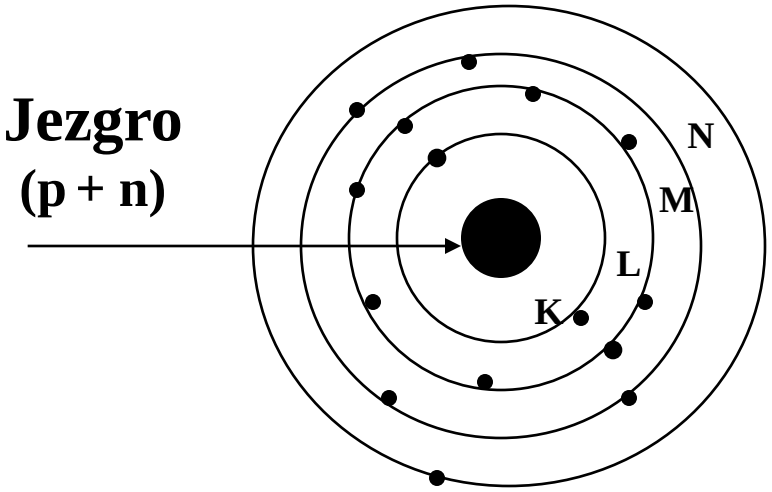
RADIONUKLIDI (RADIOIZOTOPI)



Struktura atoma

Atom je najmanji deo elementa sa definisanim hemijskim osobinama

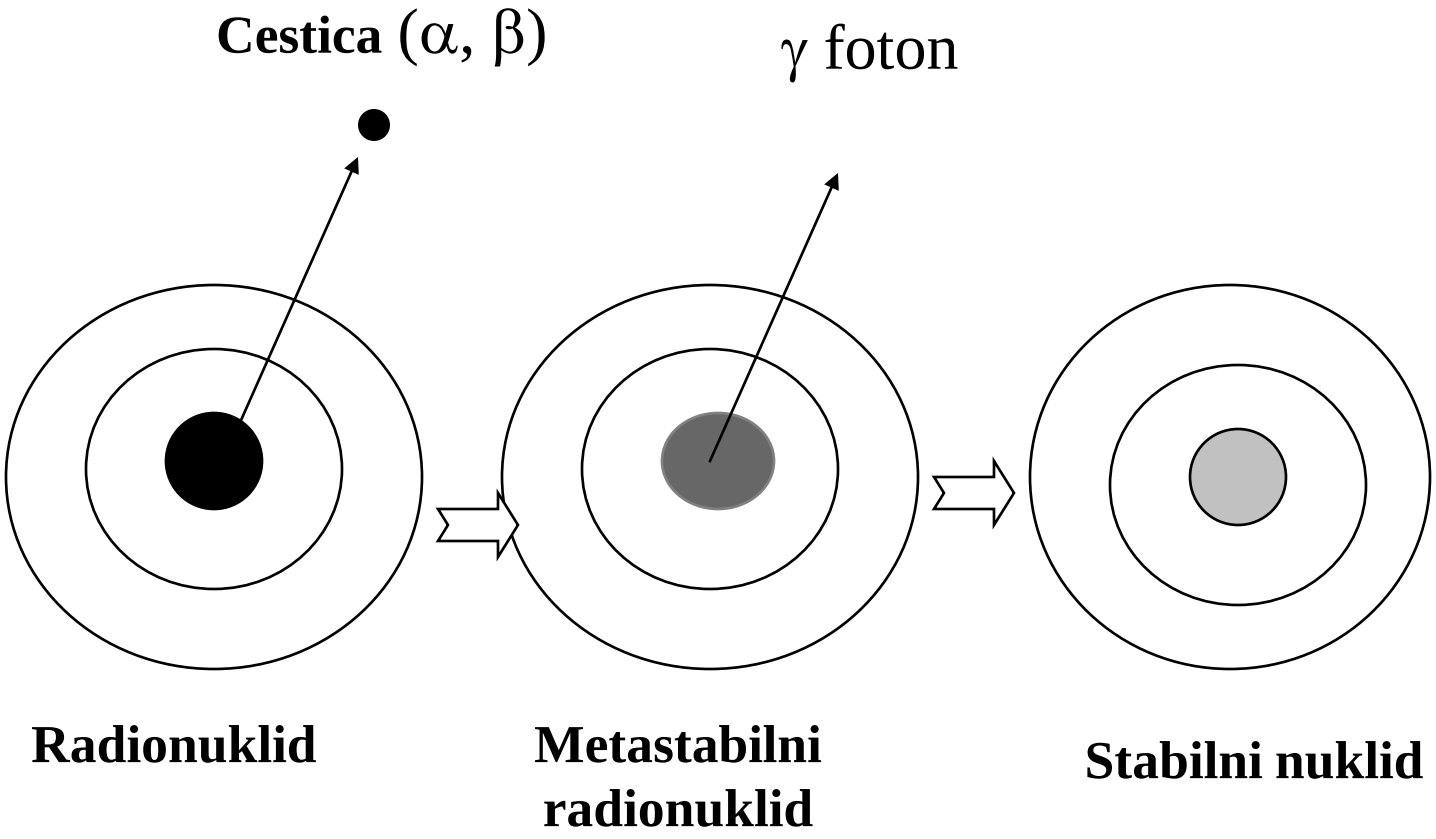
$$^{A}_{Z}X$$

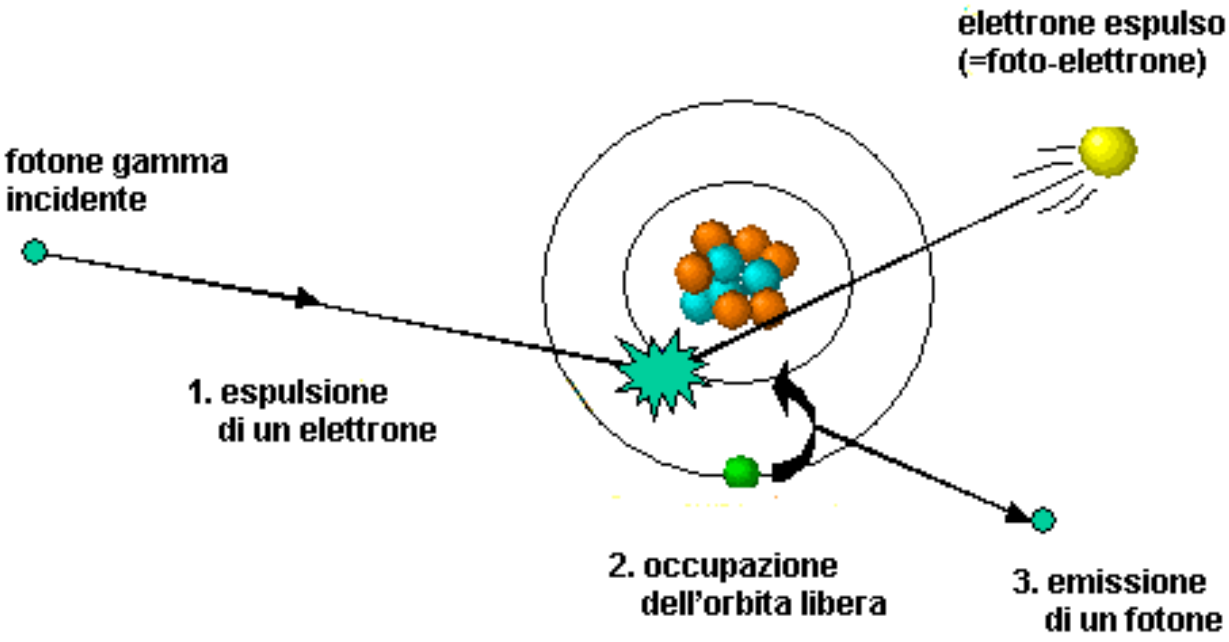
X = simbol hemijskog elementa

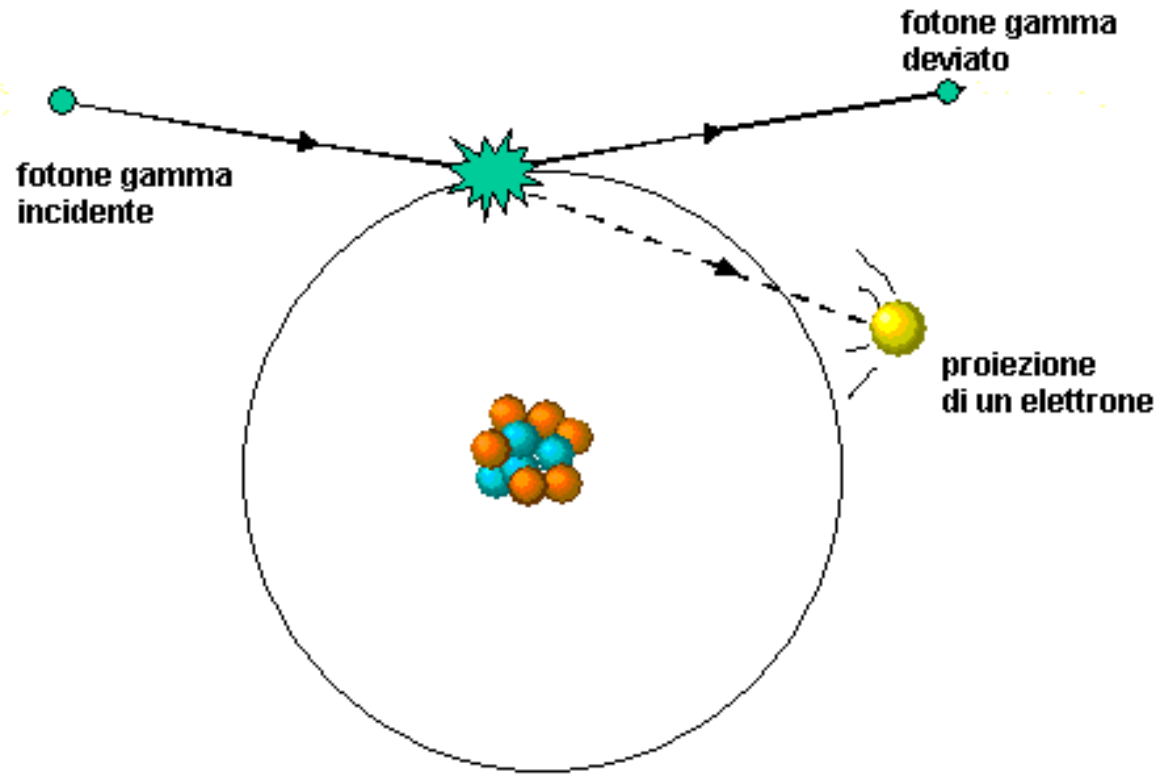
Z (redni broj) = broj p

A (atomski, maseni broj) = p+n

Radioaktivni raspad




elettrone espulso
(=foto-elettrone)
fotone gamma
incidente
1. espulsione
di un elettrone
2. occupazione
dell'orbita libera
3. emissione
di un fotone


fotone gamma
deviato
fotone gamma
incidente
proiezione
di un elettrone



generator


Saline
Charge
Collect

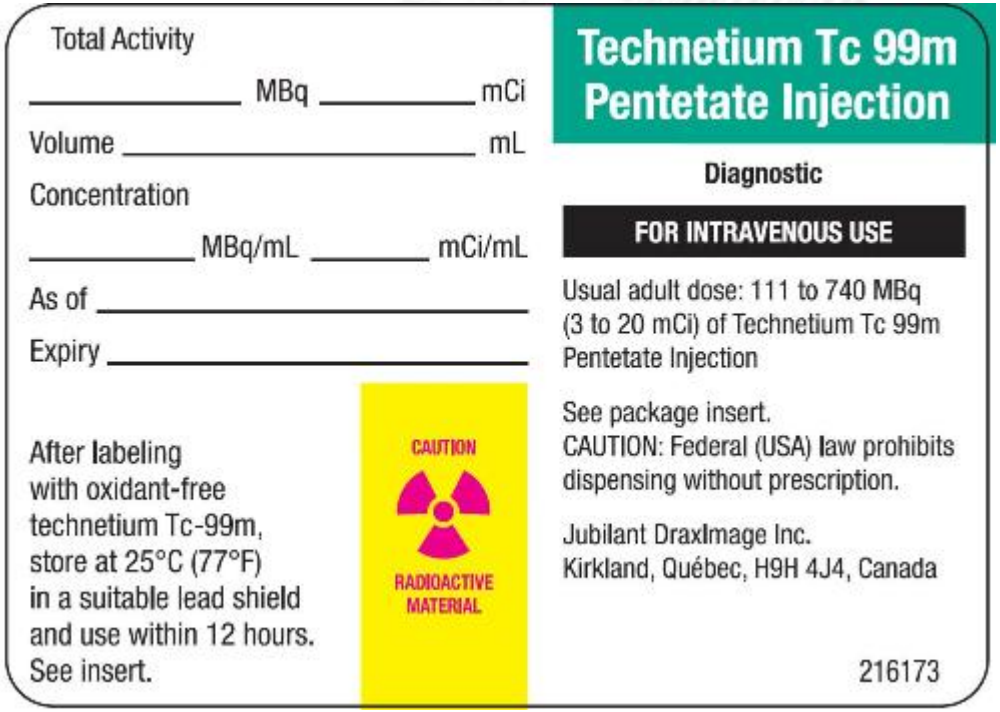


generator

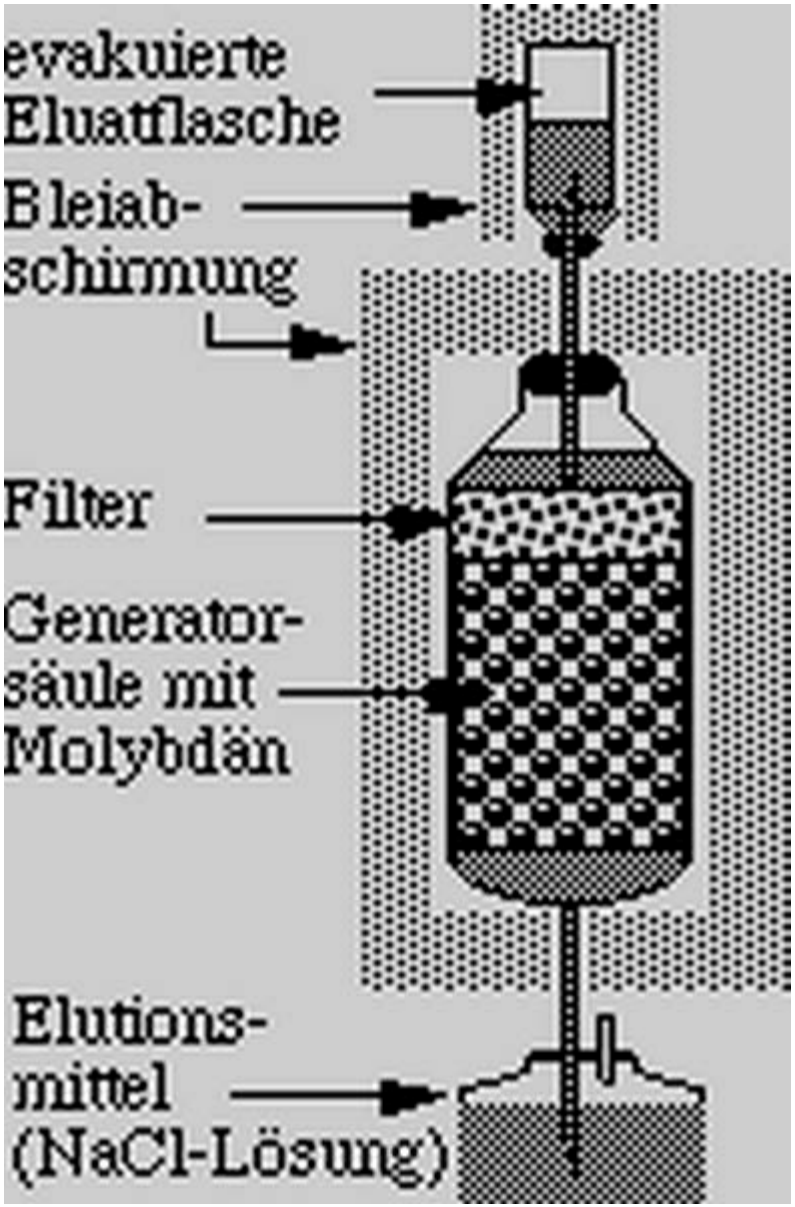

RADIOACTIVE
7

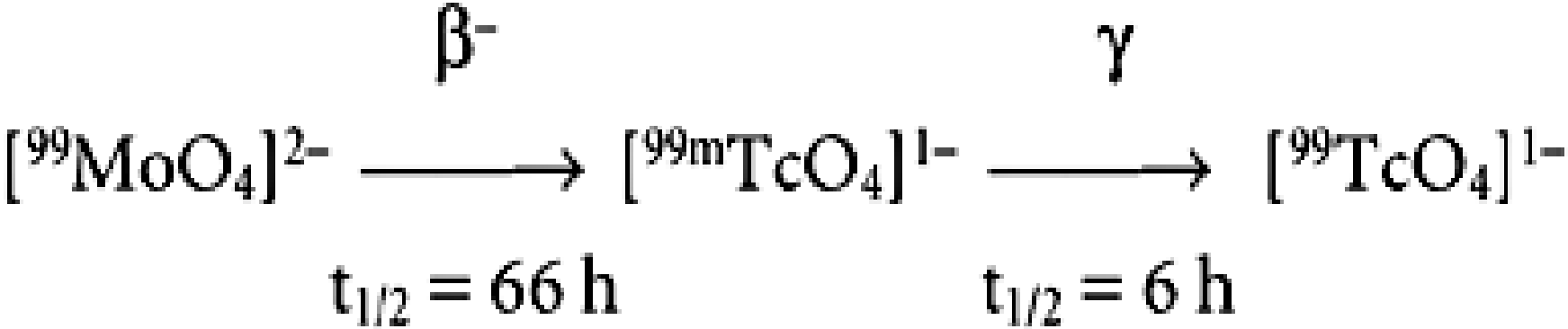

PET Radiopharmaceutical
Supplier
Activity: 1.800 MBq
Volume: 1.0 ml
Ref Time: 16/03/10. 15:27
Expiry Time: 16/03/10. 21:27

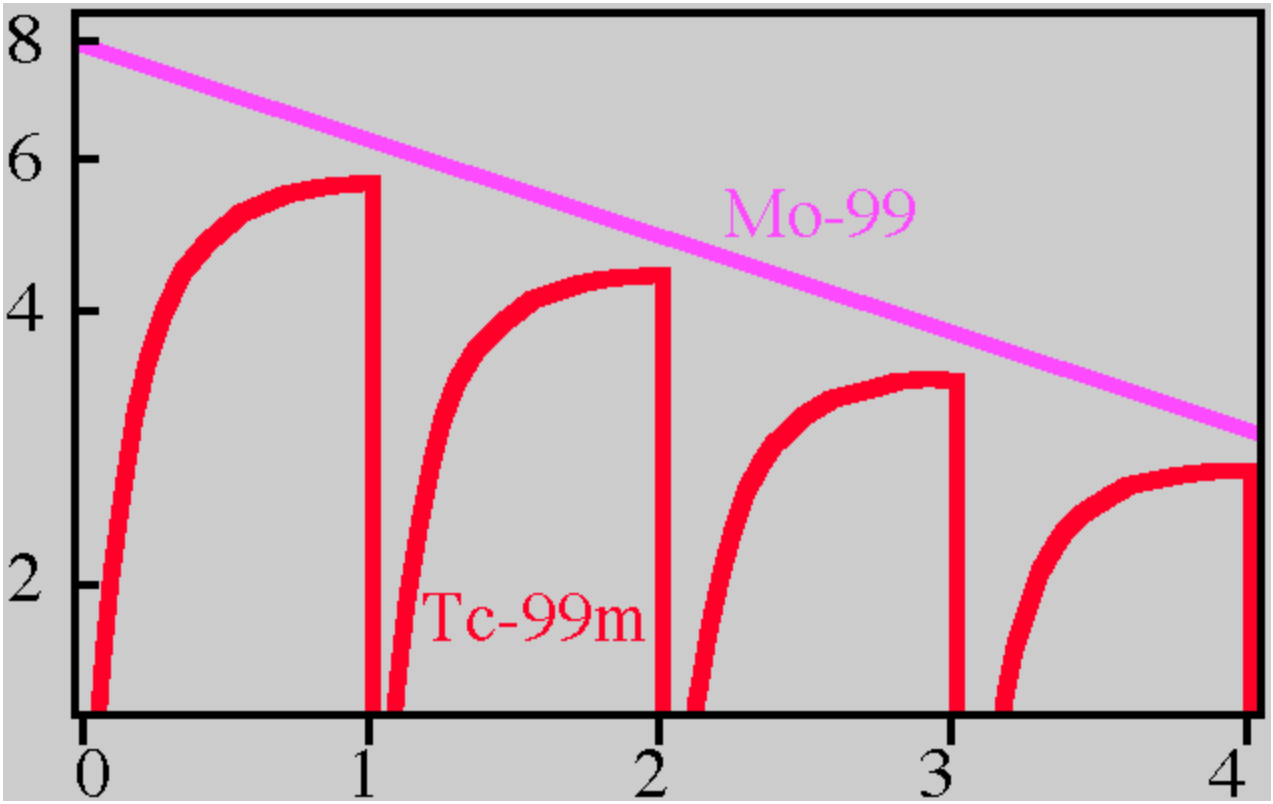


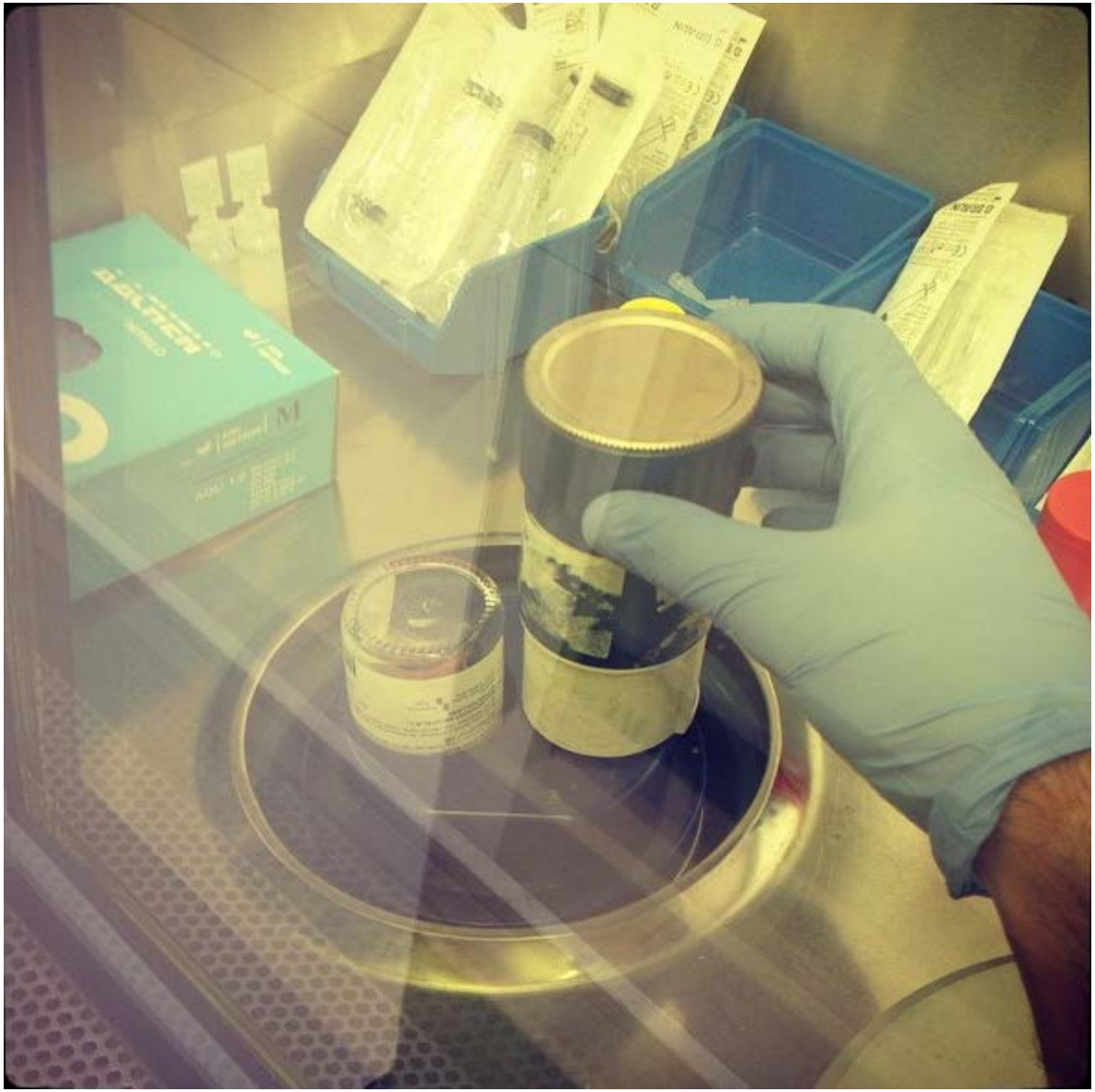

Total Activity
MBq
mCi
Volume
mL
Concentration
MBq/mL
mCi/mL
As of
Expiry
After labeling with oxidant-free technetium Tc-99m, store at 25°C (77°F) in a suitable lead shield and use within 12 hours. See insert.
CAUTION
RADIOACTIVE MATERIAL
Technetium Tc 99m Pentetate Injection
Diagnostic
FOR INTRAVENOUS USE
Usual adult dose: 111 to 740 MBq (3 to 20 mCi) of Technetium Tc 99m Pentetate Injection
See package insert.
CAUTION: Federal (USA) law prohibits dispensing without prescription.
Jubilant DraxImage Inc.
Kirkland, Québec, H9H 4J4, Canada
216173

wiseGEEK


evakuierte
Eluatflasche
Bleiab-
schirmung
Filter
Generator-
säule mit
Molybdän
Elutions-
mittel
(NaCl-Lösung)


β-
γ
[99MoO4]2-
[99mTcO4]1-
[99TcO4]1-
t1/2 = 66 h
t1/2 = 6 h


8
6
4
2
Mo-99
Tc-99m
0
1
2
3
4






1
2
3
4
5
ml










Technetium-99m
Generator





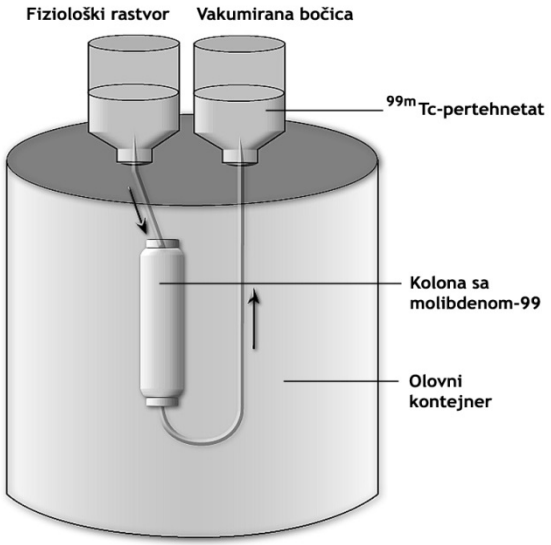




Radiofarmaci sa ^{99m}Tc

- Dobijanje ^{99m}Tc - pertehnetata: iz generatora;

  radioaktivnim raspadom ^{99}Mo



Najveci prinos ^{99m}Tc- posle 23 h

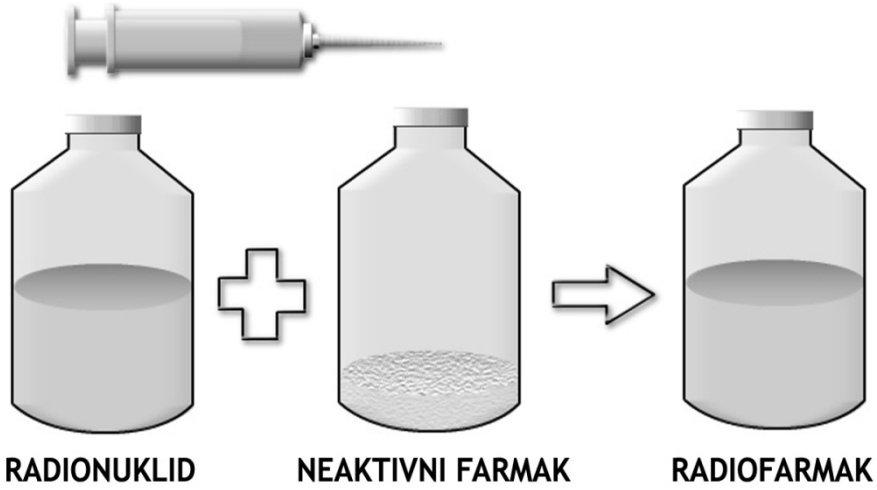
Trajnost – 12 dana

Fizicke osobine ^{99m}Tc: cist γ emiter, T1/2 = 6 h, 140 keV

Primena: scintigrafija tireoideje, pljuvacnih zlezda, procena vaskularizacije, Mckelov-divertkulum

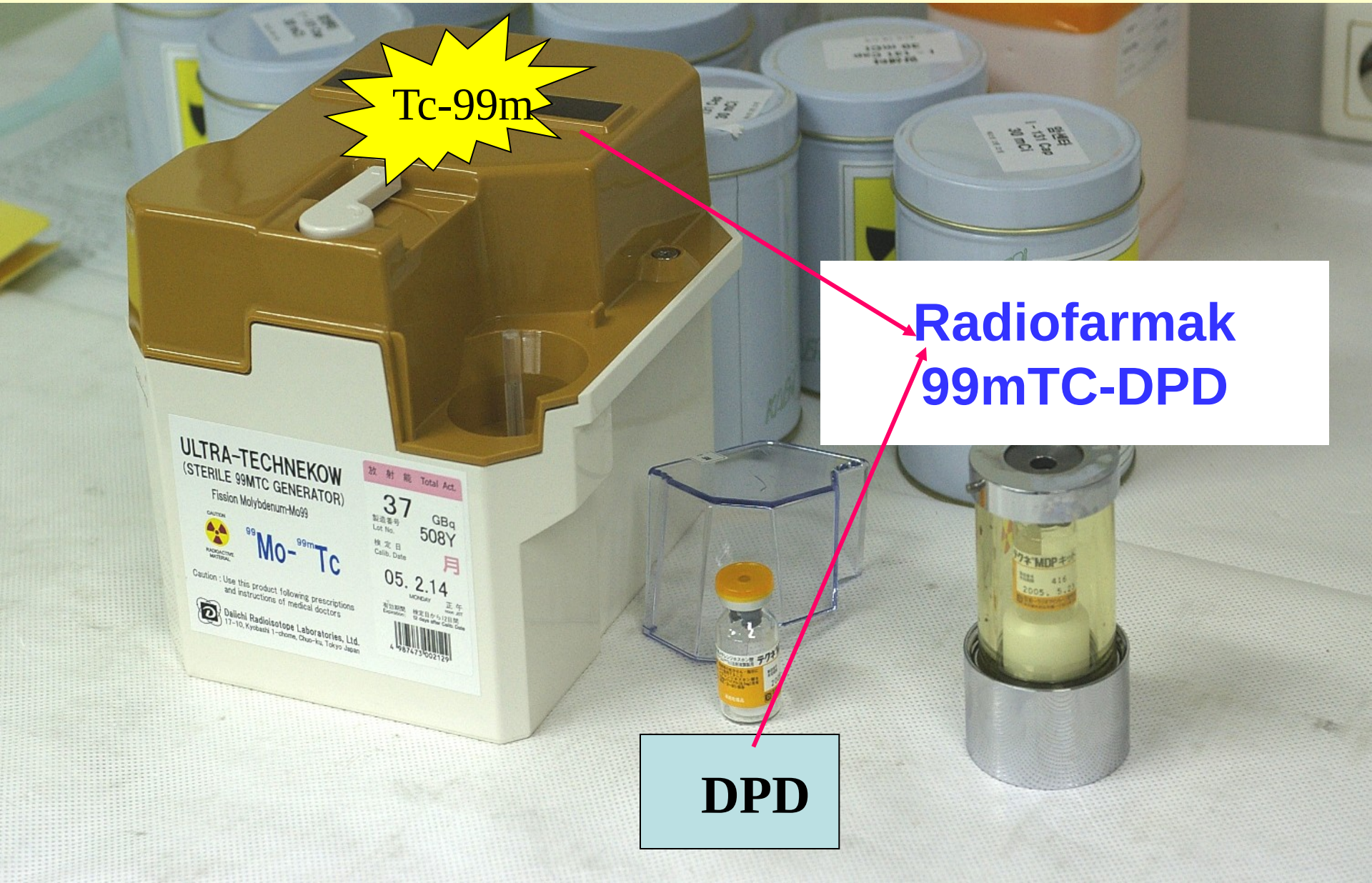
U obliku radiofarmaka: bioloski elementi, koloidi, fosfati, MAA, DTPA, DMSA,

Markiranje (obelezavanje) radiofarmaka

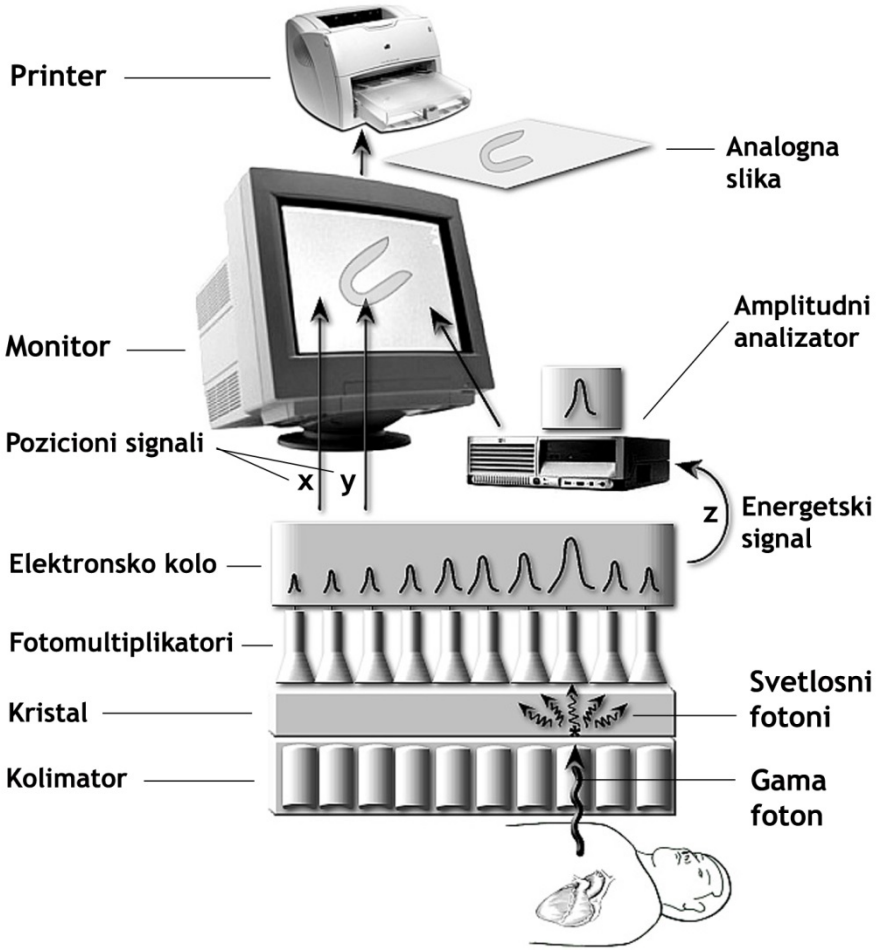


^{99m}Tc **DMSA** **99mTc – DMSA**

Priprema radiofarmaka



Komponente i princip rada gama kamere



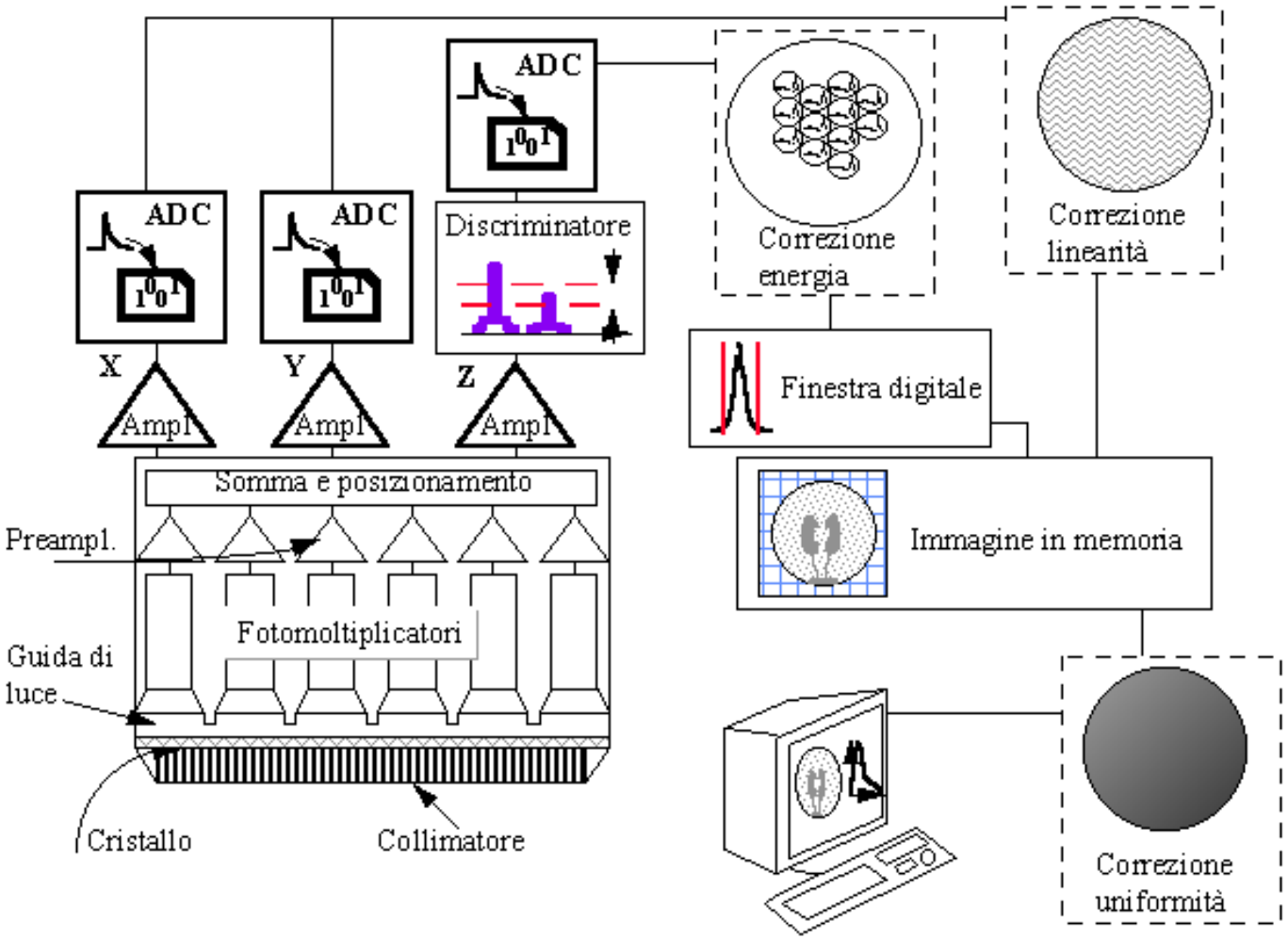


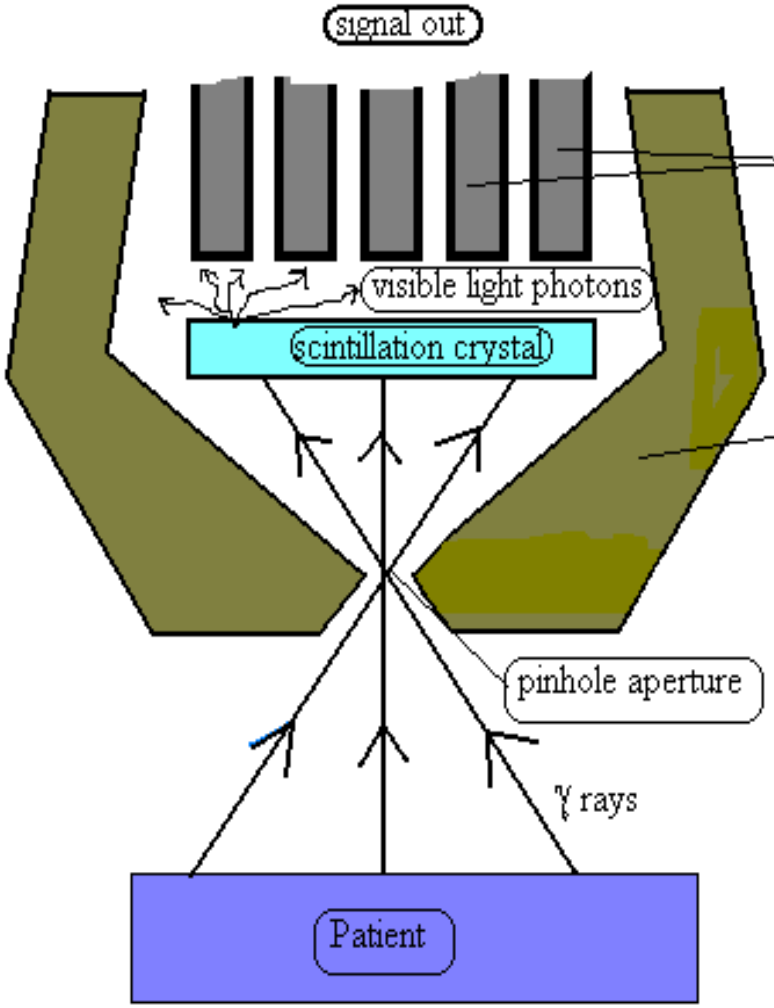
Hal Anger



Gama kamera

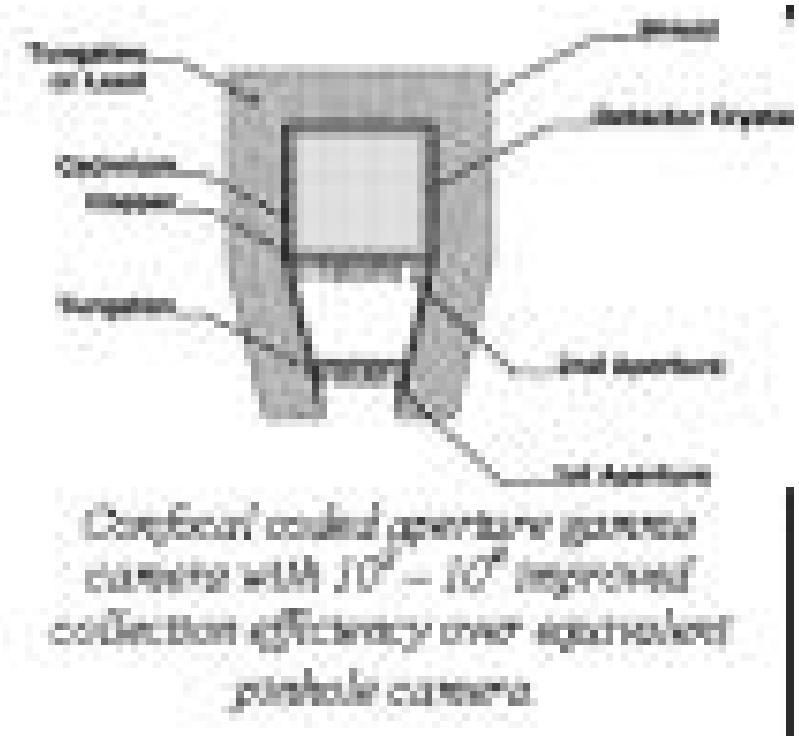



ADC
ADC
ADC
Discriminatore
Correzione energia
Correzione linearità
X
Y
Z
Ampl
Ampl
Ampl
Finestra digitale
Somma e posizionamento
Preampl.
Immagine in memoria
Fotomoltiplicatori
Guida di luce
Correzione uniformità
Cristallo
Collimatore



Simple Pinhole Aperture Gamma Camera

- radiation is collimated by a small hole in the lead housing
- scintilation is produced in the large diameter thin NaI crystal
- photomultiplier tubes change translate flashes of light into electrical energy
- signal output can go to a TV screen/video camera etc.

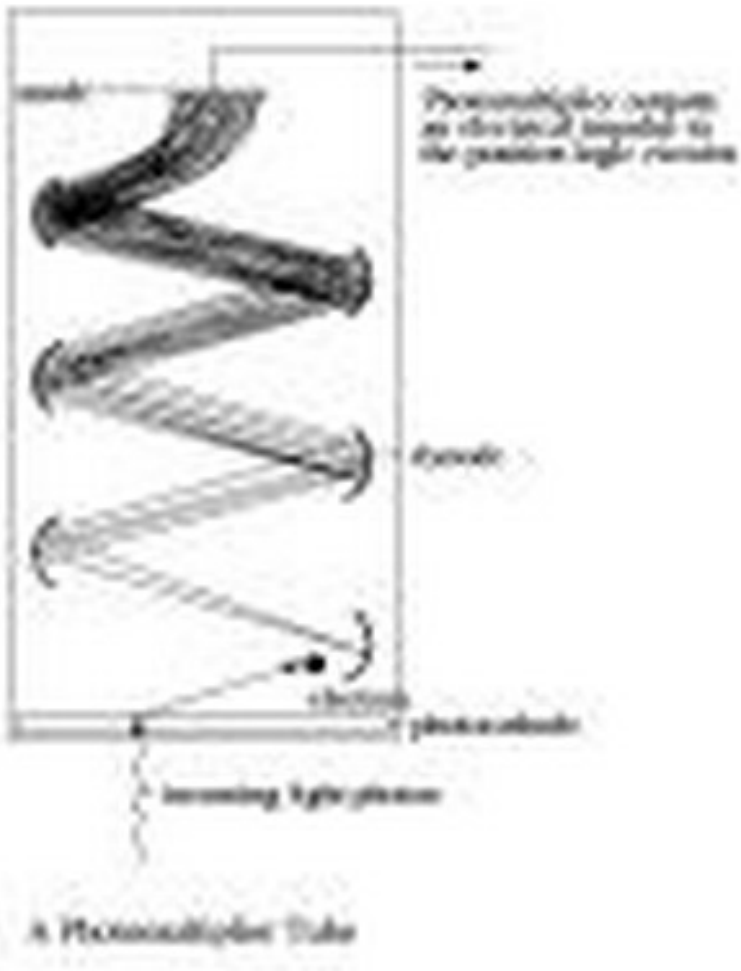


Confocal coded aperture gamma camera with $10^4 - 10^6$ improved collection efficiency over equivalent pinhole camera.

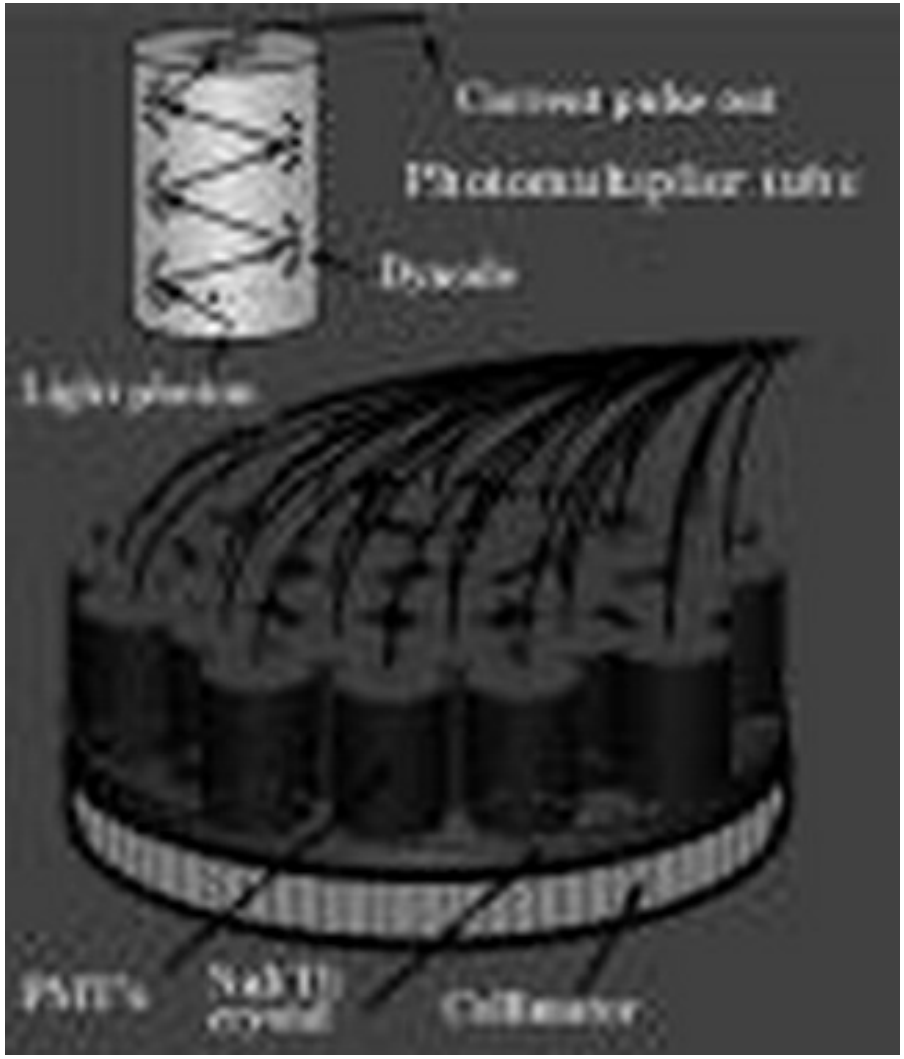
Konvergentni kolimator



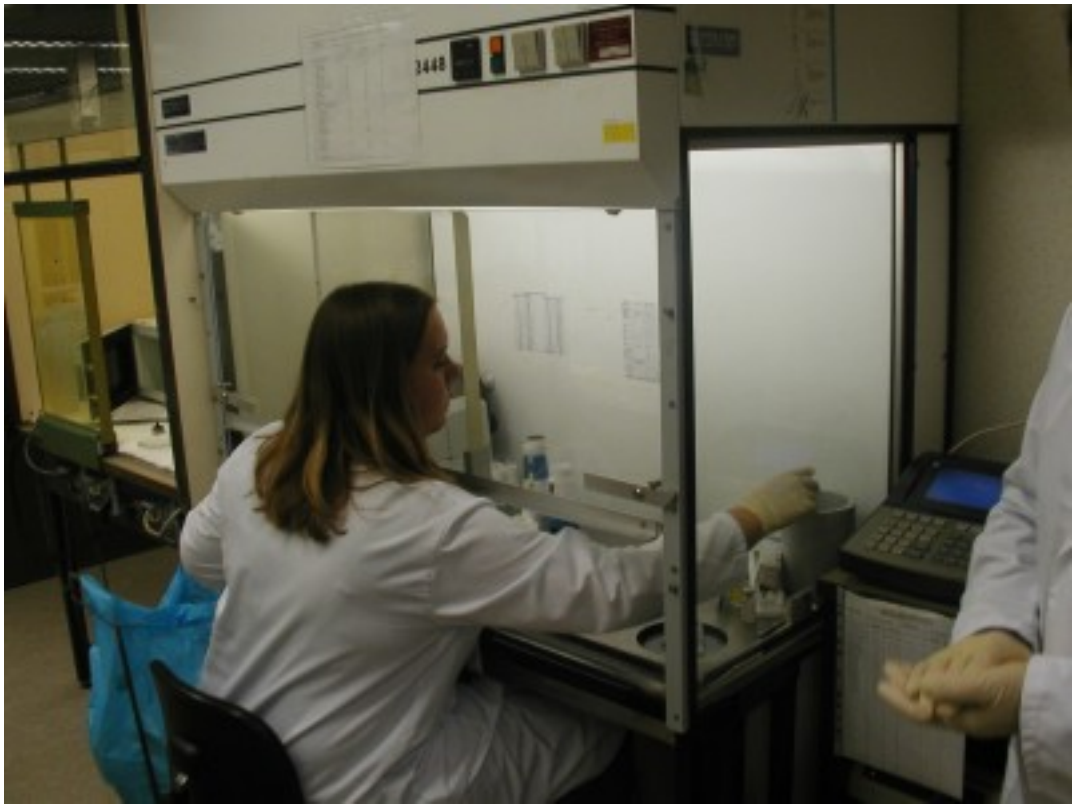
Kristal gama kamere



fotomultiplikator

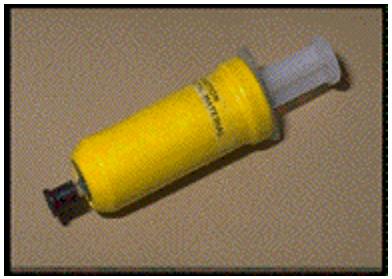

Current pulse out
Photomultiplier tube
Dynode
Light photon
PMT's
NaI(Tl)
crystal
Collimator

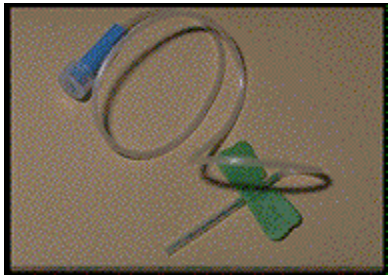

Minimize
Radiation
Exposure



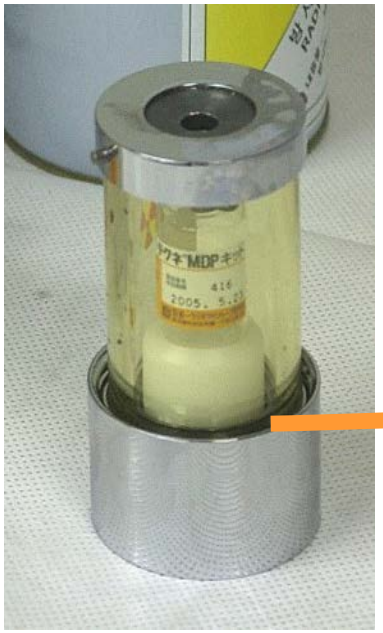


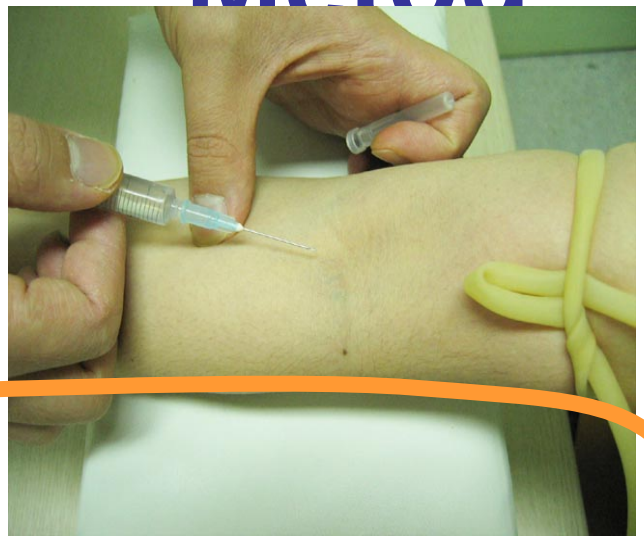




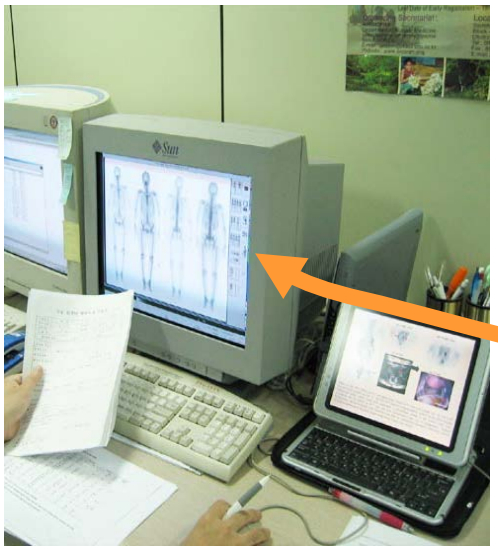


Metod













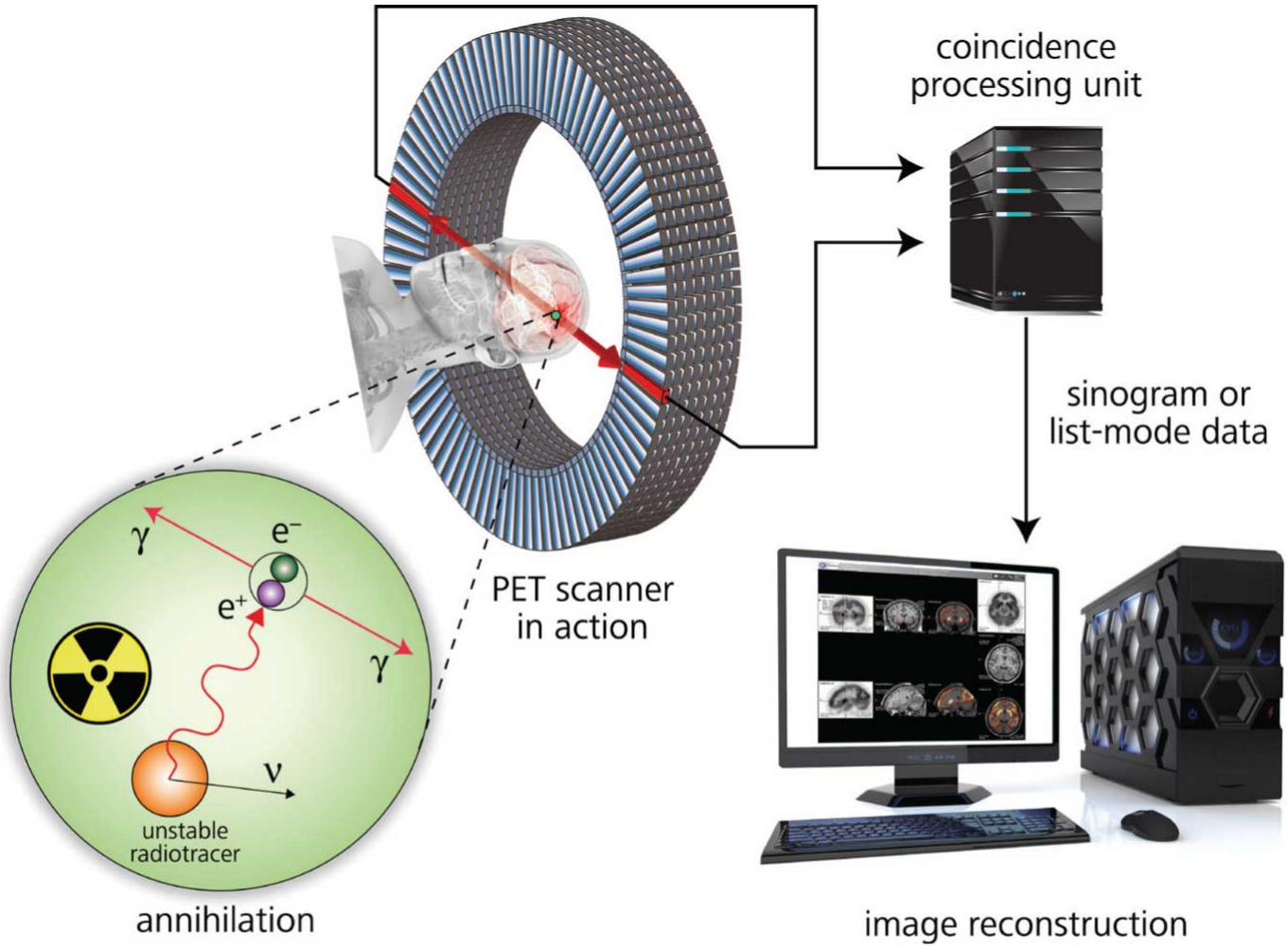

SCOPE



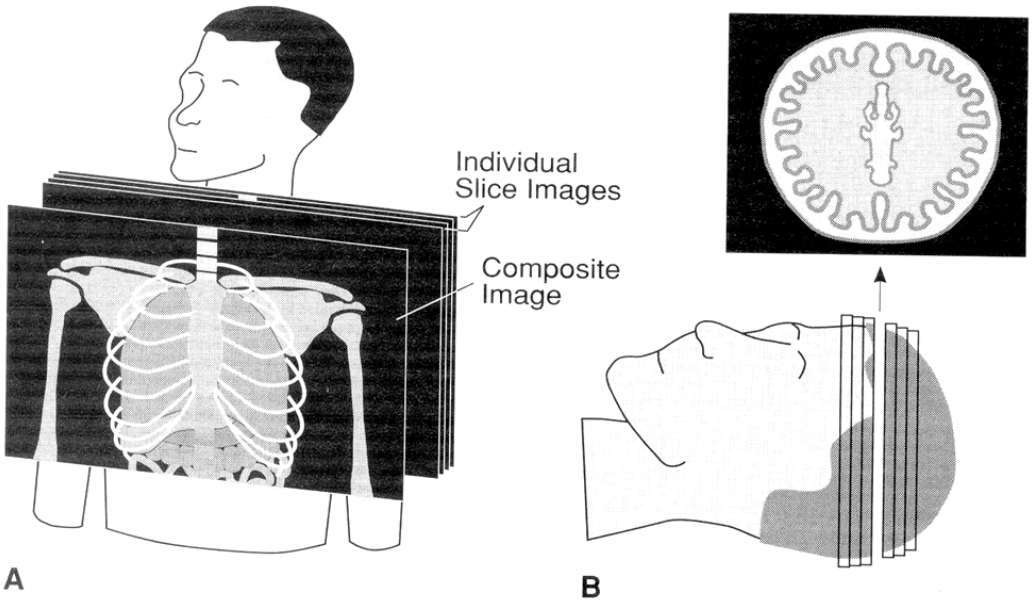


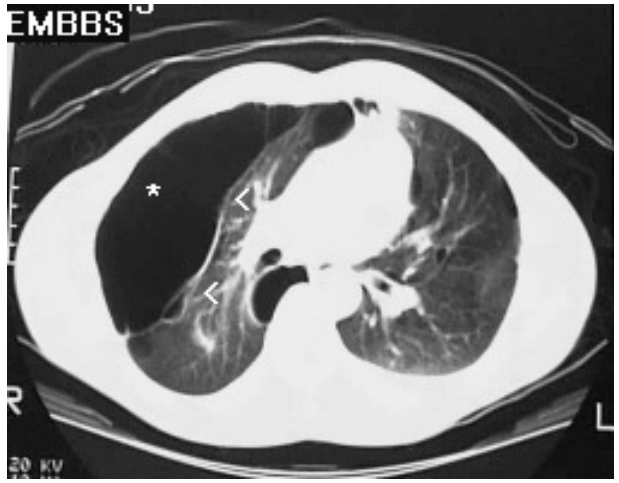

NaI(Tl) crystal
Collimator

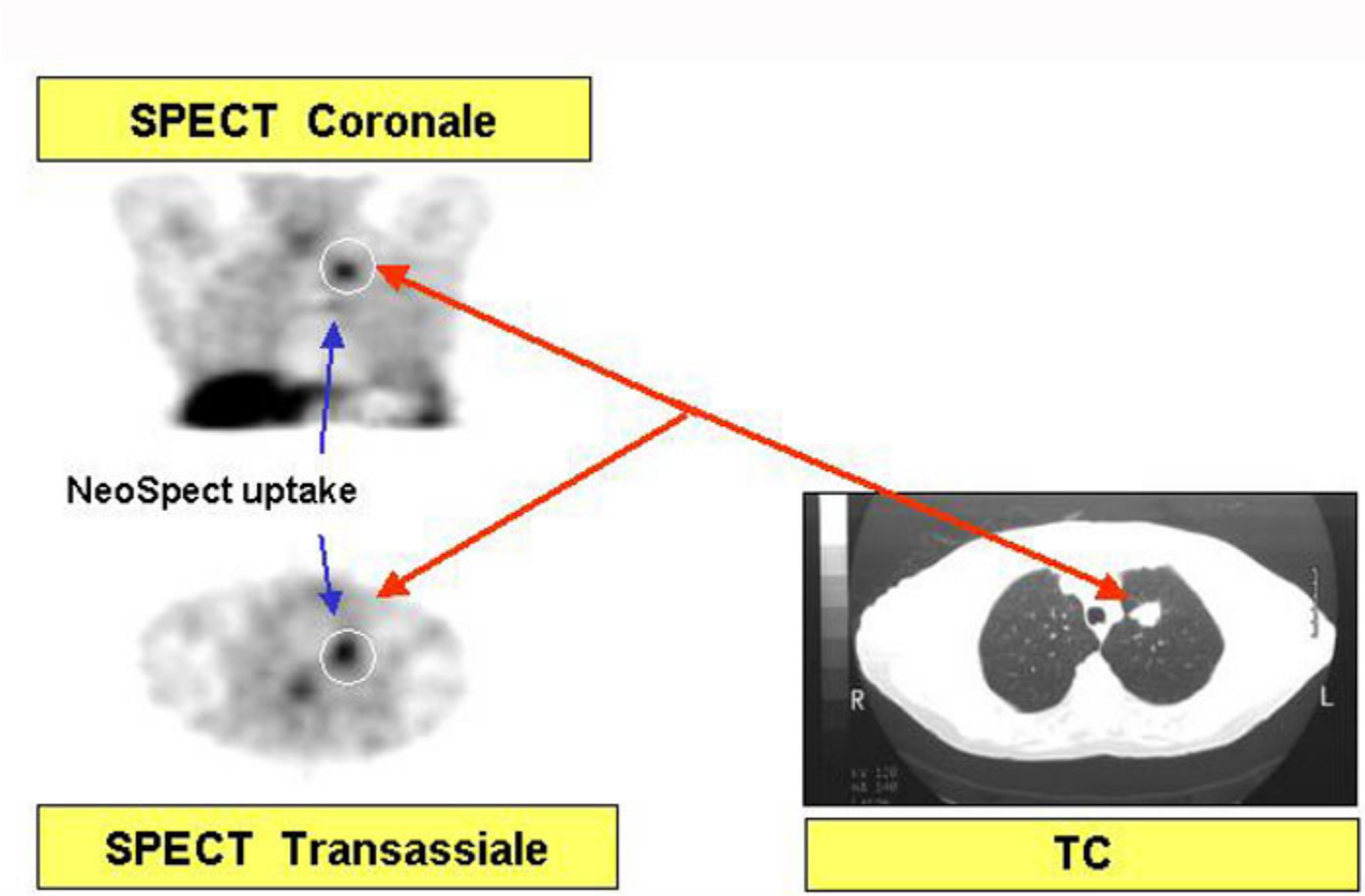



coincidence
processing unit
sinogram or
list-mode data
PET scanner
in action
γ
e⁻
e⁺
γ
ν
unstable
radiotracer
annihilation
image reconstruction

Tomografsko snimanje: CT

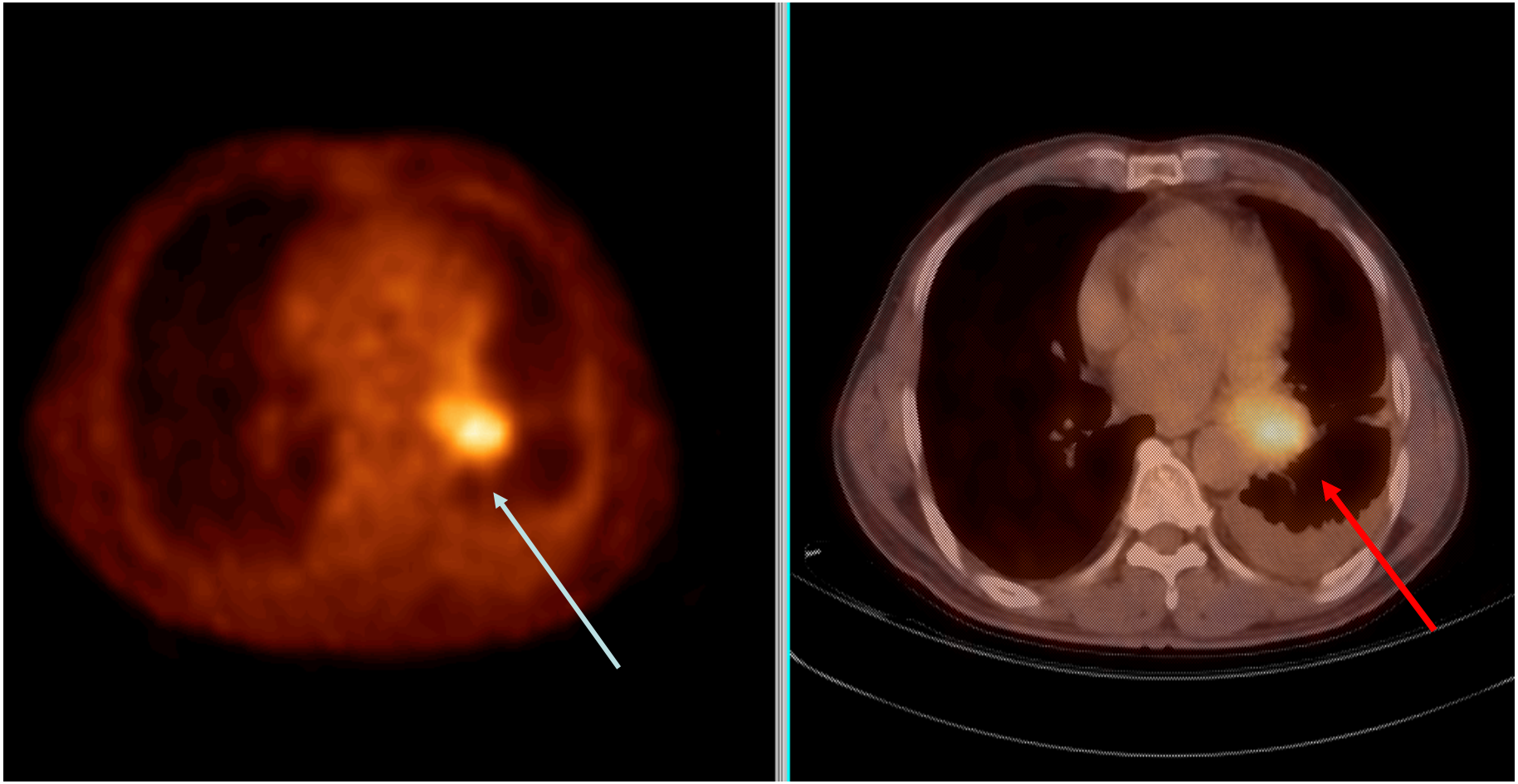






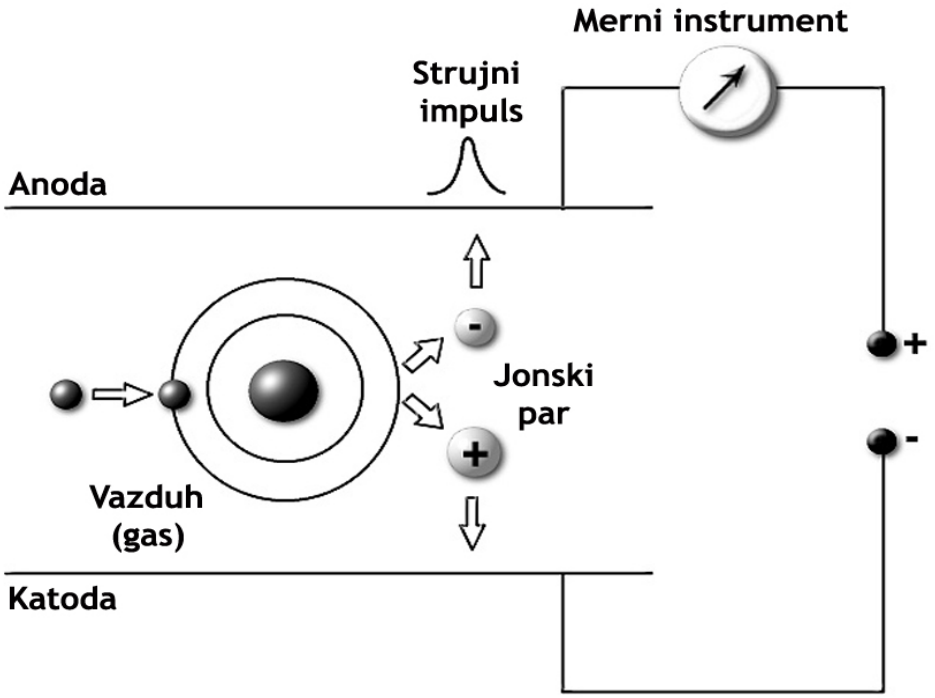
SPECT, Akumulacija NeoSPECta u SPN

PET-^{18}FDG- karcinom pluca

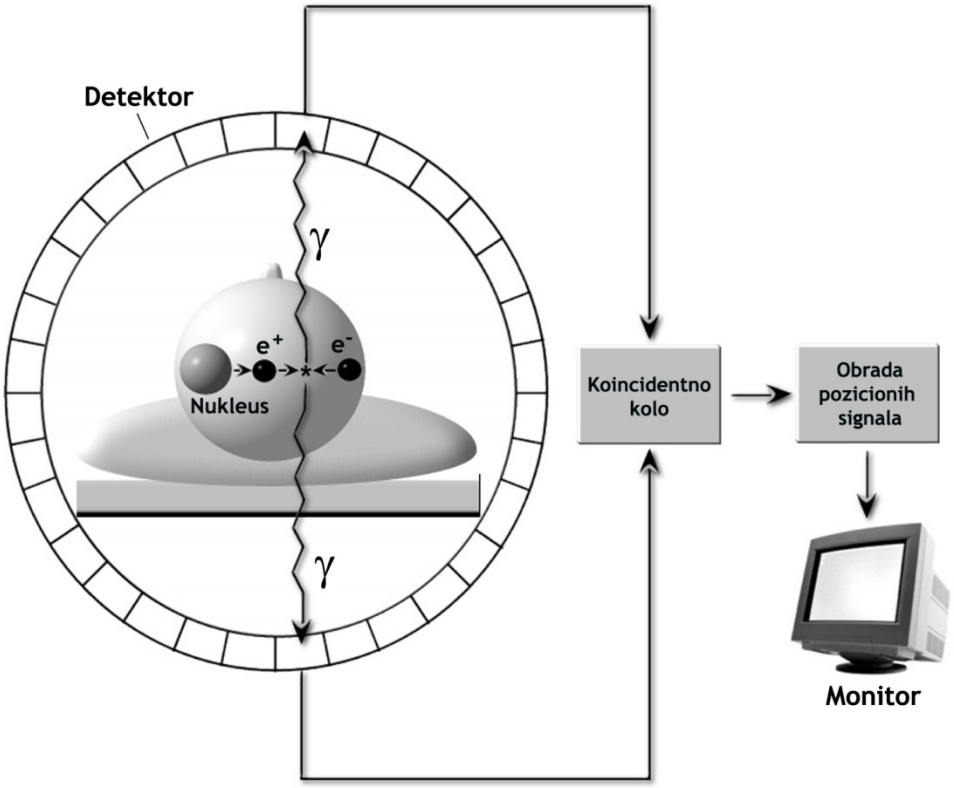


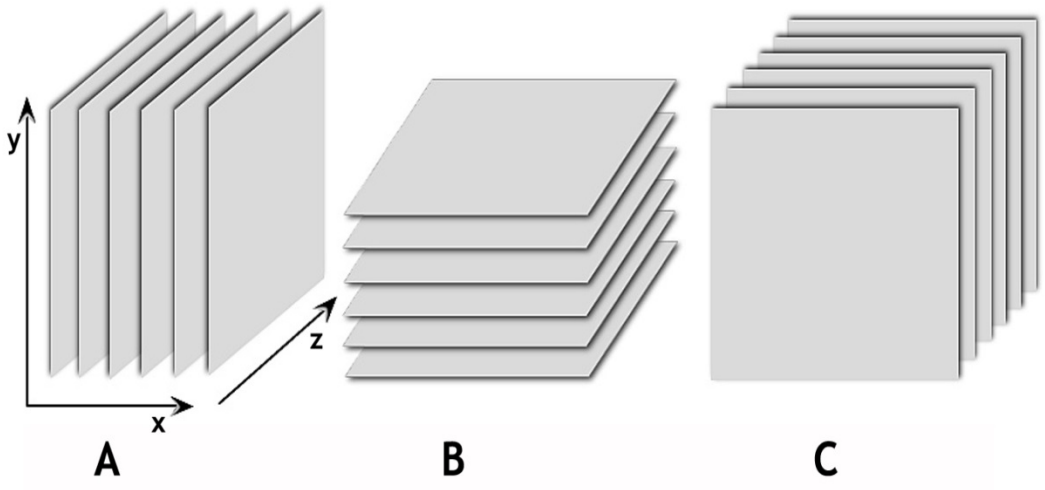
Jonizaconi detektori

- Princip rada:
  - jonizacija atoma vazduha (gasa) u aparatu pod dejstvom upadnih radioaktivnih cestica



Princip rada PET kamere

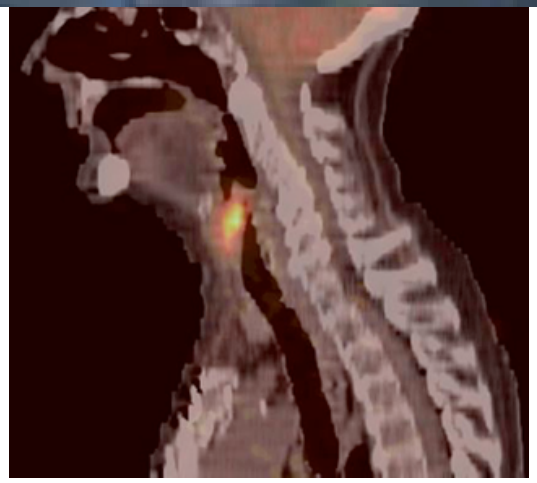


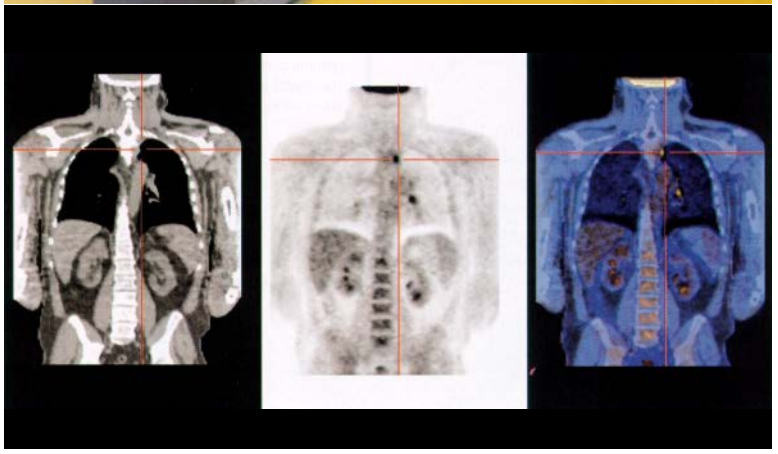


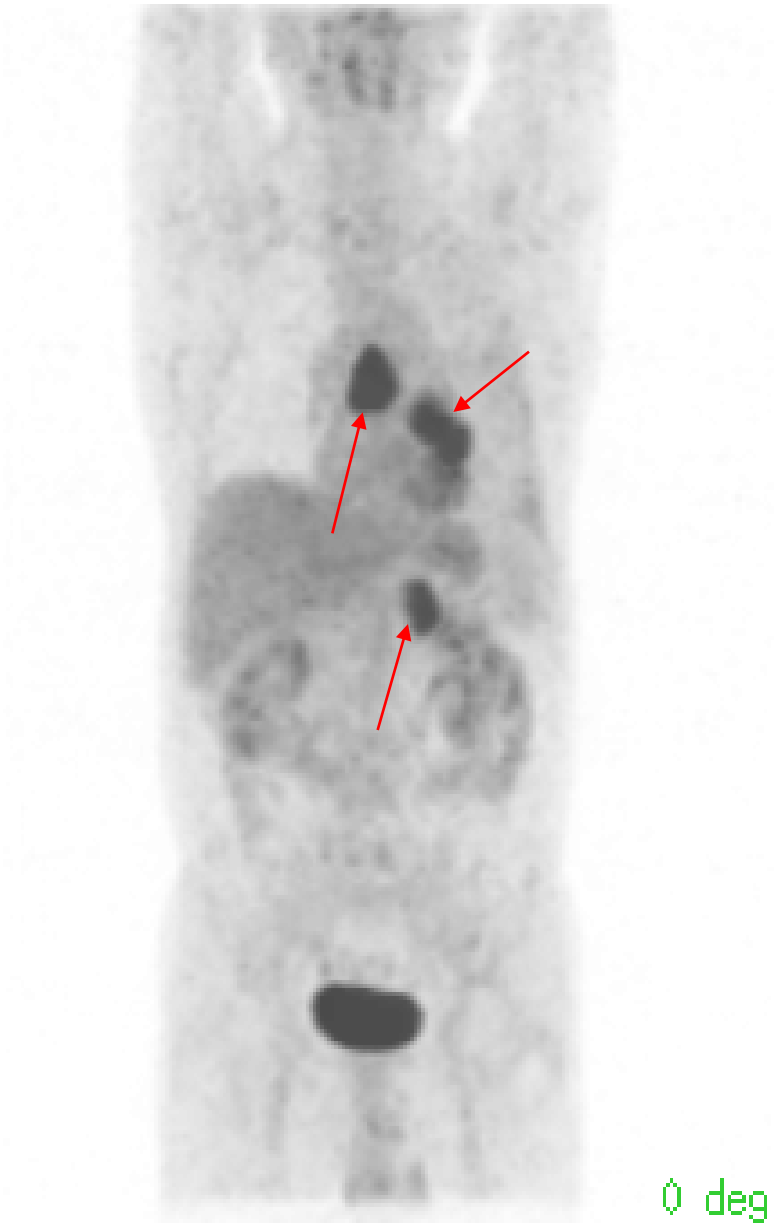
A – sagitalni; B – transferzalni; C – koronarni (frontalni)

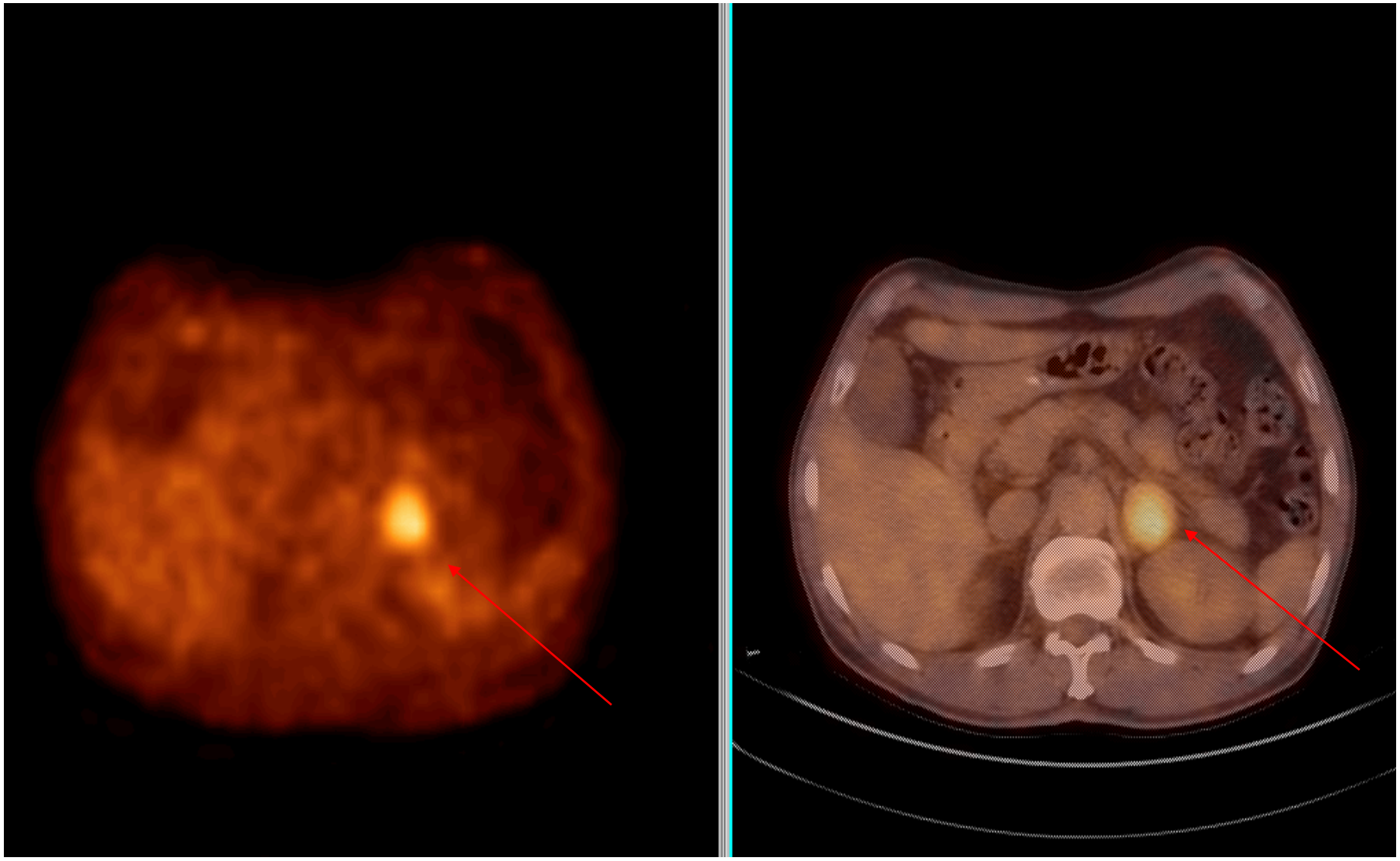




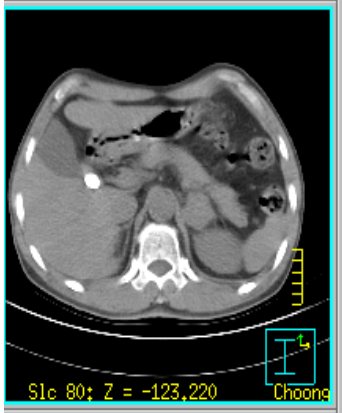


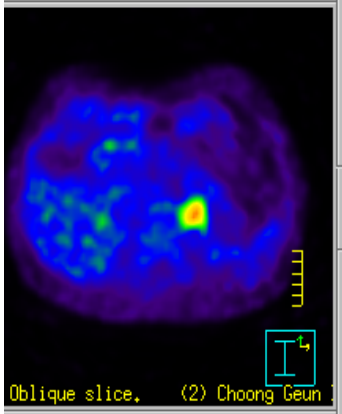


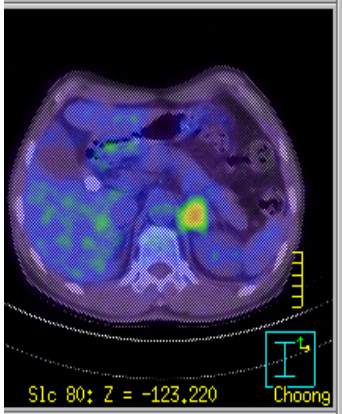

0 deg



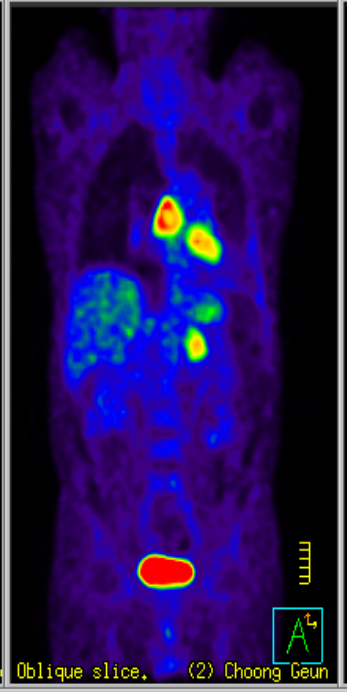
Metastaza u levoj nadbubreznoj zlezdi

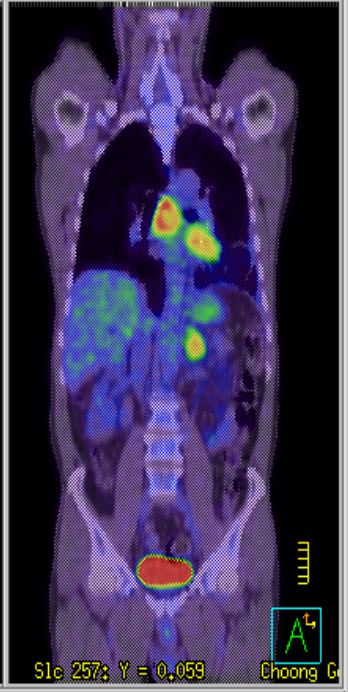


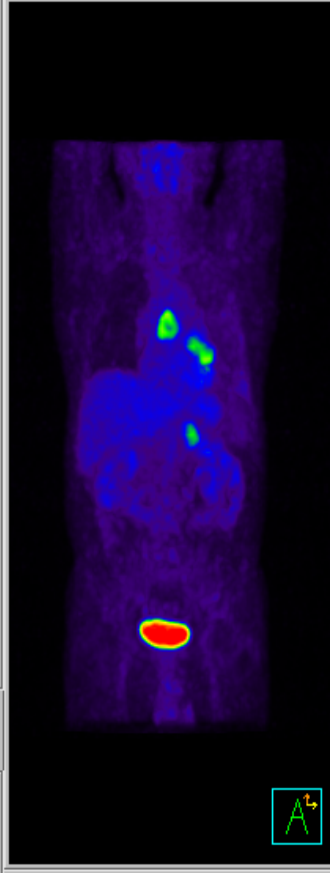




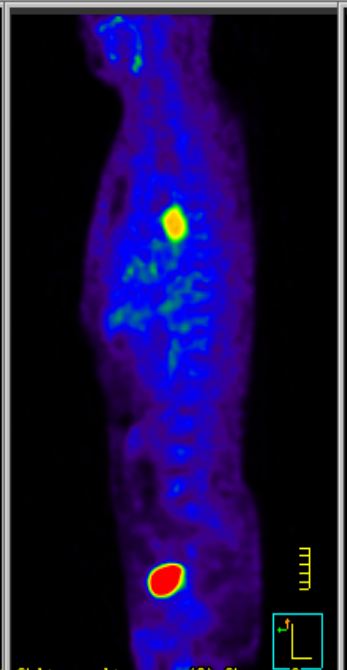


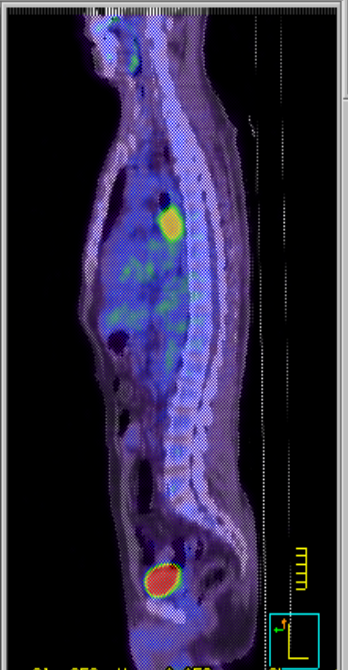












Primary Render: Yes No

skin | Surface

Secondary Render: Yes No

skin | MIP

Render | MIP Options...

Synchronize Windows

De-Synchronize Windows



Mobilna PET kamera