

# Metode formiranja medicinske slike

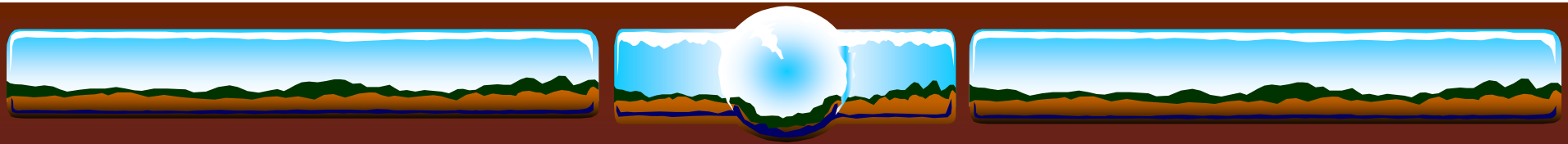
0F3MFM

Nastavnik: dr Predrag Marinković

Obavezan predmet na smeru

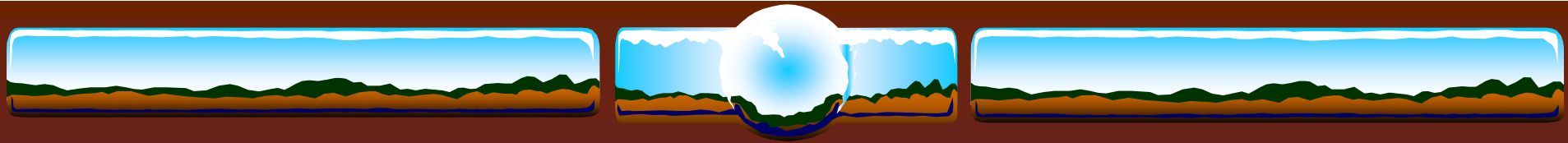
Biomedicinski i ekološki inženjering





# Sadržaj kursa

- ❖ Uvodno predavanje
- ❖ Medicinska slika
- ❖ Rekonstrukcija slike iz projekcija
- ❖ Imidžing pomoću X-zraka
- ❖ Imidžing u nuklearnoj medicini
- ❖ Imidžing magnetskom rezonacijom (MRI)
- ❖ Imidžing ultrazvukom



U okviru kursa se tretiraju osnove medicinskog slikanja, uključujući fiziku i tehniku za svaki modalitet medicinskog imidžinga, kao i matematiku i kompjuterske alate vezane za rekonstrukciju slike i procesiranje slike.

$$\mathcal{R}\{f(x, y)\} = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x, y) \delta(y - (mx + b)) dx dy.$$

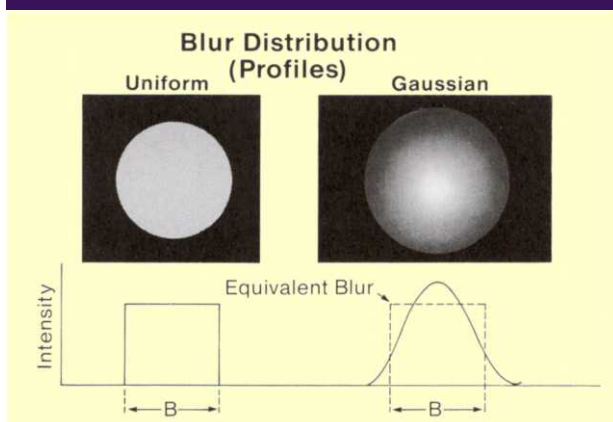
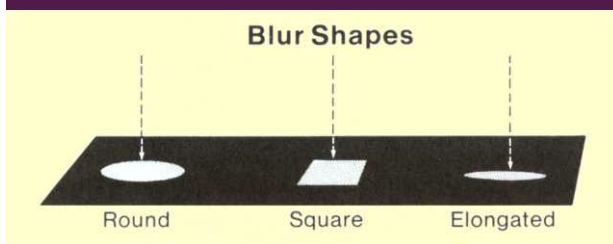
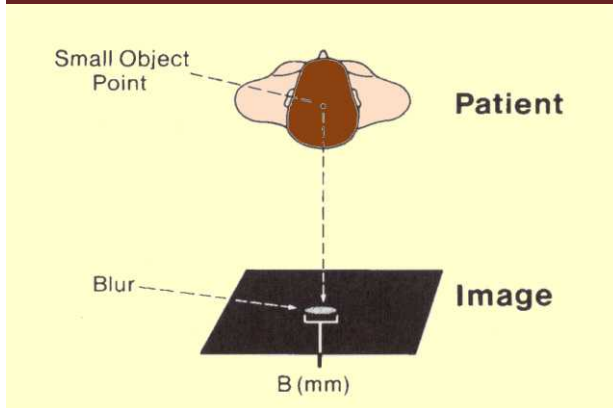
DICOM

RIS

PACS

Kurs je namenjen studentima biomedicinskog i ekološkog inženjerstva

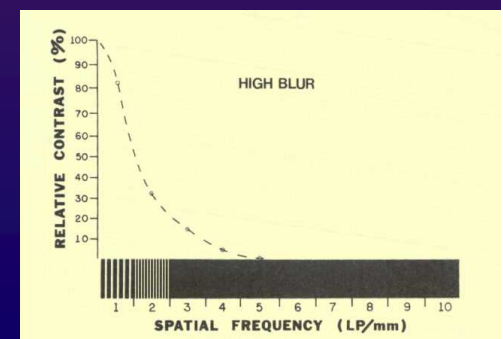
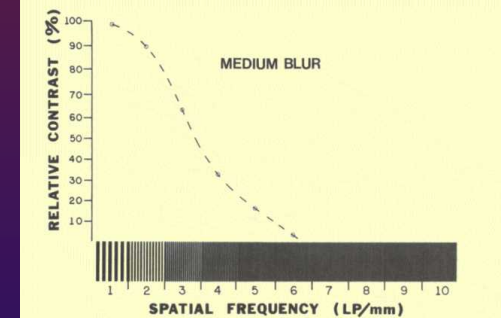
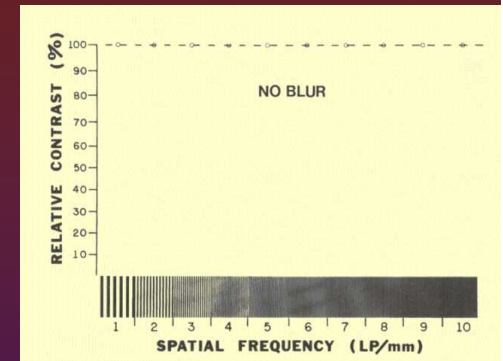
# Medicinska slika



- Osnovne informacije o medicinskoj slici

- Kvalitet medicinske slike:

- kontrast
- zamućenje
- rezolucija
- šum
- distorzija
- artefakti





# Rekonstrukcija tomografske slike iz projekcija

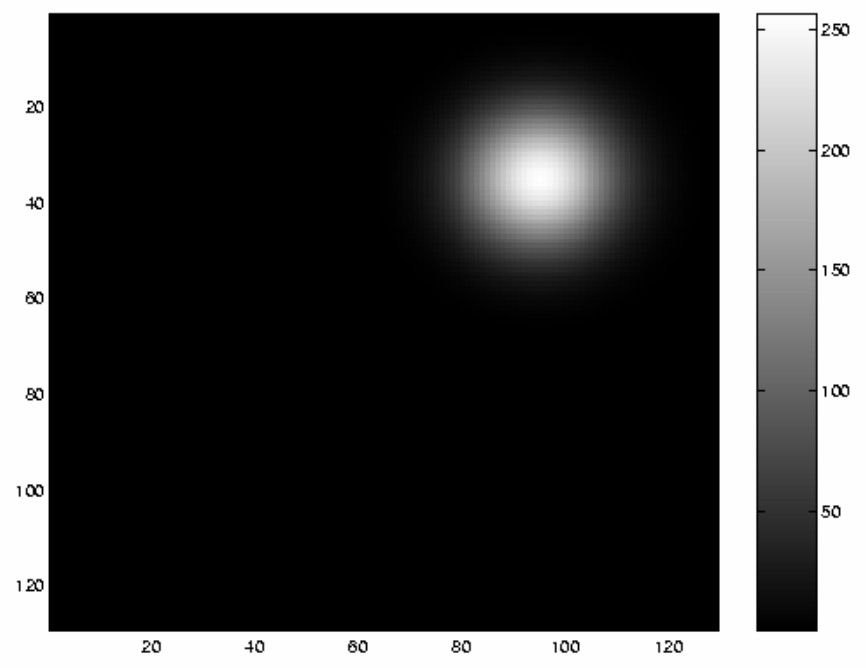
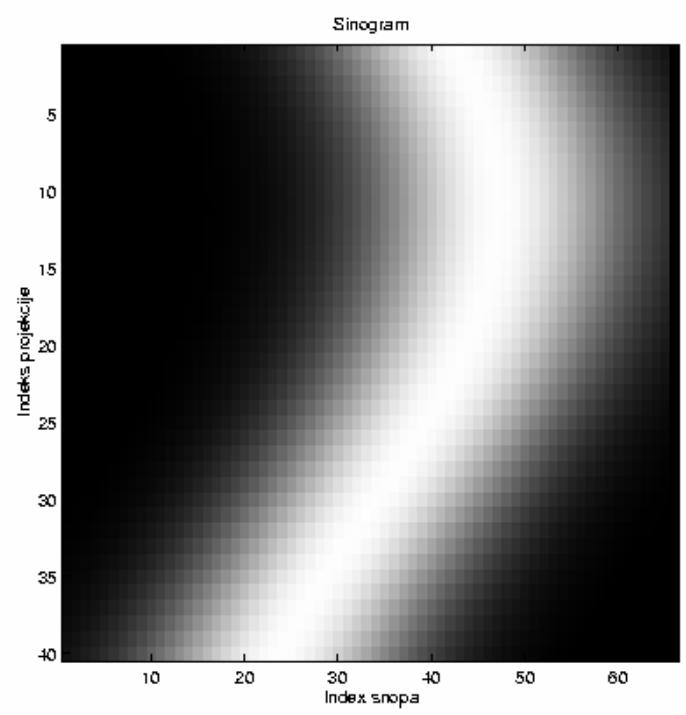
Tomografija = slika sloja

Rekonstrukcija tomografske slike iz sinograma,

Nekorektno postavljen problem

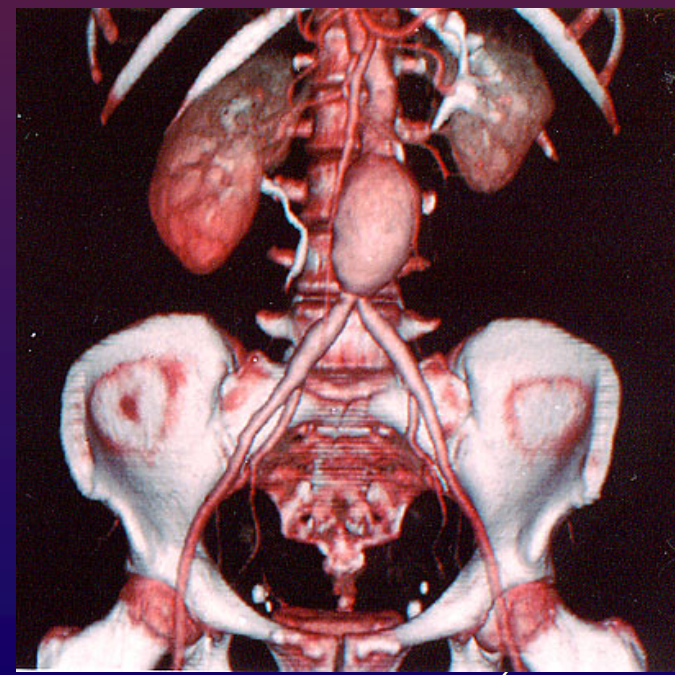
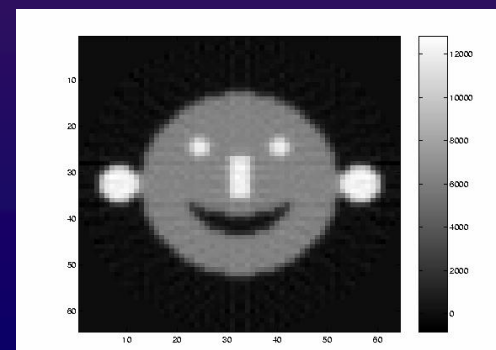
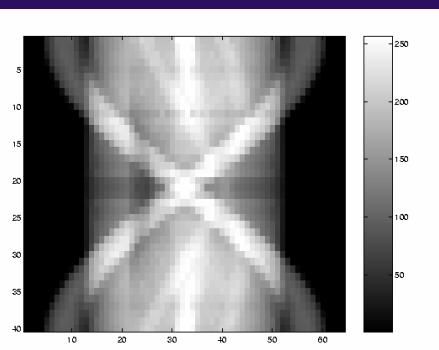
Sinogram

Slika sloja





- ❖ Radonova transformacija i njene osobine
- ❖ Teorma o centralnom preseku
- ❖ Metode rekonstrukcije slike sloja:
  - ❖ Transformacione
    - ❖ BP, FBP, CBP ...
    - ❖ Filtriranje (RAM-LAK, Shep-Logan ...)
  - ❖ Iterativne
    - ❖ MNK, MLEM, OSMLEM ...
    - ❖ Direktna 3D rekonstrukcija

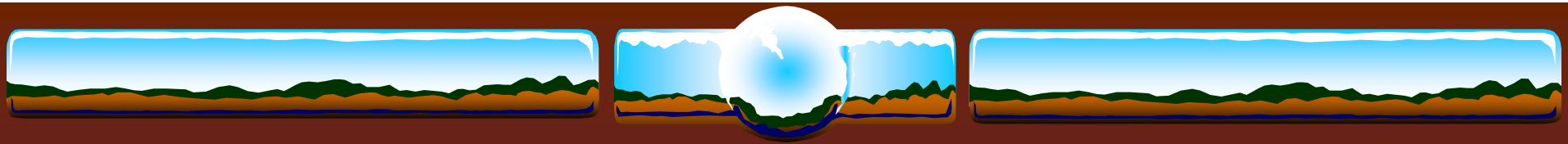


6  
3D vizualizacija

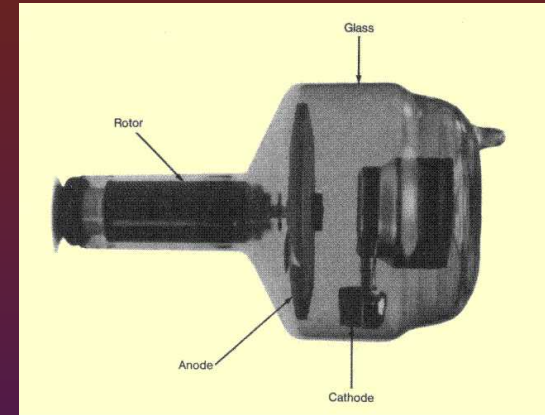


# Imidžing X-zracima

- ❖ Radiografija
  - ❖ Pomoću filma
  - ❖ Pomoću intenzivirajućeg ekrana i filma
  - ❖ Digitalna
- ❖ Fluoroskopija
- ❖ Mamografija
- ❖ Digitalna subtrakciona angiografija (DSA)
- ❖ Kompjuterizovana tomografija - CT



# Radiografija



Daje 2D sliku 3D objekta (projekcija)



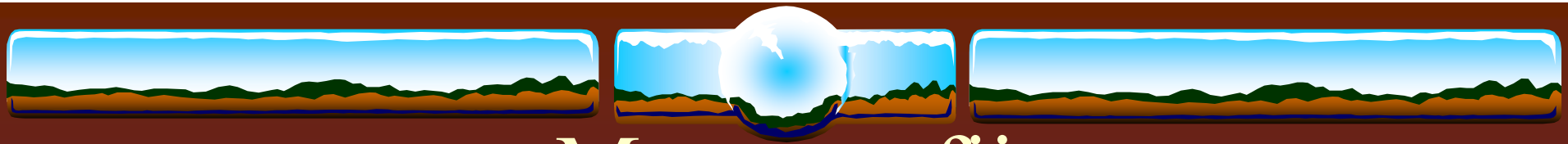




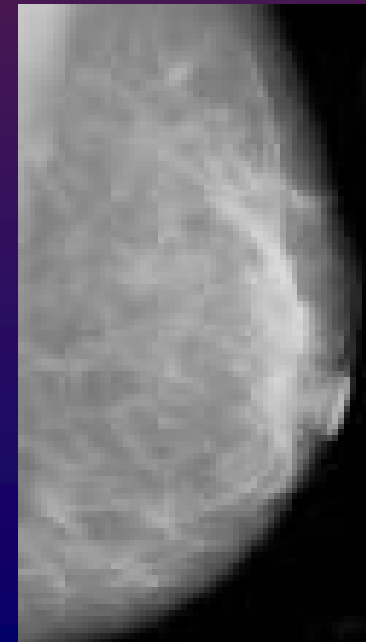
# Fluoroskopija

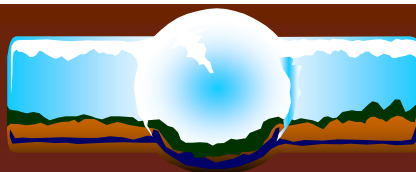
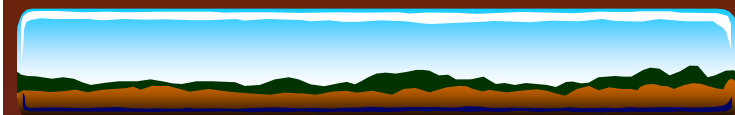
Snimanje u realnom vremenu malom brzinom doze X-zračenja





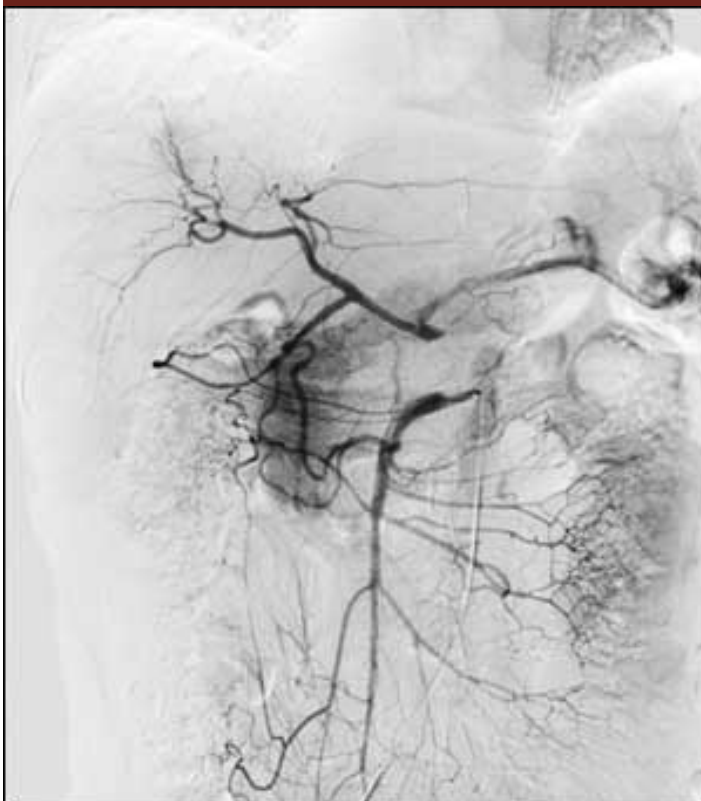
# Mamografija





# DSA

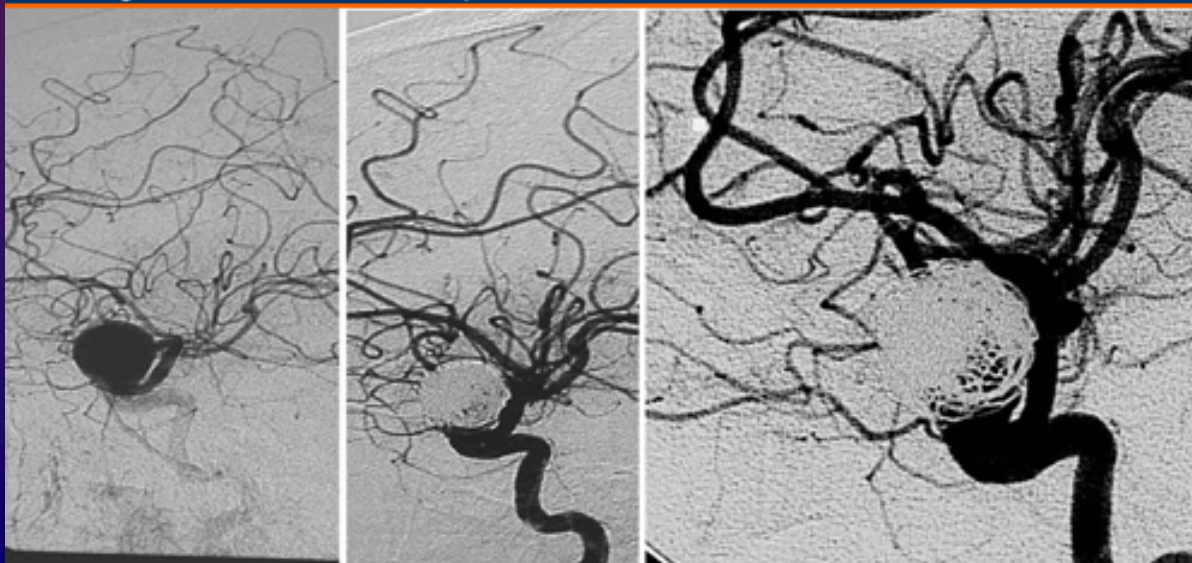
Realizuje se pomoću fluooskopskog uređaja i kontrastne materije snimanjem žive slike i maske.

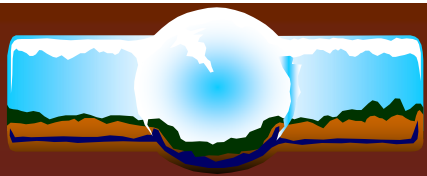


Angiografska slika

Medscape®

[www.medscape.com](http://www.medscape.com)

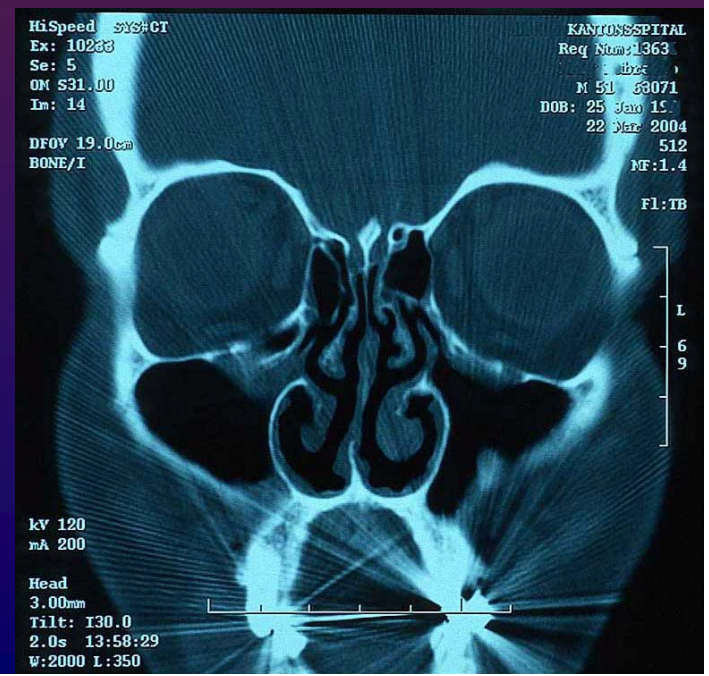
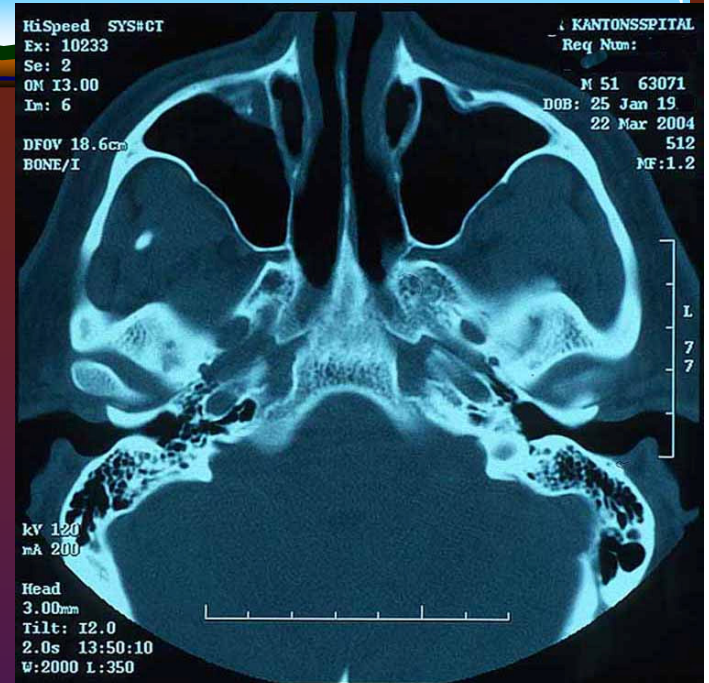
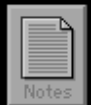
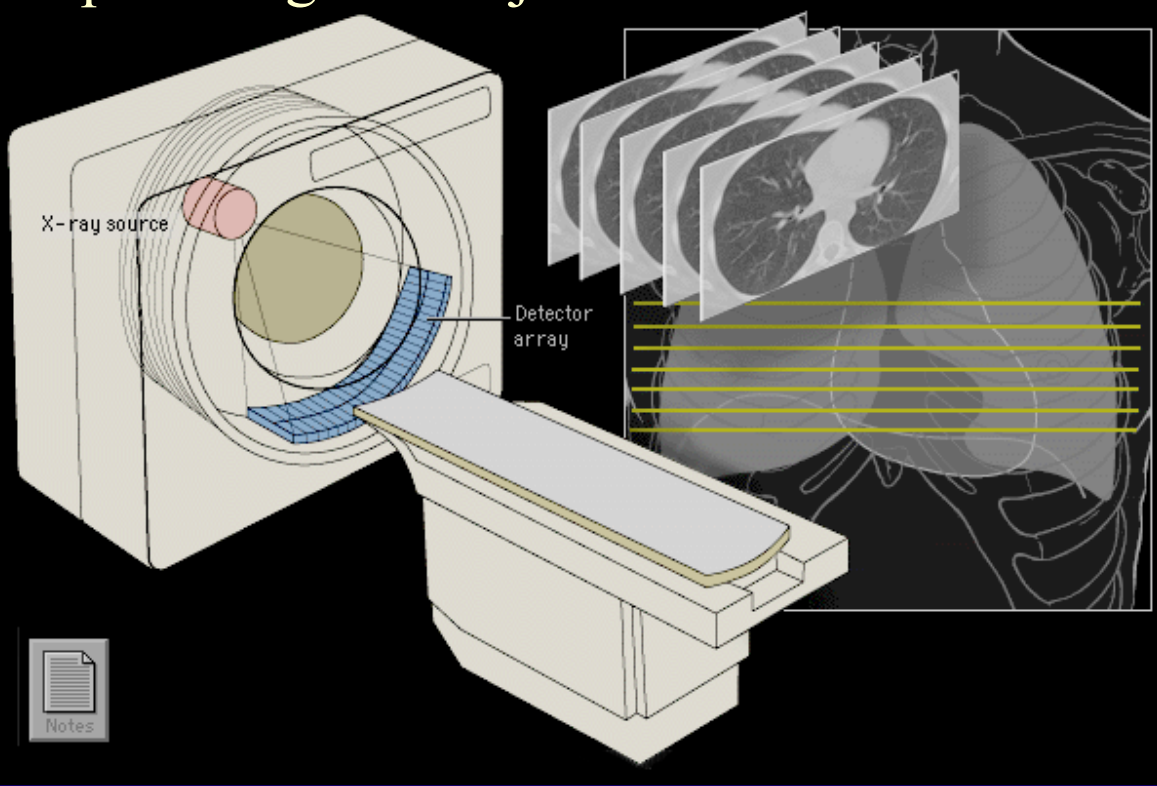




# CT

Slike na morfološkom nivou.

Lepezasta geometrija.

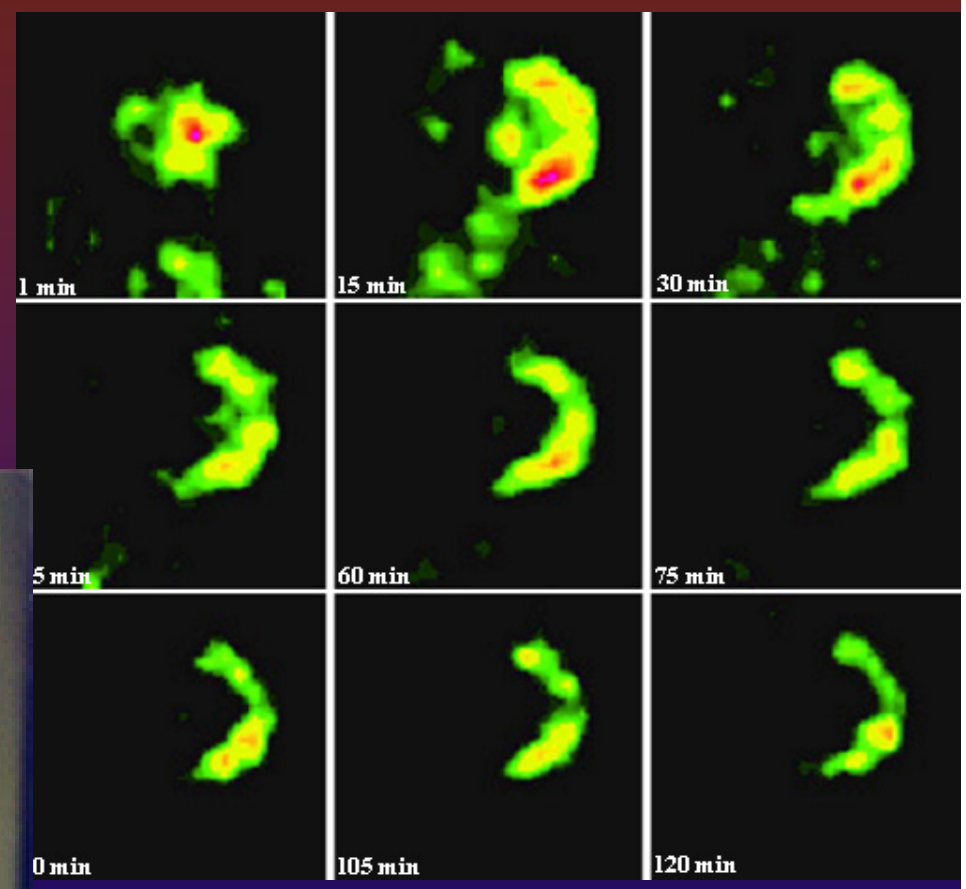




# SPECT

Tc-99m

Jednofotonska emisiona  
kompjuterizovana tomografija  
(SPECT).



Pružá informacije o funkciji organa  
ili sistema



# PET

Pozitronska emisiona tomografija.

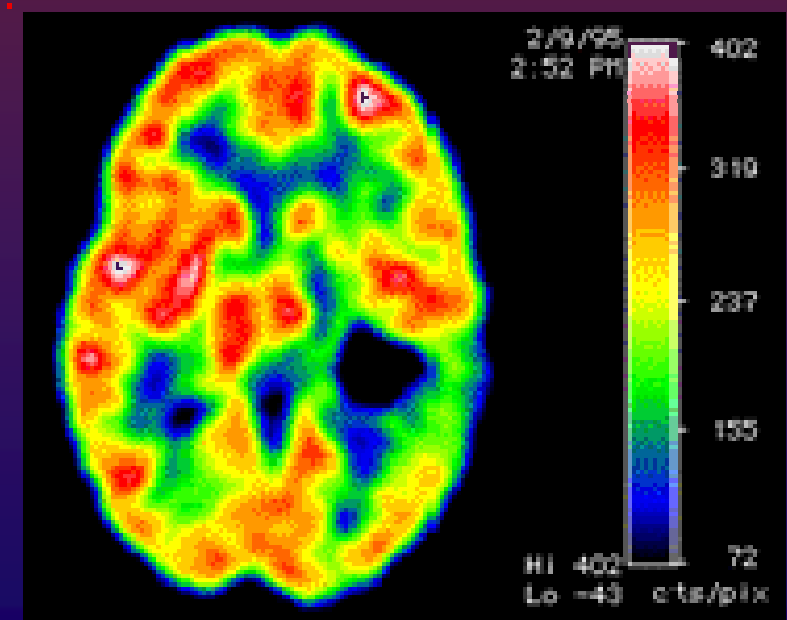
Mogućnost molekularnog imidžinga (*in-vivo* merenje specifičnih molekula koji su povezani sa oboljenjem).

Pruža informacije o funkciji.

4D imidžing



FDG  
F-18, C-11  
O-15



University of Washington

# MRI



Slike na morfološkom nivou.  
Slike zavise od PD, T1, T2,  
toka fluida.



3T mag. indukcija

# Ultrazvuk

