

# Radioaktív izotópok az orvoslásban Molekuláris képalkotás

Pávics László

MTA doktora

Szegedi Tudományegyetem,  
Nukleáris Medicina Intézet



# Hevesy György



- 1885-1966
- Tracer elv
- Hafnium
- Izotóp hígítás
- Aktivációs analízis



# Glenn T. Seaborg 1912-1999




Nobel díj 1951  
Transurán elemek  
131-I



# Izotópok előállítása

 Reaktor

 Gyorsító (cyklotron)

 generátor

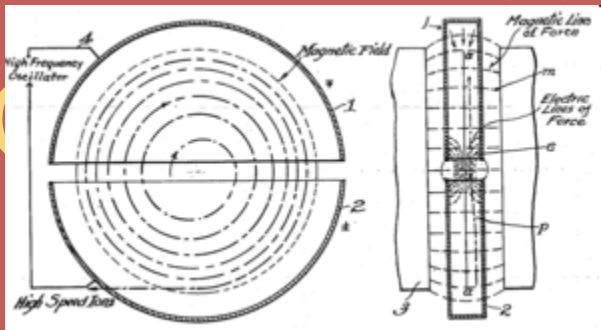


# Cyklotron



- Gál Sándor
- Szilárd Leo
- E. Lawrence
- S. Livingstone





**Ernest O. Lawrence (1901-1958)**



# Cyklotron



1930



2000

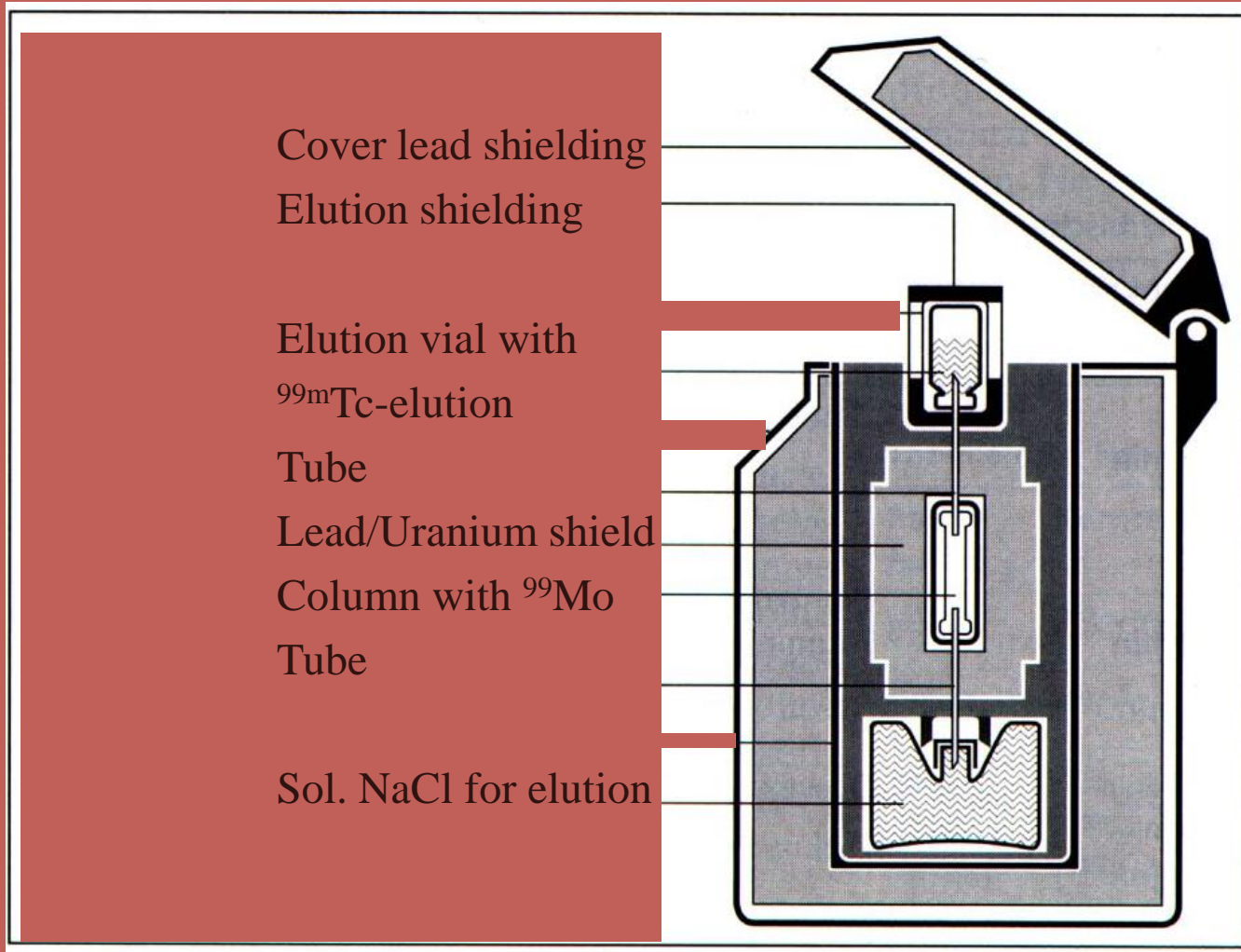


# Neutron therapy

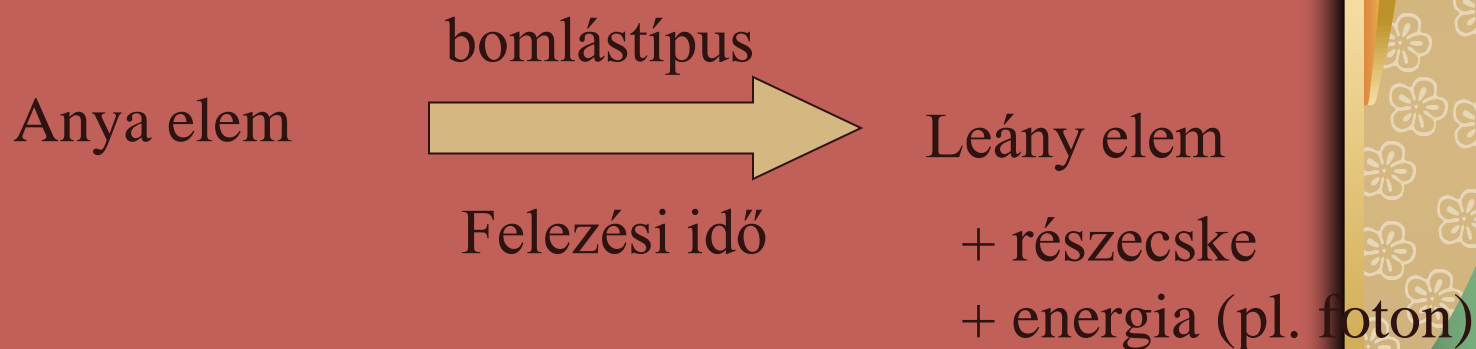




# $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ Generator

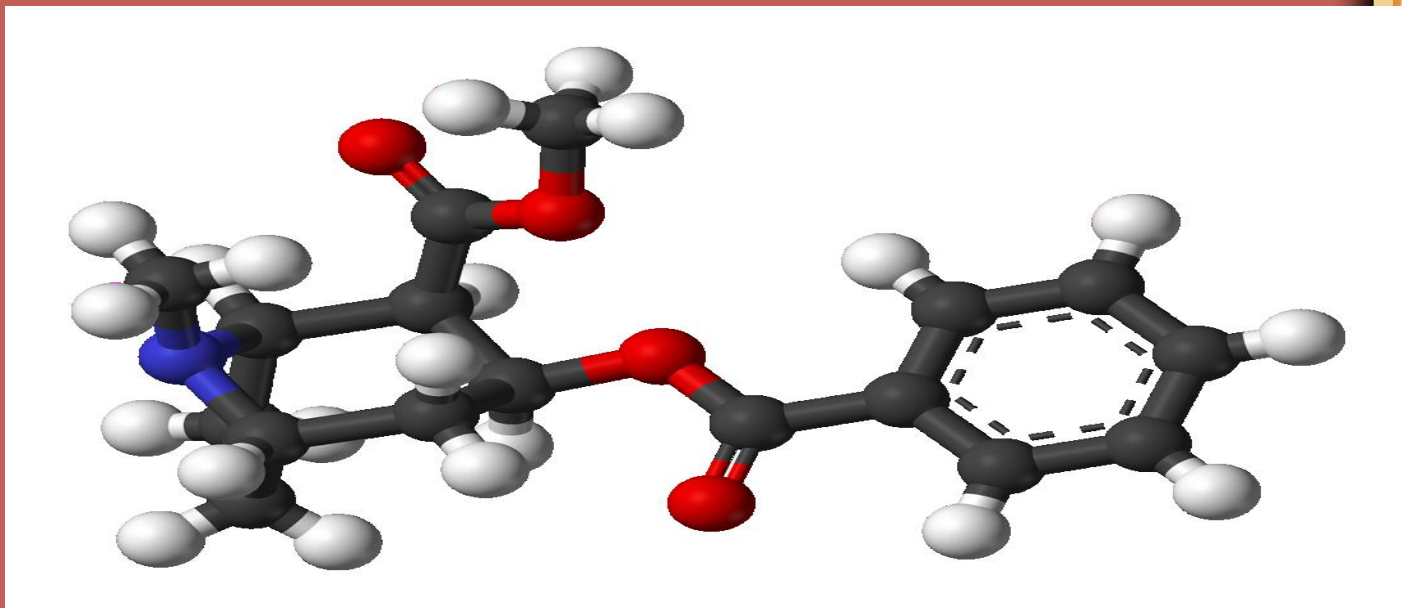


# Radioaktív bomlás

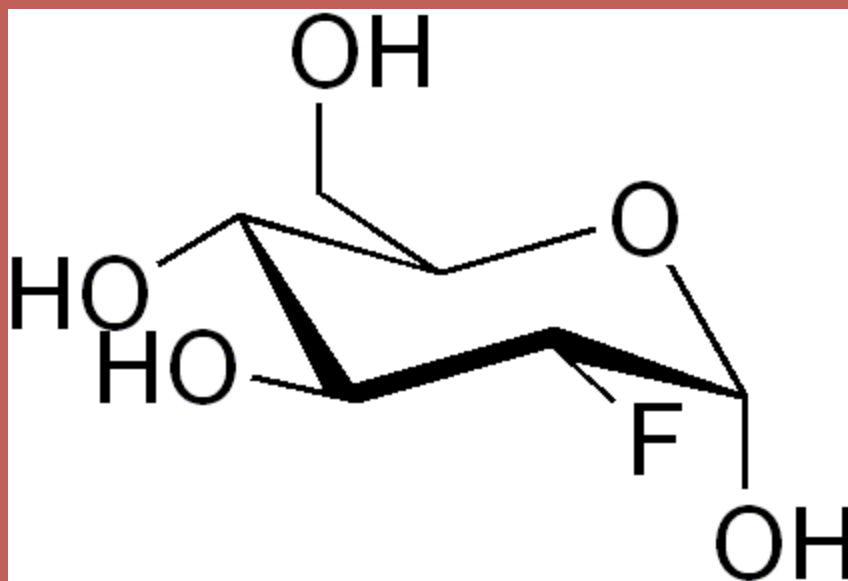


# Dopamin transzporter SPECT

- Preszinaptikus dopamin rendszer
- Cocain analógok



# FDG- PET (cukoranyagcsere)



$^{18}\text{F}$ -2-fluoro-2 deoxy-d-glukóz

# Radioaktivitás leképezése

- Gamma kamera
- SPECT SPECT/CT
- PET/CT, PET/MRI



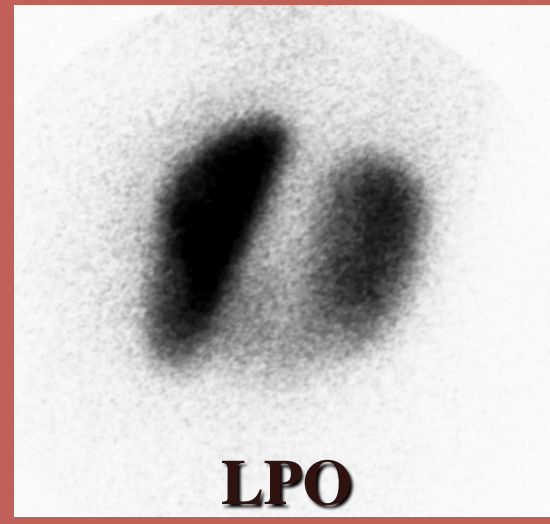
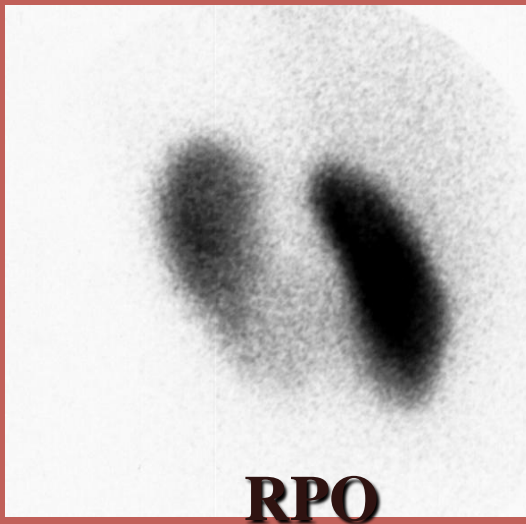
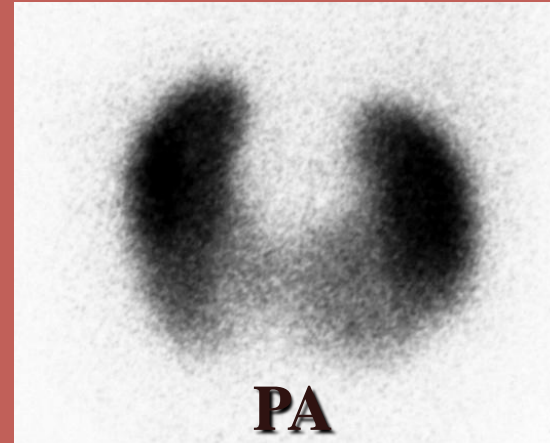
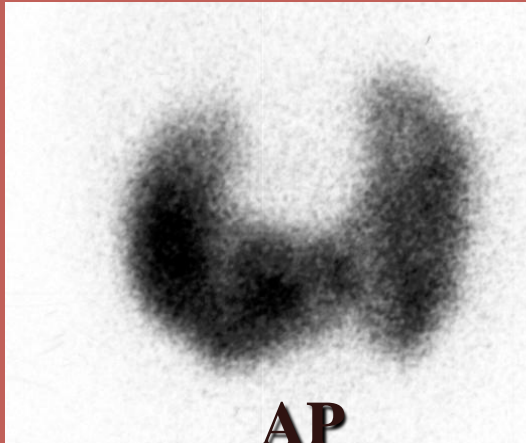
# Eljárások

	Felbontás tér	Felbontás idő	Érzékenység Mol/L
SPECT	0,5-1.5 mm	perc	$10^{-10}$ - $10^{-11}$
PET	1-2 mm	10 mp-perc	$10^{-11}$ - $10^{-12}$
Lumineszcens	3-5 mm	mp	$10^{-15}$ - $10^{-17}$
Fluoreszcens	2-3 mm	mp	$10^{-9}$ - $10^{-12}$

# SPECT

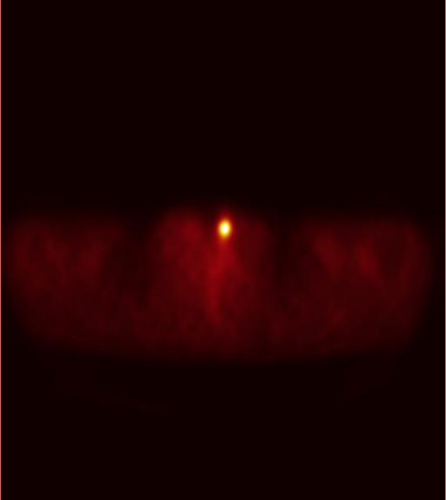


# $^{99m}\text{Tc}$ -DMSA





FDG PET/CT



+



# FÉNYEK



# KÖRNYEZET



# KÉP-FÚZIÓ

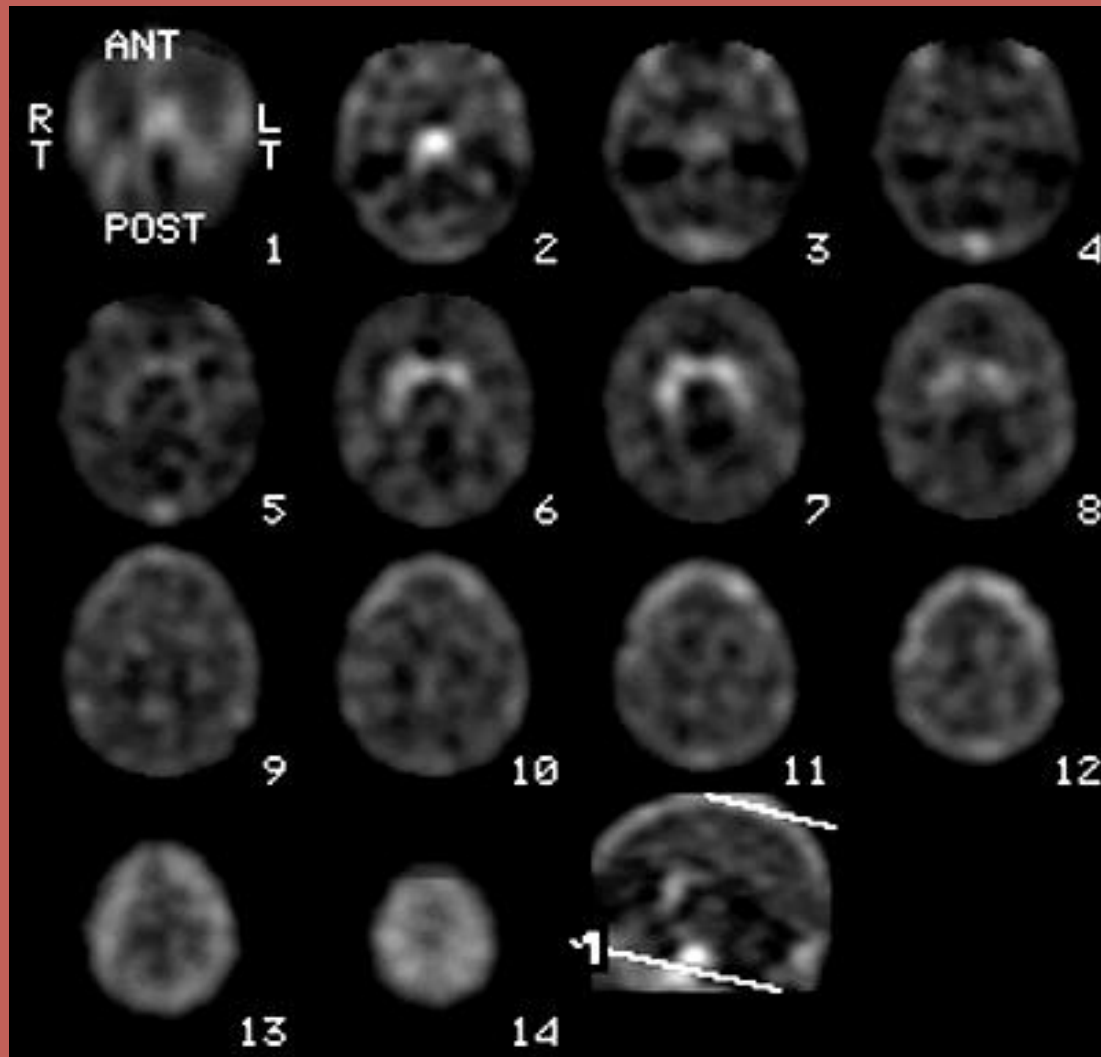


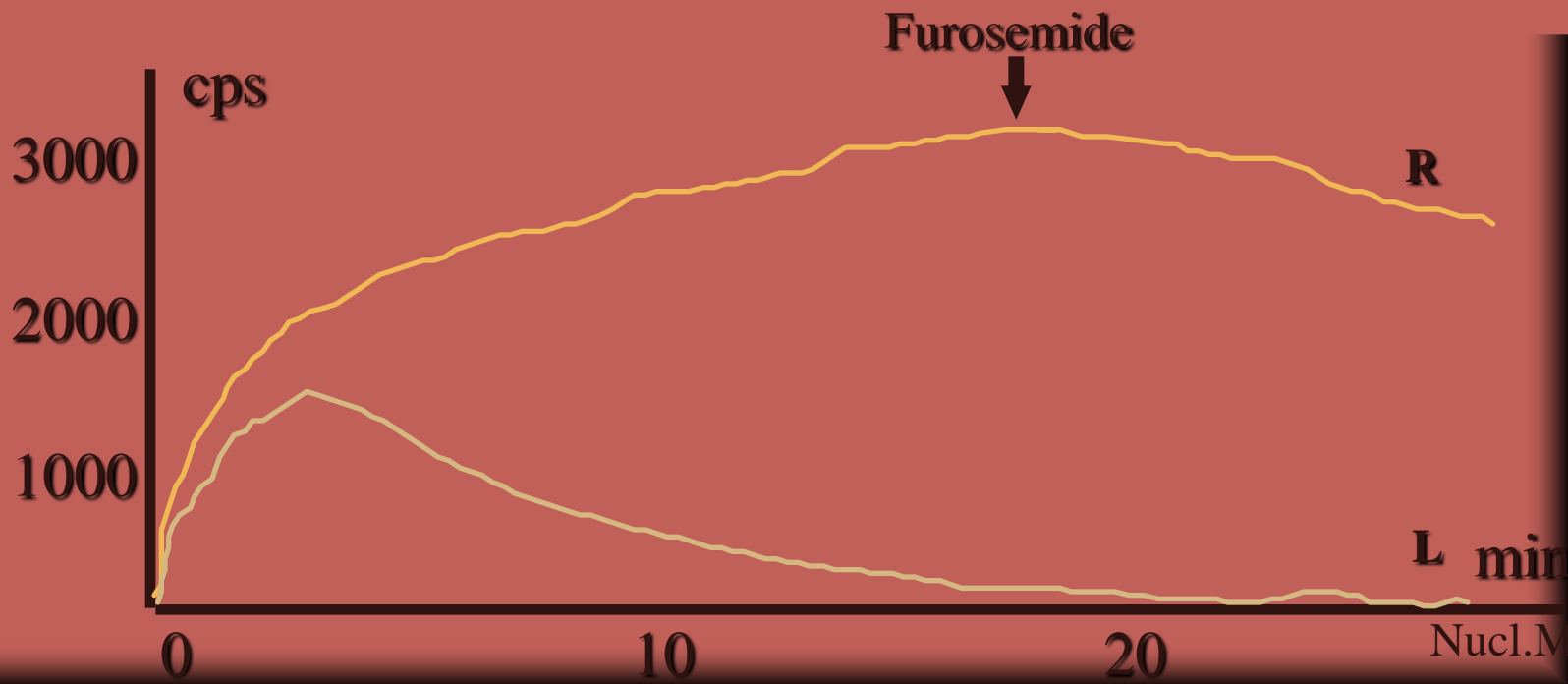
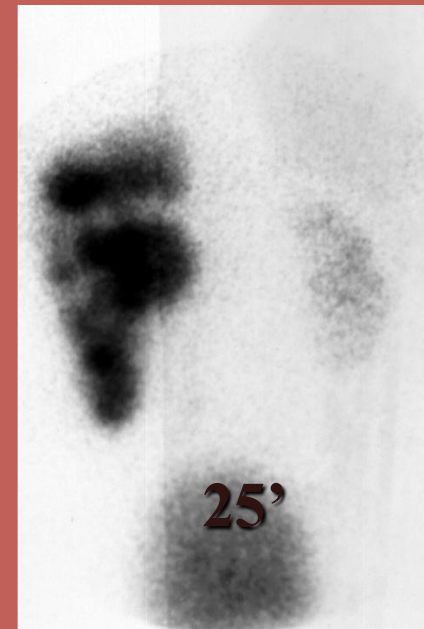
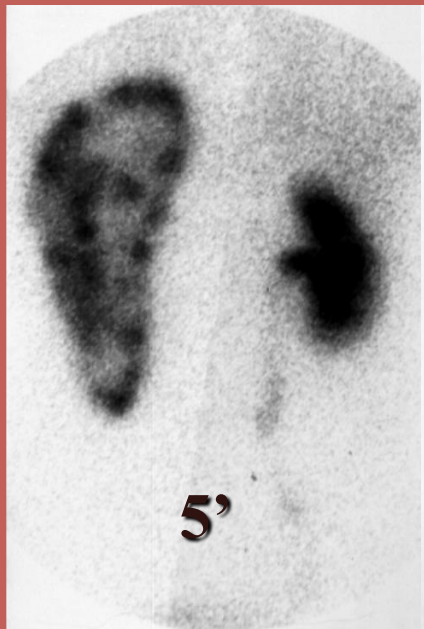


**GE Discovery**



# $^{99m}\text{Tc}$ -TRODAT<sub>pl</sub>





# $^{99m}\text{Tc}$ -MDP csontszcintigráfia





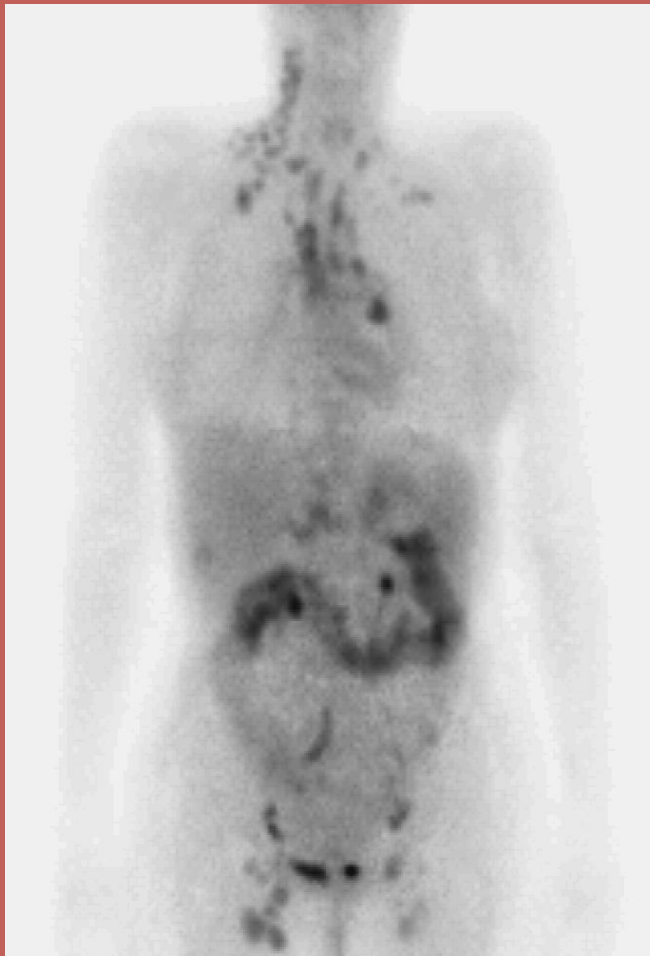
# $^{18}\text{F}$ -FDG PET, melanoma



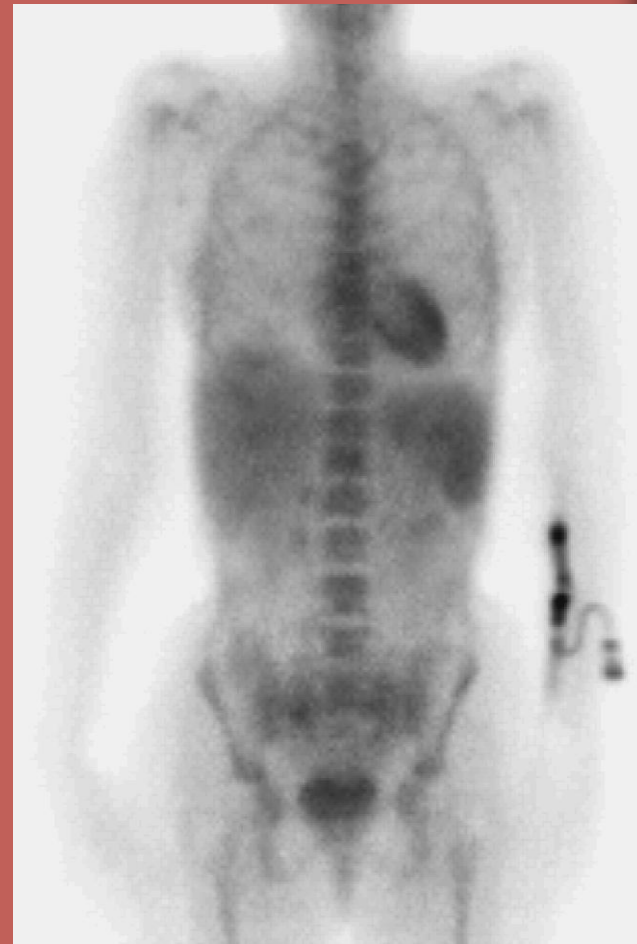
Image courtesy of Rush-Presbyterian-St Luke's Medical Center, Chicago

# $^{18}\text{F}$ -FDG PET, non-Hodgkin's lymphoma

pre-therapy



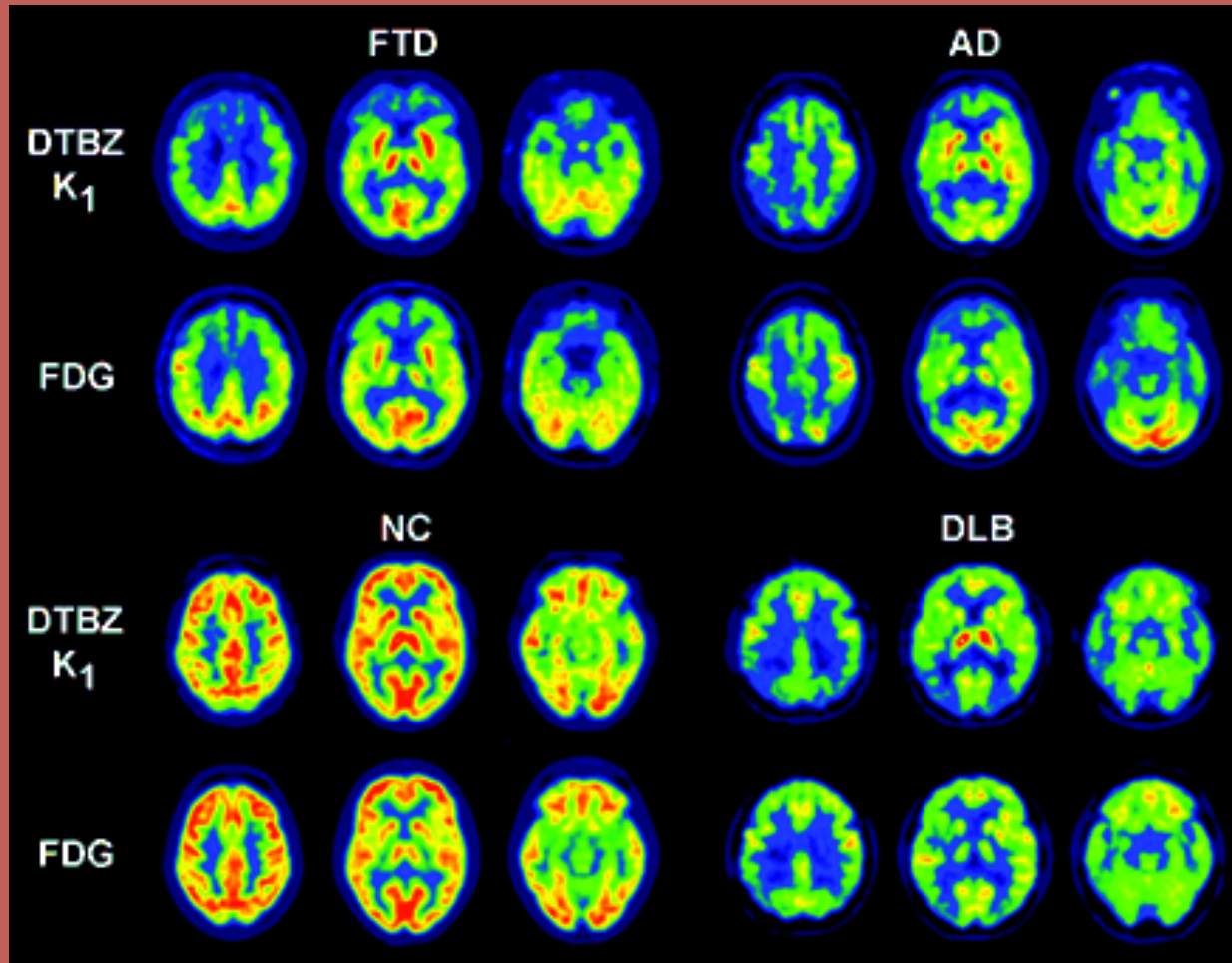
post-therapy



# $^{99m}\text{Tc}$ -tetrofosmin SPECT, CT angiográfia

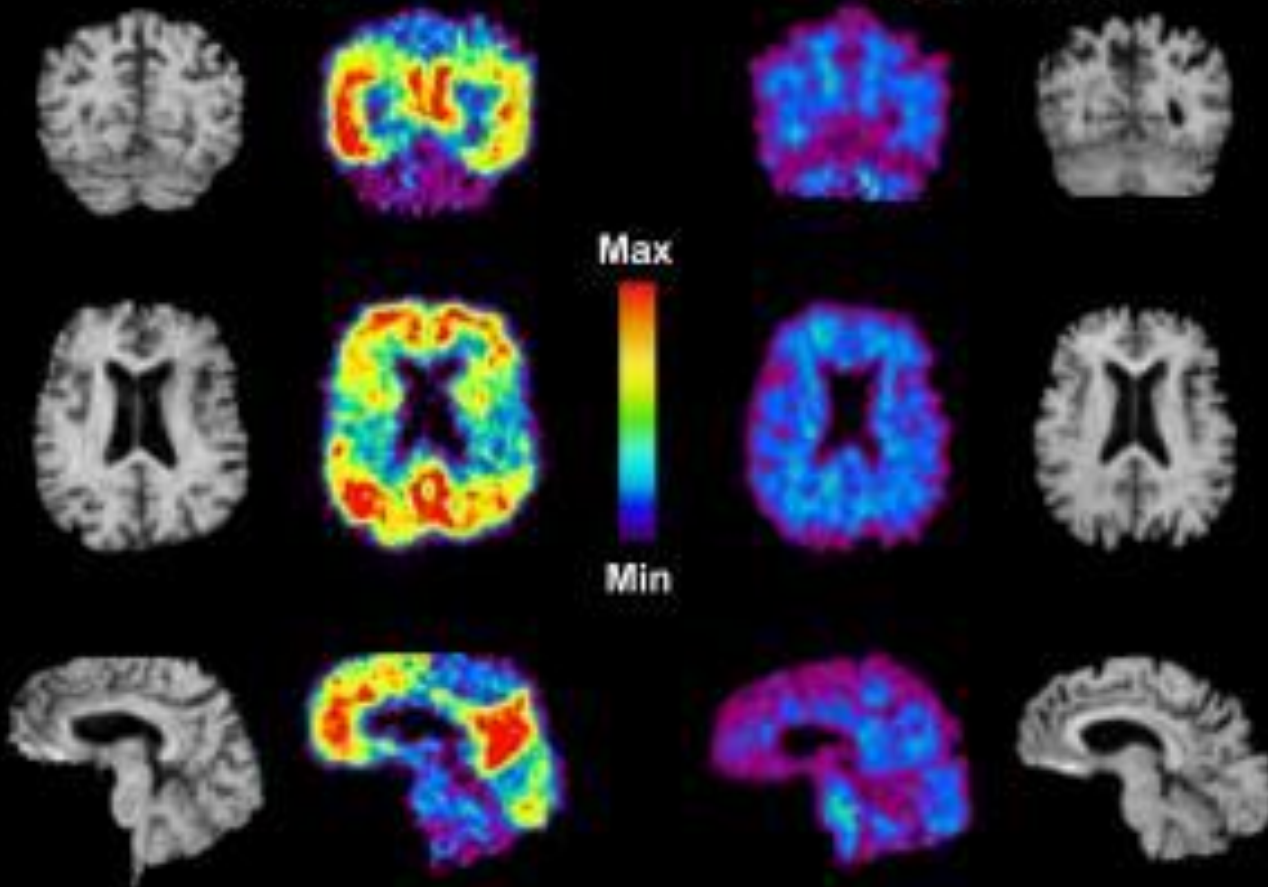


# Demencia



AD

Control



MR

[C-11]PIB PET

[C-11]PIB PET

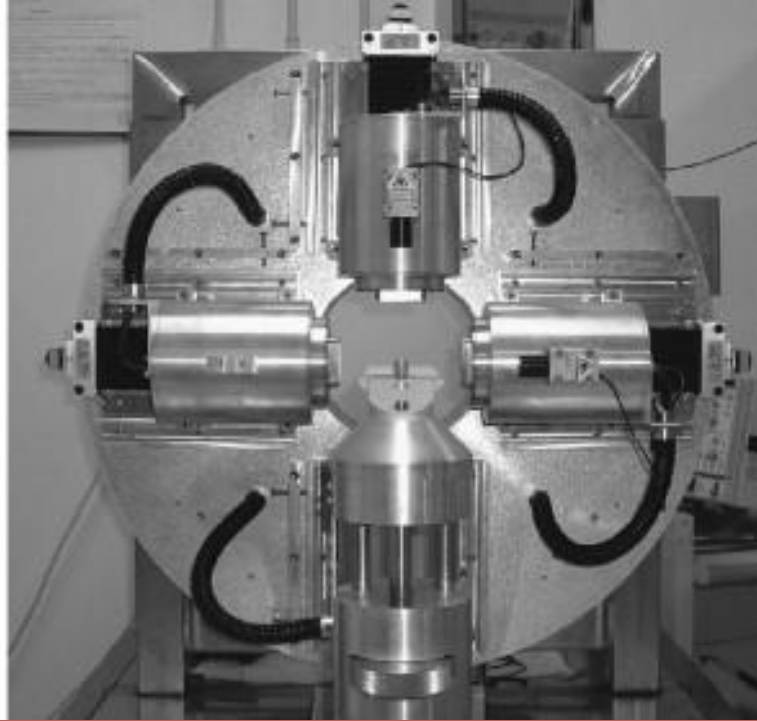
MR



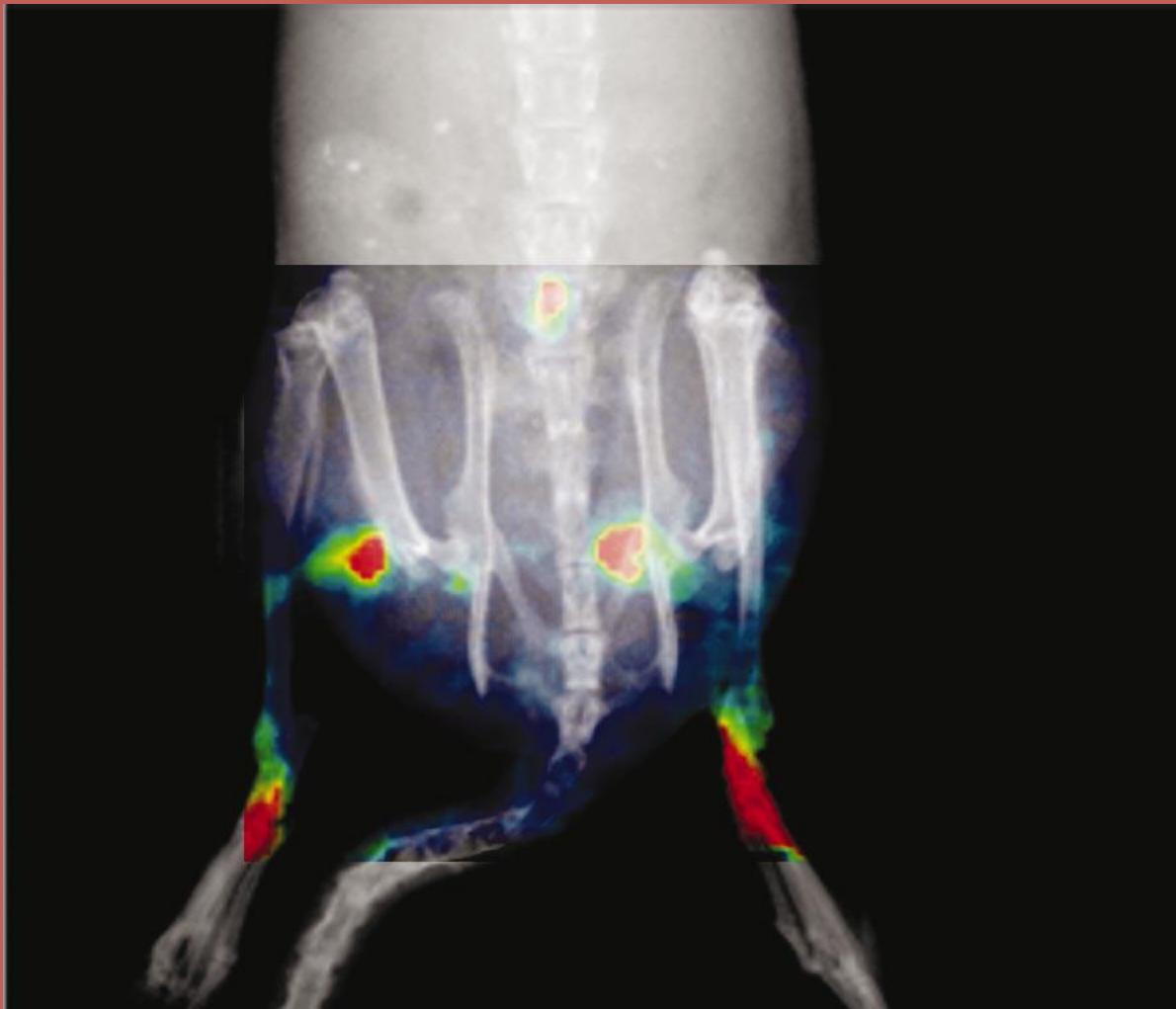
University of Pittsburgh  
PET Amyloid Imaging Group

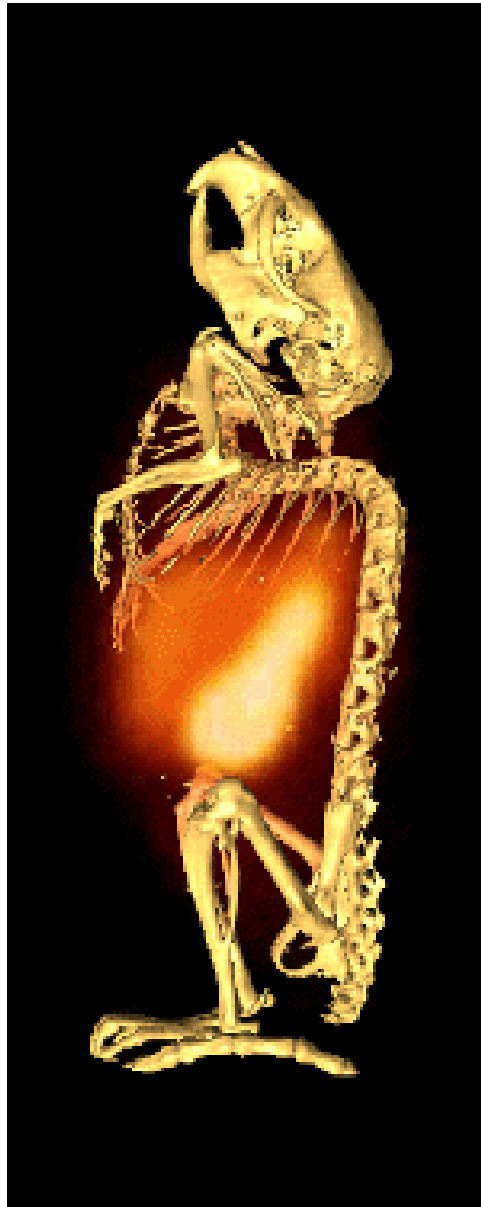


# Animal PET



# SPECT/CT egér nyirokcsomók

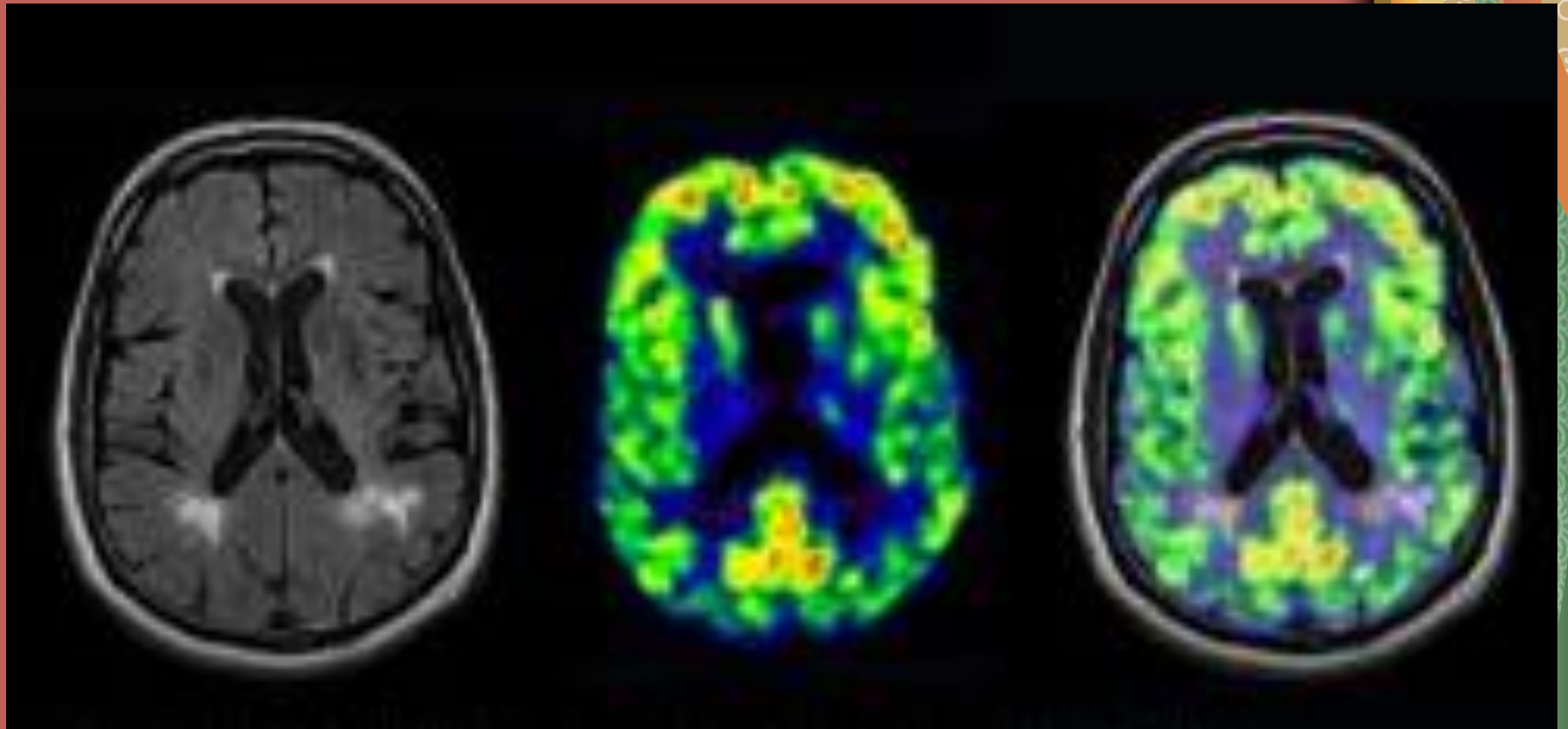


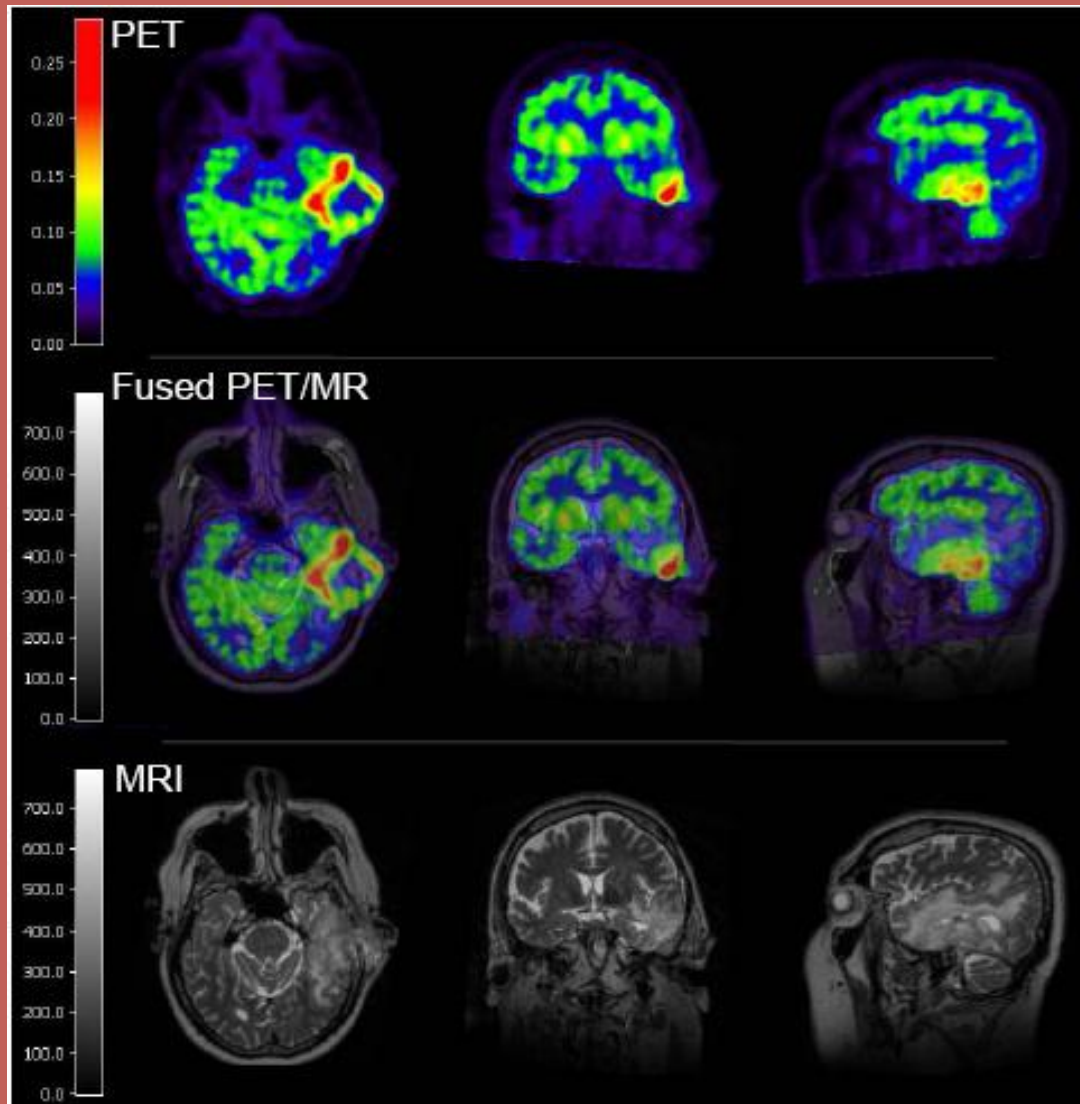


*Rendering of x-ray CT  
mouse skeleton with fused  
SPECT data showing  
amyloid in spleen.*









# Sugárvédelem a Nukleáris Medicinában

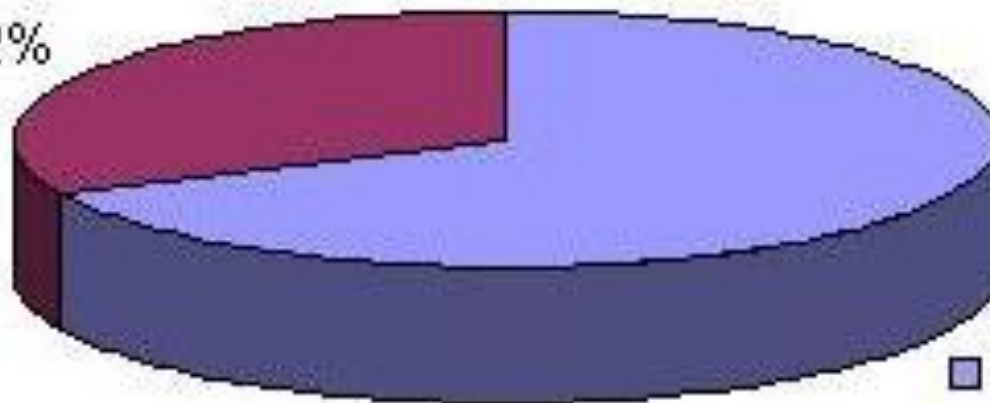
- Olyan alacsony amilyen ésszerűen elérhető (ALARA) elv
- Radioaktív sugárzás csökkentése:
  - idő
  - távolság
  - árnyékolás



## A Föld lakosságának sugárterhelése

Mesterséges  
eredetű

■ 32%



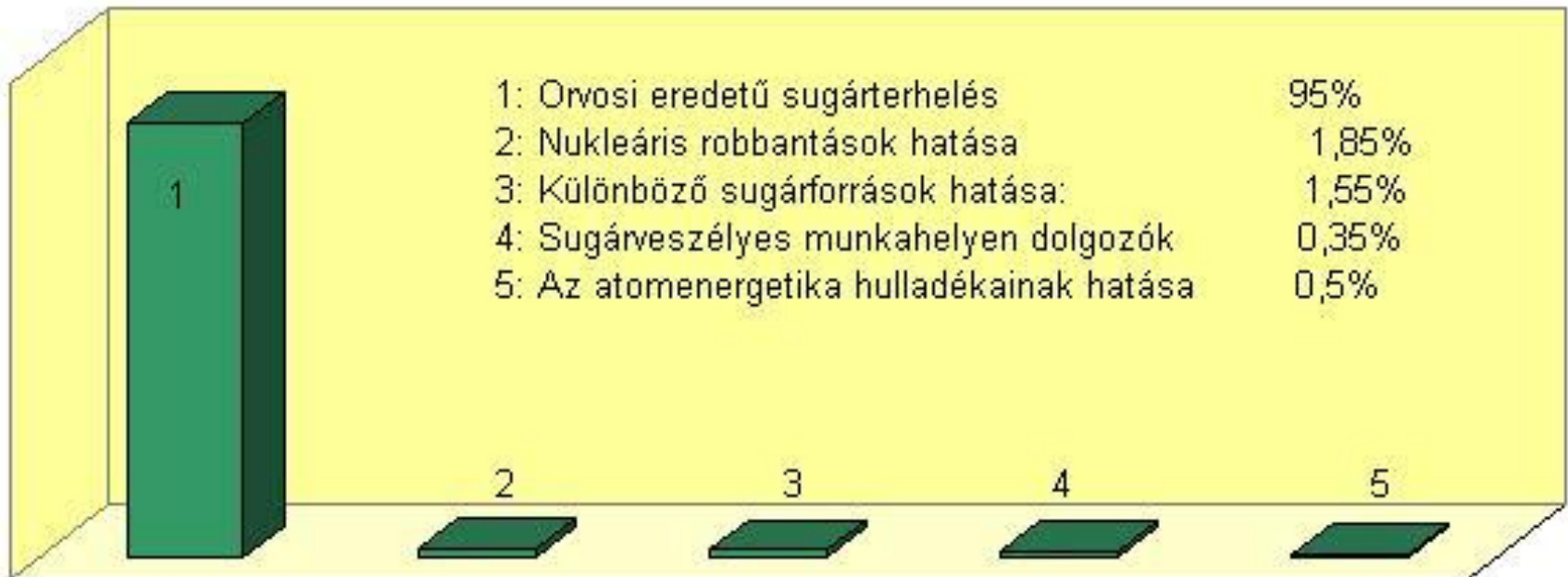
Természetes  
eredetű

■ 68%

## Természetes eredetű sugárterhelés



## Mesterséges eredetű terhelés



KÖSZÖNÖM A FIGYELMET !

