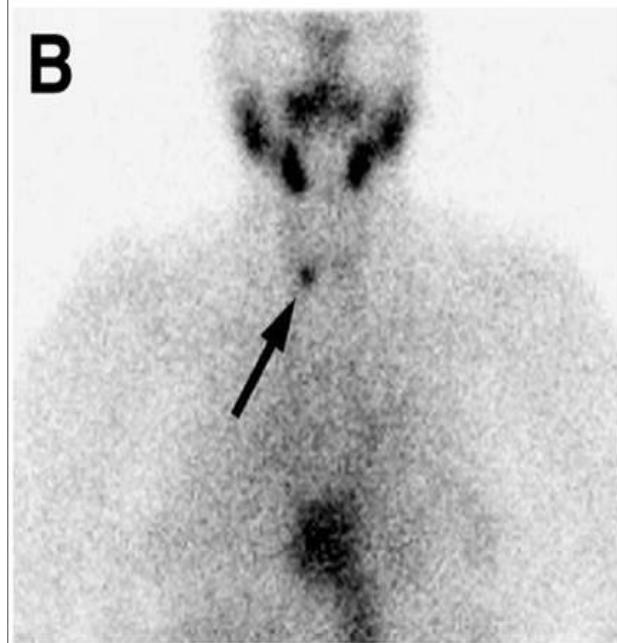
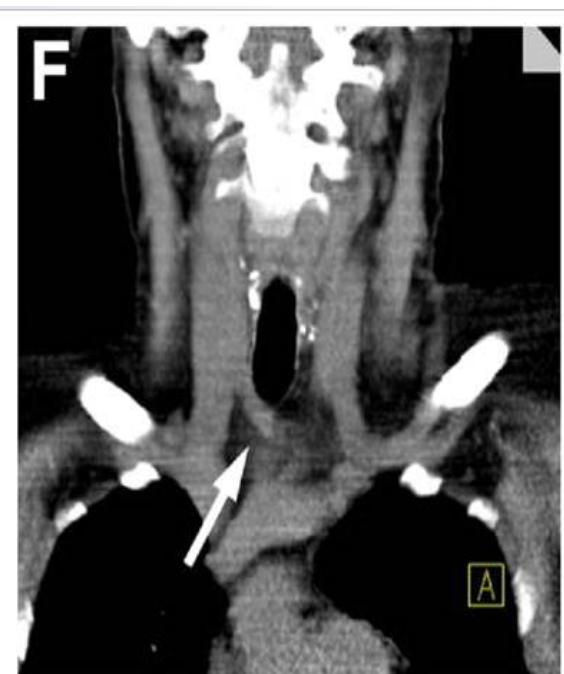
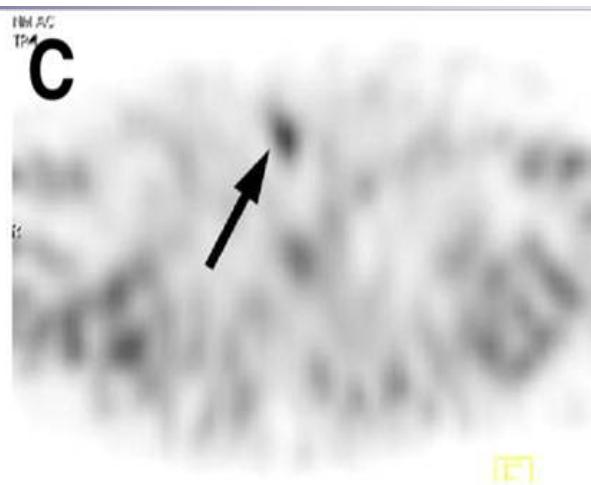


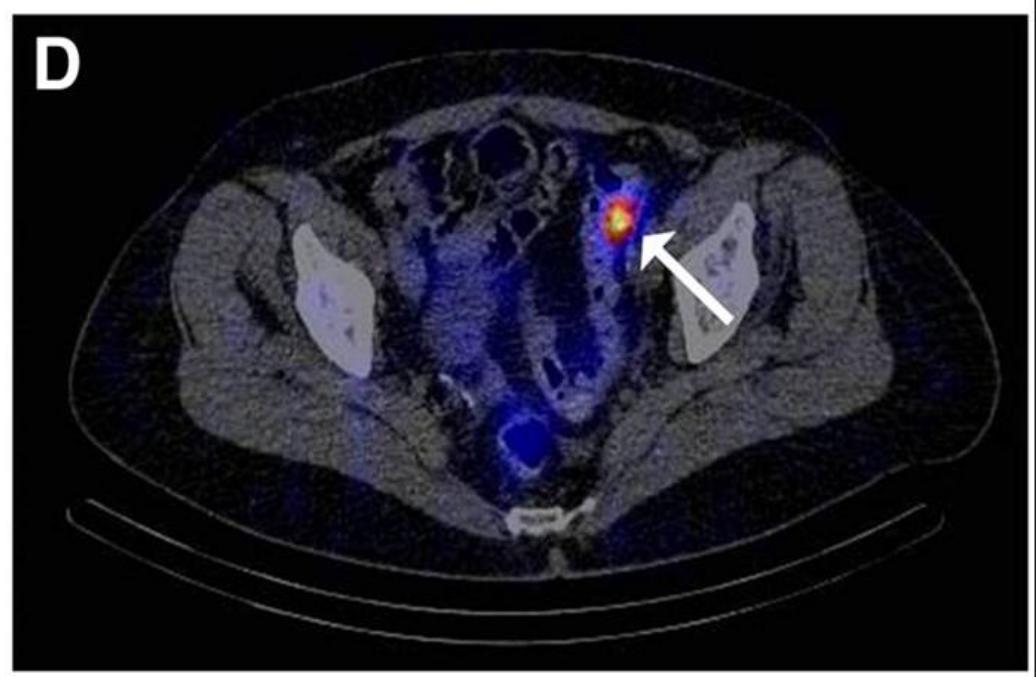
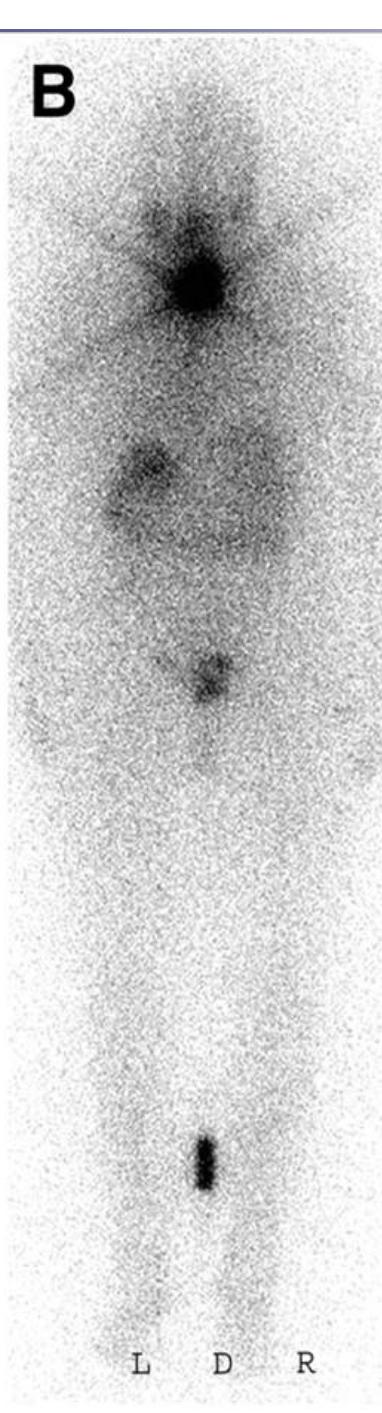
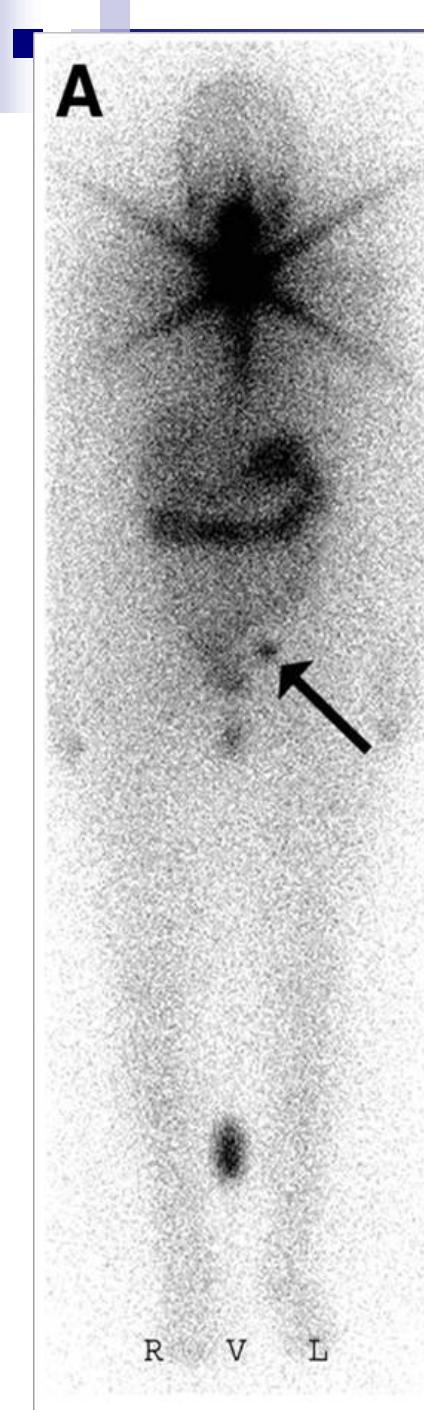
BONE SCANS

- Highly sensitive, but not often specific
- Benign processes can simulate malignancy
- Neoplastic lesions may occur in distribution suggestive of arthritic change
- Soft tissue abnormalities are usually not detected on routine bone scanning











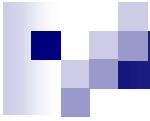
Sarajevo Mai 2012

a physique des particules élémentaires,
au LHC, l'expérience CMS,
les recherches en cours.

D. Denegri
CE Saclay, IRFU/SPP, France







THANK YOU. ENJOY THE CONFERENCE!

