

MRT algkursus

Katrin Bakhoff
radioloog, PERH

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Loengu eesmärk:

Tutvustada erinevaid sekventse

Õpetada ära tundma erinevaid sekventse

Tutvustada erinevate kudede/struktuuride
omadusi erinevatel sekventsidel

Mida vaadata/otsida erinevatelt sekventsidelt

- MRT uuring koosneb erinevatest sekventsides, mis on skanneeritud erinevates tasapindades
- Tavaliselt koosneb uuring T1, T2, PD kaalutud kujutistest
- Sekventsid ja tasapinnad on valitud vastavalt uuritavale piirkonnale ja kliinilisele probleemile
- Sekventside ja tasapindade kombinatsiooni teatud probleemile lähenemiseks nimetatakse uuringualgoritmiks või uuringuprotokolliks

Natiivuuringud ja kontrastainega uuringud

Kontrastainega uuringud-

T1 kujutised: Gd- signaali intensiivistumine

T2 kujutised- Fe sisaldavad k/a- signaali
langus

- T1 kujutised

TR 300 – 800

TE min/ min full

kontrastainega uuringutel TR < 500- enam T1
kaalutud, kontrasti efekt selgem

- T2 kujutised

TR 1800-10000

TE 50 →

- PD kujutised

TR 1500 – 3000

TE 20-40

Kujutiste kirjeldamine

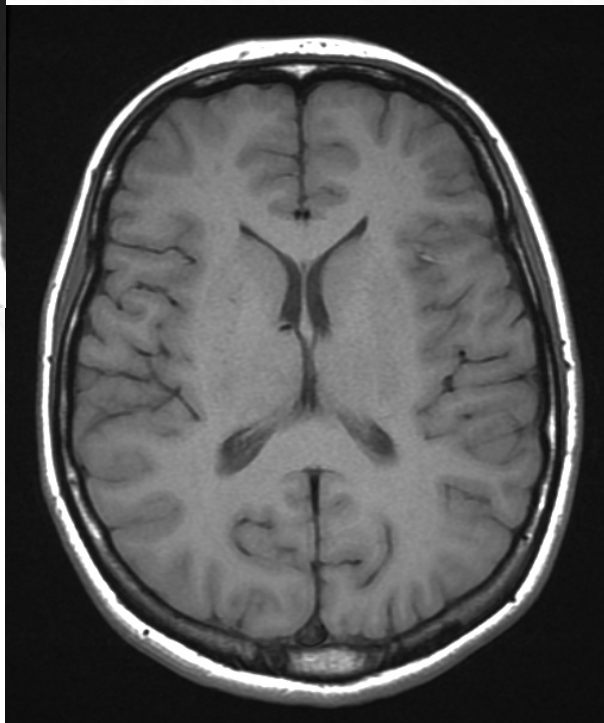
- Signaalivaba- must
- Hüpointensiivne signaal- tume
- Isointensiivne- sama intensiivsusega mingi objekti või struktuuriga võrreldes, nt. isointensiivne skeletilihasega
- Intensiivse või hüperintensiivse signaaliga- hele v. väga hele
- Homogeense või inhomogeense signaaliga

T1 kujutised

T1 SE; T1 TSE; T1 FSE

- Vesi- hüpointensiivne
- Rasv- hüperintensiivne
- Ajukude- veest intensiivsema signaaliga
- Lihased – veest intensiivsema signaaliga
- Veri- sõltuvalt vanusest, intensiivse või vahepealse signaaliga
- Lubistused, kortikaalne luu- signaalivabad

T1 kaalutud kujutised

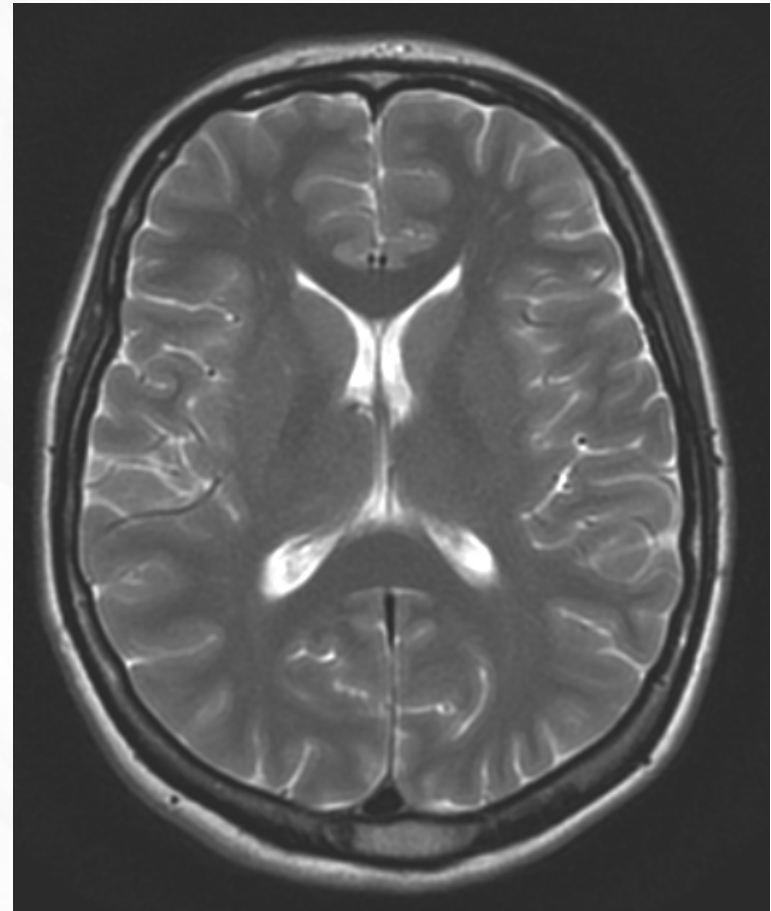
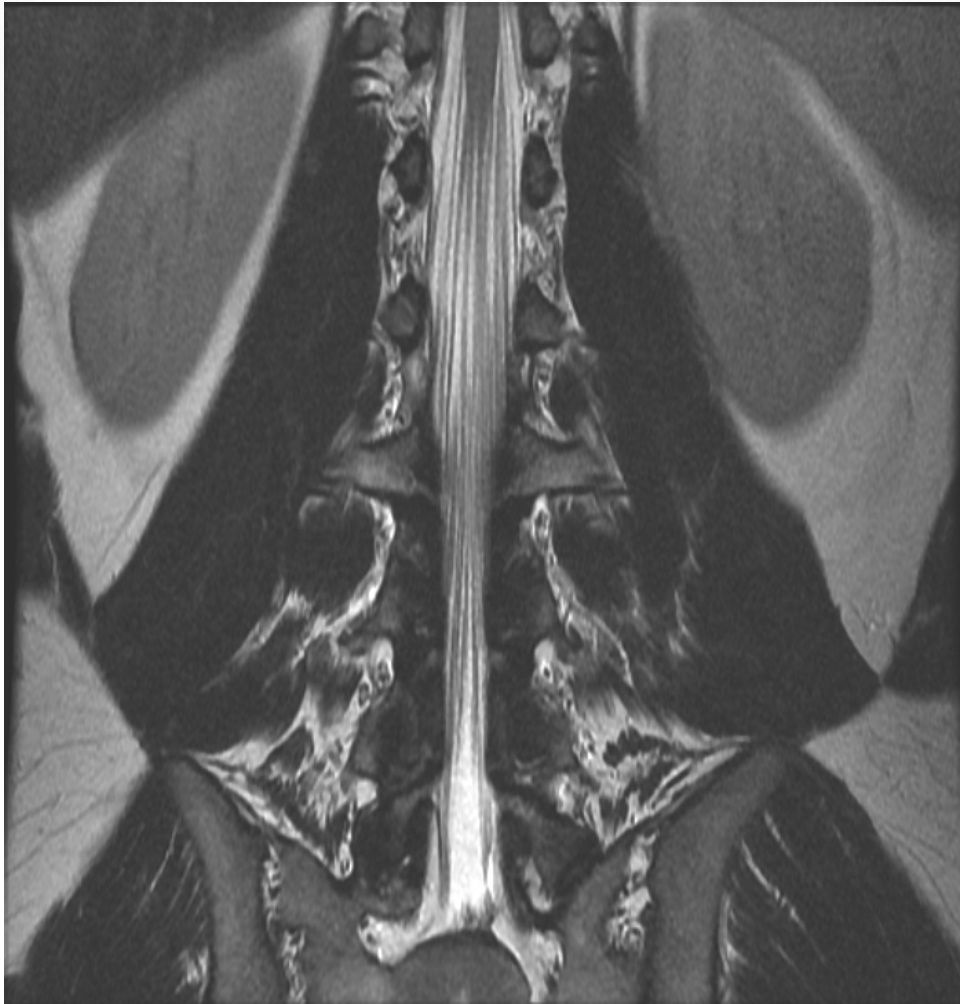


T2 kujutised

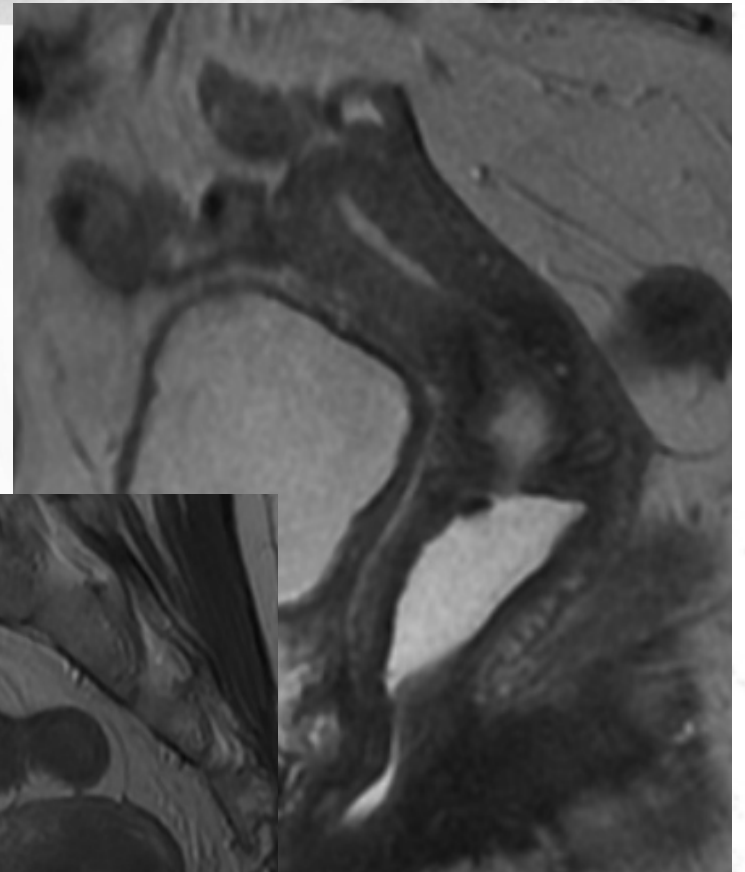
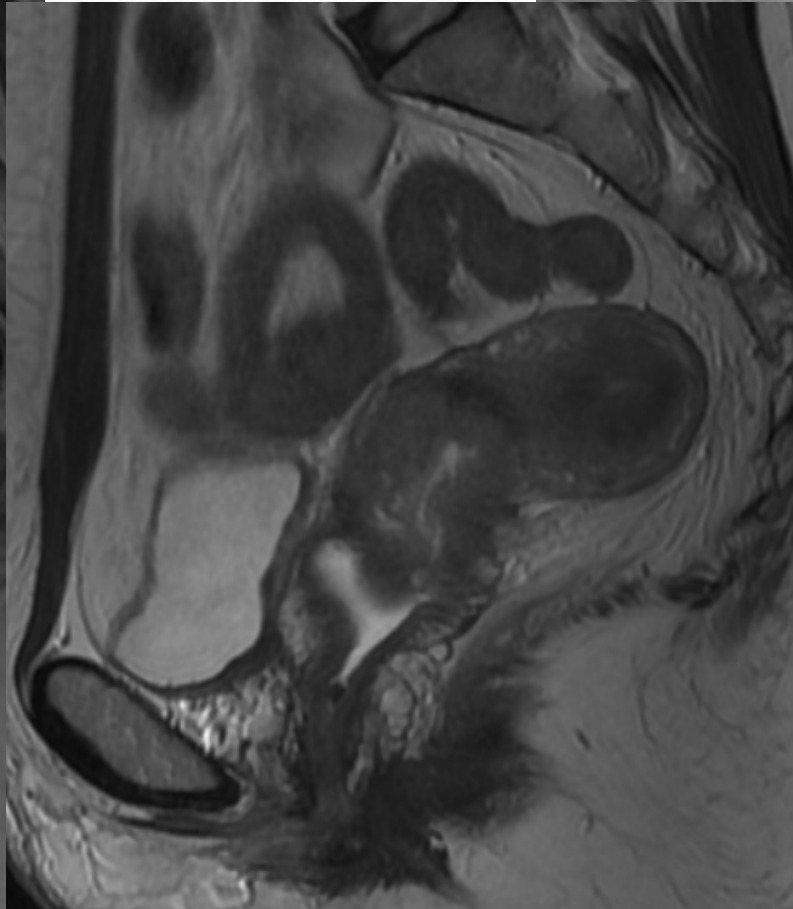
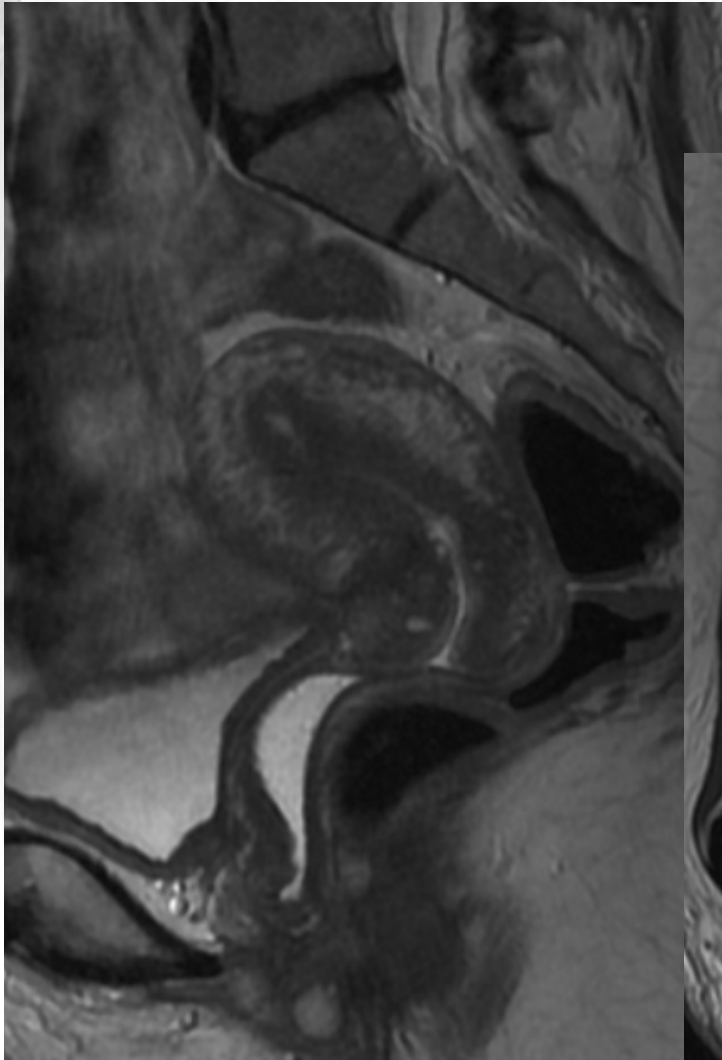
T2 FSE; T2 TSE; T2 FRFSE; T2 SSFSE...

- Vesi- hüperintensiivne
- Rasv- hüperintensiivne
- Veri- sõltuvalt vanusest, intensiivse, vahepealse signaaliga või signaalivaba
- Ajukude- veest hüpointensiivsema signaaliga
- Lihased – veest hüpointensiivsema signaaliga
- Lubistused, kortikaalne luu- signaalivabad

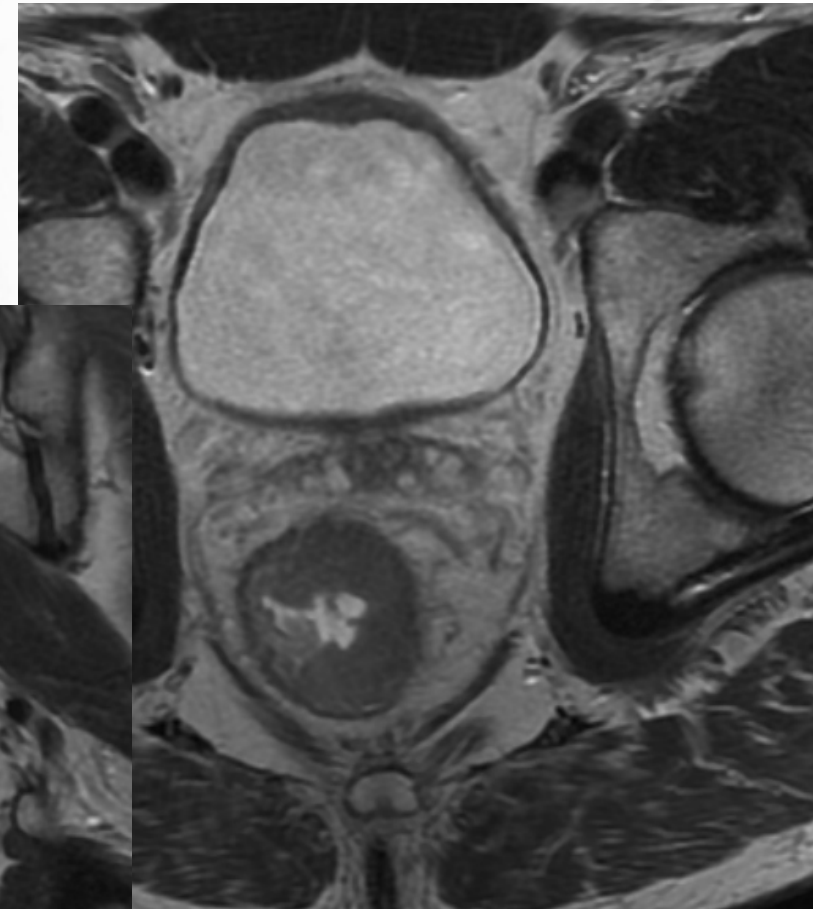
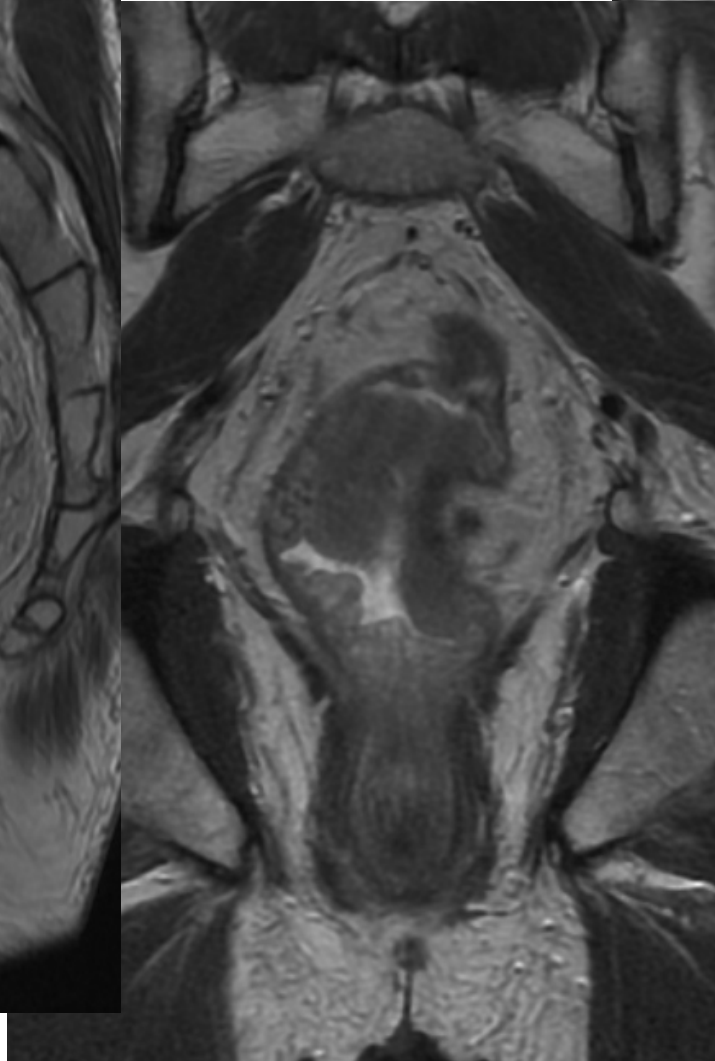
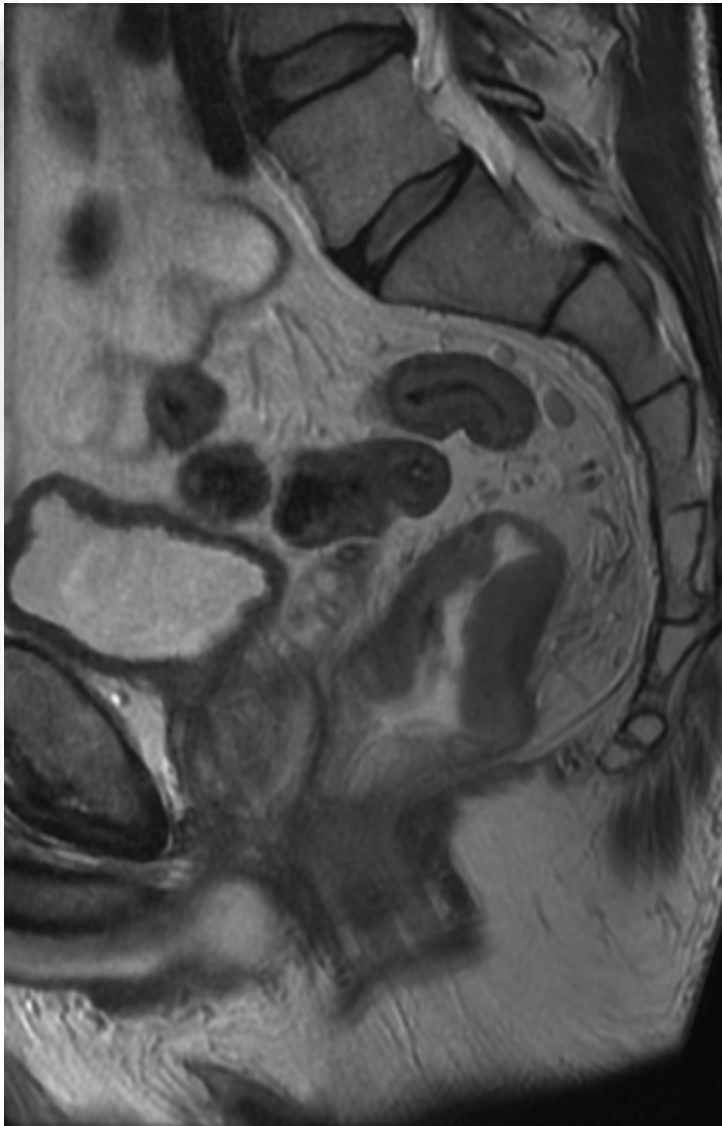
T2 kujutised



T2 kujutised- emakas



T2 kujutised- rektum

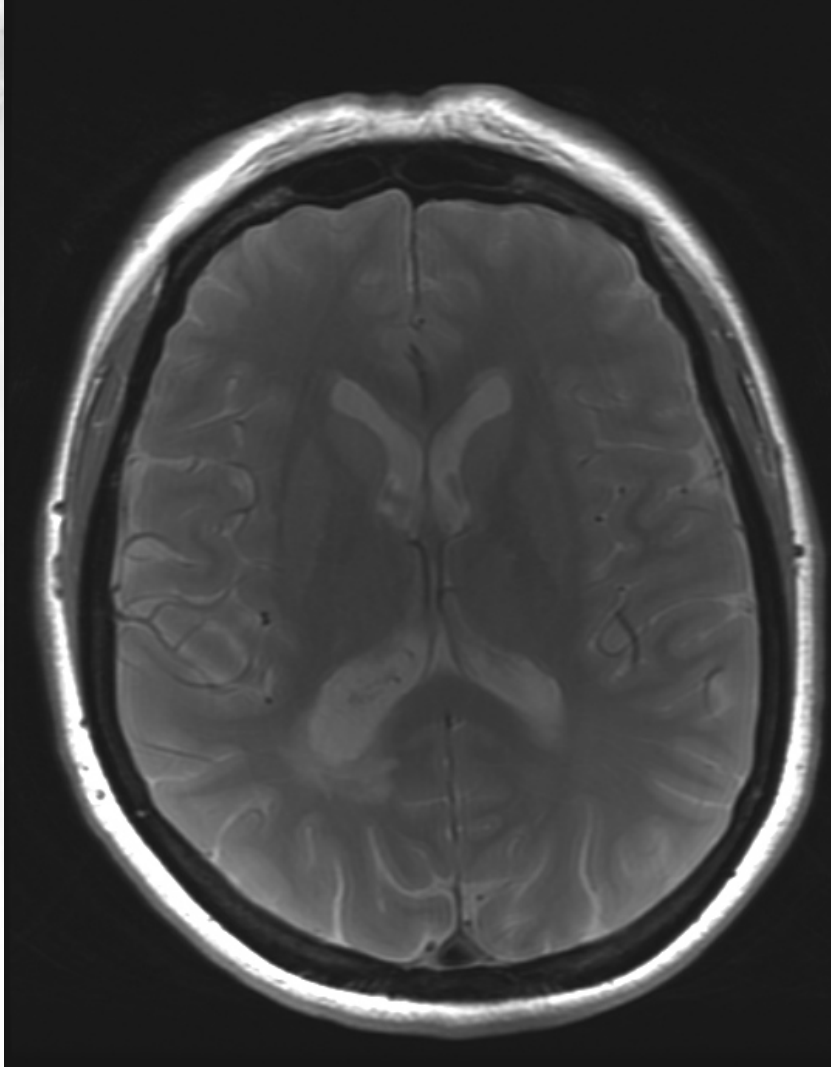


PD kujutised

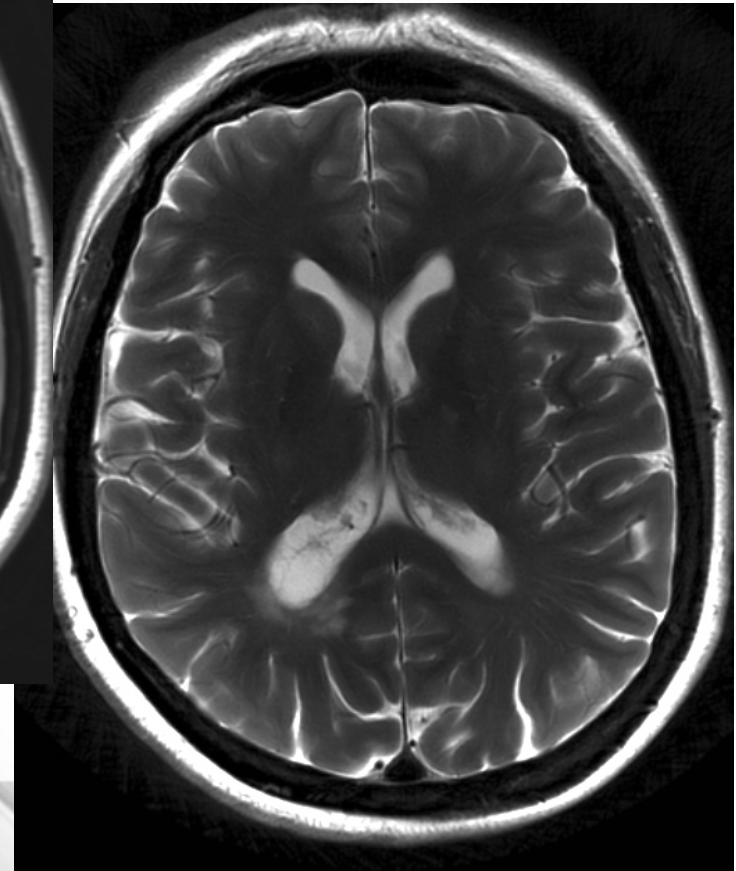
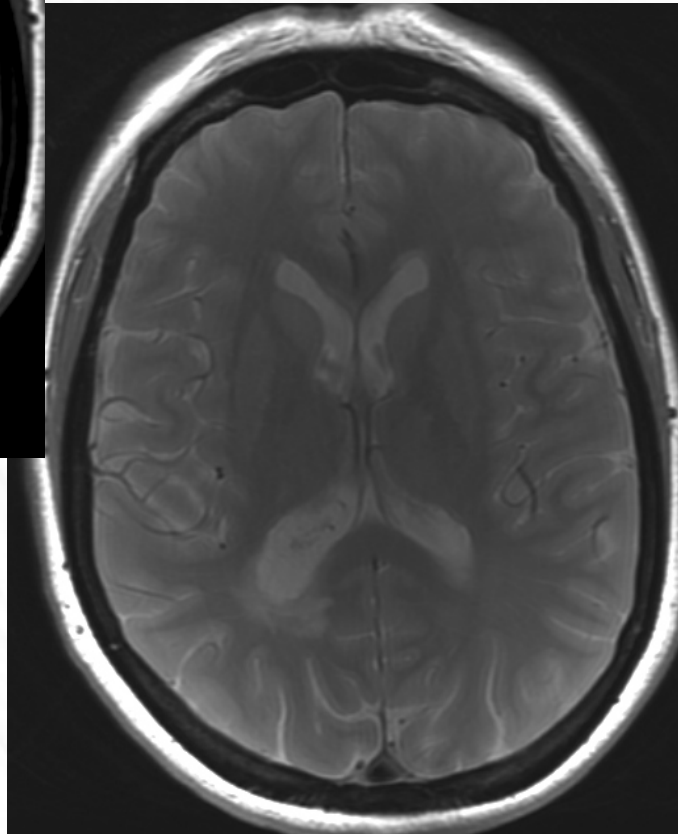
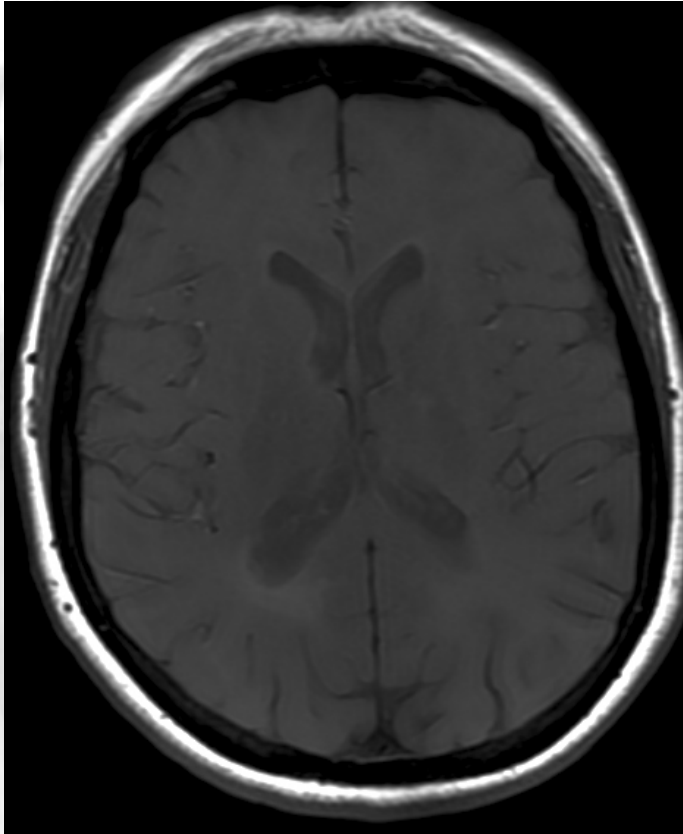
PD FSE; PD TSE

- Intermediate weighted- vahepealse signaaliga- erinevad hallskaala toonid
- Vesi, ajukude, lihased- vahepealse signaaliga
- Rasv- intensiivse signaaliga
- Lubistused, kortikaalne luu- signaalivabad

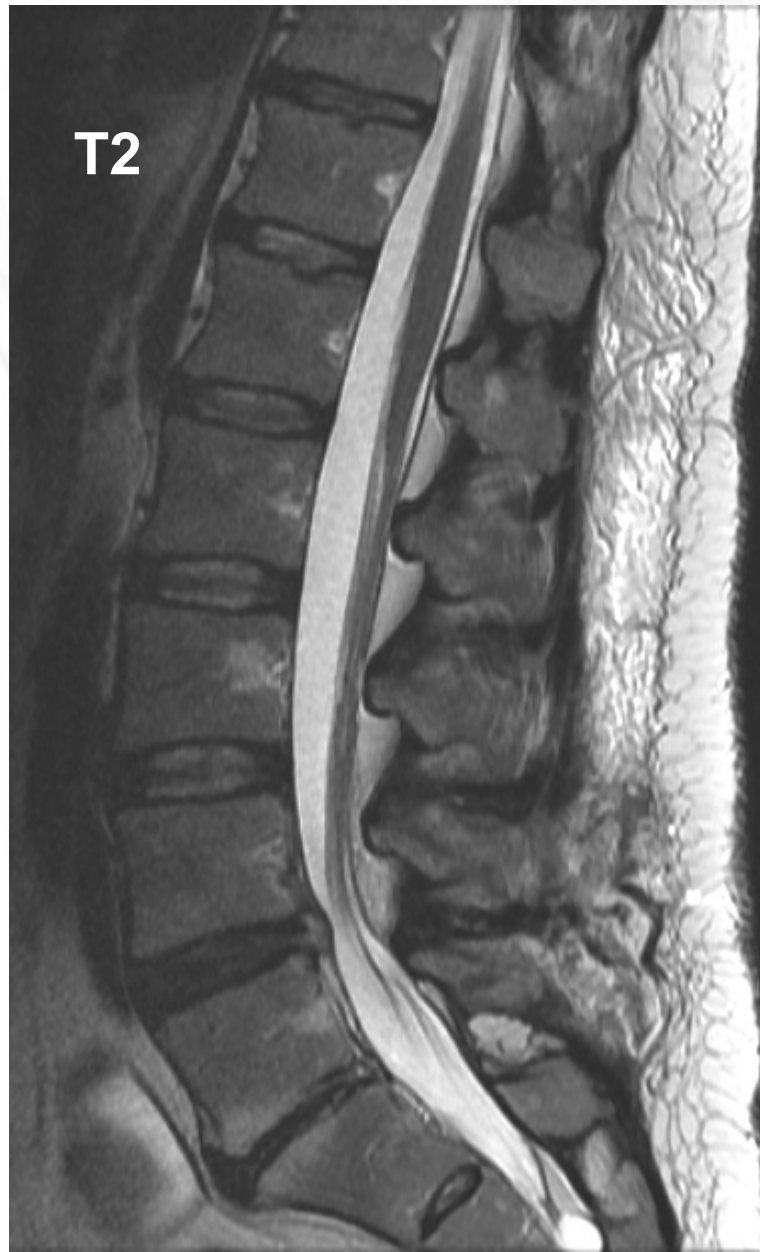
PD kujutised



T1/ PD/ T2 aju



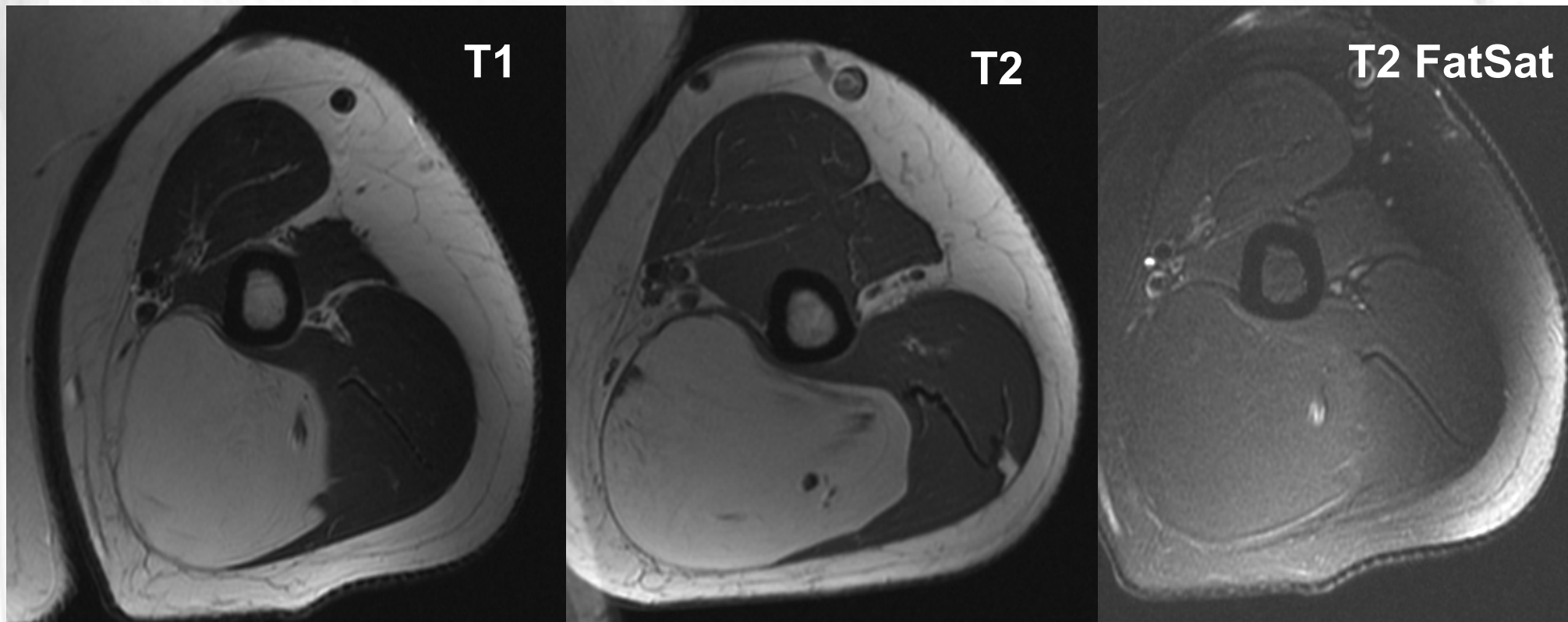
T1, T2 lülsammas



Rasv

Konventsionaalsetel sekventsidel (T1, PD T2) intensiivse signaaliga

Rasva signaali on võimalik maha suruda



Rasvsupressiooniga kujutised

FS; Fat Sat; STIR; SPIR; SPAIR

Rasva signaal surutakse maha, see on tume, praktiliselt must, signaalivaba

T2 kaalutud kujutistel aitab välja tuua patoloogia, kus kudedes on vedeliku sisalduse tõus- põletik, vaskulariseeritud tuumor, vedelikukogumid

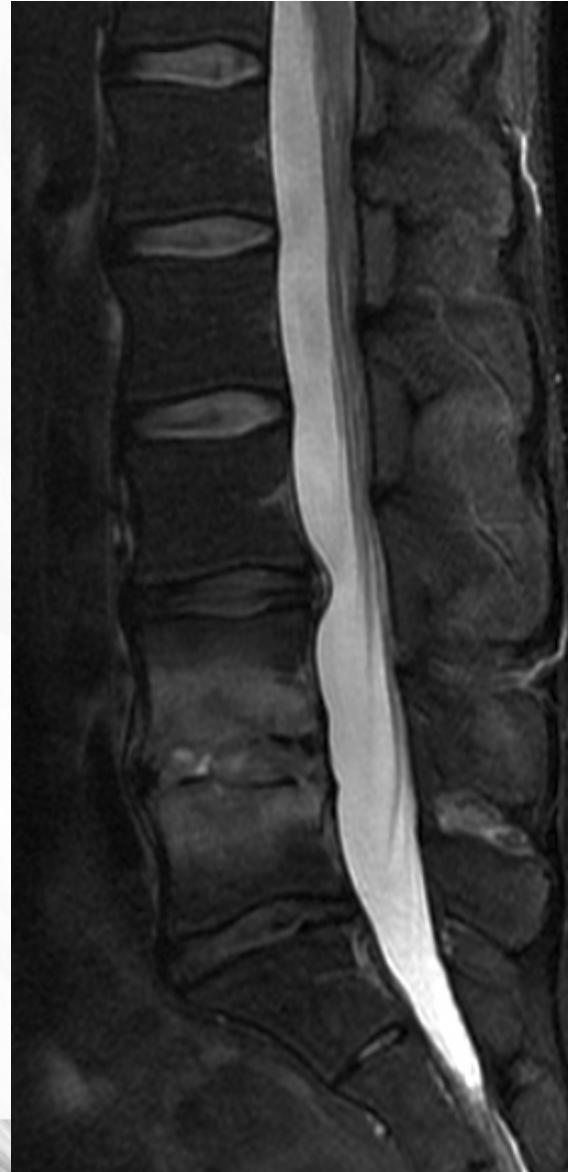
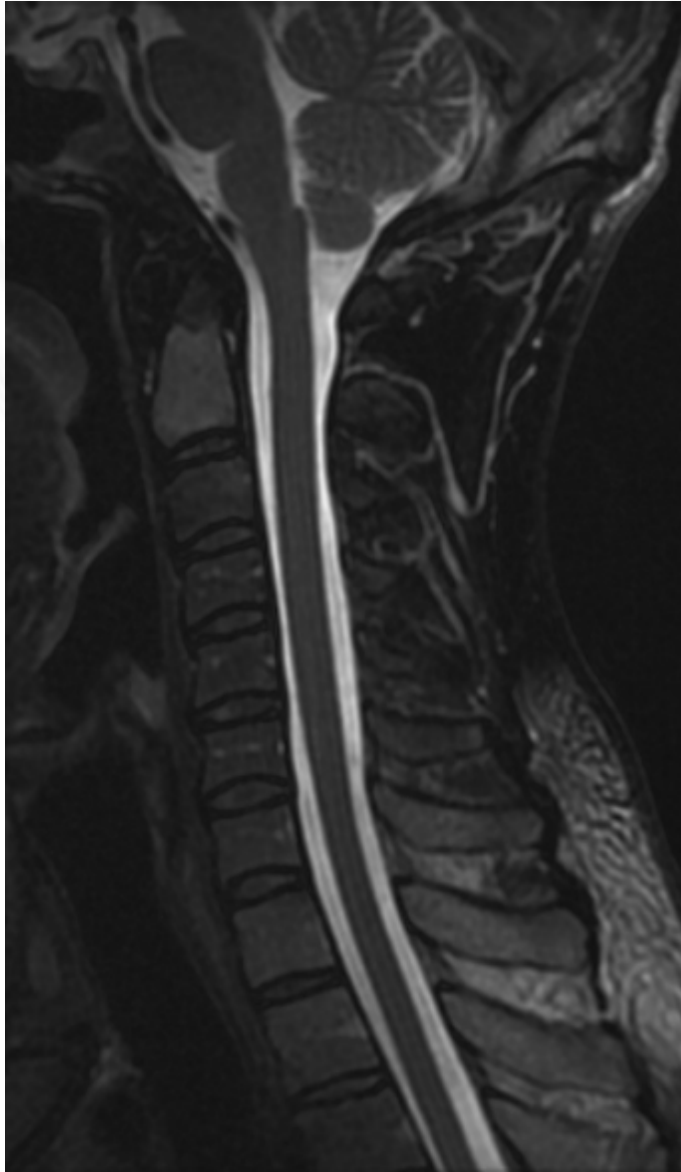
T1 kujutistel aitab leida verd

T1 kontrastainega kujutistel aitab välja tuua patoloogilise kontrasteerumise

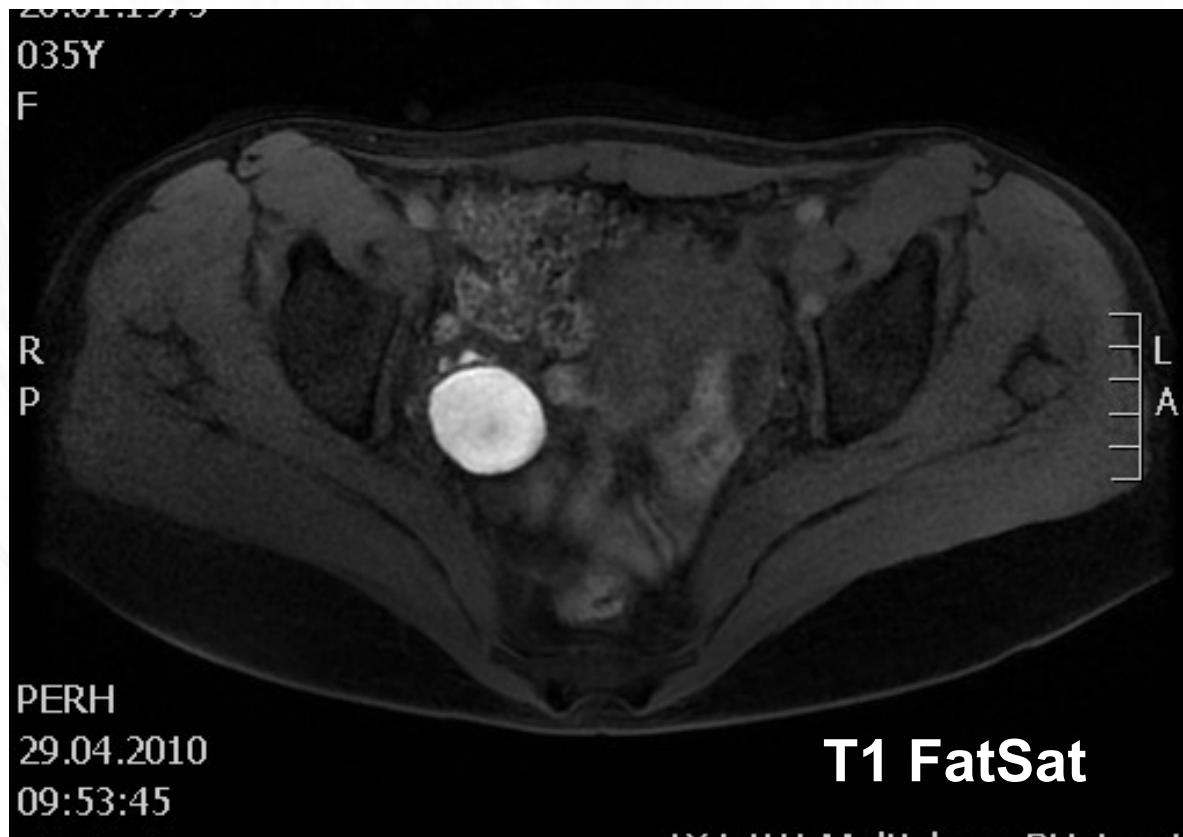
Rasvsuppressiooniga T2 kujutised- selg



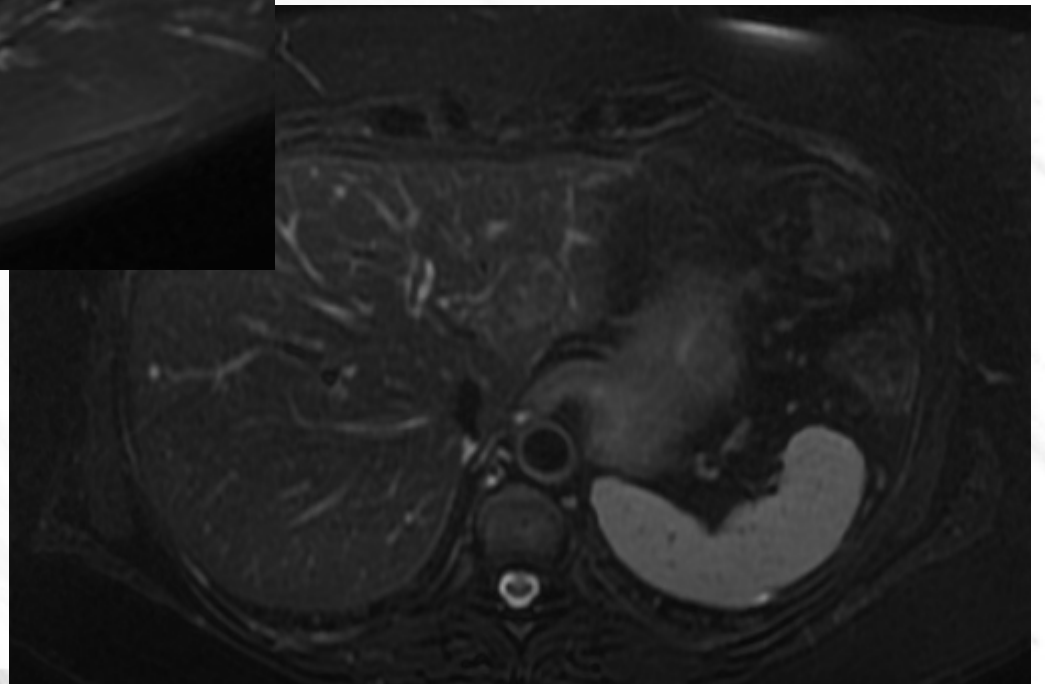
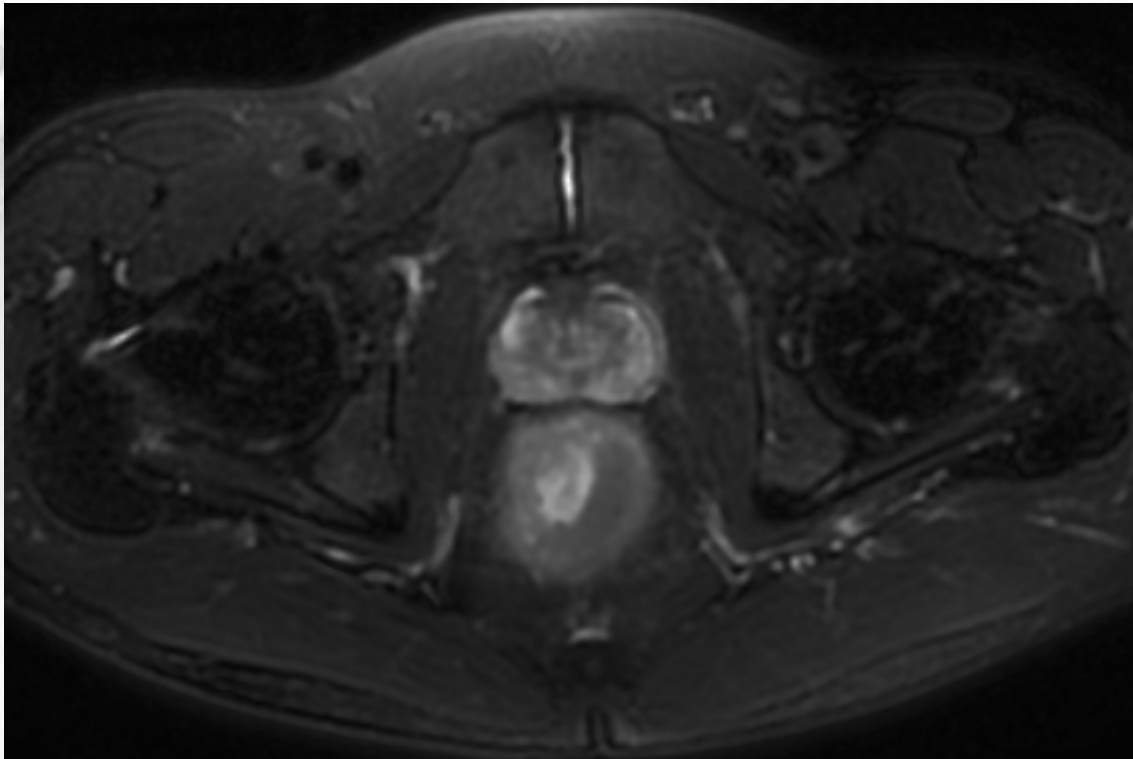
Rasvsuppressiooniga T2 kujutised



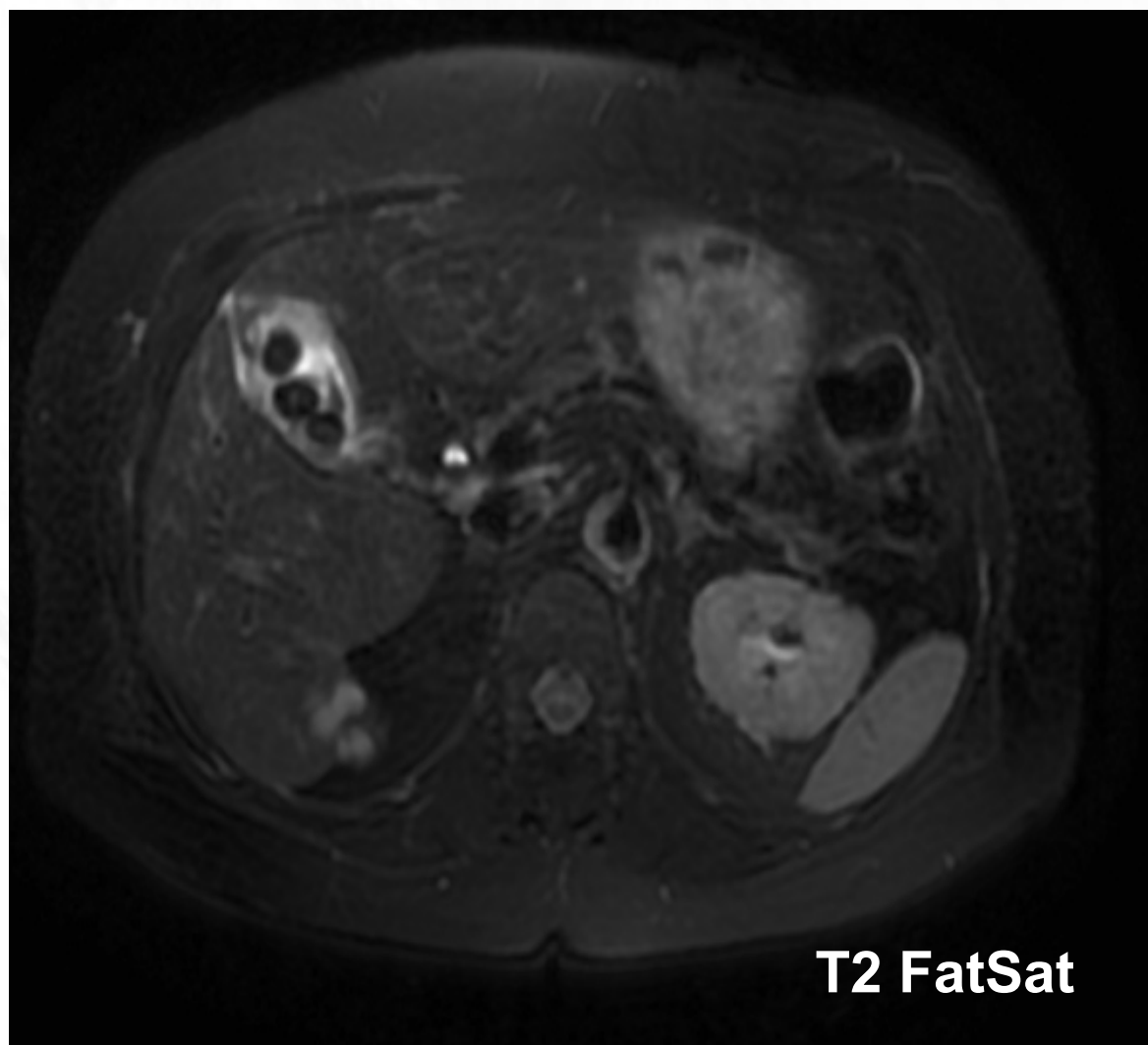
Veri (hemorraagiline tsüst)



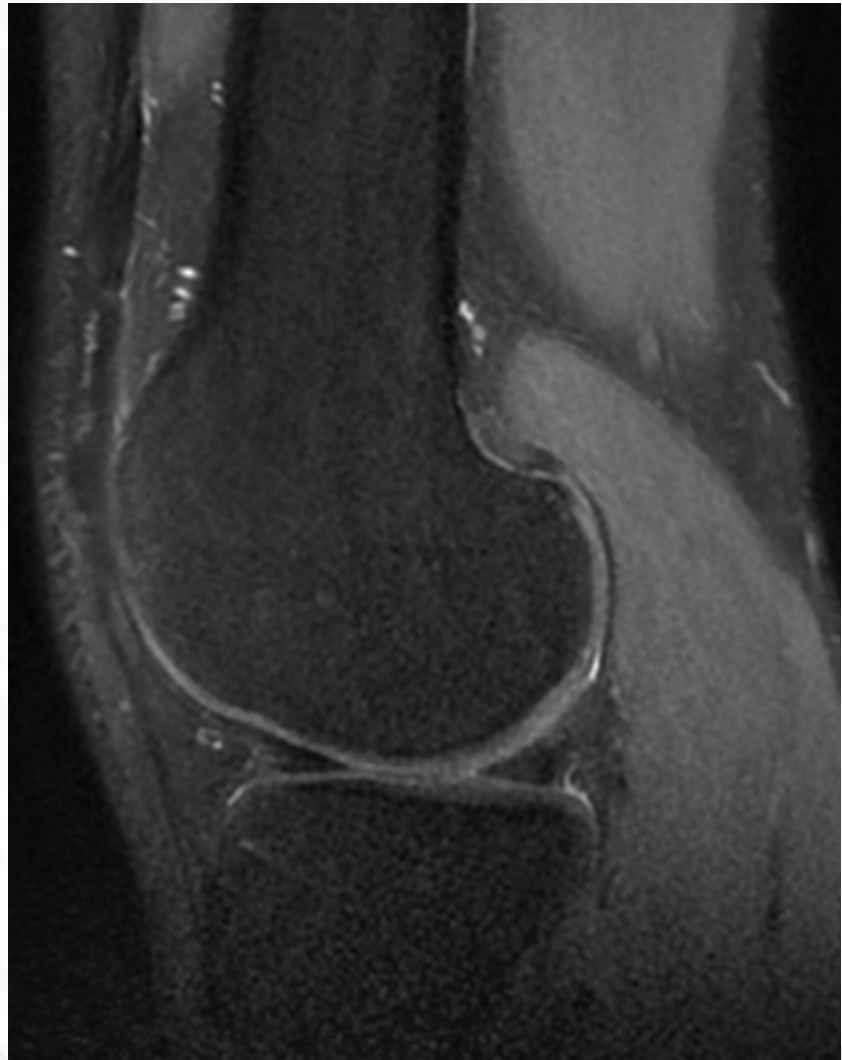
Rasvsuppressiooniga T2 kujutised



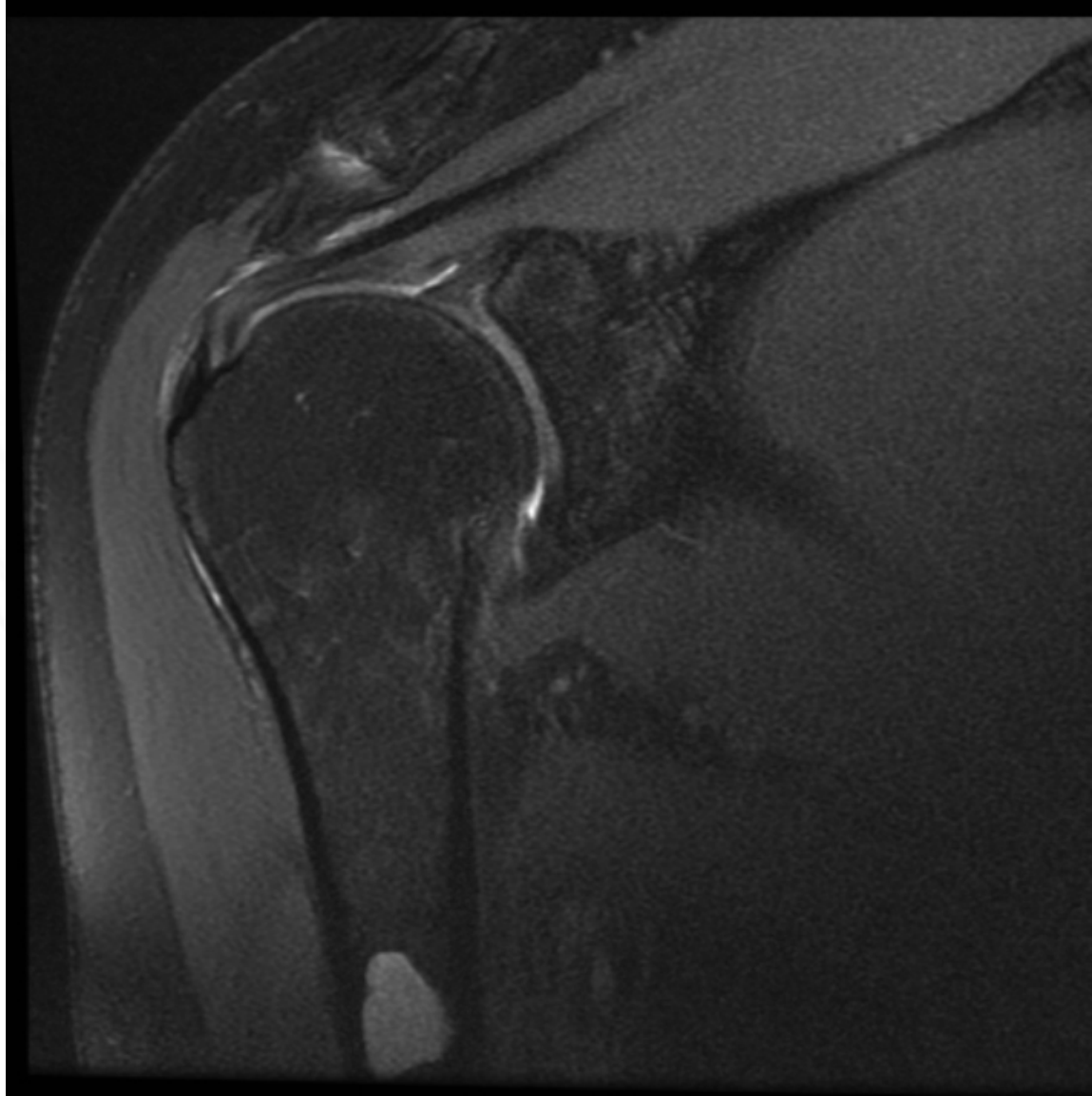
Sapipõis kividega



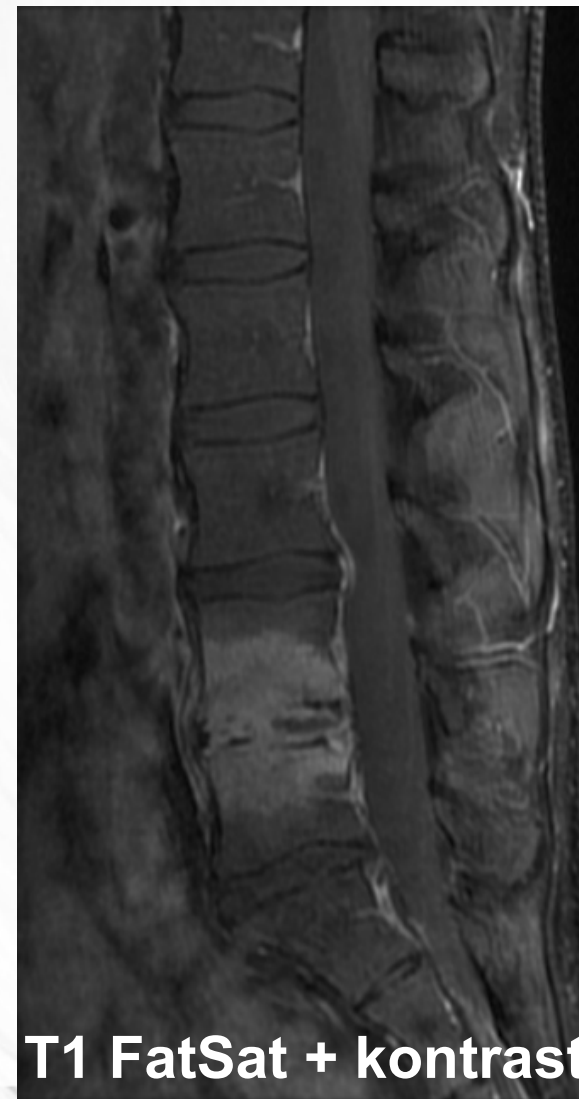
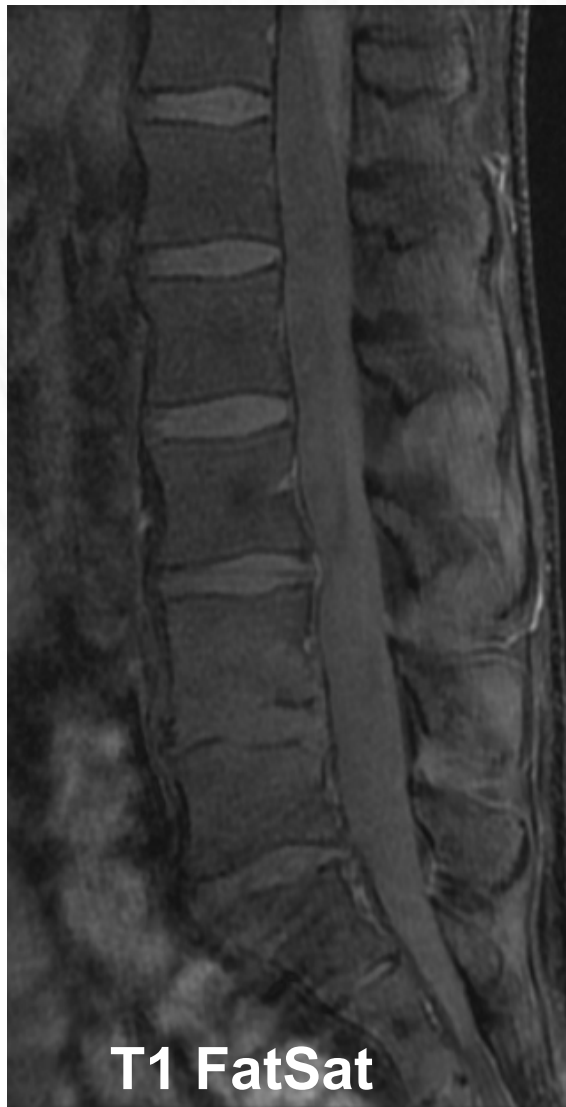
Rasvsupressiooniga PD kujutised



Rasvsupressiooniga PD kujutised



Rasvsuppressiooniga T1 kujutised



T2 FLAIR

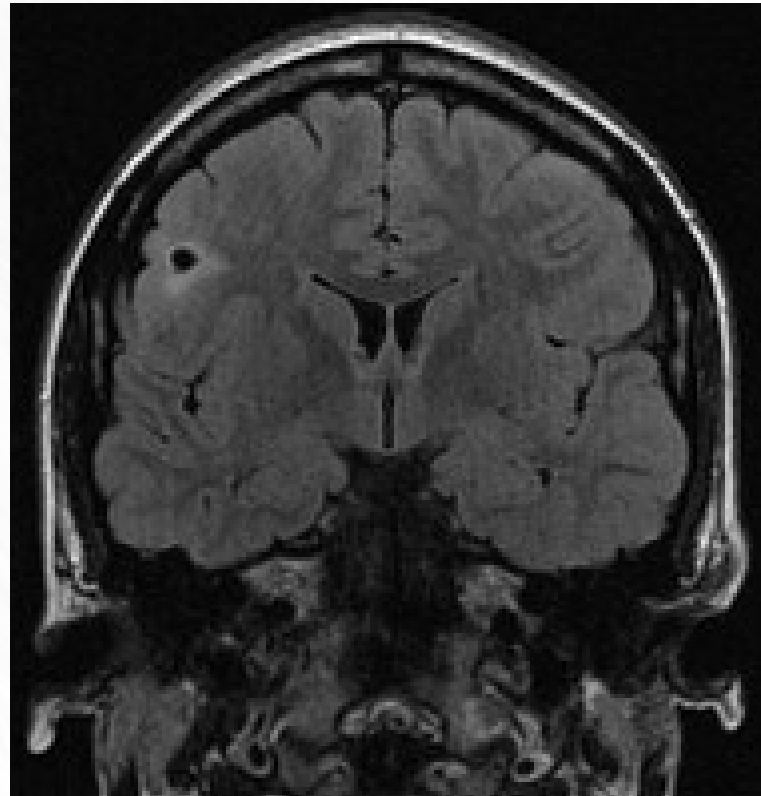
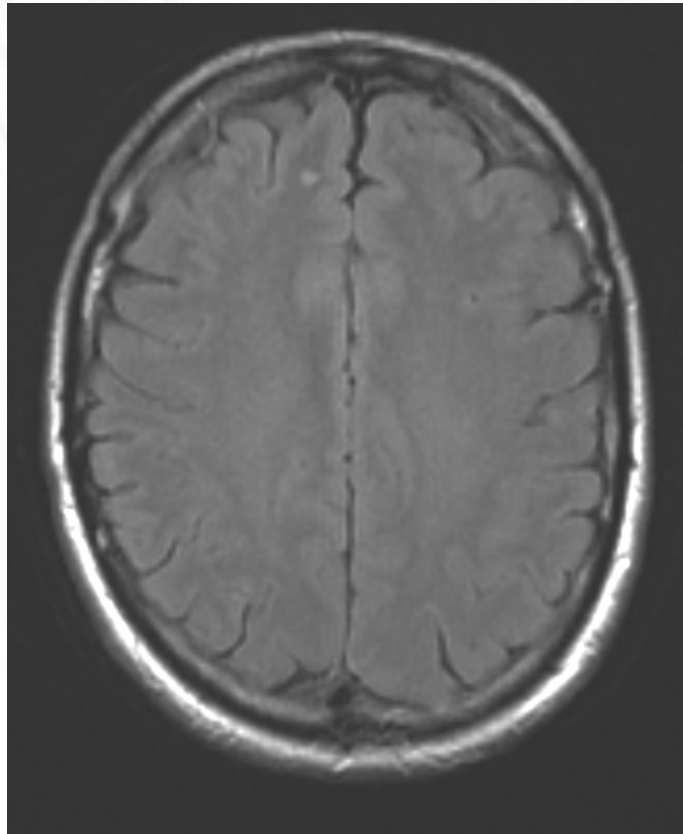
TIRM Dark Fluid, Turbo Dark Fluid

Kasutatakse aju uuringutel

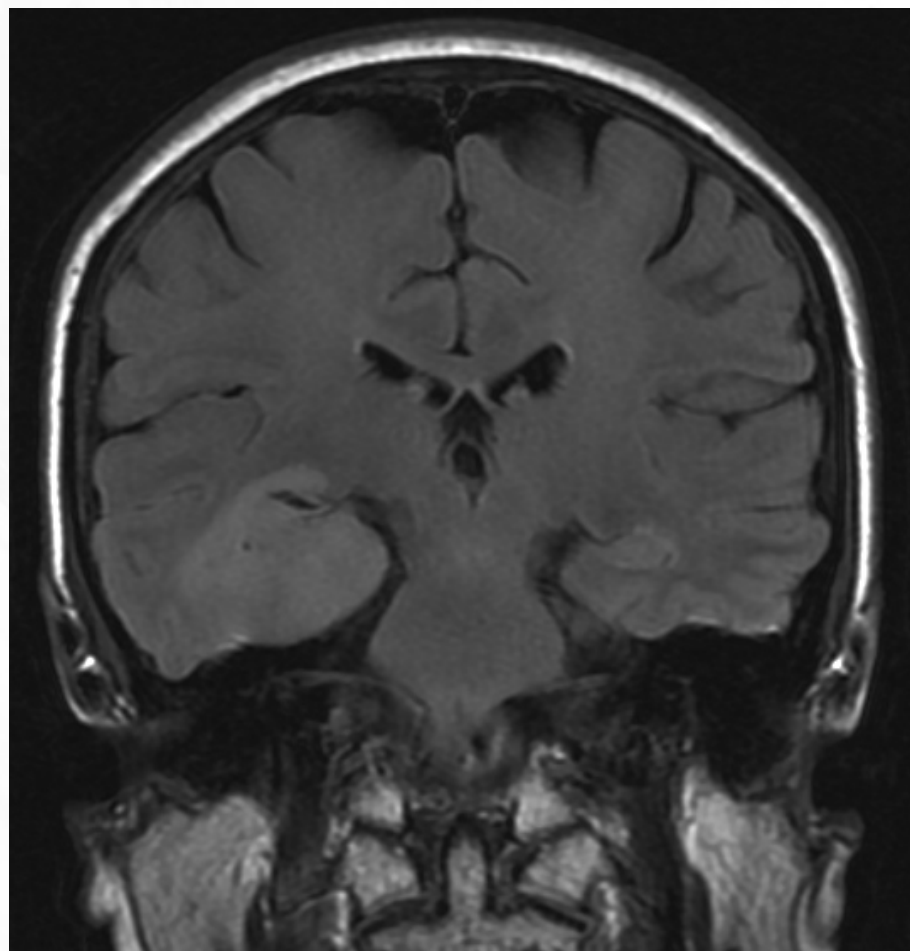
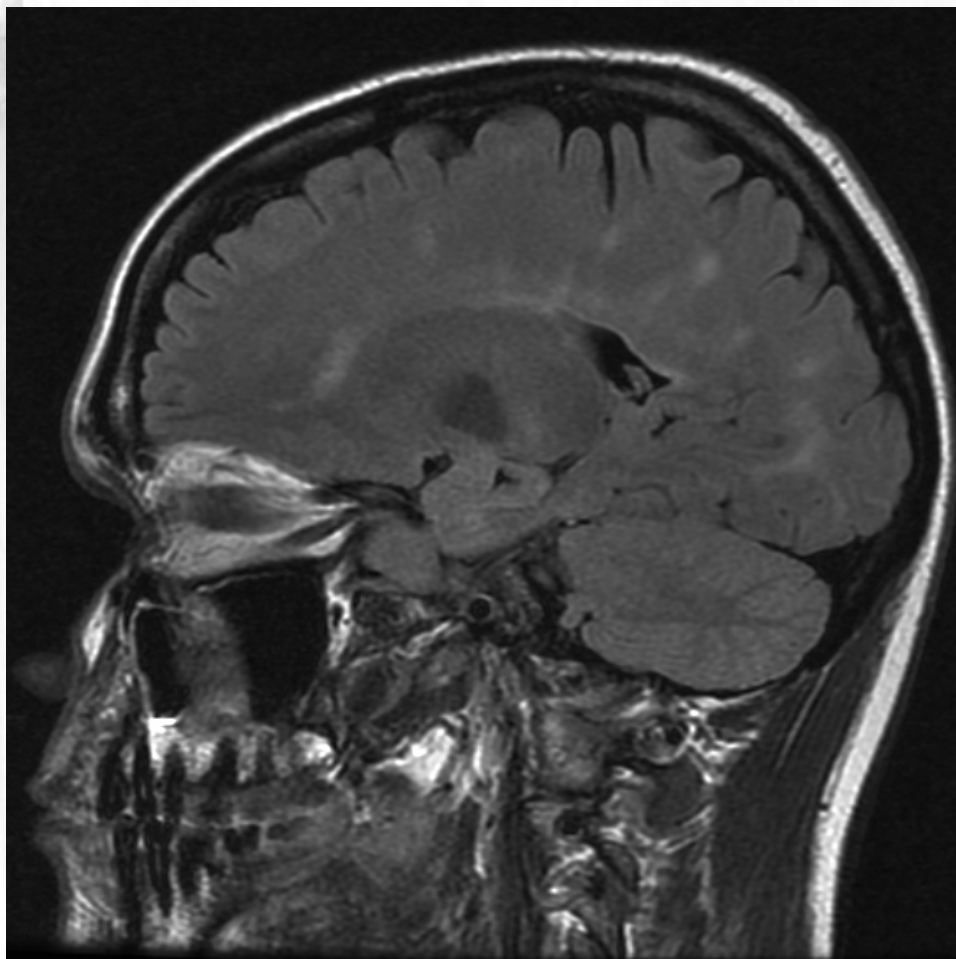
Surutakse maha liikvori signaal,
kahjustuskolded on intensiivse signaaliga

Väga tundlik ka väikeste kollete leidmisel

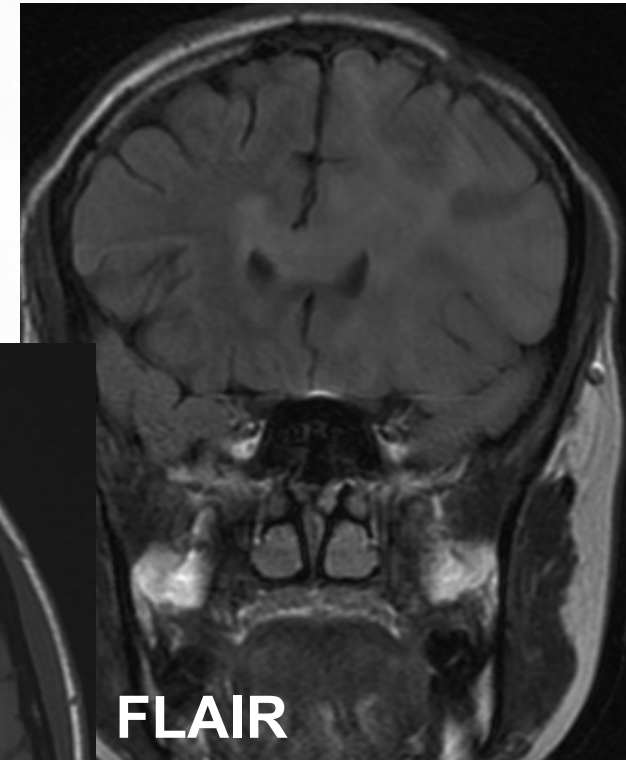
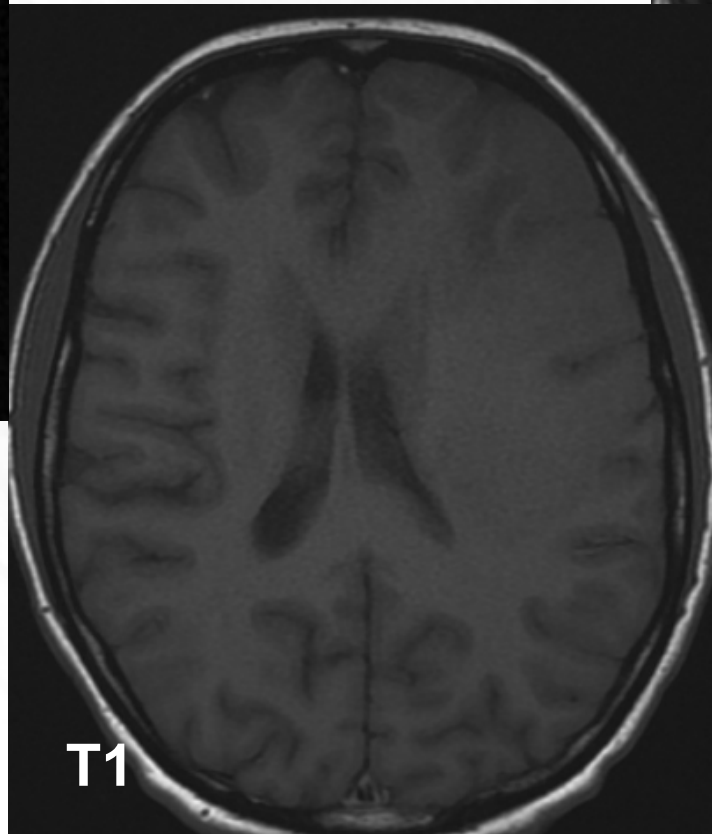
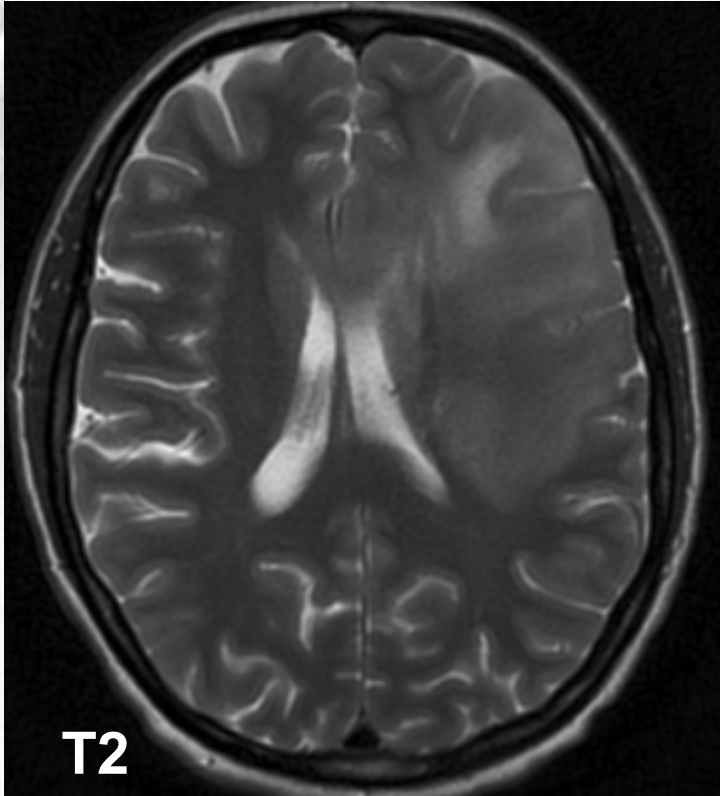
T2 FLAIR



T2 FLAIR



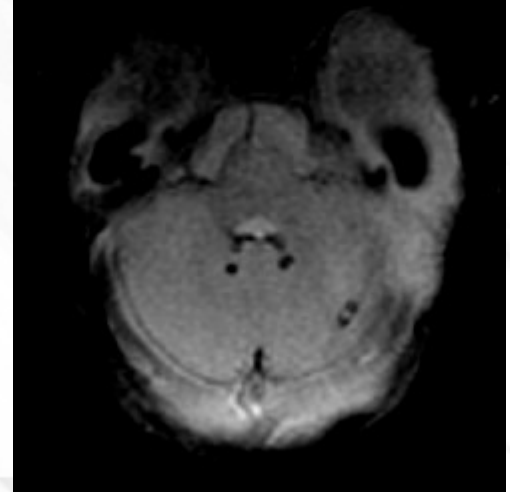
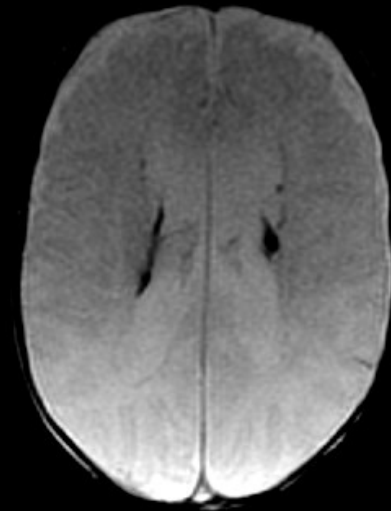
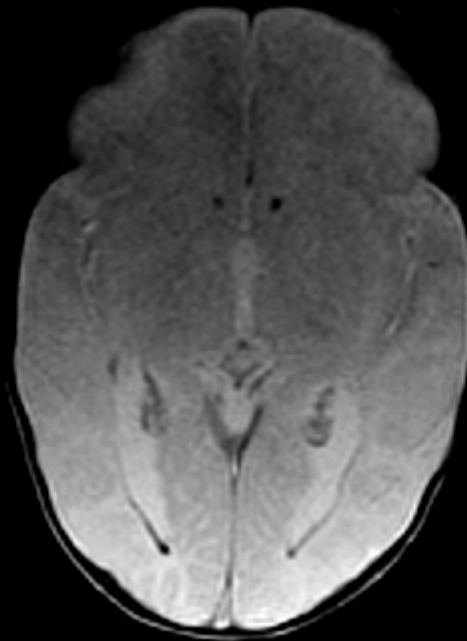
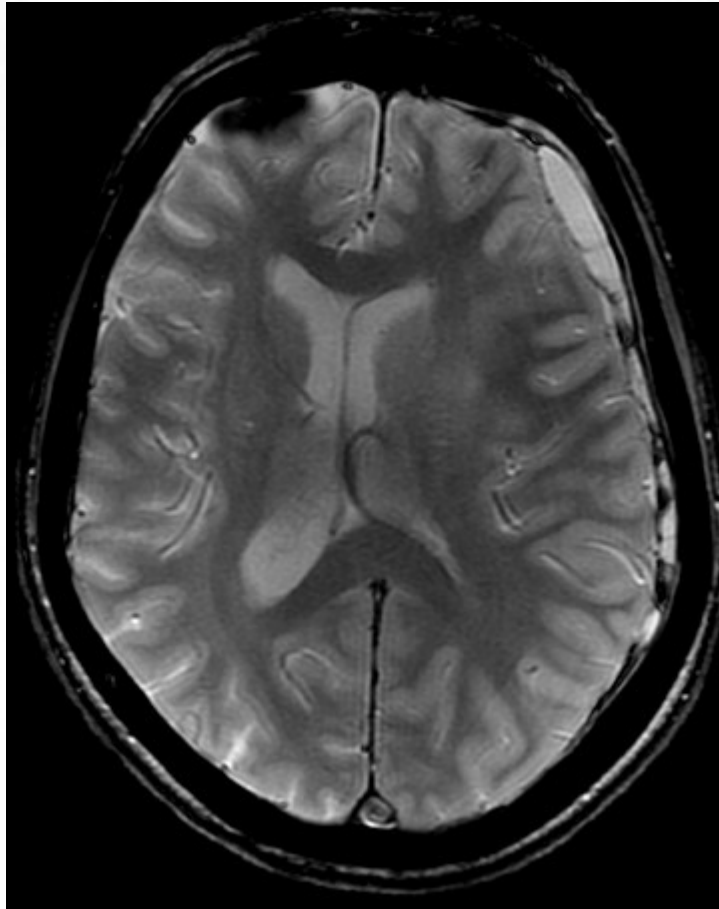
Infiltratiivne tuumor- T2, T1 ja FLAIR



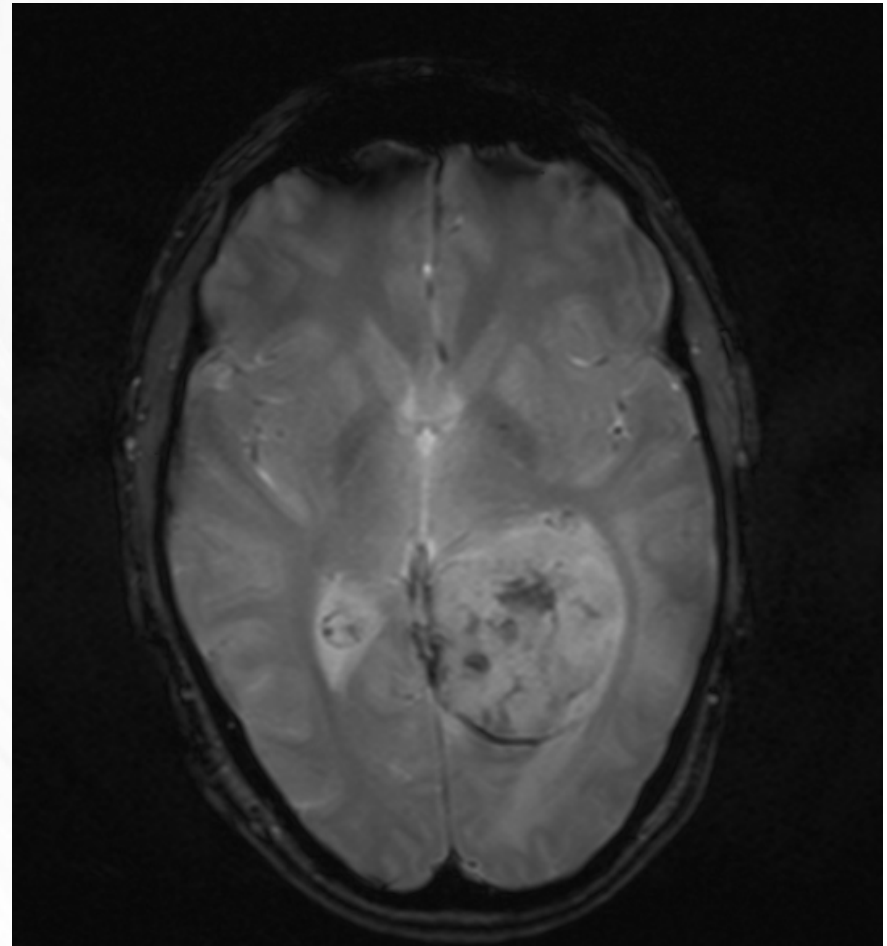
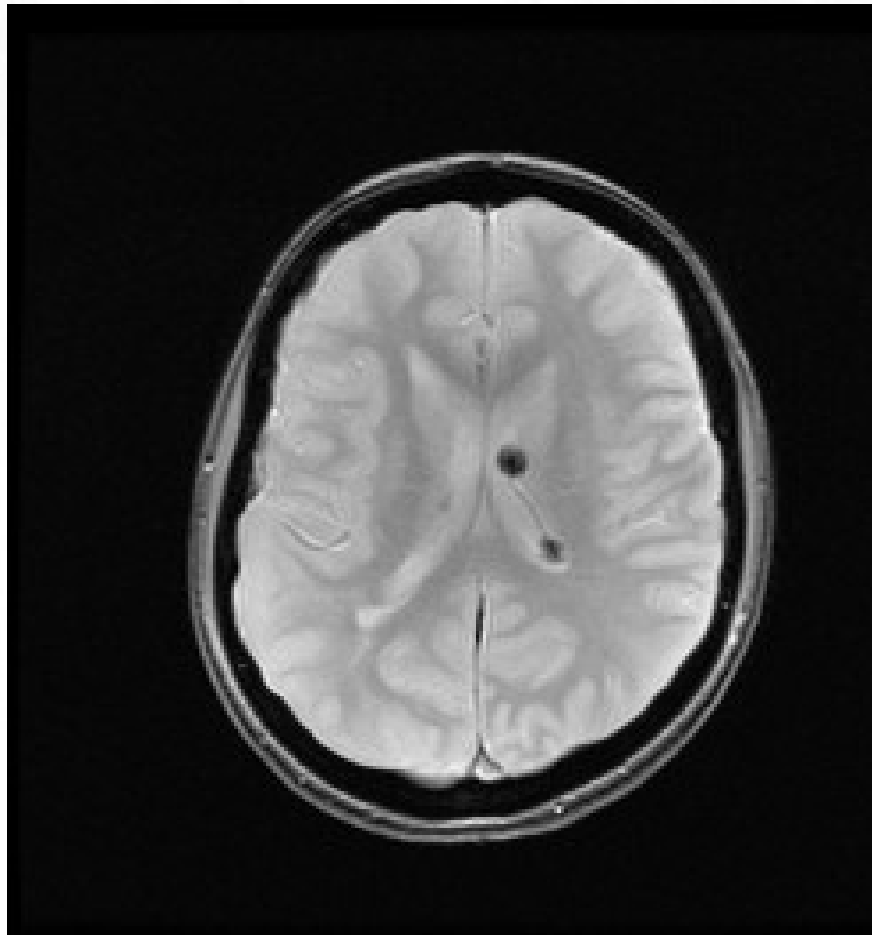
T2 gradient kujutised

- T2*GRE
 - SWAN
 - SWI
 - MERGE
 - T2 hemo
-
- toob välja mikrohemorraagiad, lubistused, ladestused, luu kontuurid

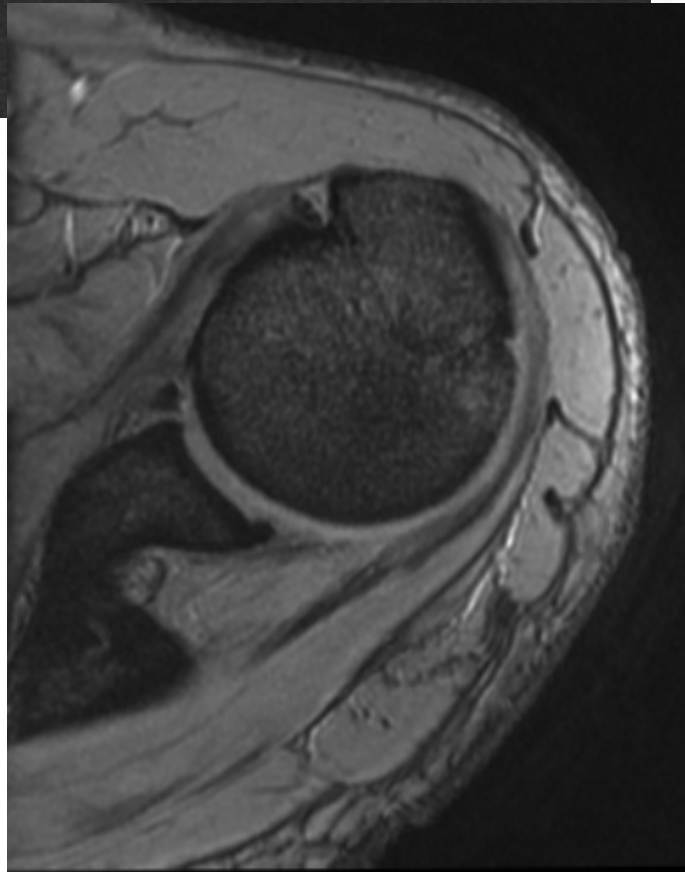
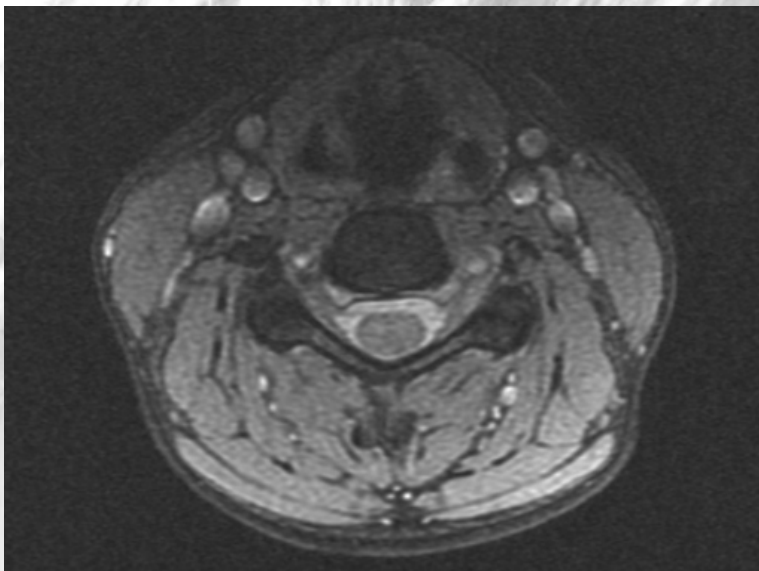
T2*GRE- veri



T2*GRE lubistused



Luude kontuurid



VERI: signaali intensiivsus sõltub hematoomi vanusest

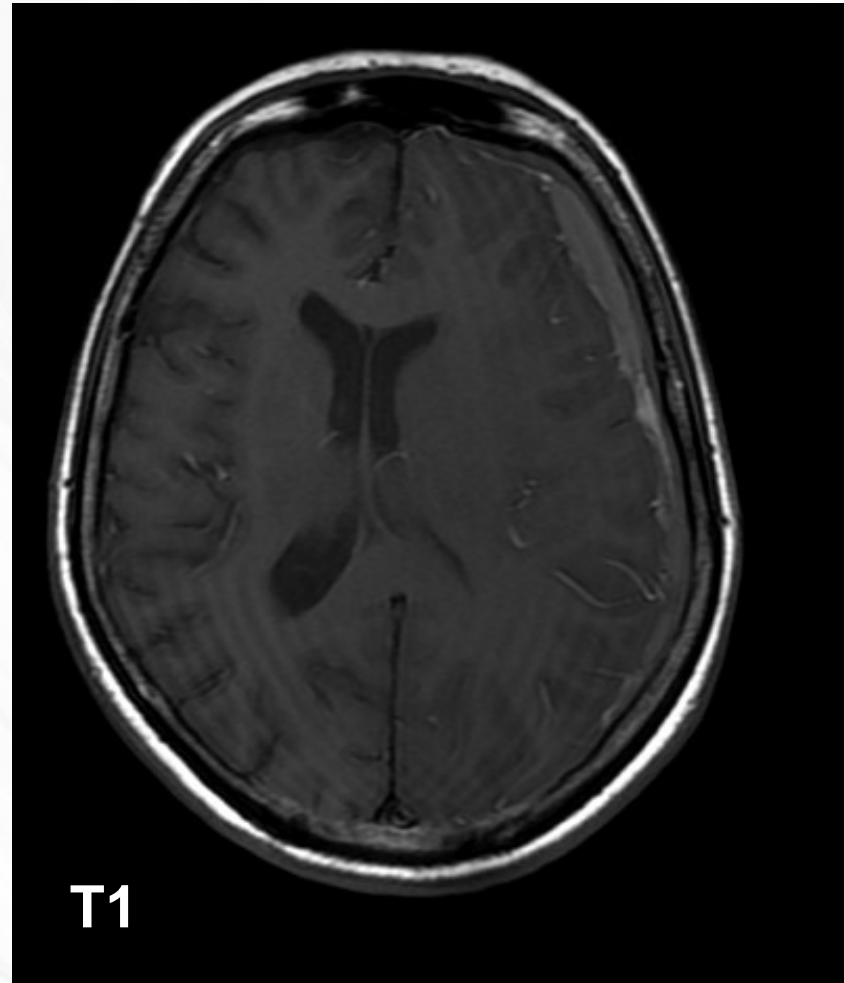
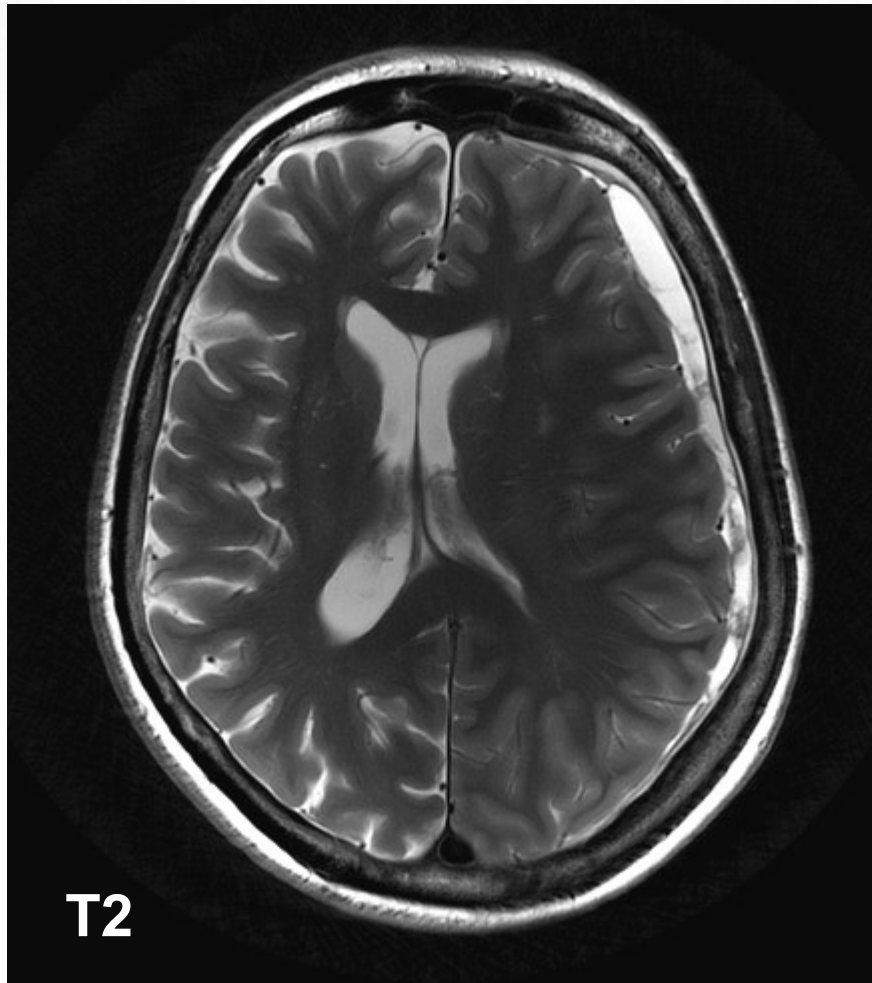
- erütrotsüüdid sisaldavad hapniku kandjana hemoglobiini
- hemoglobiin seob hapnikku, selle koostises on raud
- hemoglobiini oksüdatsiooni aste on seotud magneetiliste omadustega

Table 2 Sequential signal intensity (SI) changes of intracranial hemorrhage on MRI (1.5 T). *Hb* hemoglobin; *e*- electrons; *PEDD* proton-electron dipole-dipole interaction; *T2-PRE* T2-proton relaxation enhancement; *FeOOH* ferric oxyhydroxide; $\approx$ isointense

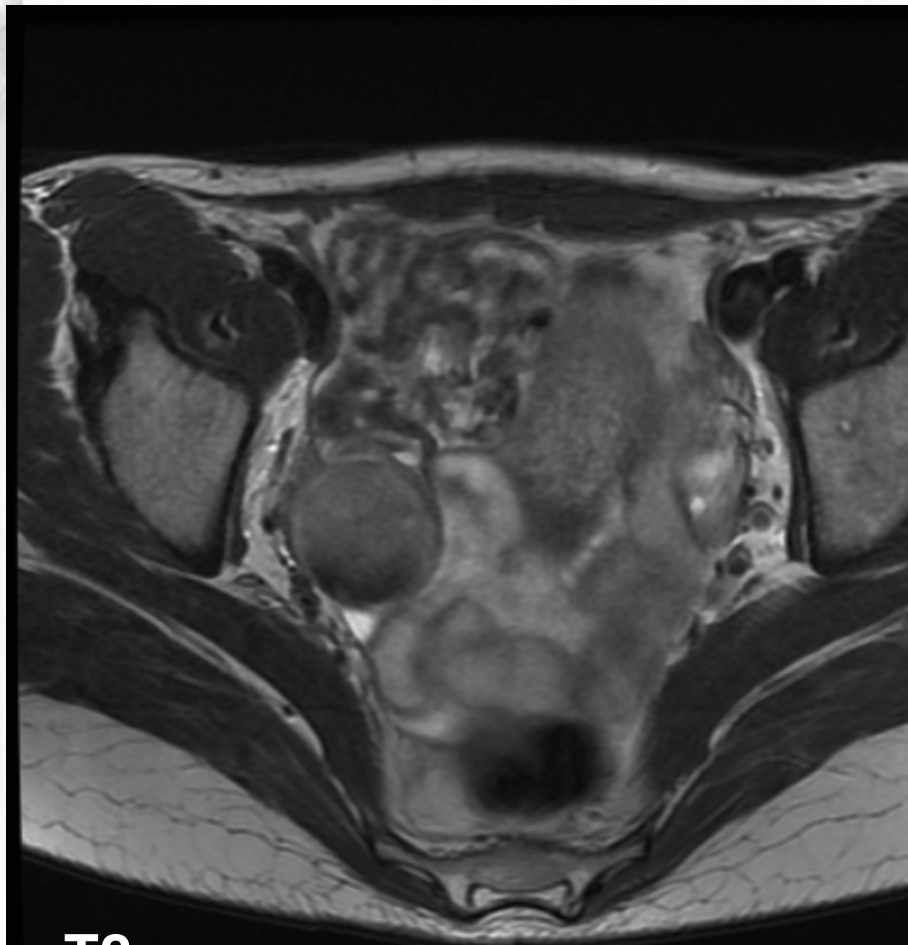
relative to normal gray matter; $\uparrow$ increased SI relative to normal gray matter; $\downarrow$ decreased SI relative to normal gray matter; $\downarrow\downarrow$ markedly decreased SI relative to normal gray matter

	Hyperacute hemorrhage	Acute hemorrhage	Early subacute hemorrhage	Late subacute hemorrhage	Chronic hemorrhage
What happens	Blood leaves the vascular system (extravasation)	Deoxygenation with formation of deoxy-Hb	Clot retraction and deoxy-Hb is oxidized to met-Hb	Cell lysis (membrane disruption)	Macrophages digest the clot
Time frame	< 12 h	Hours to days (weeks in center of hematoma)	A few days	4–7 days to 1 month	Weeks to years
Red blood cells	Intact erythrocytes	Intact, but hypoxic erythrocytes	Still intact, severely hypoxic	Lysis (solution of lysed cells)	Gone; encephalomalacia with proteinaceous fluid
State of Hb	Intracellular oxy-Hb	Intracellular deoxy-Hb	Intracellular met-Hb (first at periphery of clot)	Extracellular met-Hb	Hemosiderin (insoluble) and ferritin (water soluble)
Ionisation state	Ferrous (Fe^{2+}), no unpaired e-	Ferrous (Fe^{2+}), four unpaired e-	Ferric (Fe^{3+}), five unpaired e-	Ferric (Fe^{3+}), five unpaired e-	Ferric (Fe^{3+}) 2000 $\times$ 5 unpaired e-
Magnetic properties	Diamagnetic (χ)	Paramagnetic ($\chi > 0$)	Paramagnetic ($\chi > 0$)	Paramagnetic ($\chi > 0$)	<i>FeOOH</i> is superparamagnetic
SI on T1-weighted images	$\approx$ or $\downarrow$	$\approx$ (or $\downarrow$) (No PEDD interaction)	$\uparrow\uparrow$ (PEDD interaction)	$\uparrow\uparrow$ (PEDD interaction)	$\approx$ or $\downarrow$ (no PEDD interaction)
SI on T2-weighted images	$\uparrow$ (High water content)	$\downarrow$ T2 PRE (susceptibility effect)	$\downarrow\downarrow$ T2 PRE (susceptibility effect)	$\uparrow\uparrow$ No T2 PRE (loss of compartmentalization)	$\downarrow\downarrow$ T2 PRE (susceptibility effect)

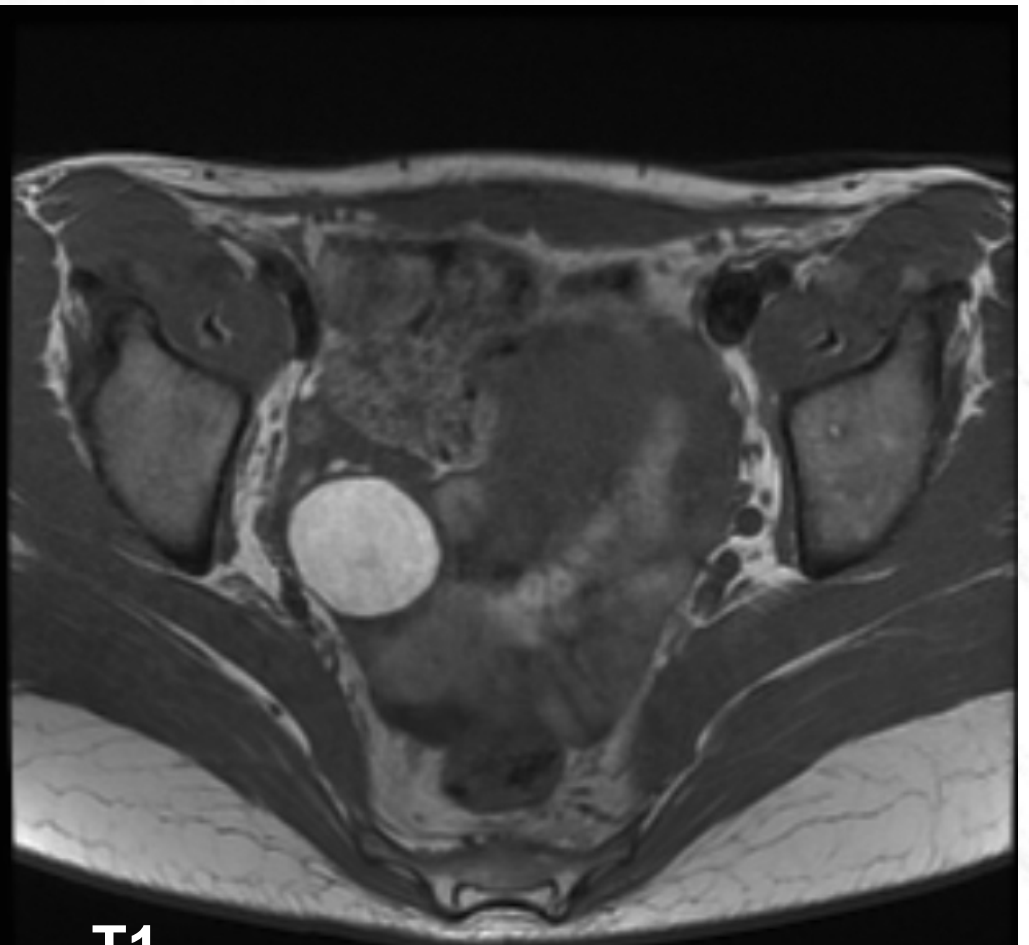
Veri: subduraalne hematoom



VERI: endometrioosikolle munasarjas

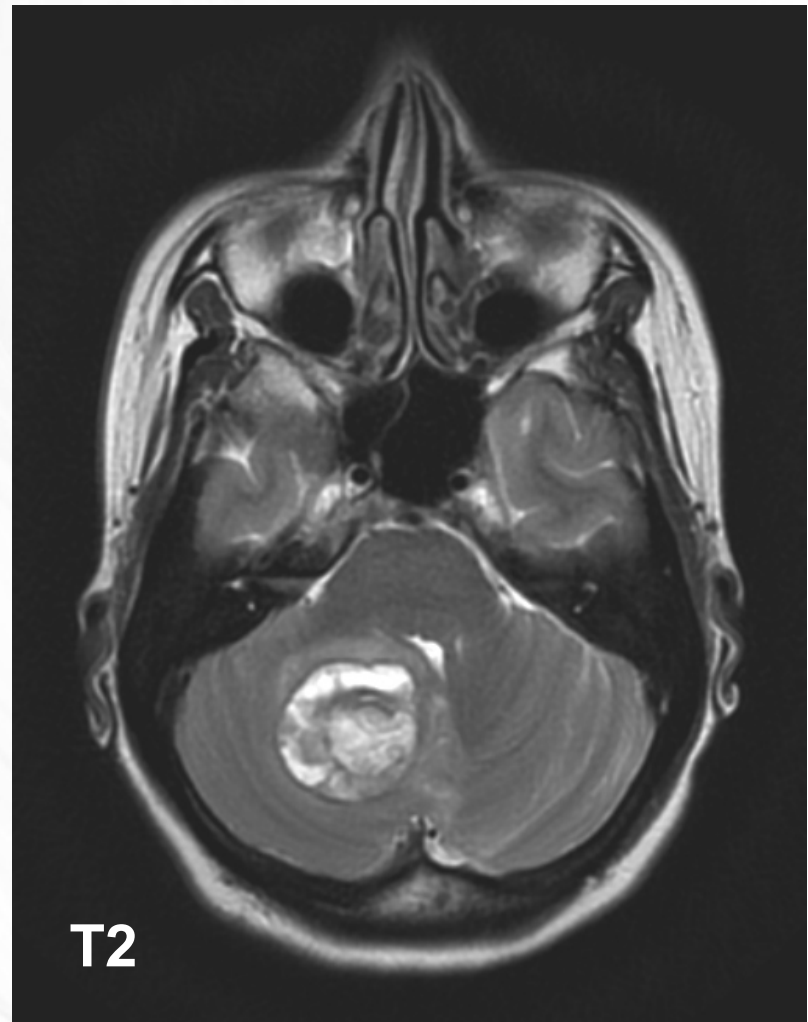
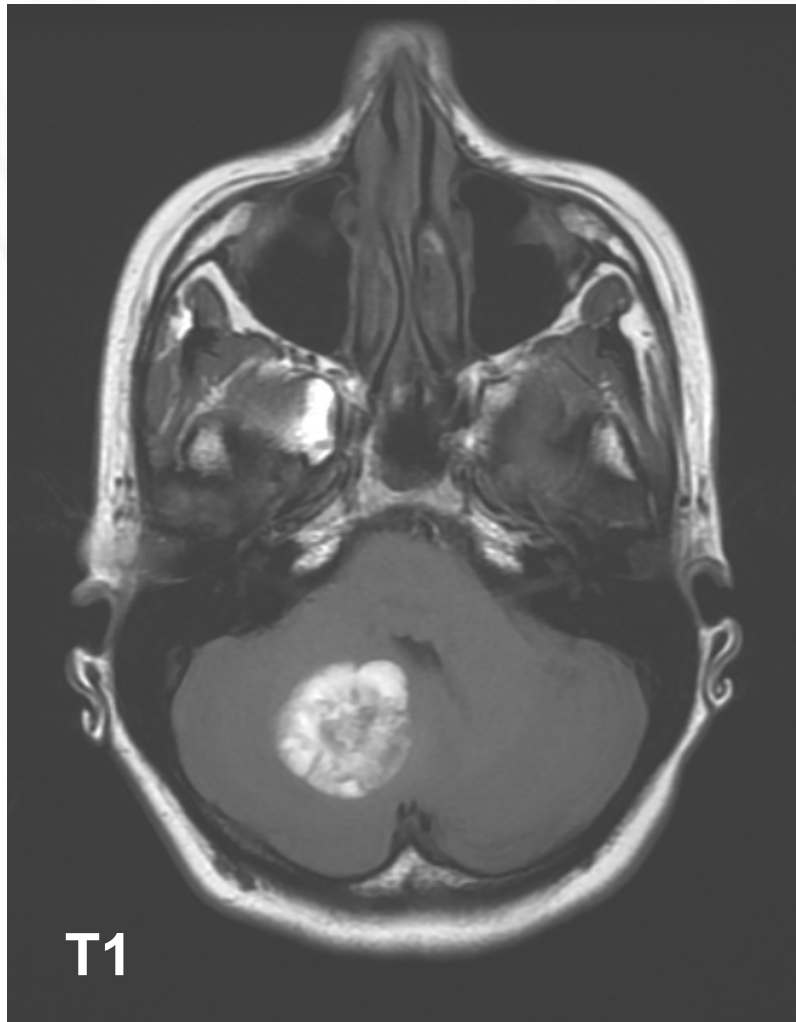


T2



T1

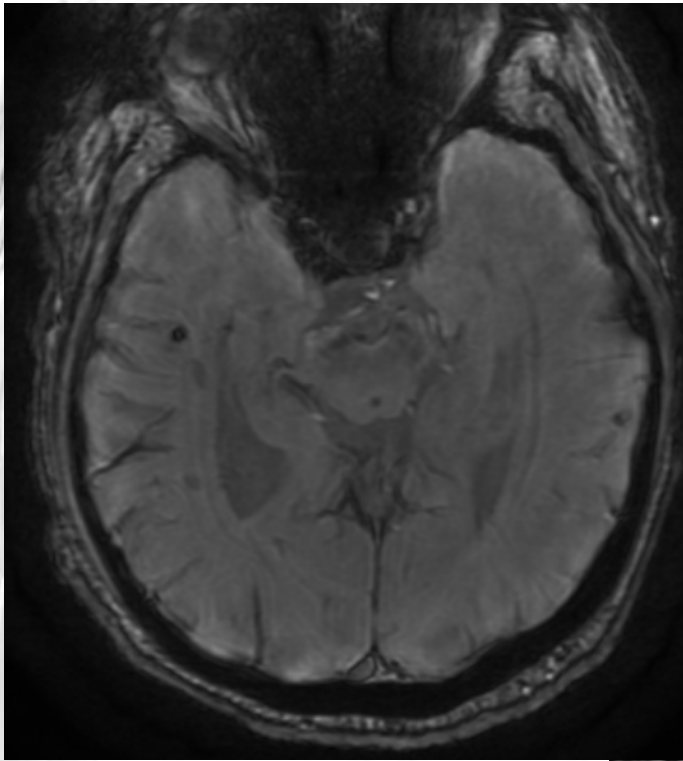
VERI: kavernoom



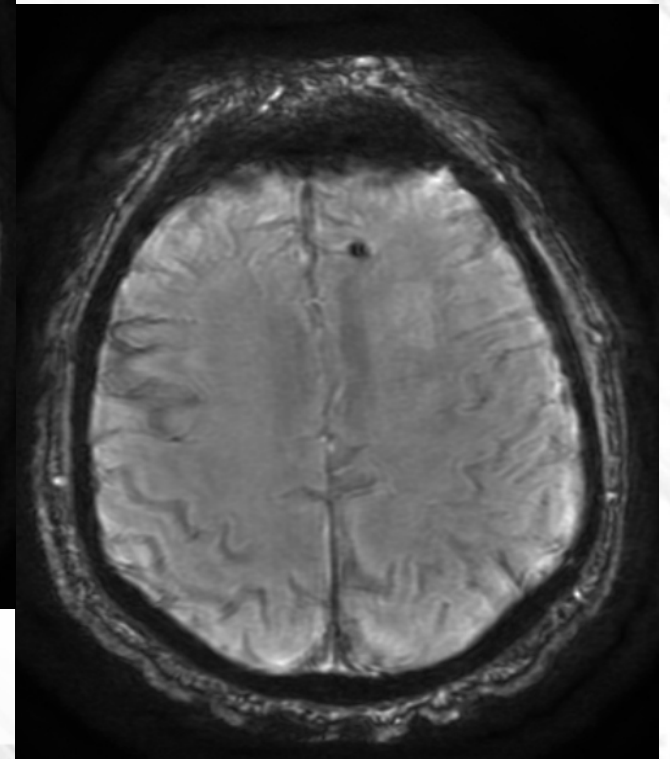
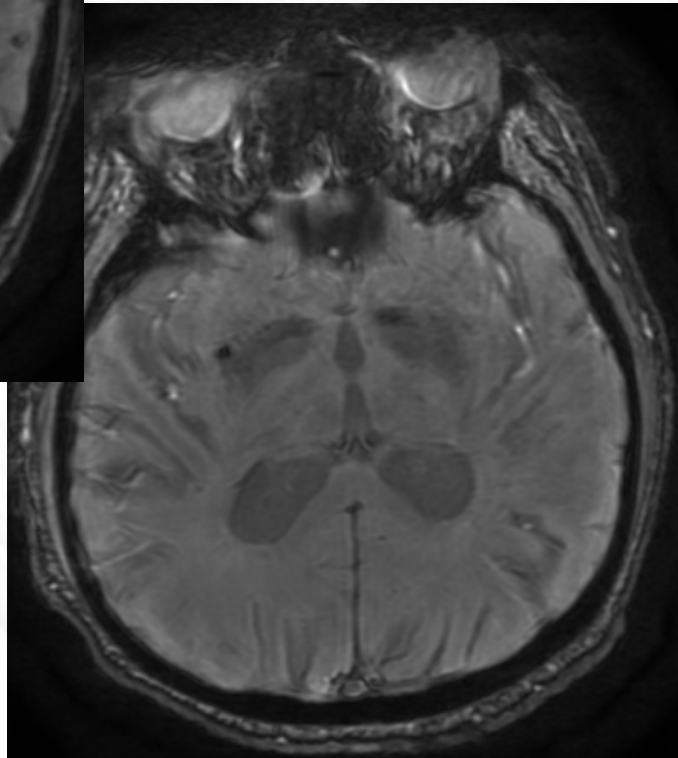
Veri- äge epiduraalne hematoom

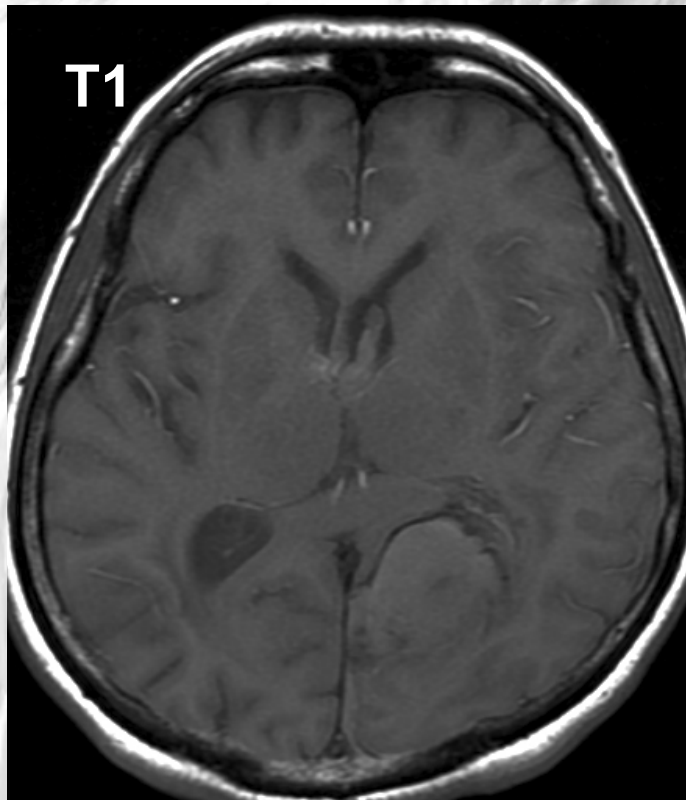


Veri: mikrohemorraagiad

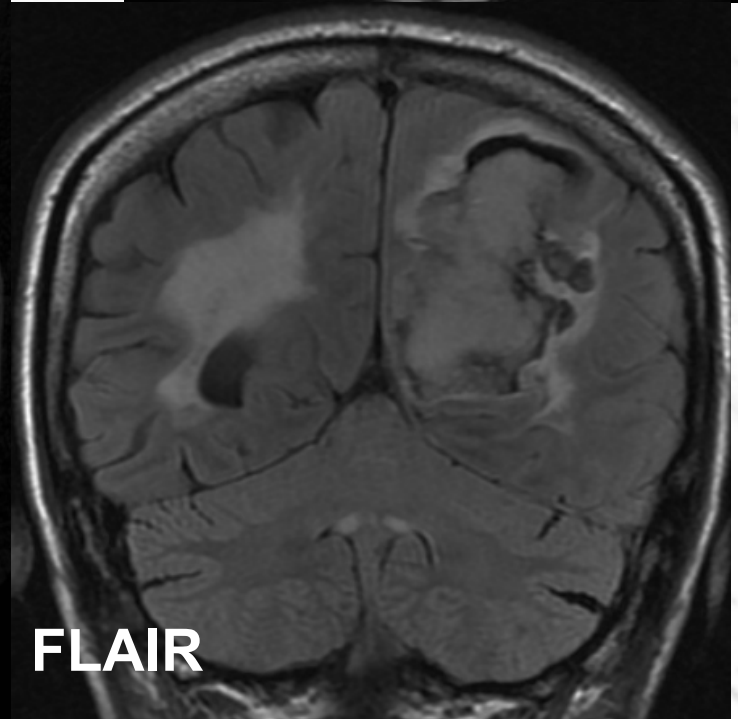
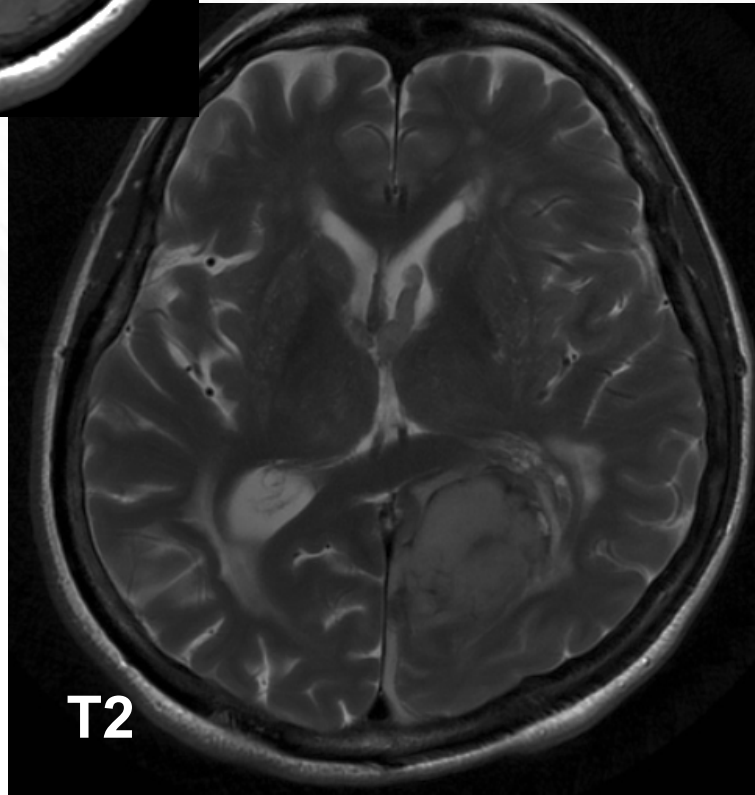
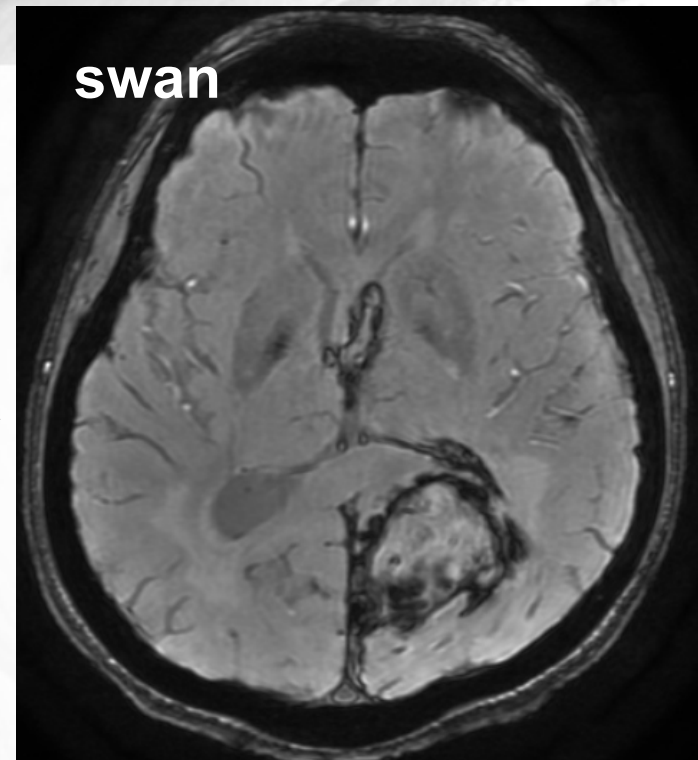


SWAN

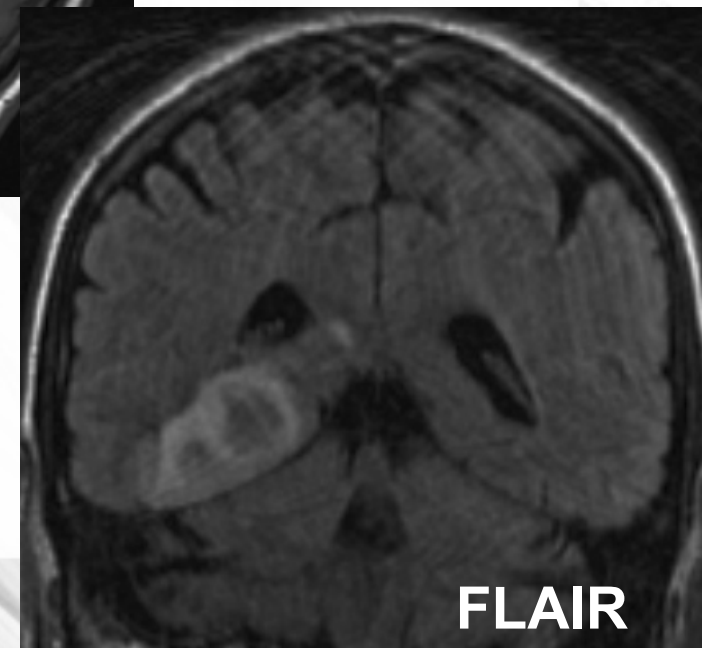
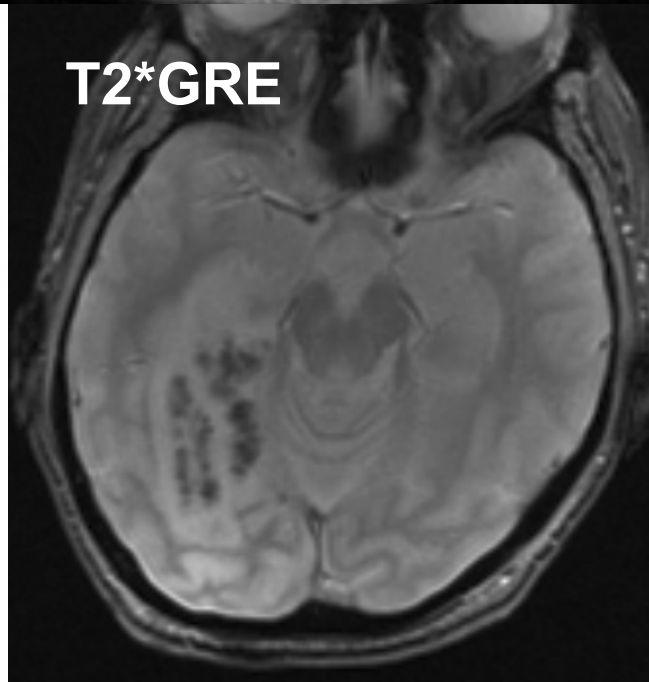
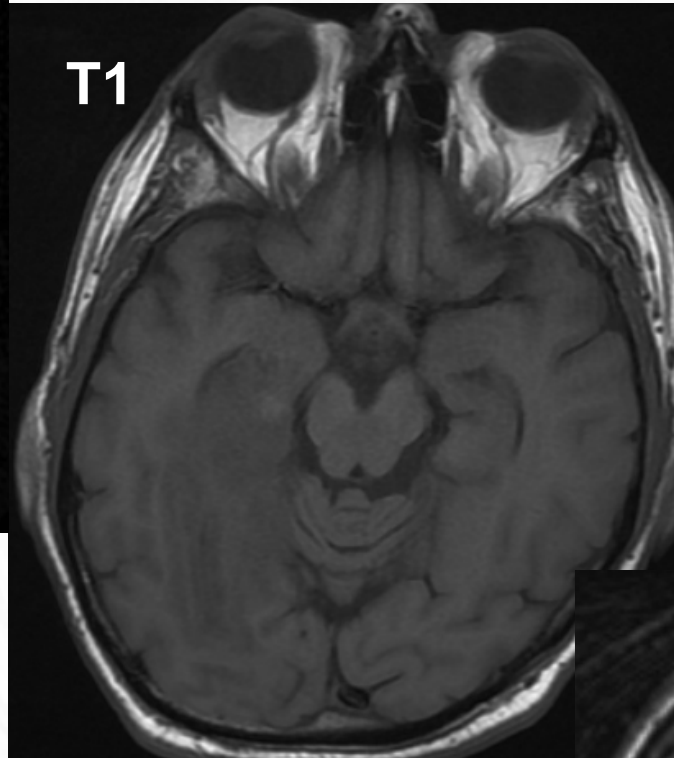




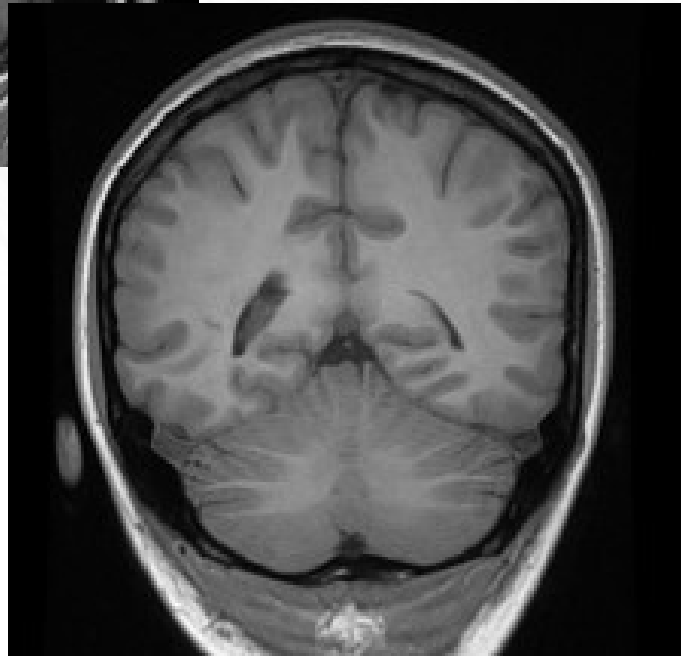
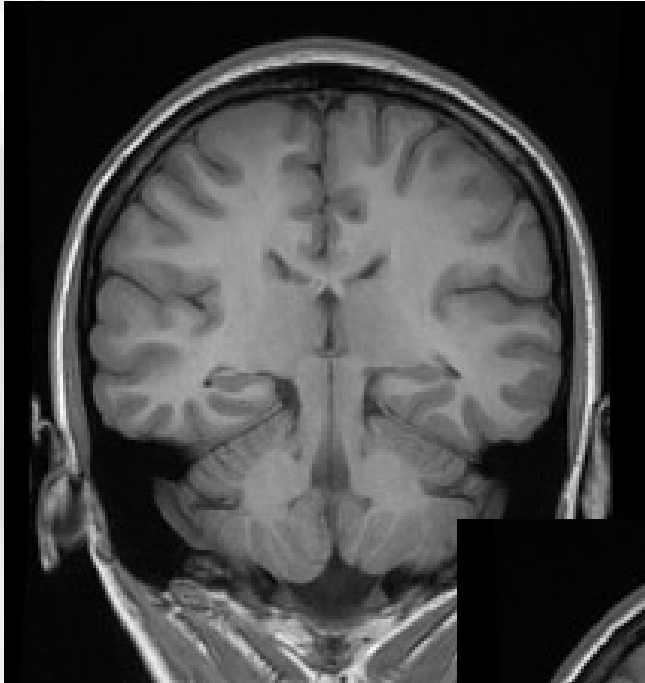
Akuutne i/c
hemorraagia



Infarkt sekundaarse verdumisega



T1 IR

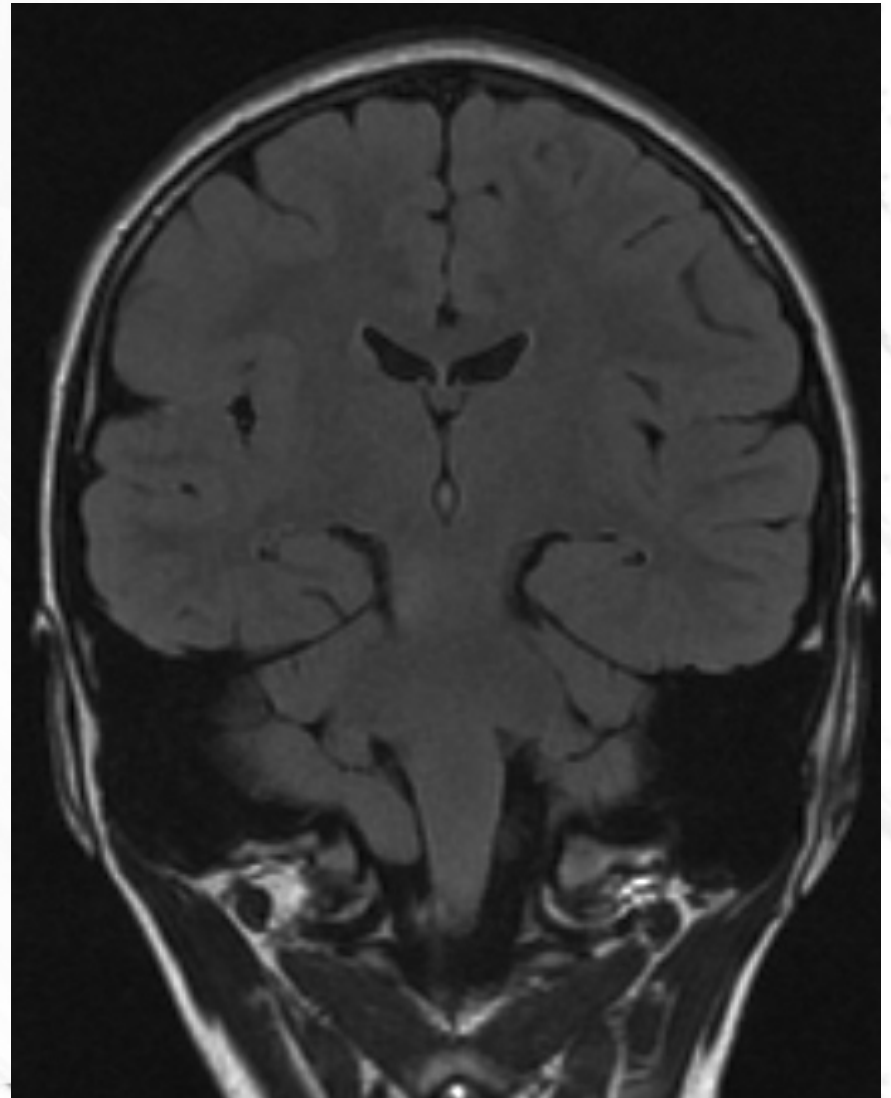
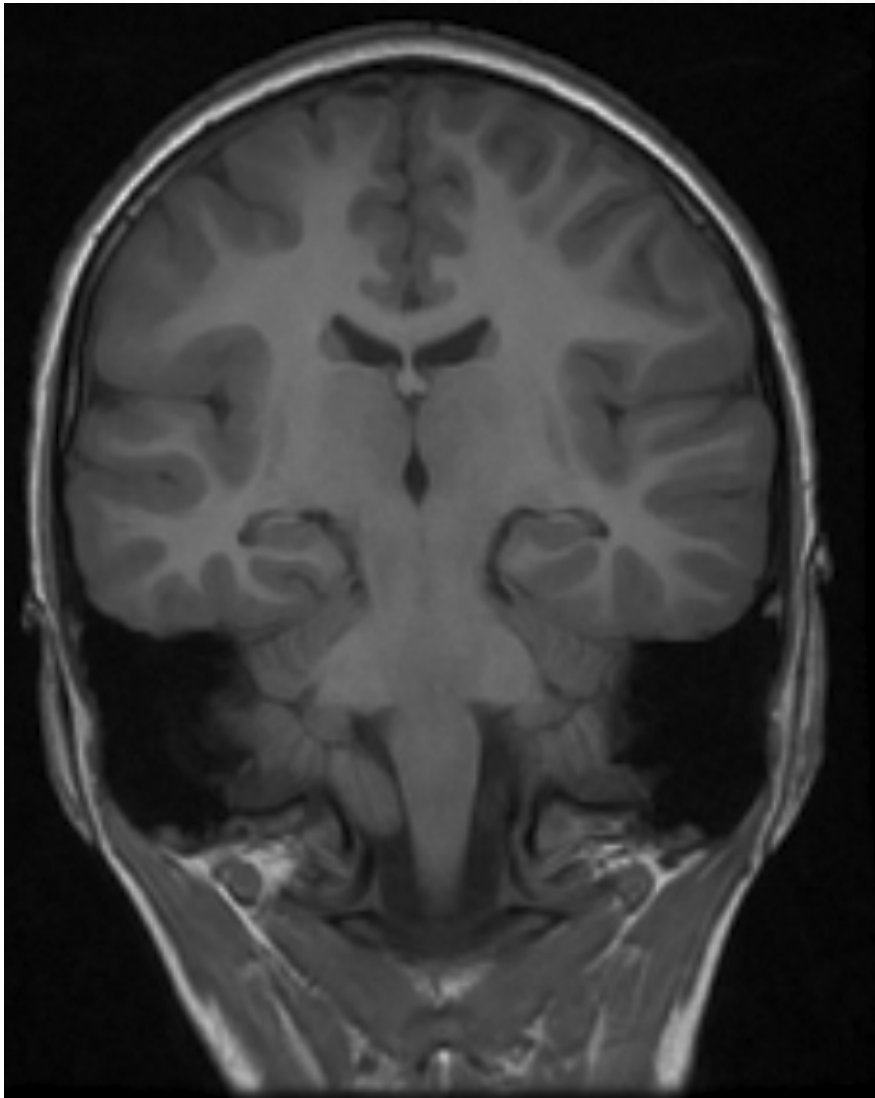


Ettevalmistav
ilmulss- faasi nihe
hall- ja valgeaine
vahel

Suurem erinevus
hall- ja valgeaine
signaali vahel

Struktuuri
hindamine, nt.
kortikaalsed
düsplaasiad

T1 IR- kortikaalne düsplaasia



DUALECHO kujutused

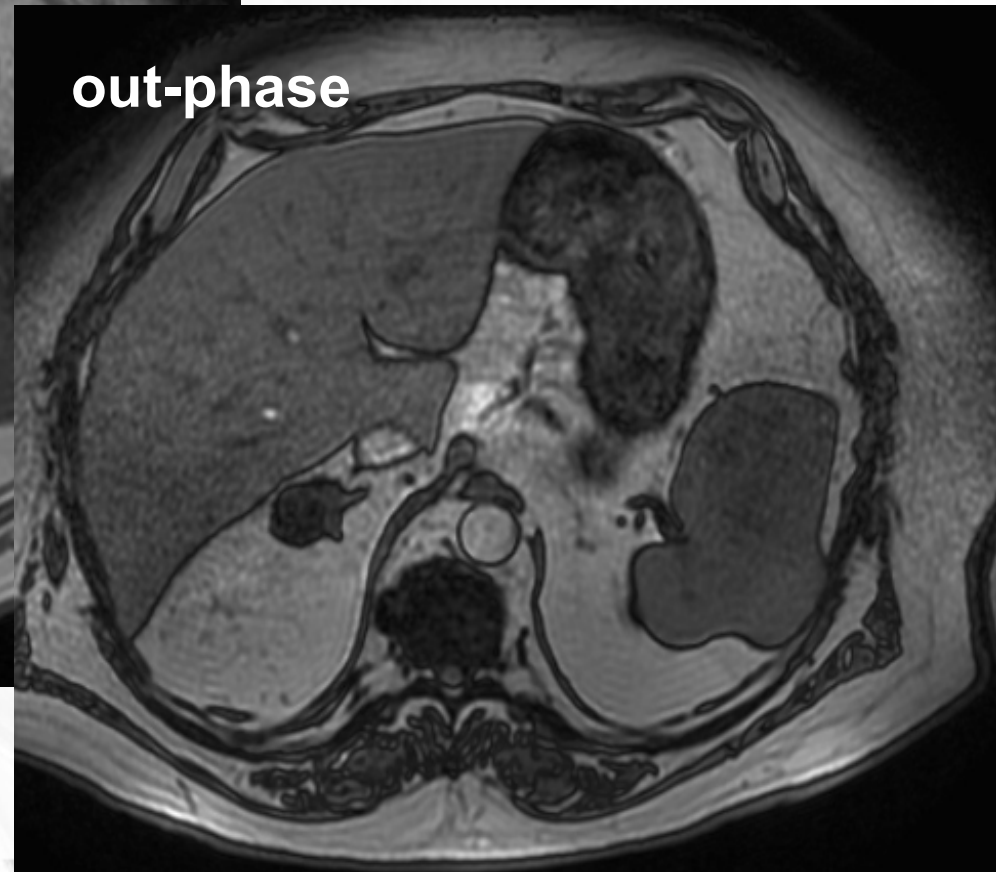
In- phase /out- phase kujutised

T1 kaalutud

Võimaldab määrata intratsellulaarse rasva olemasolu- tekib signaali langus out- phase kujutistel võrreldes in-phase kujutistega

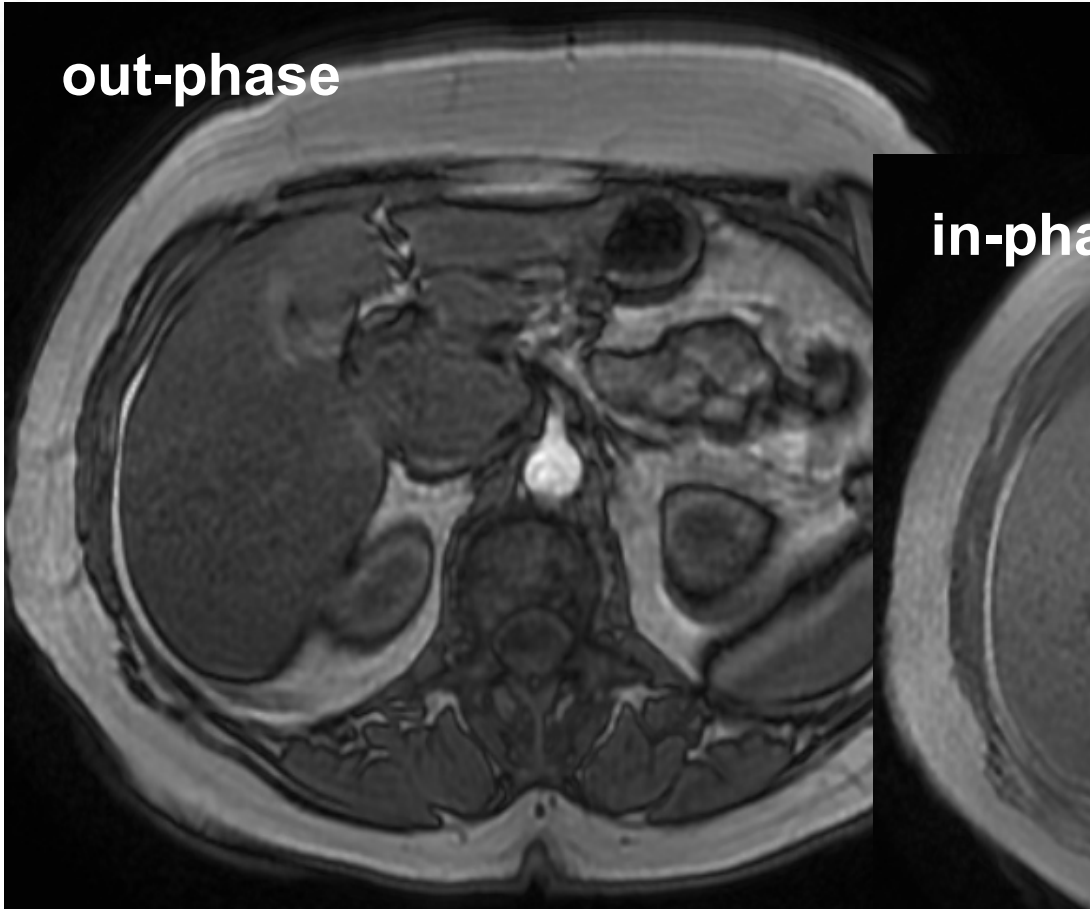
Võimaldab hinnata raualadestust- in- phase kujutistel on SI madalam kui out- phase kujutistel

Dualecho- neerupealise adenoom

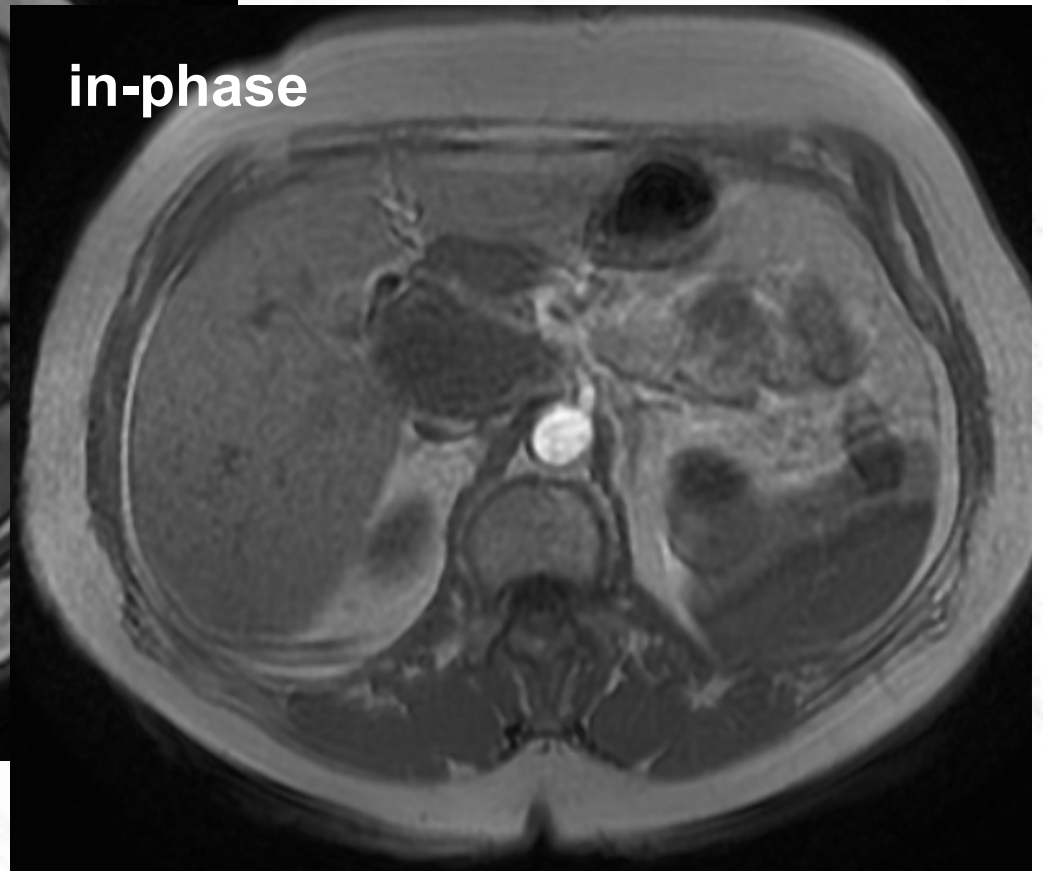


Dualecho- maksa rasvdüstroofia

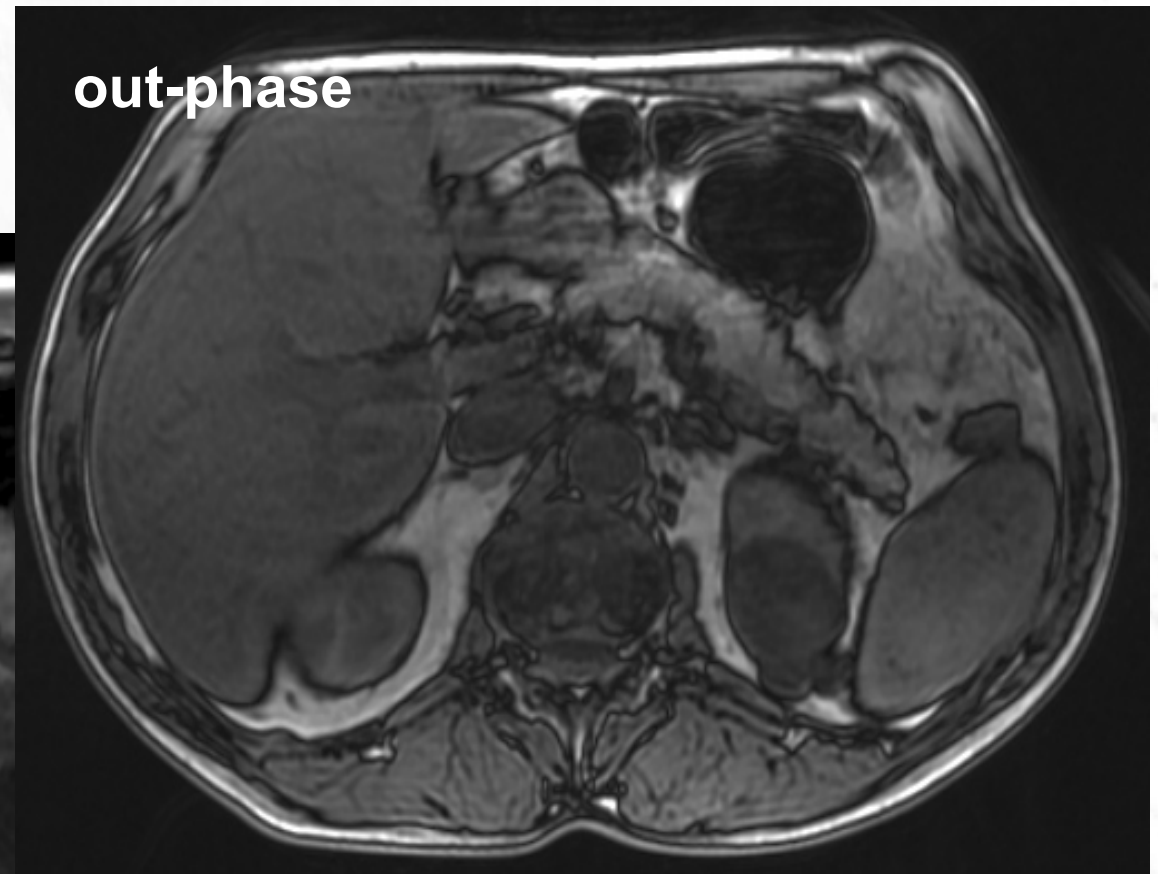
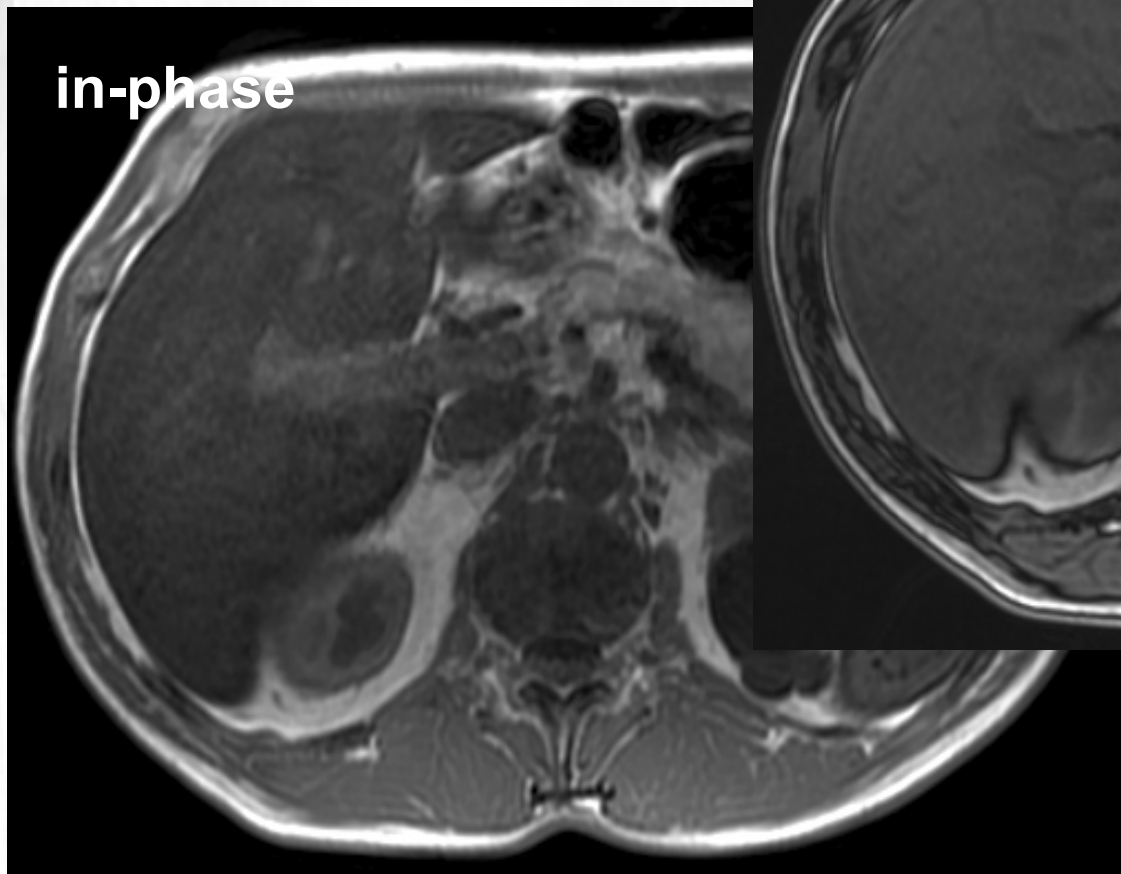
out-phase



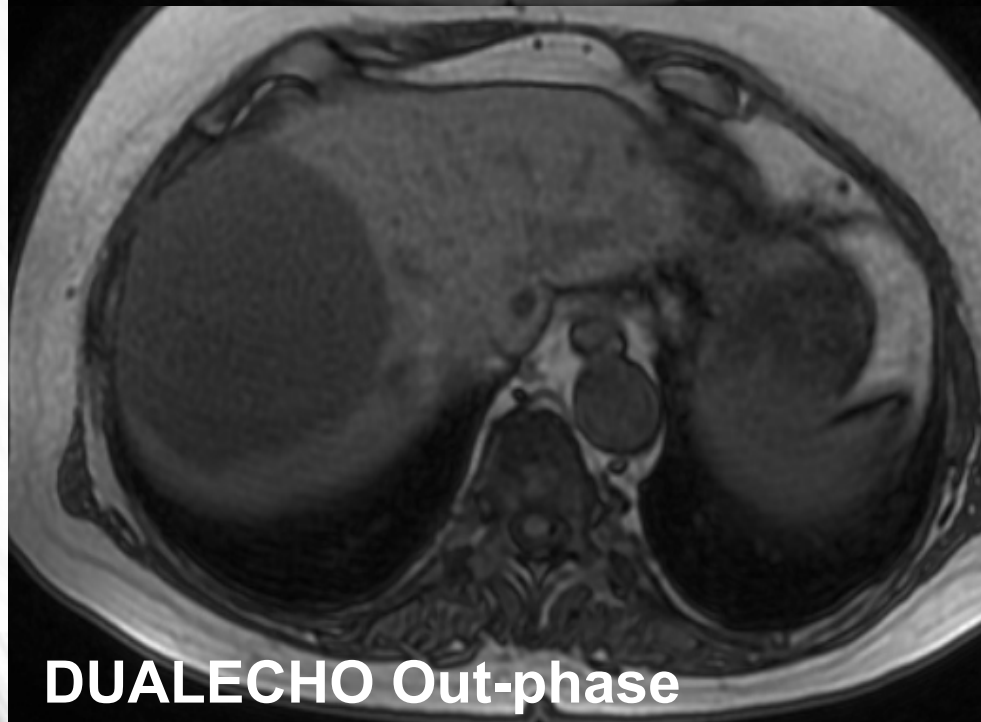
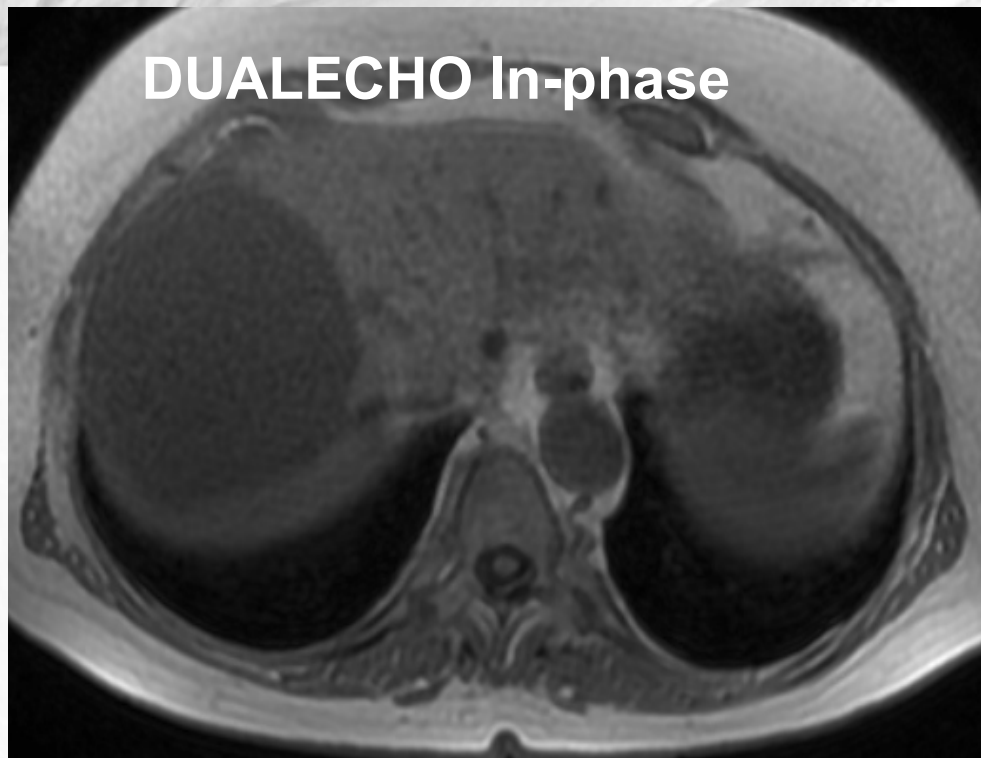
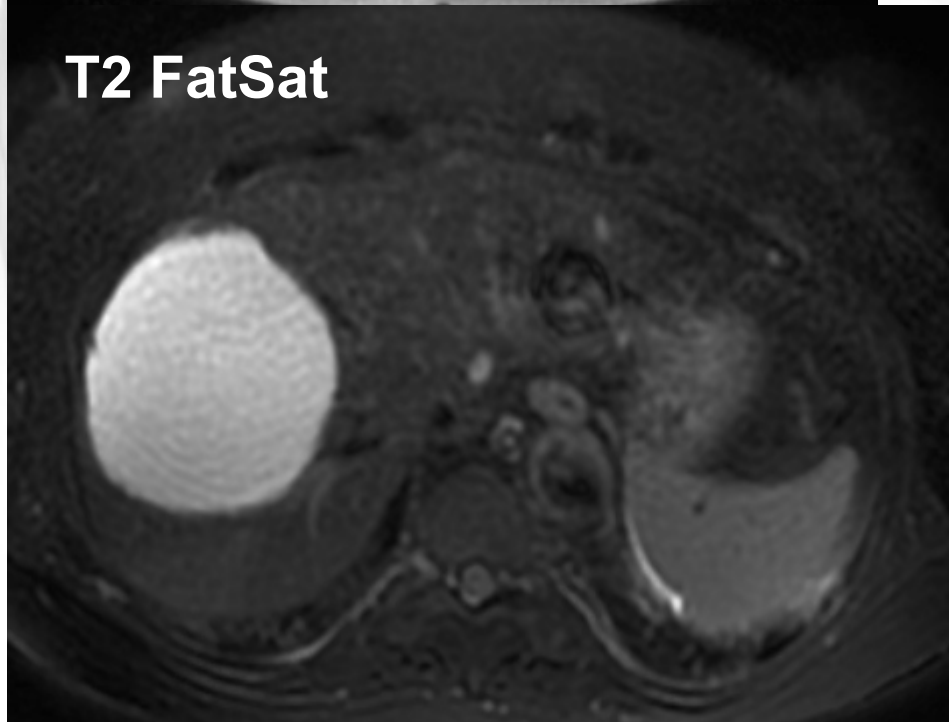
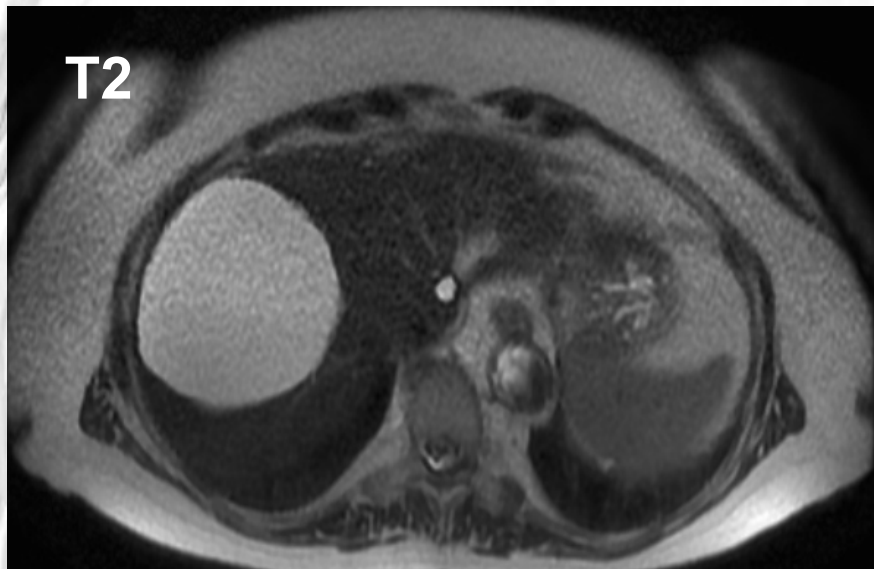
in-phase



Dualecho- maksa raualadestus



Tsüst



3D sekventsid

Isomeetriline voxel

Võimaldab teha hiljem rekonstruktsioone erinevates tasapindades, 3D kujutiste rekonstrueerimist

Hea anatoomiliste struktuuride lahutusvõime

3D sekventsid: tugevalt T2 kaalutud *FIESTA; DRIVE; CISS; T2 spc*

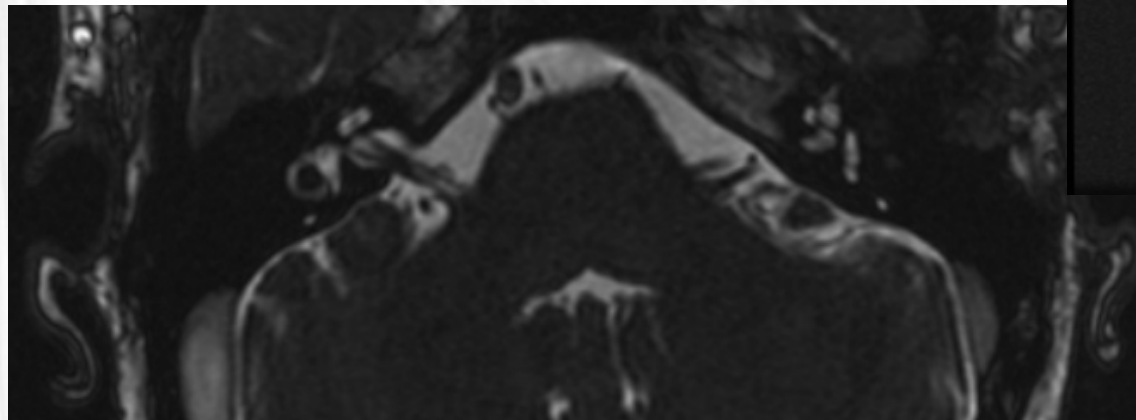
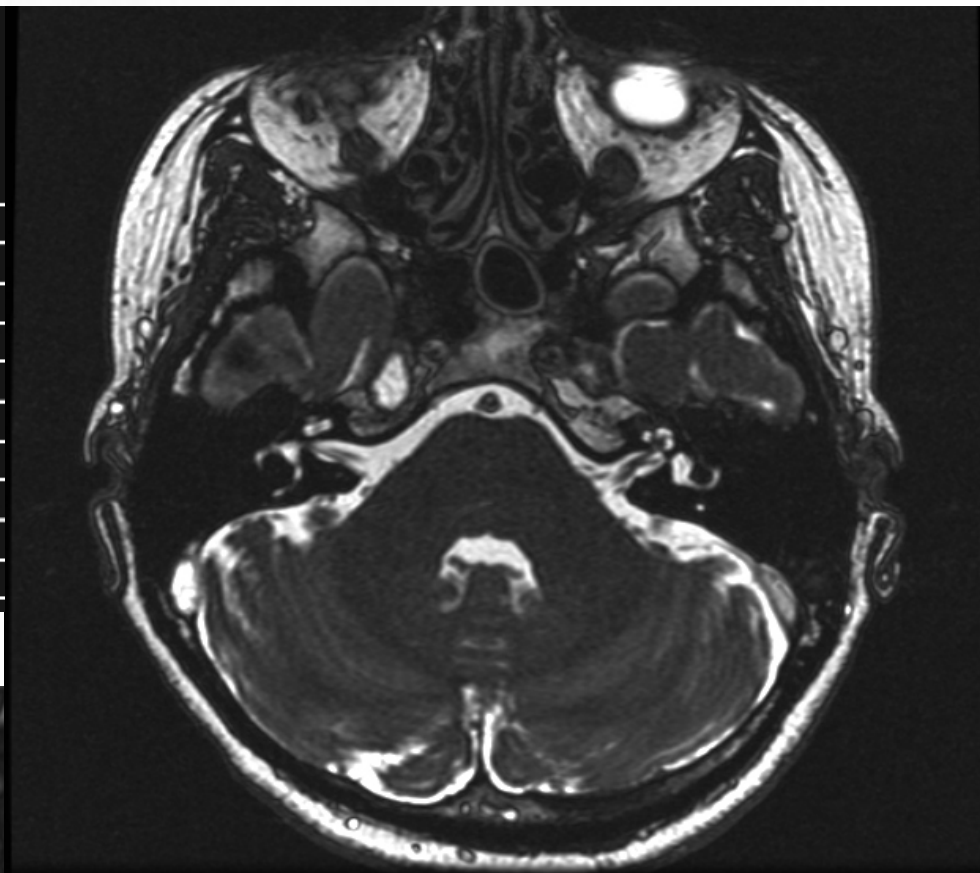
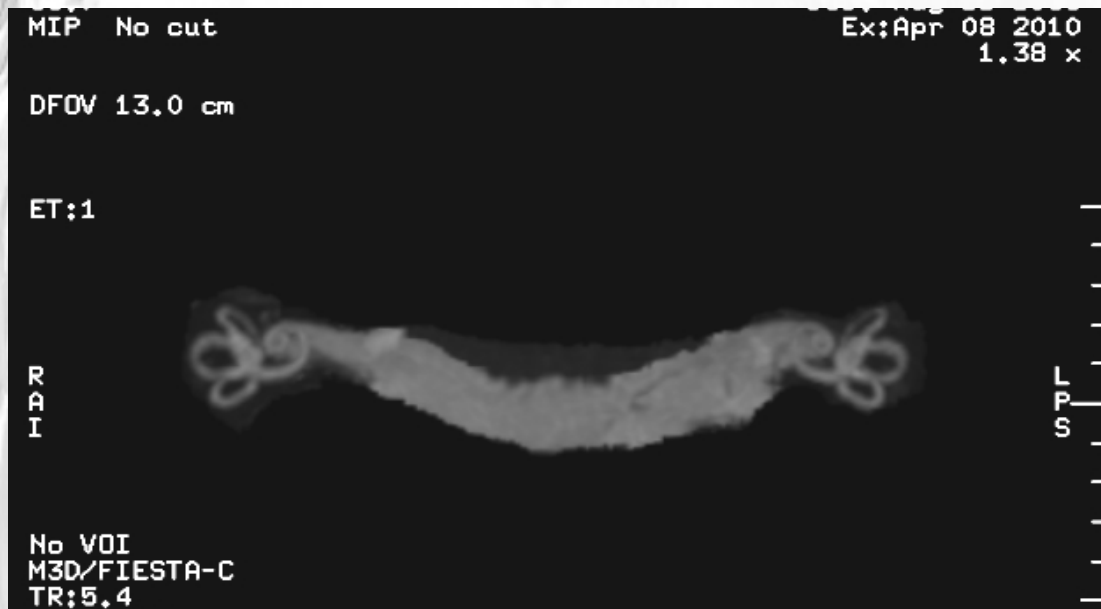
Isomeetriline voxel

Eristab koelised struktuurid- vedeliku

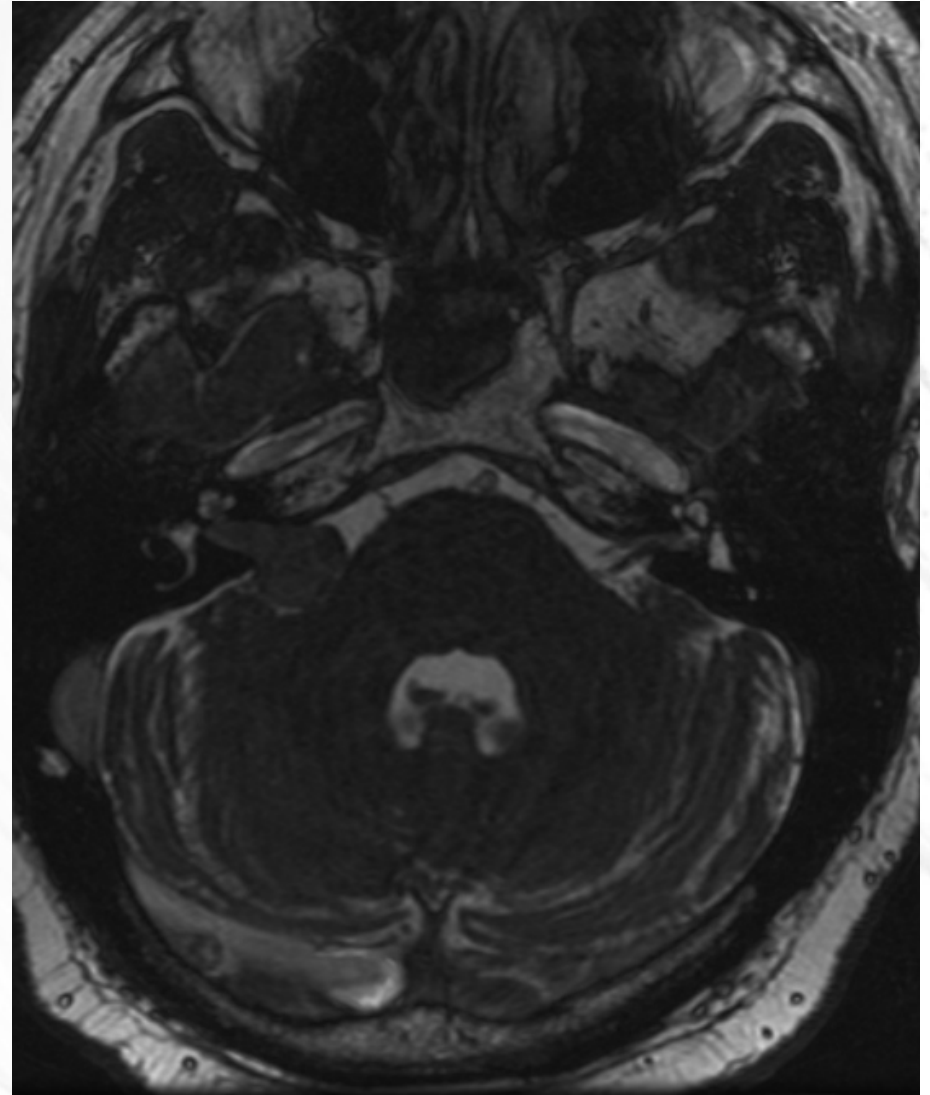
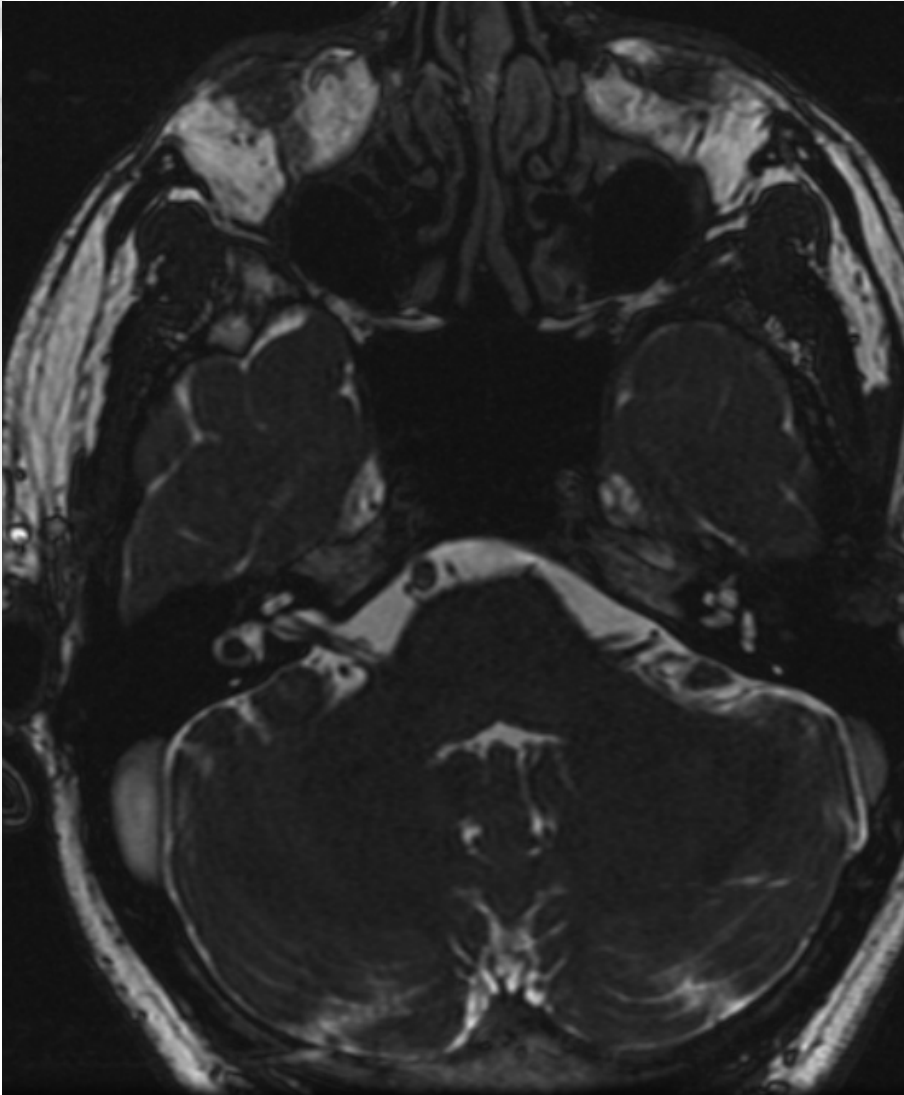
Kasutatakse nt. kraniaalvärvide
visualiseerimiseks, sisekõrva struktuuride
visualiseerimiseks, liikvoriteede läbitavuse
hindamiseks

Võimaldab rekonstruktsioone erinevates
tasapindades, 3D kujutiste rekonstrueerimist

FIESTA

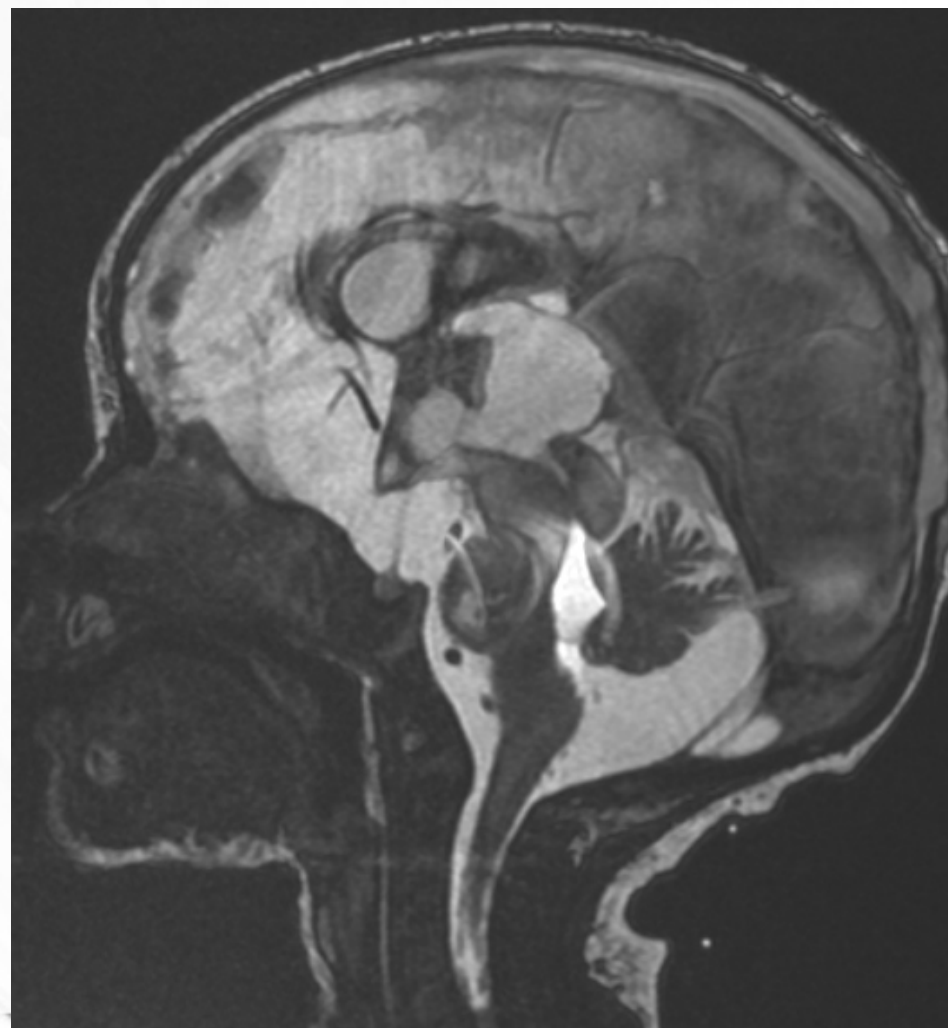
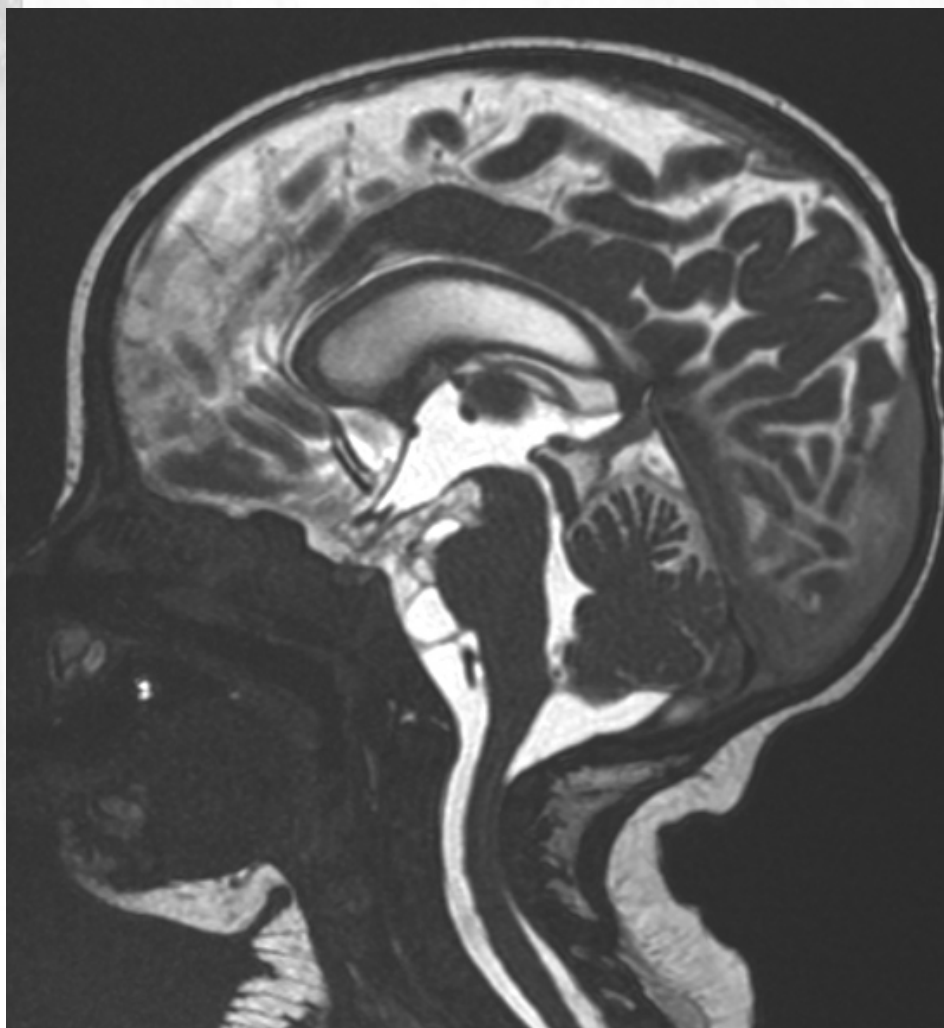


Fiesta- n. acusticuse neurinoom

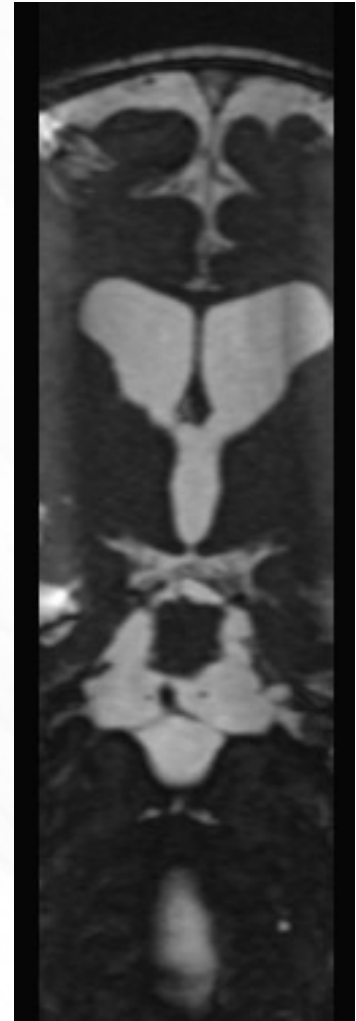
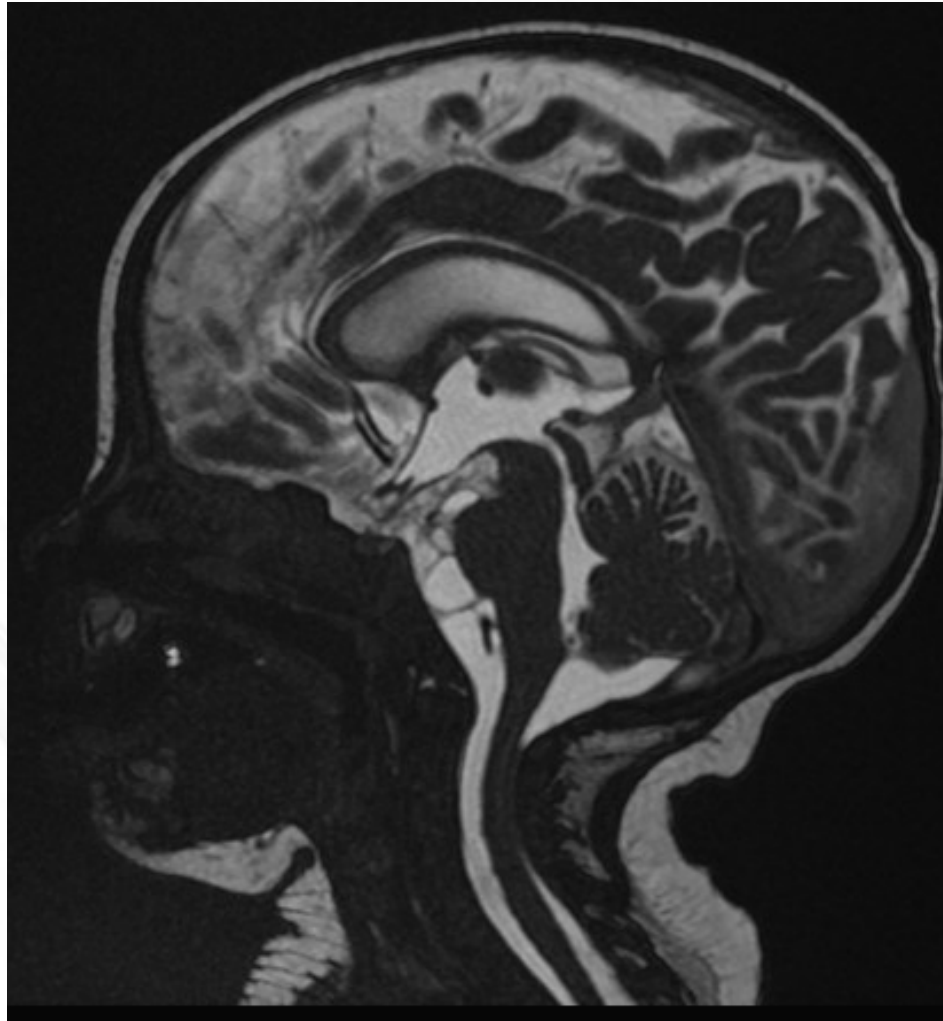


3D FIESTA

liikvorteede läbitavuse hindamiseks



3D *FIESTA*- MPR

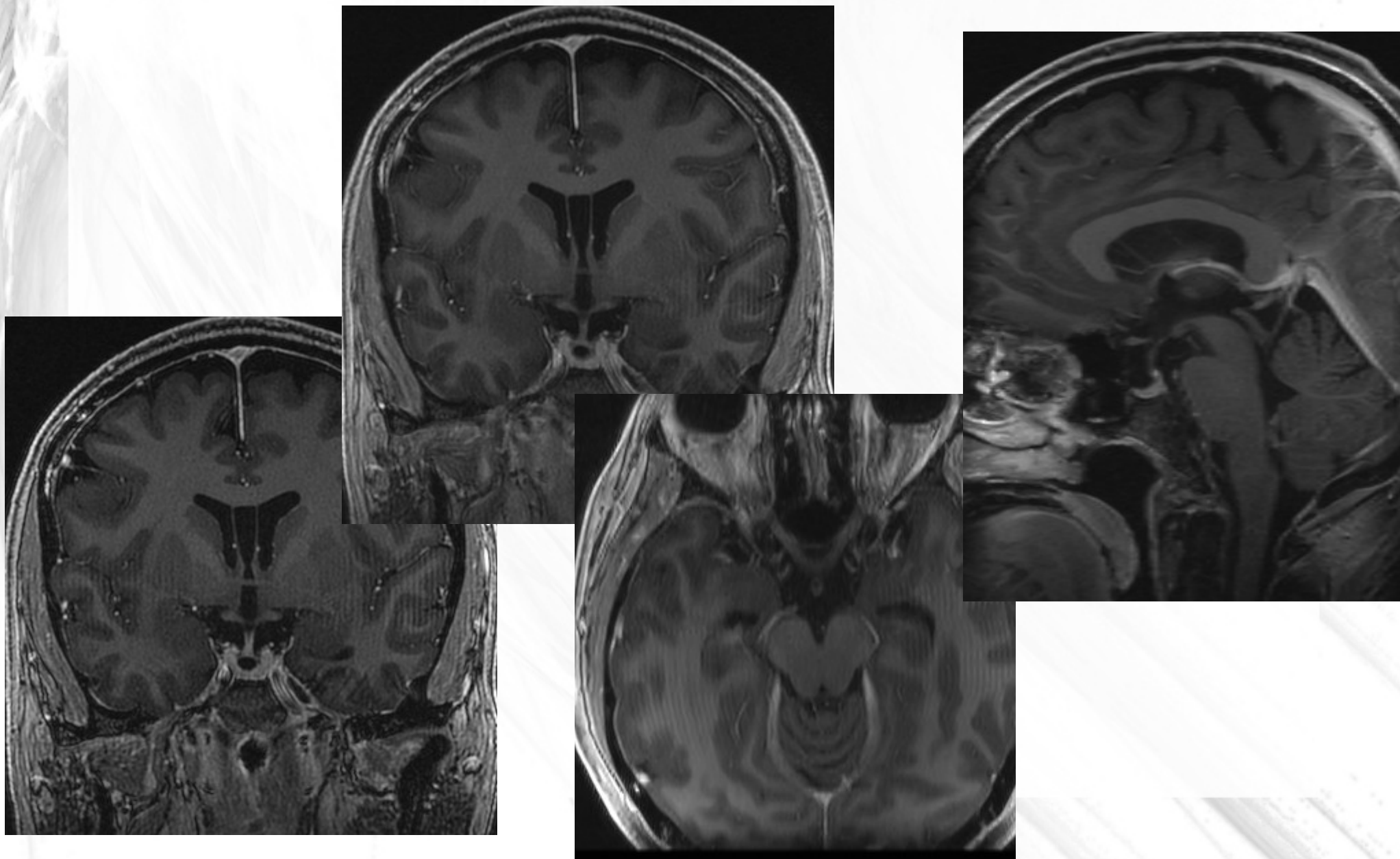


3D sekventsid:

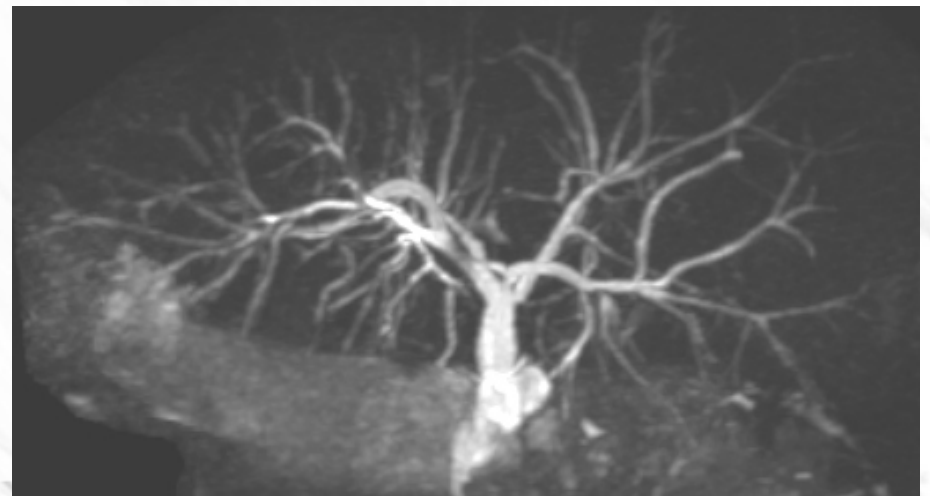
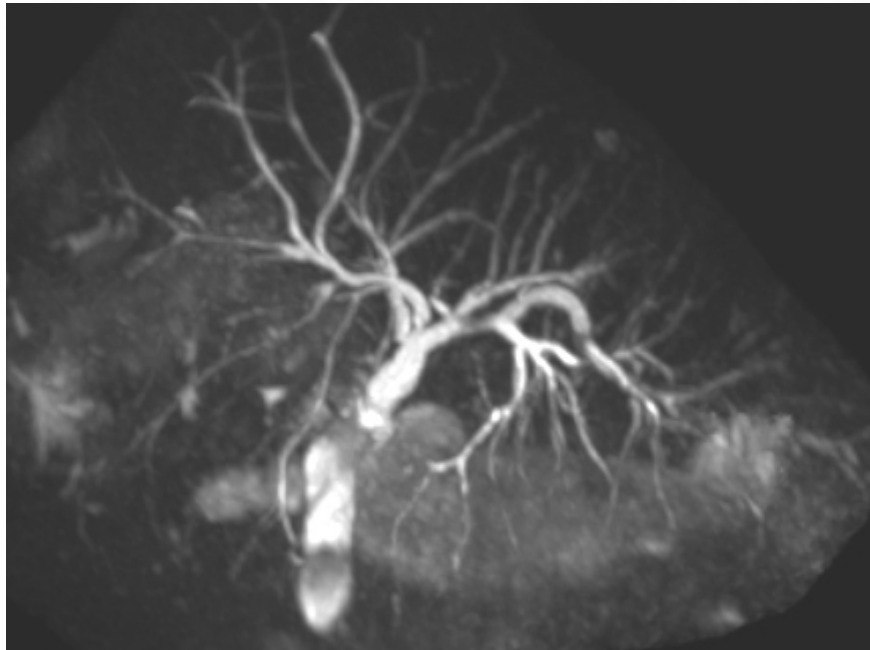
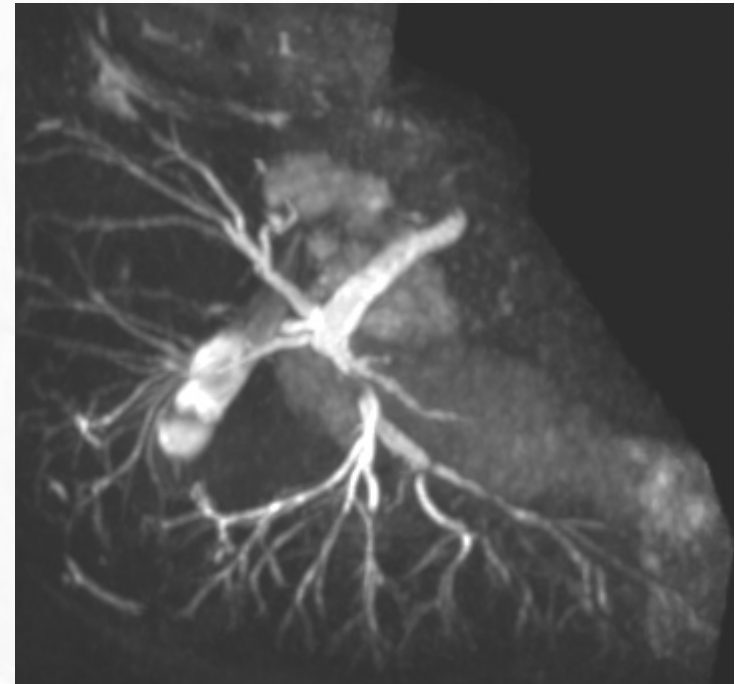
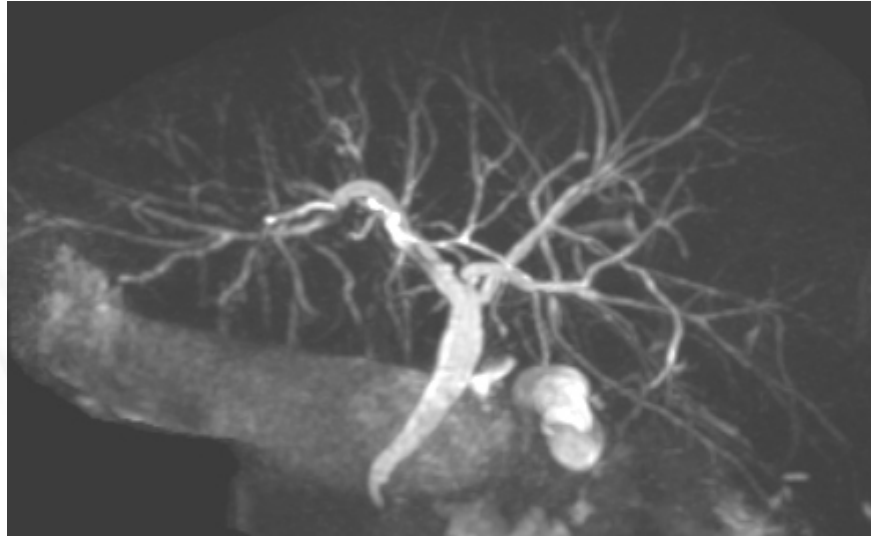
T1, FLAIR, PD, T2 kaalutud

CUBE,
BRAVO
3D FSPGR
3D T1 FFE
FLASH
...

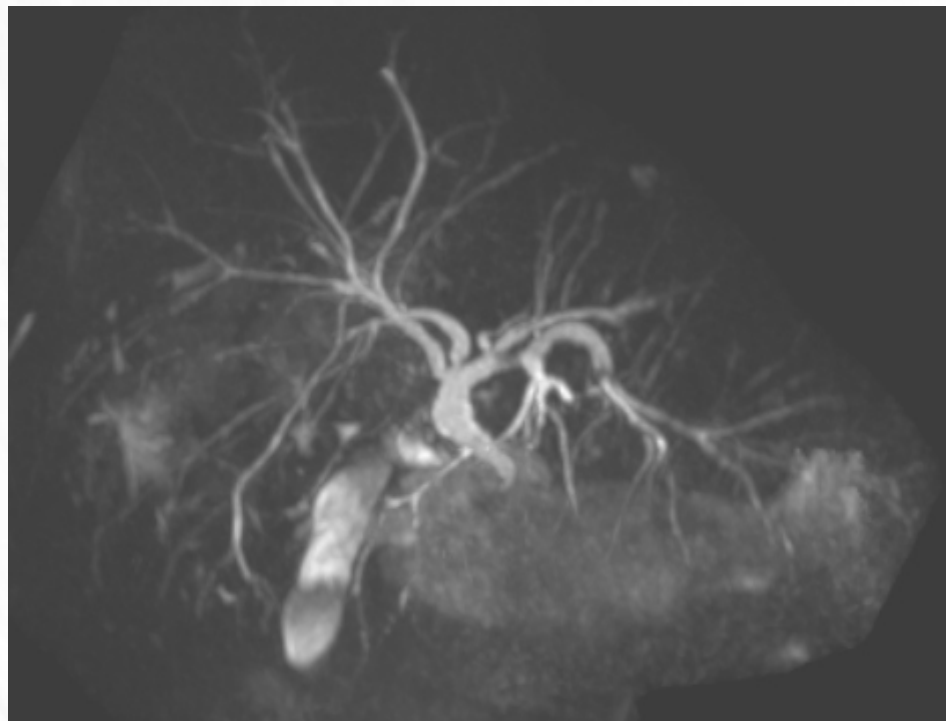
3D sekventsids- T1 3D FSPGR



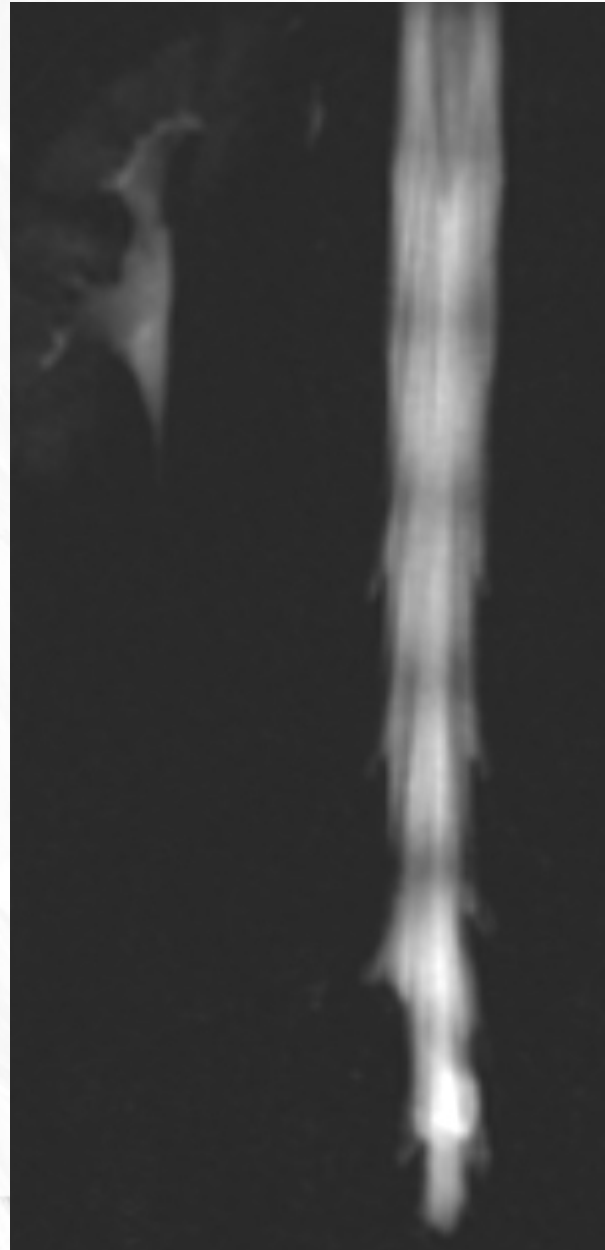
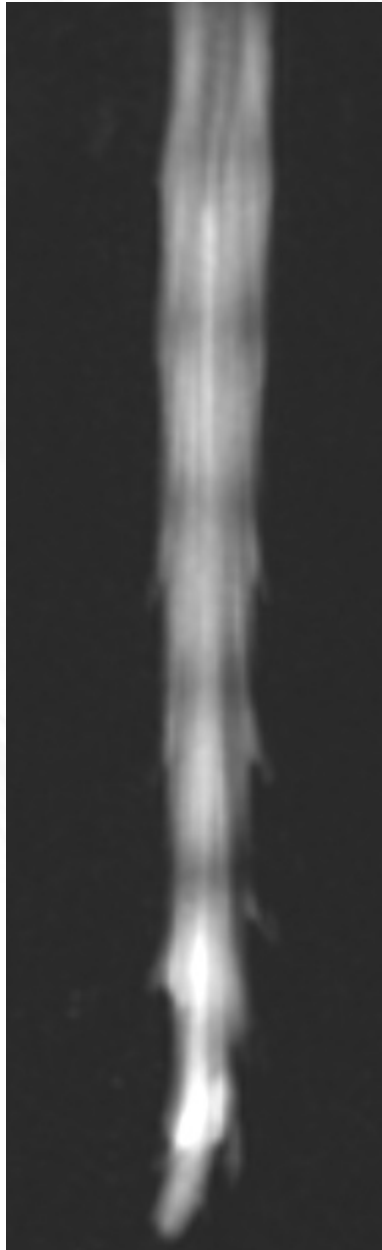
MRCPG



MRCPG



MR Müelogramm



DWI ja ADC

Meetod põhineb veemolekulide difusiooni muutusel ruumis:

isheemilised alad akuutses staadiumis
abstsessid

rakurikkad koed (hypercellular tissue)-
tuumorid

DWI ja ADC

Diffusion **W**eighted **I**mages; *ep. diff*

Apparent **D**iffusion **C**oefficient

Difusiooni muutuse e. restriksiooni korral on näha

DWI signaali intensiivistumine

ADC signaali langus

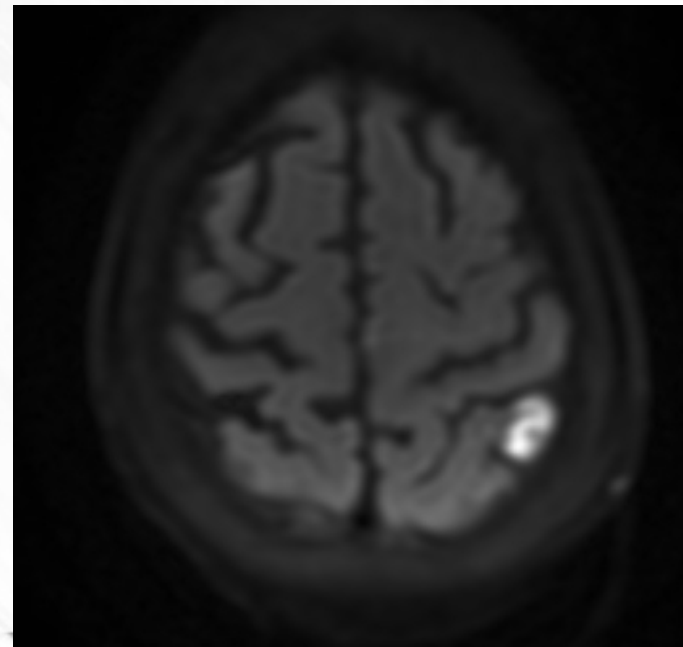
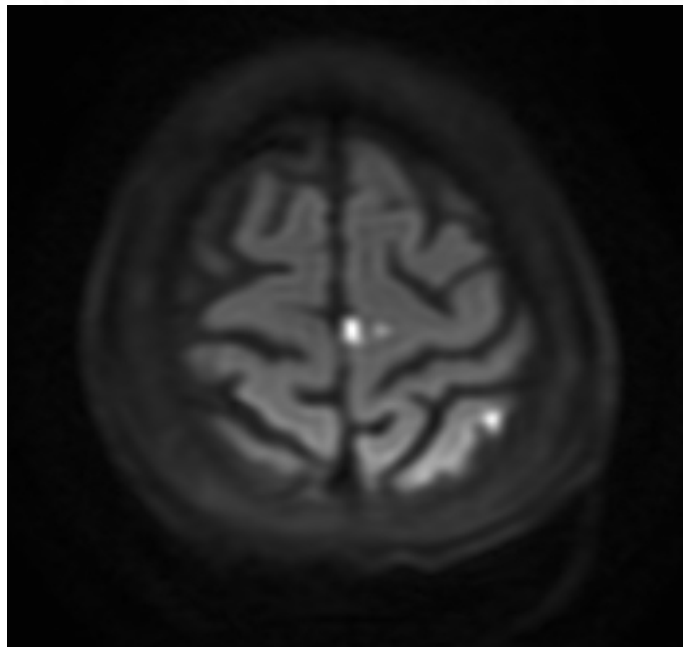
T2 shine through efekt

nii DWI kui ADC signaali intensiivistumine, nt.
vasogeense turse puhul

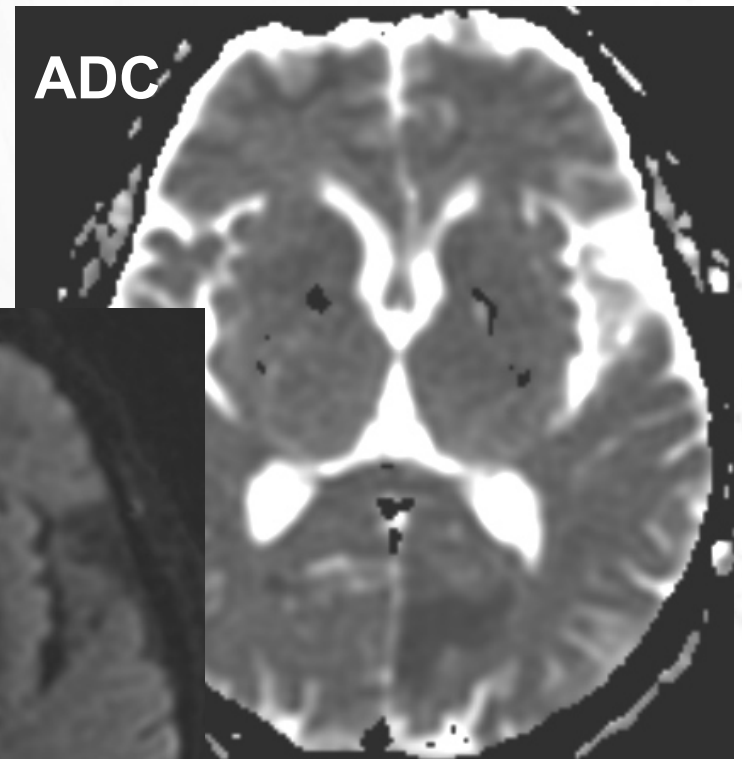
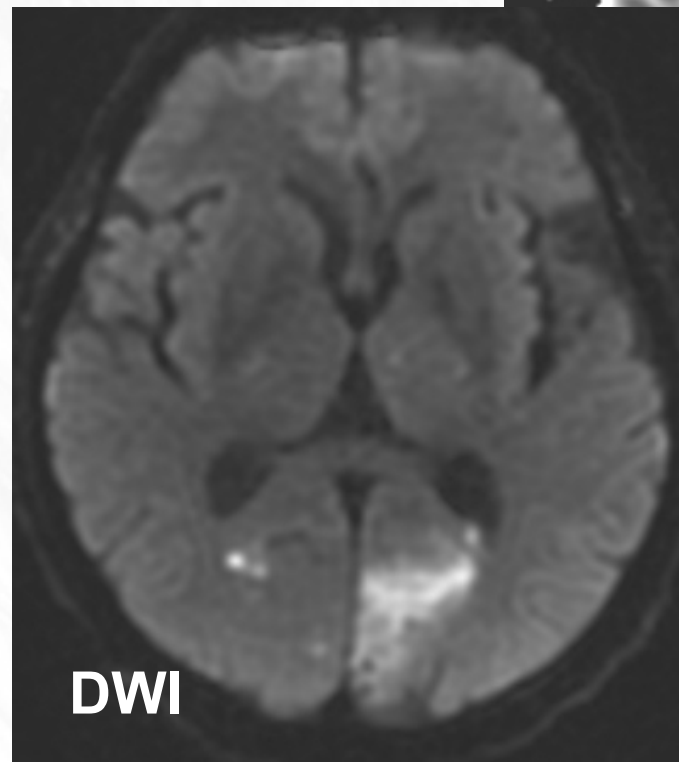
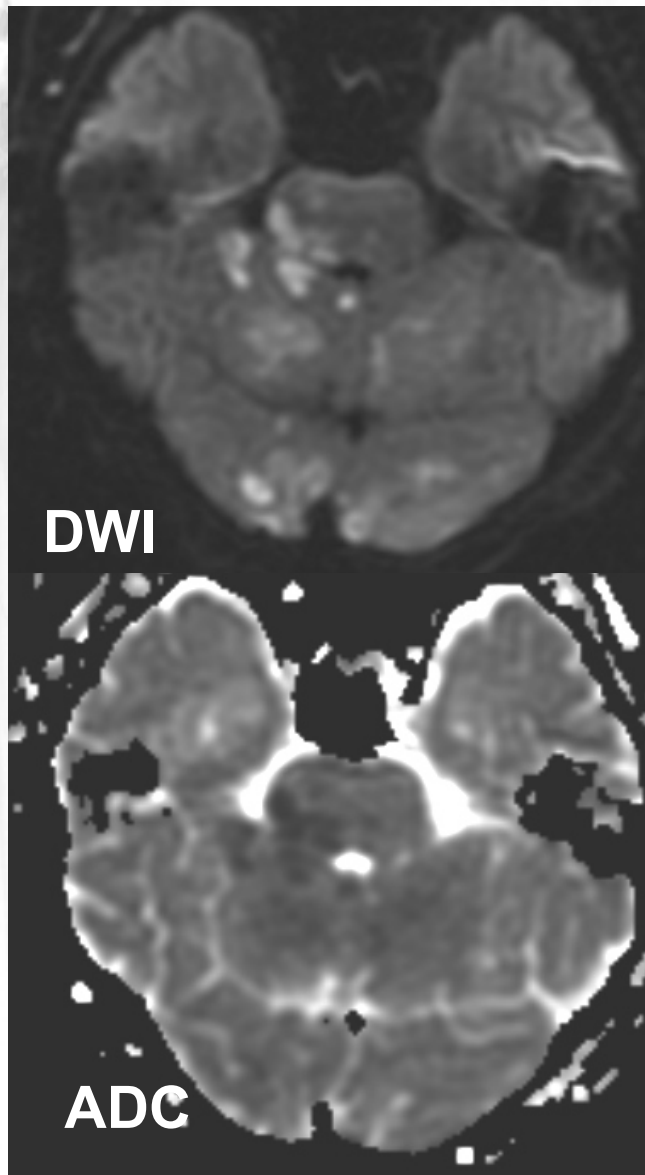
DWI- äge isheemia

Signaali muutus tekib esimese 30 min jooksul

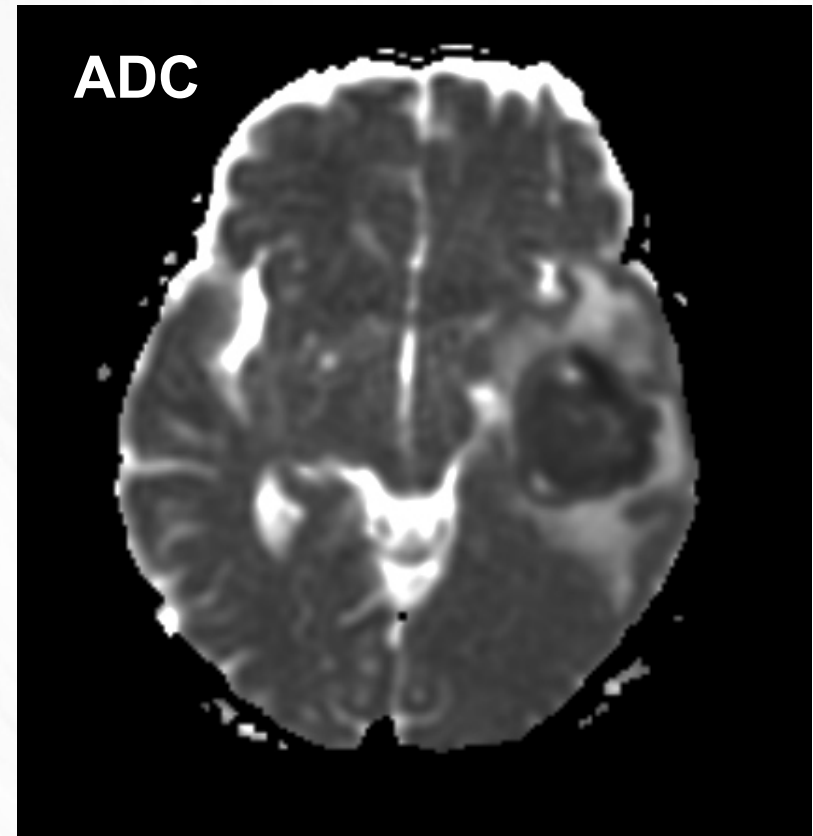
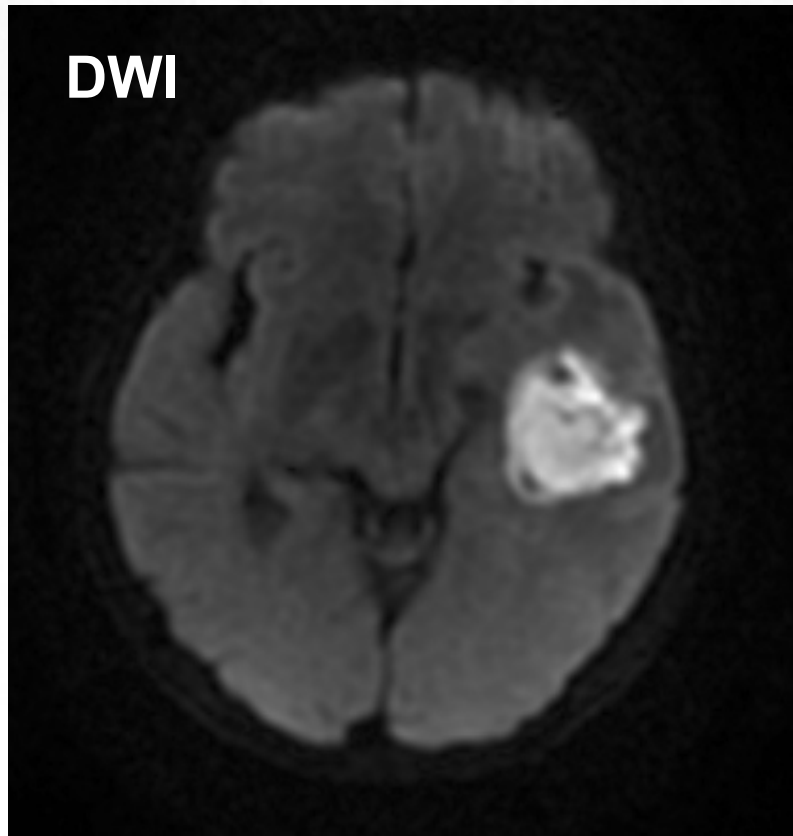
Rakkudes hapniku nälg, energia puudus, rakumembraani pumbad ei tööta, rakud paisuvad, rakkudevaheline ruum väheneb



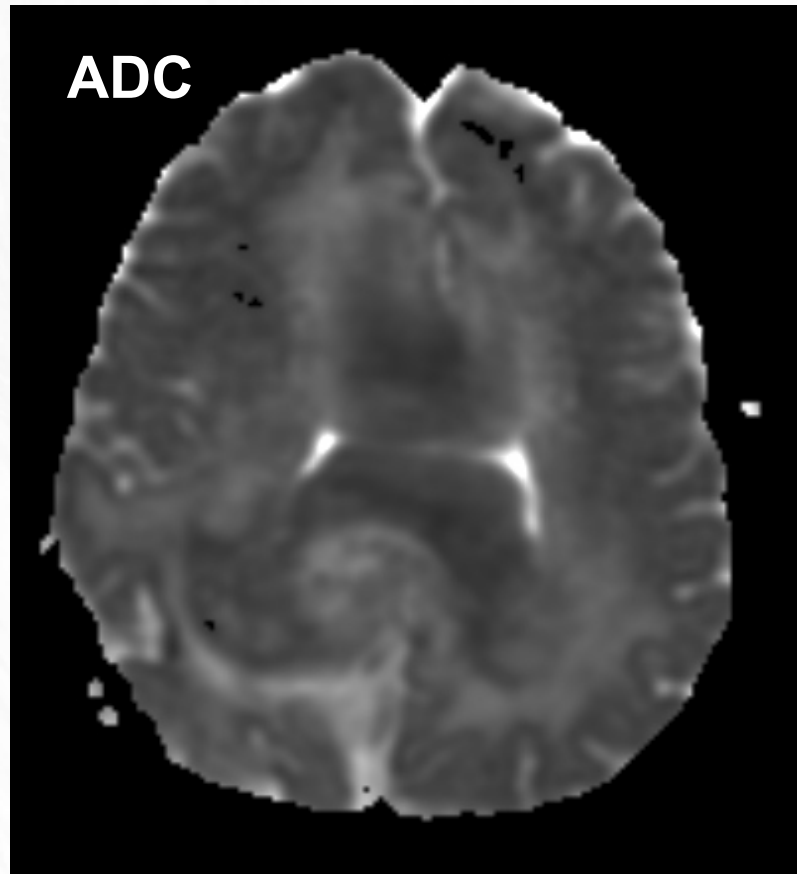
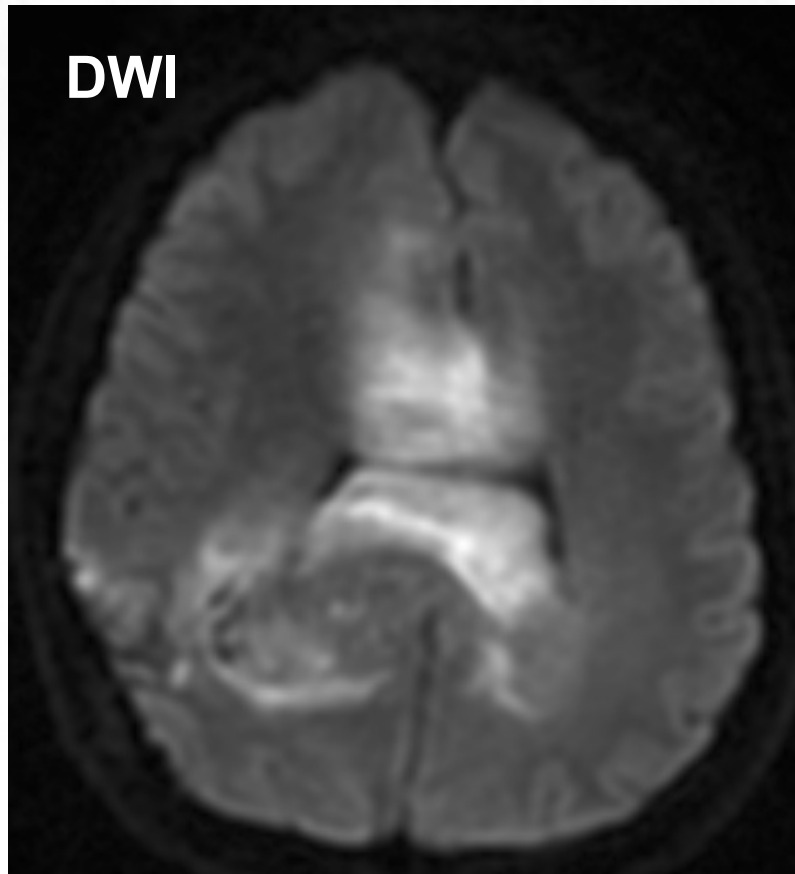
DWI ja ADC- äge infarkt



DWI- aju abstsess

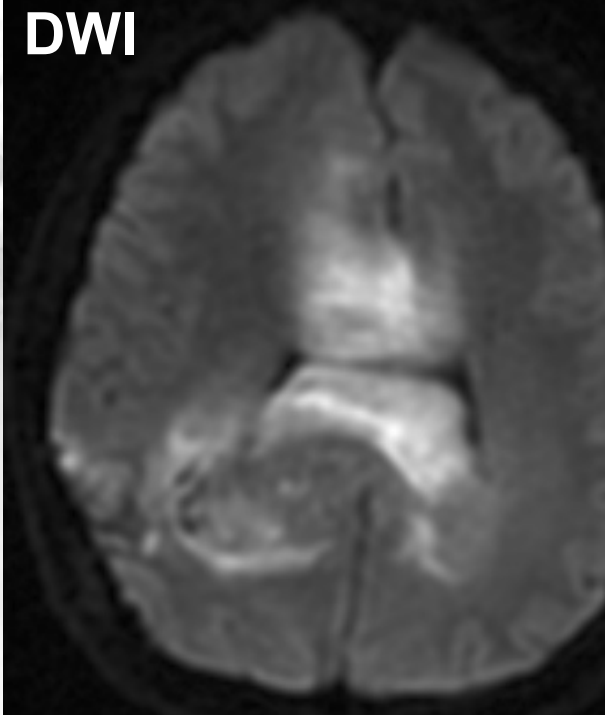


DWI ja ADC- tuumor ajus

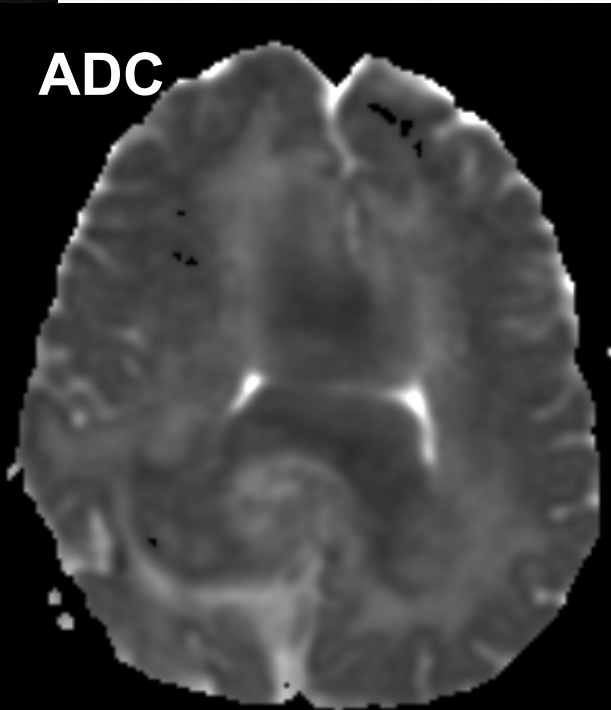


DWI- ADC tuumor/ vasogeenne turse

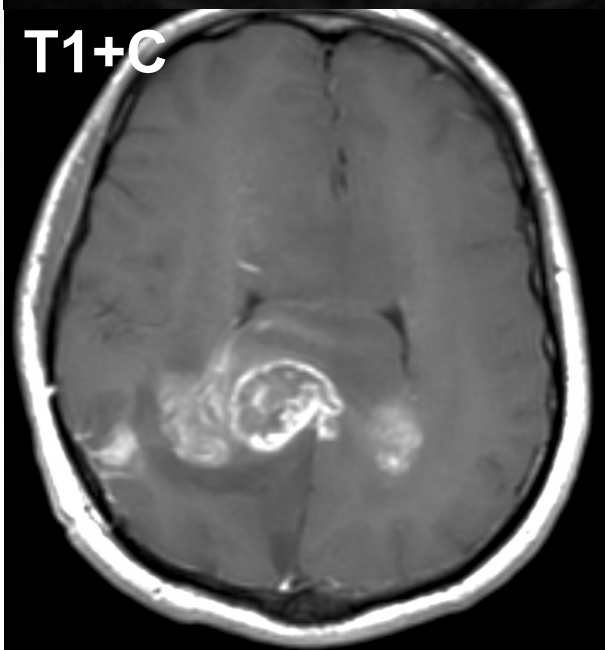
DWI



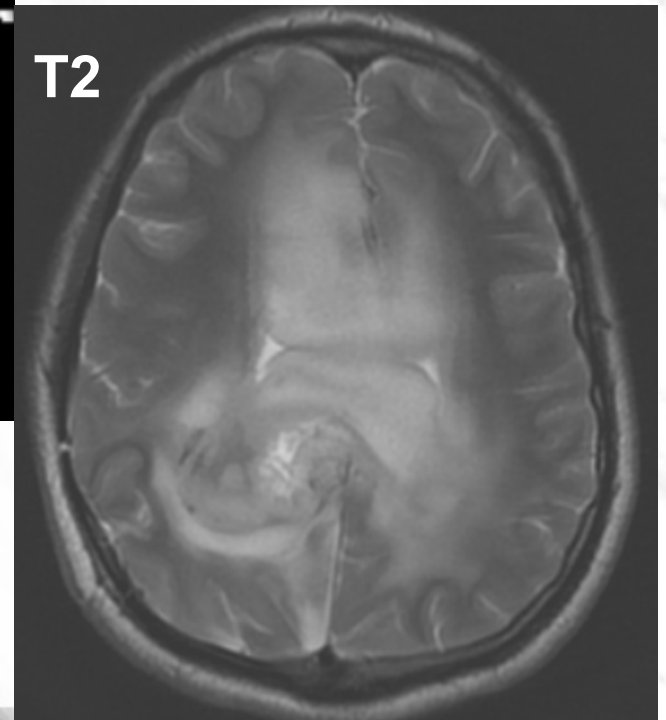
ADC



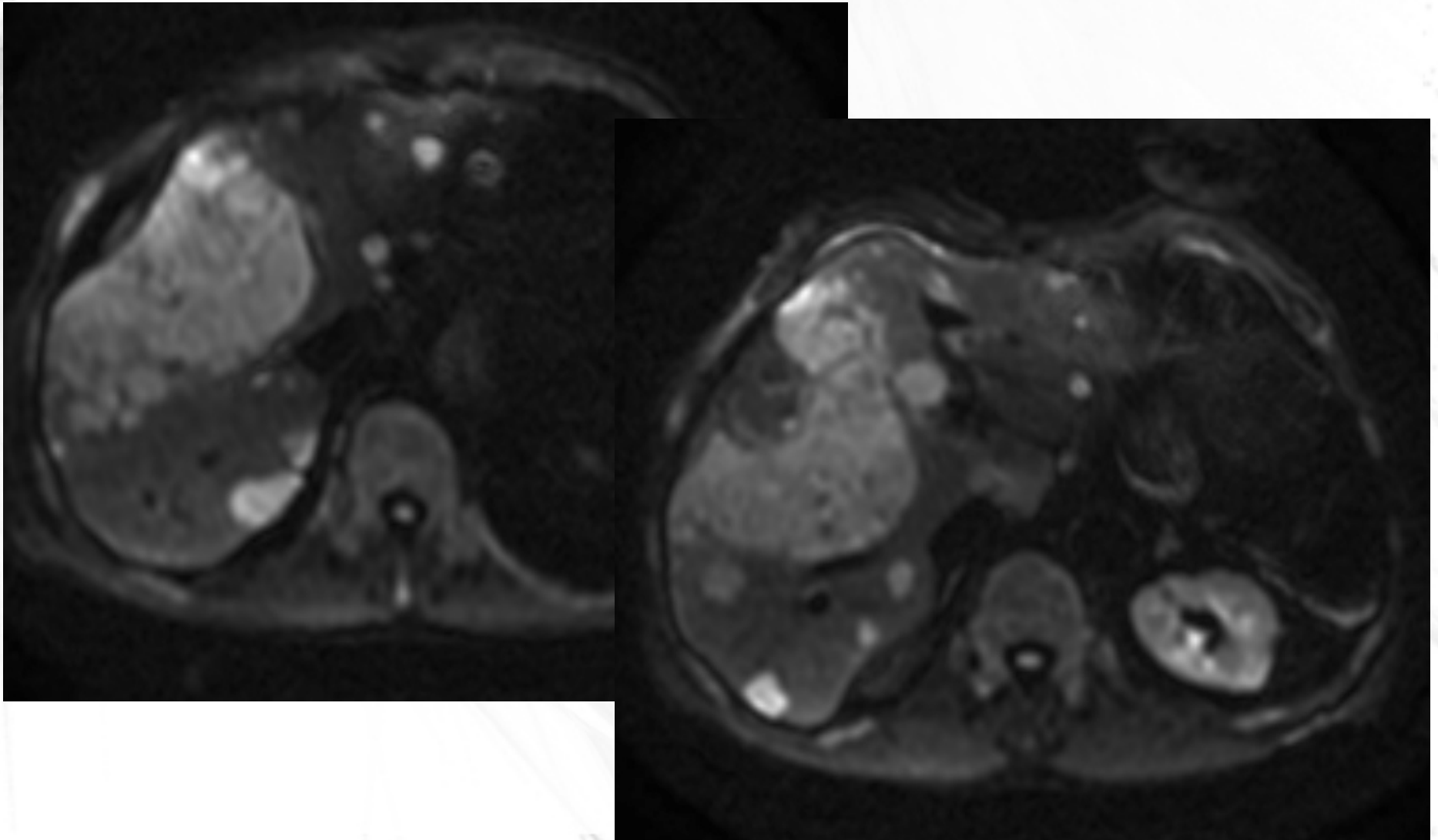
T1+C



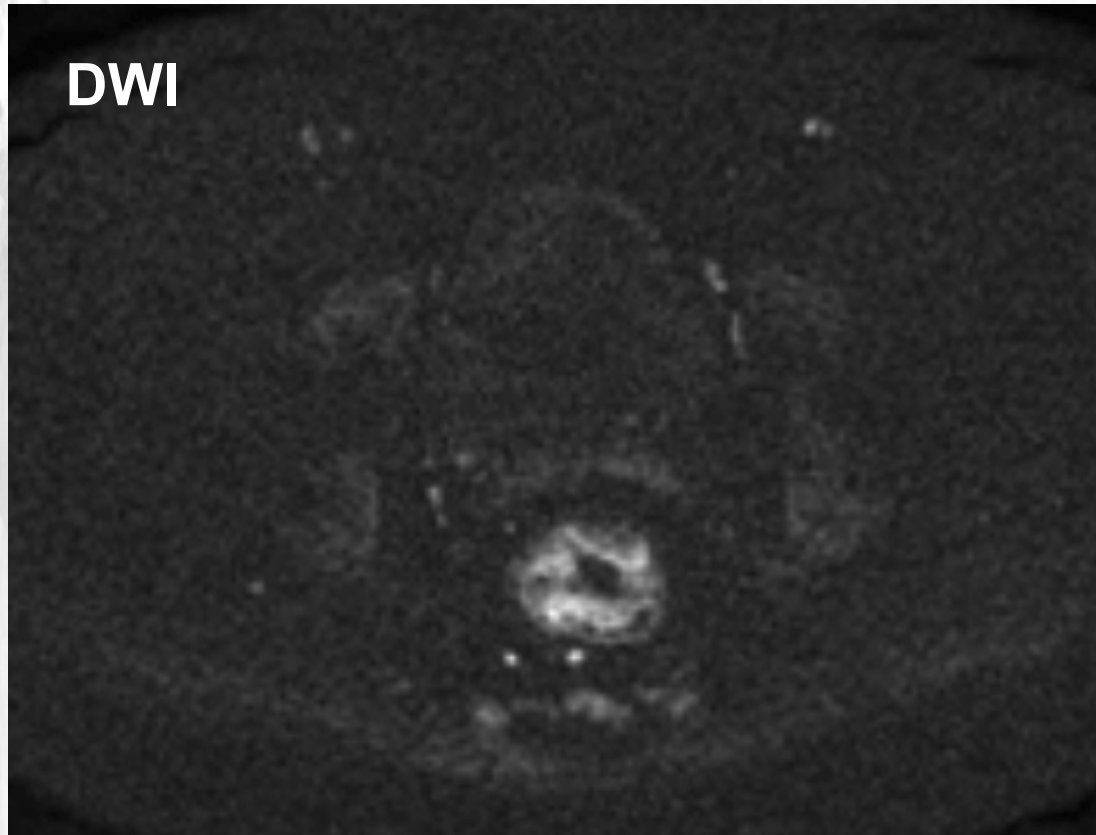
T2



DWI- tuumor ja mts maksas



DWI- rektumi tuumor



Veresoonte uuringud

TOF angio

Kontrastainega MR angio

RUN-OFF angio

Dünaamiline angio (TRICS)

TOF angio

Kujutise moodustamine verevoolu signaali alusel

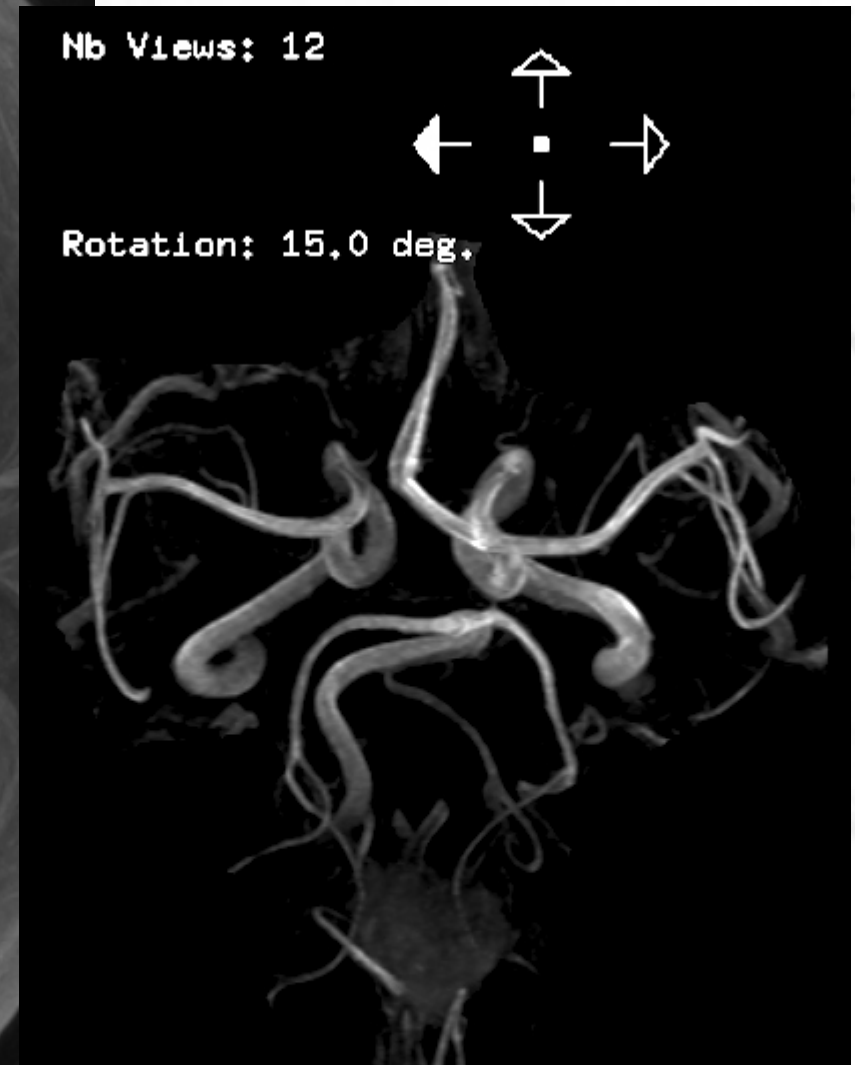
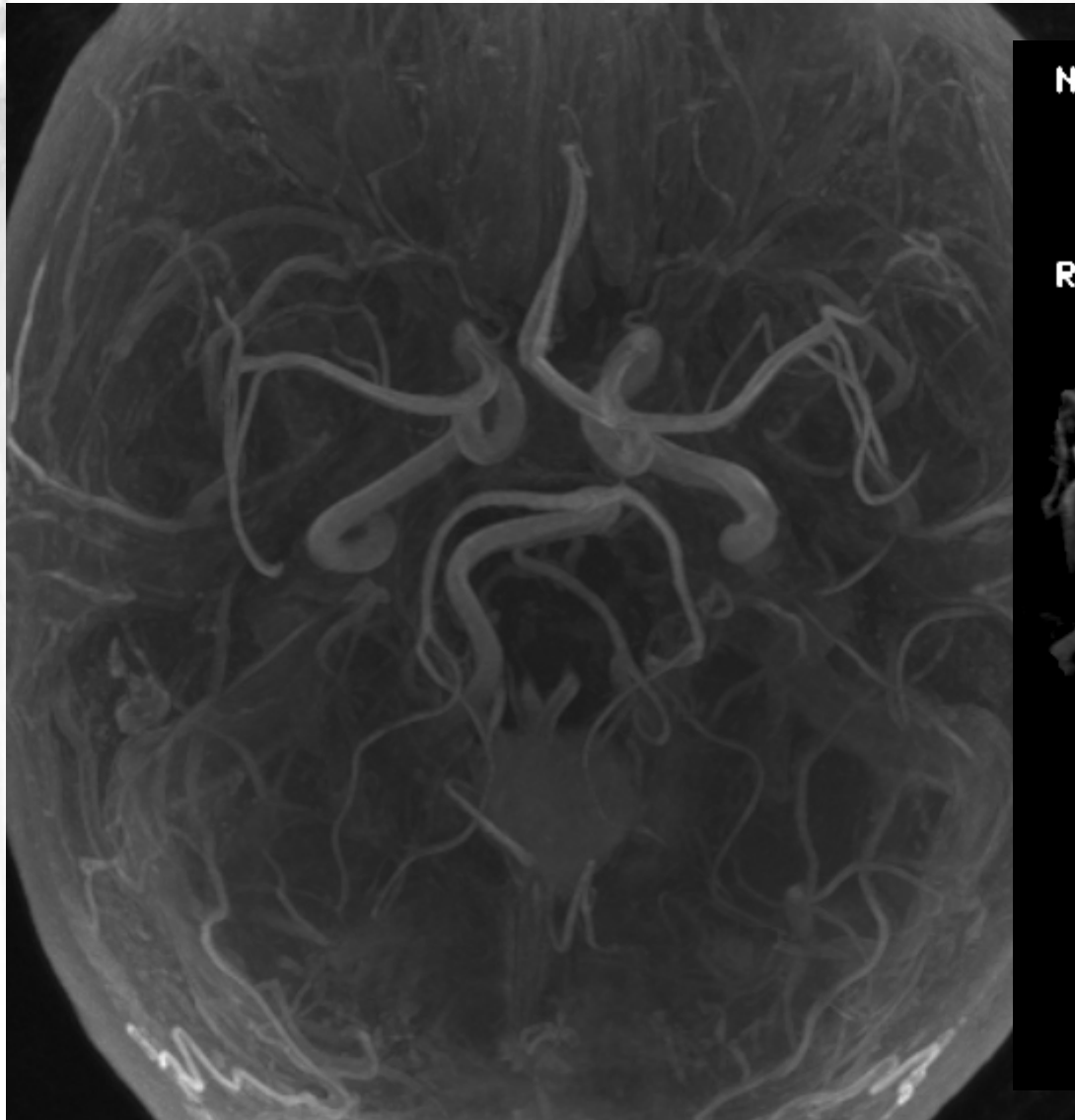
Kontrastainet ei kasutata

Kasutatakse enam aju arterite visualiseerimiseks

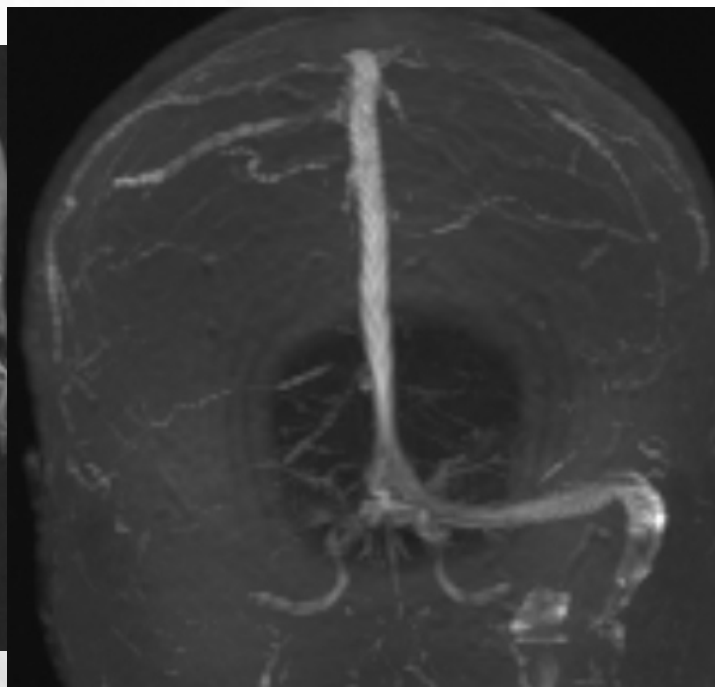
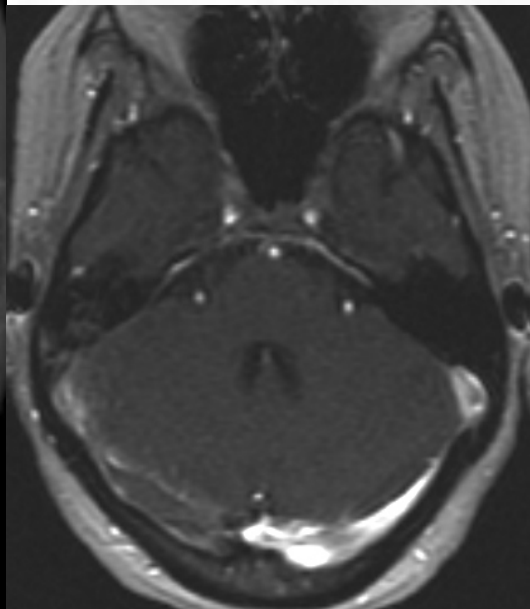
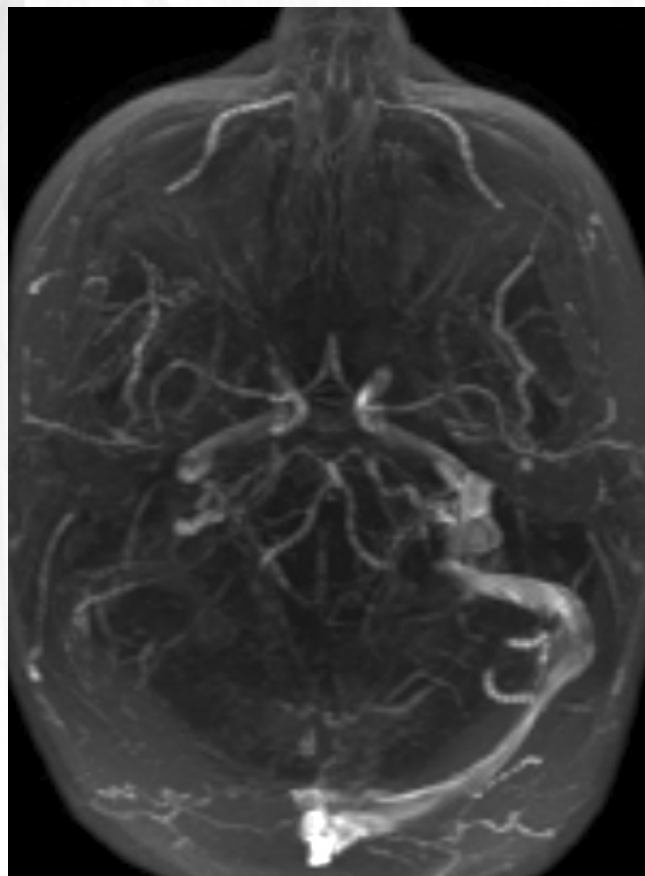
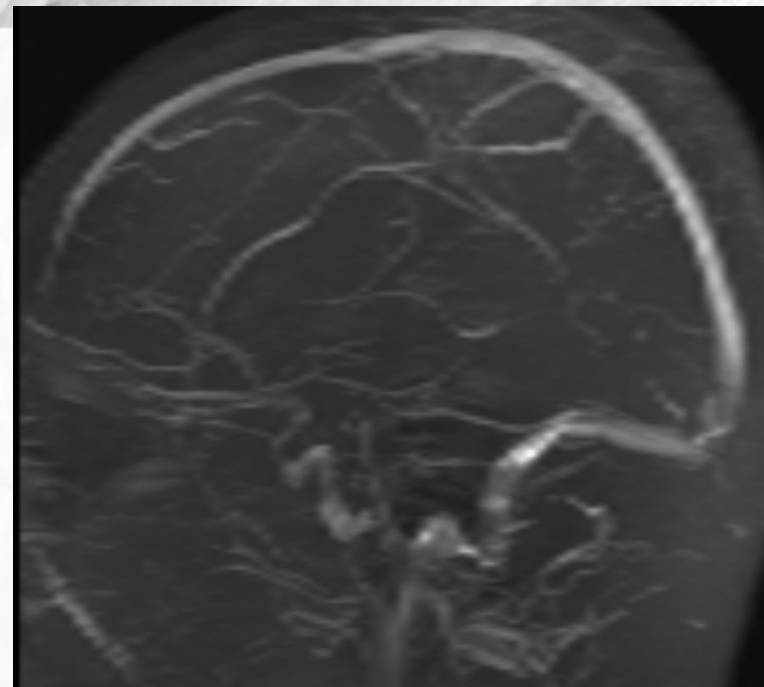
Aju magistraalveenide visualiseerimiseks

Kaela, perifeersed arterid- sageli täiendava uuringuna

3D TOF angio aju arteriteile



TOF angio aju veenidele



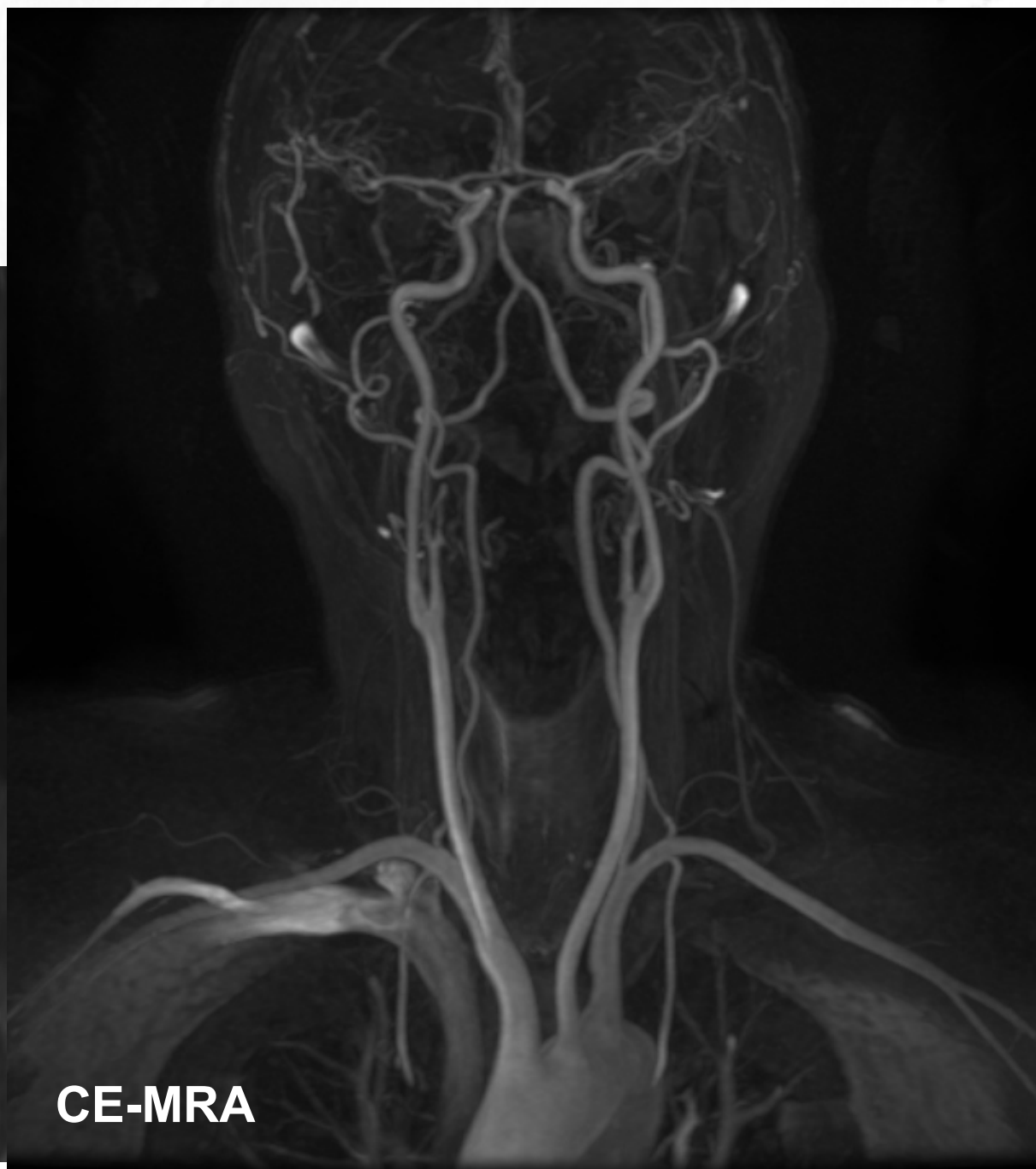
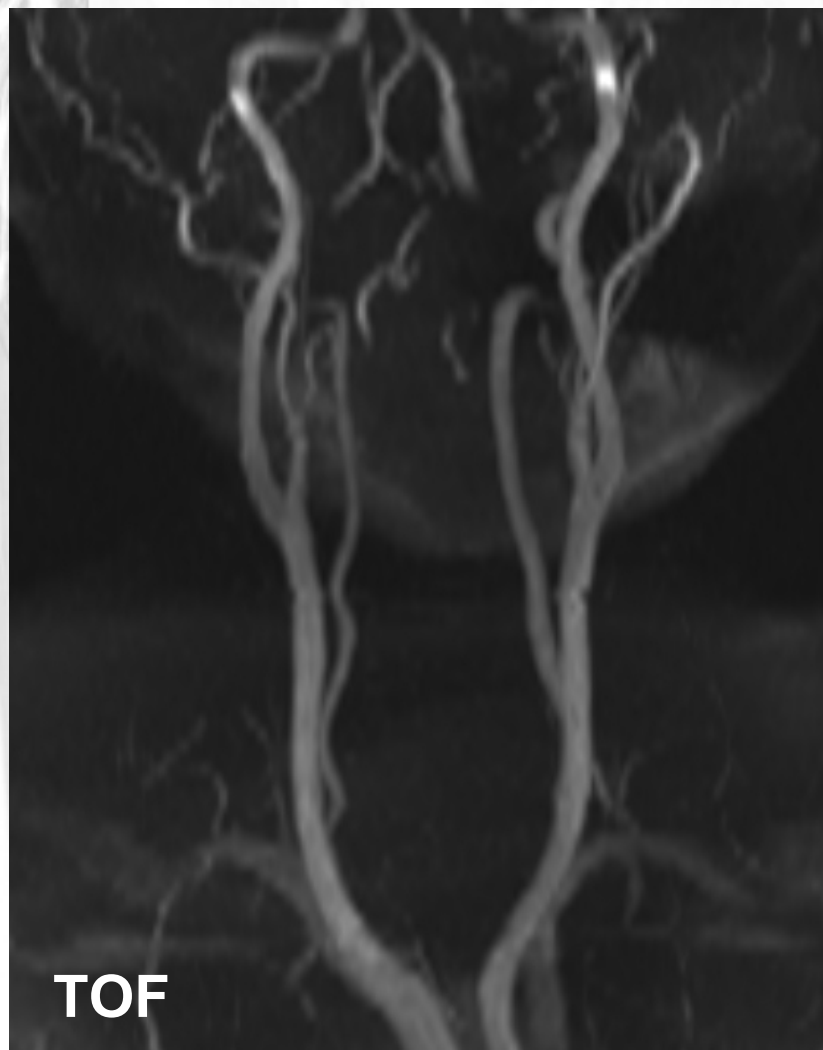
Kontrastainega MR- angio

Süstitakse i/v kontrastaine

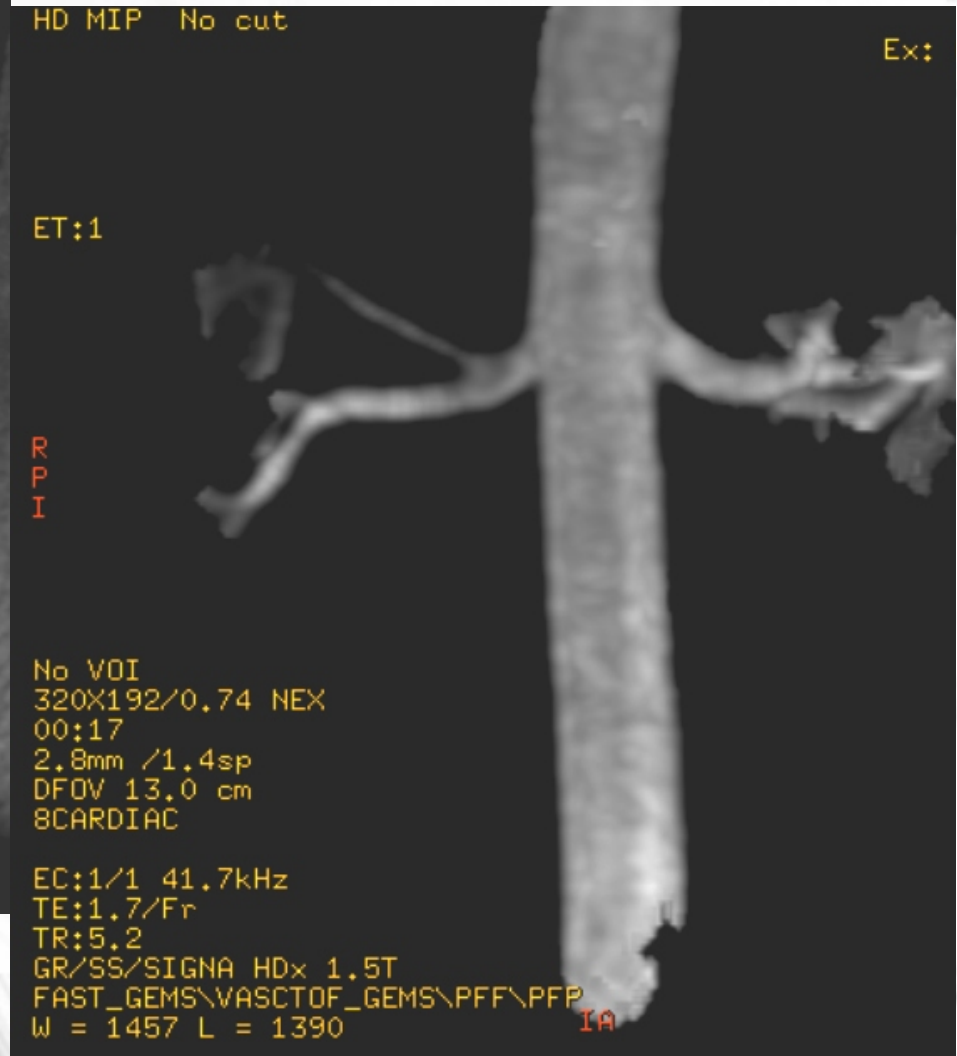
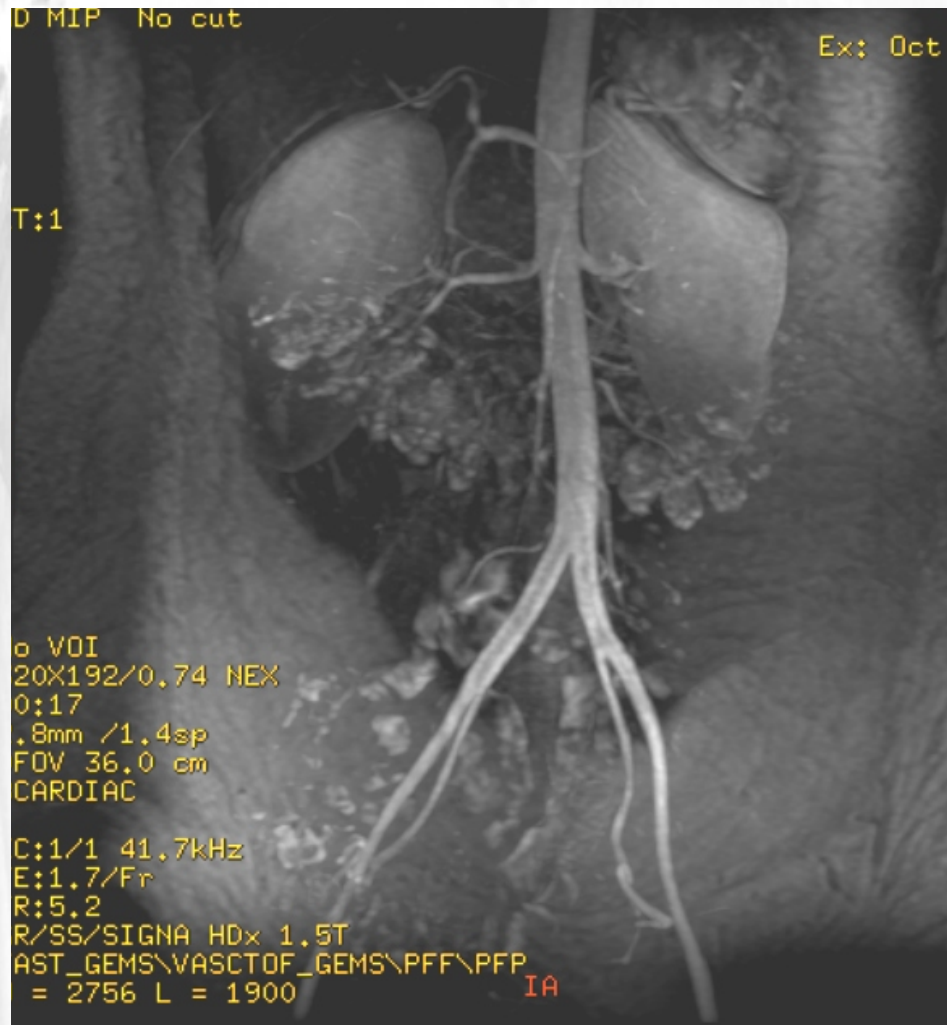
Püütakse kinni kontrastaine boolus, kujutis moodustatakse valendiku kontrastainega täitumise alusel

Kasutatakse enam karotiidarterite, aordi, neeruararterite hindamisel

TOF vs. CE-MRA



Neeruarterite MR angio

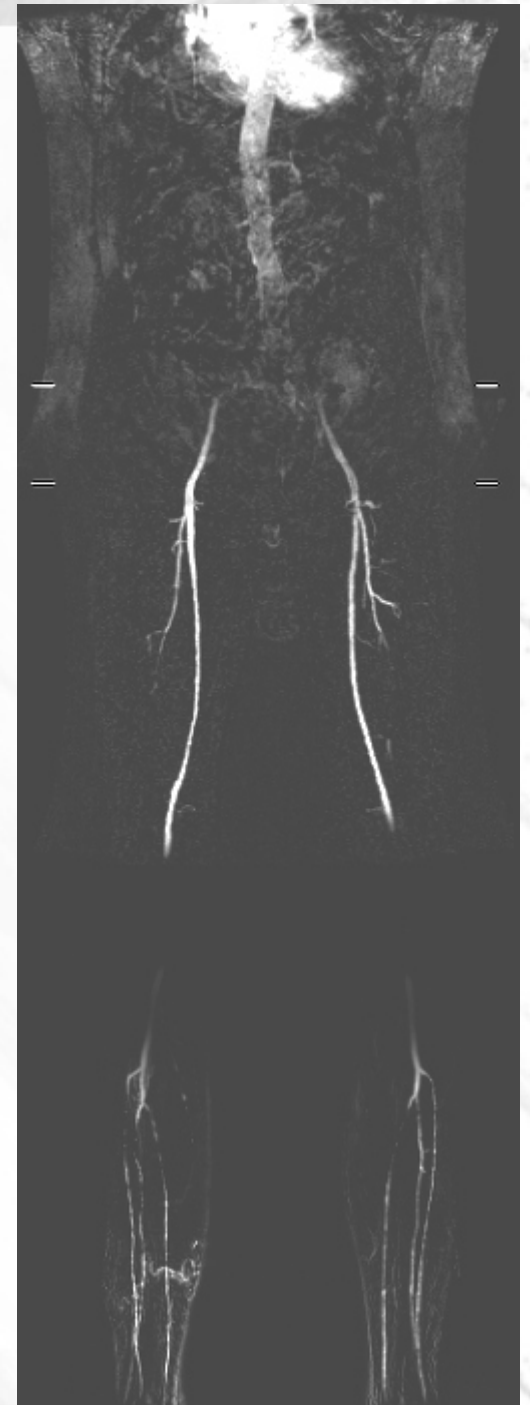
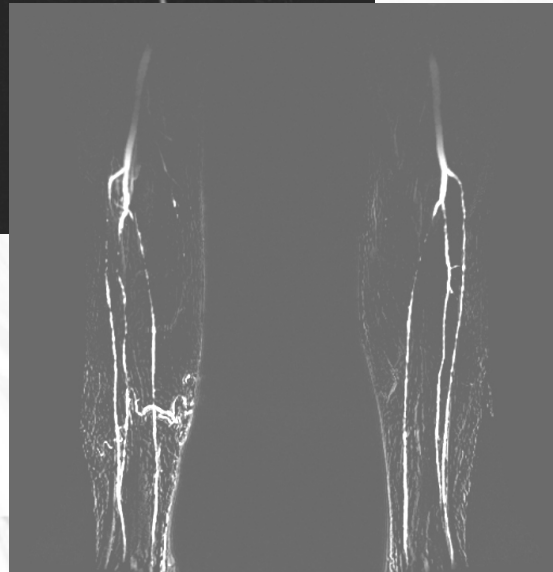
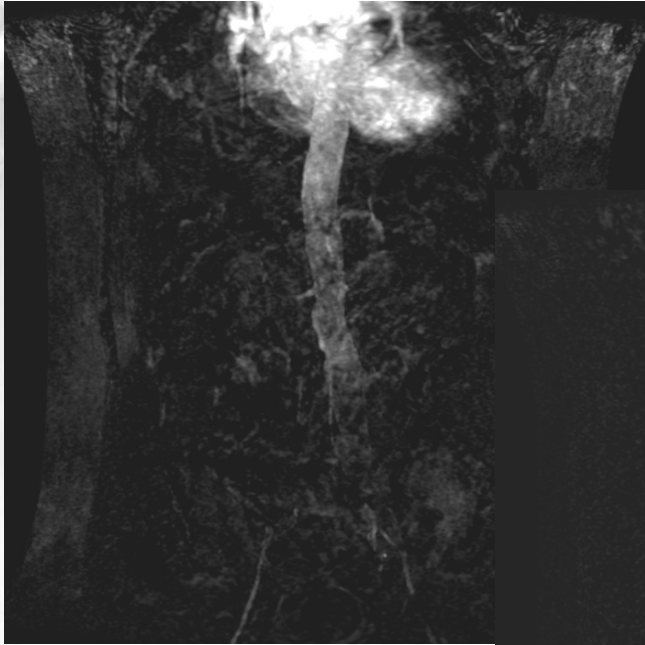


RUN-OFF ANGIO

Kontrastainega MR- angio

Skanneeritakse järjest erinevad anatoomilised piirkonnad ja liidetakse omavahel üheks terviklikuks kujundiks (pasting)

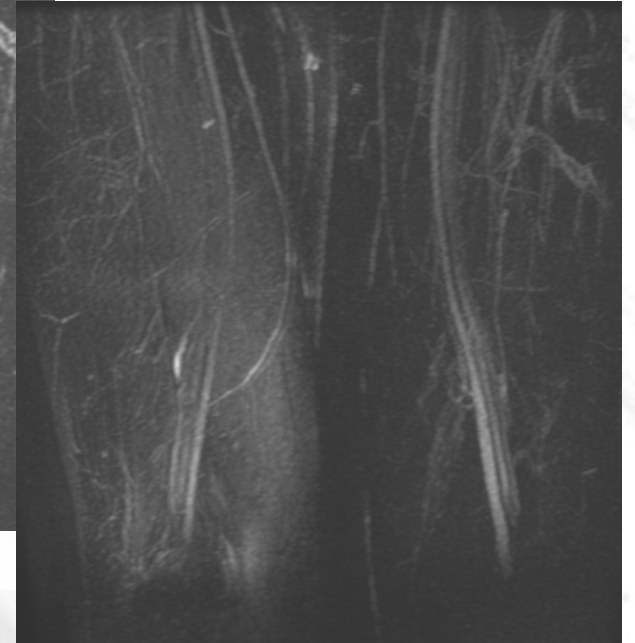
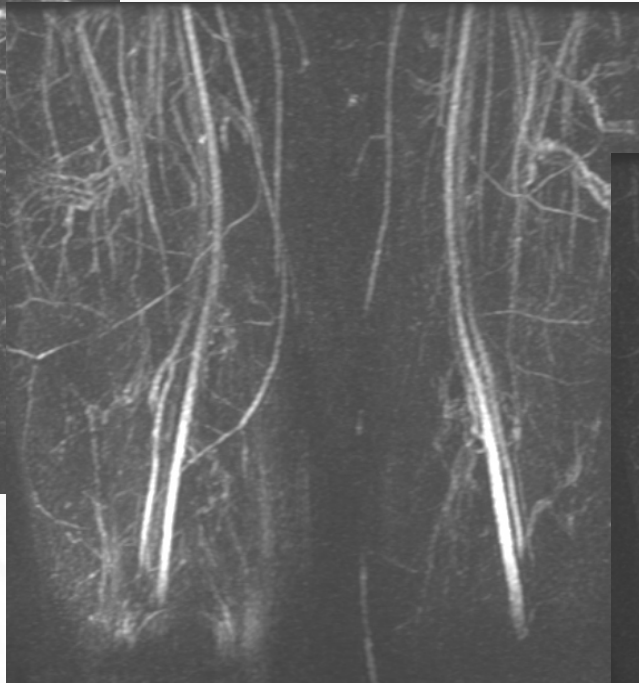
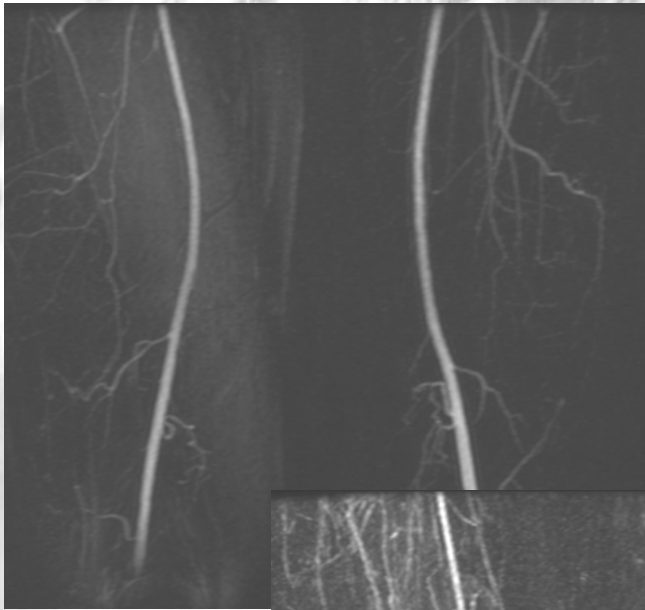
RUN-OFF ANGIO



Dünaamiline angio e. TRICS

Skanneeritakse sama anatoomilist piirkonda korduvalt, saadakse ajaliselt erinevad kontrasteerumisfaasid: arterid → veenid

Dünaamiline angio e. TRICS



Kontrastainega uuringud

Paramagneetilised kontrastained

Gd, Mn

T1 kujutistel signaali intensiivistumine

Ekstratsellulaarse- hepatobiliaarse jaotusega

SPIO ühendid

Fe

T2 signaal langeb

T1 signaali intensiivistumise efekt on tagasihoidlik

Retikuloendoteliaalse jaotusega

Vastavalt jaotumisele jagatakse kontrastained

1) ekstratsellulaarsed

Gd-DTPA (Magnevist®)

Gd-DOTA (Dotarem®)

Gd-DTPA-BMA (Omniscan®)

Gd-HP-DO3A (ProHance®)

Gd-BT-DO3A (Gadovist®)

2) organspetsiifilised

Mn-DPDP (Teslascan®)

3) ekstratsellulaarsed ja organspetsiifilised

Gd-BOPTA (Multihance®)

Gd-EOB-DTPA (Primovist®)

4) retikuloendoteliaalsed

AMI 25 (Endorem®)

SH U 555 A (Resovist®)

Ekstratsellulaarsed kontrastained

sisaldavad gadoliiniumit (Gd)

T1 efekt- signaali intensiivistumine T1 kujutistel

Eestis saadaval

Omniscan (Gd-DTPA-BMA)

Magnevist (Gd-DTPA)

Gadovist (Gd-BT-DO3A)

Ekstratsellulaarsed kontrastained

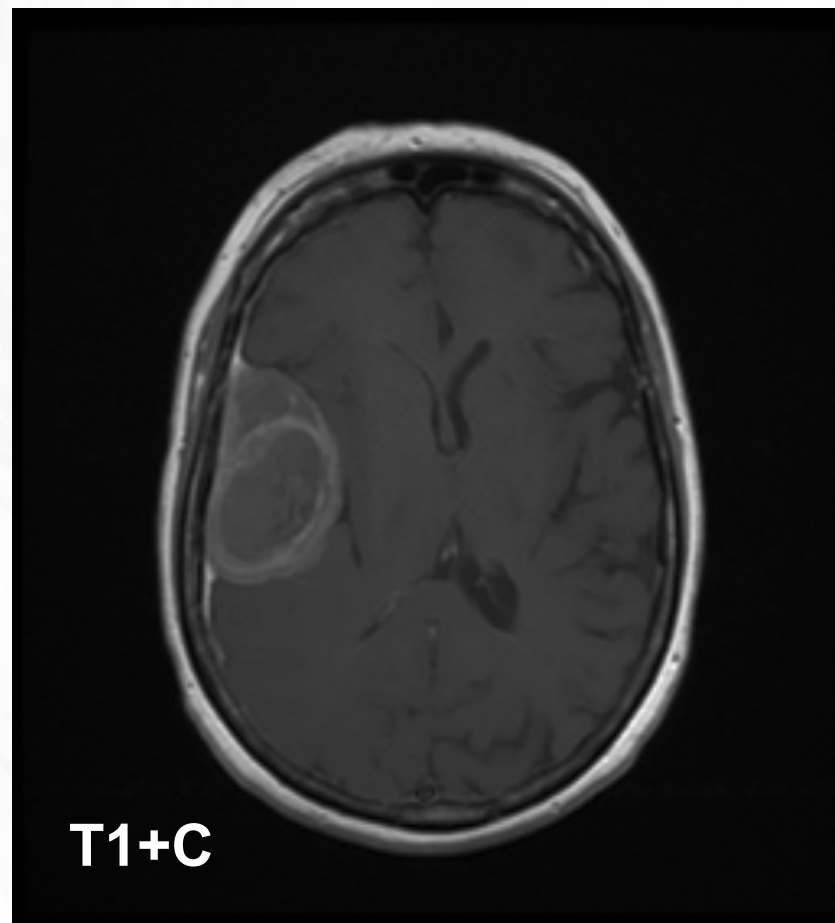
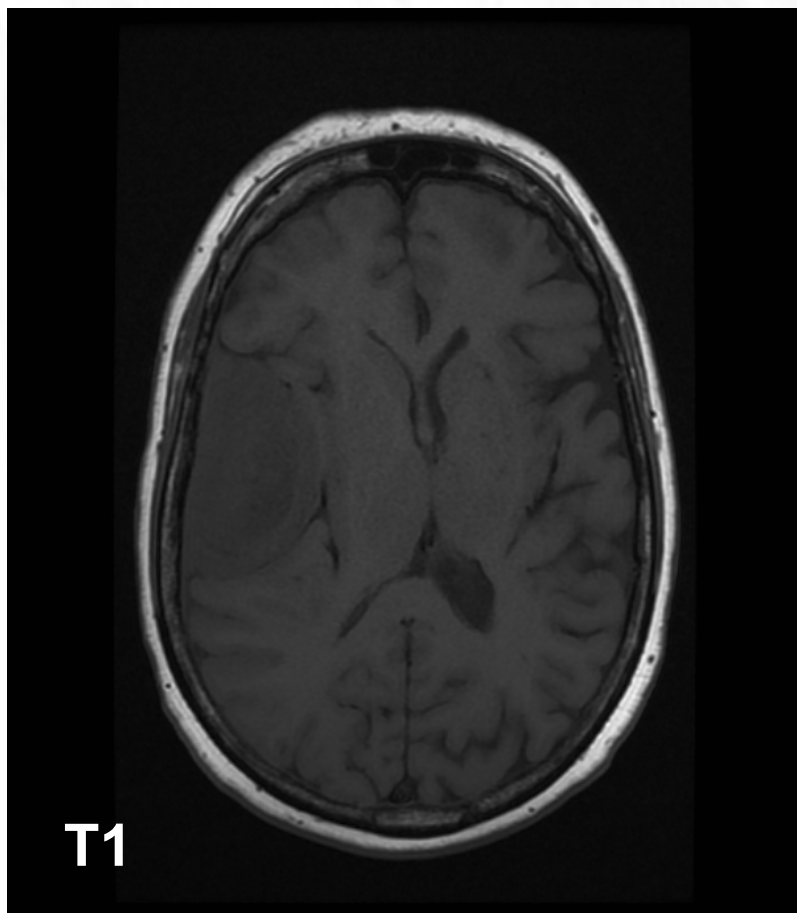
Süstitakse veeni, enamasti boolusena

Filtreeruvad veresoontest kudede ekstratsellulaarsesse ruumi

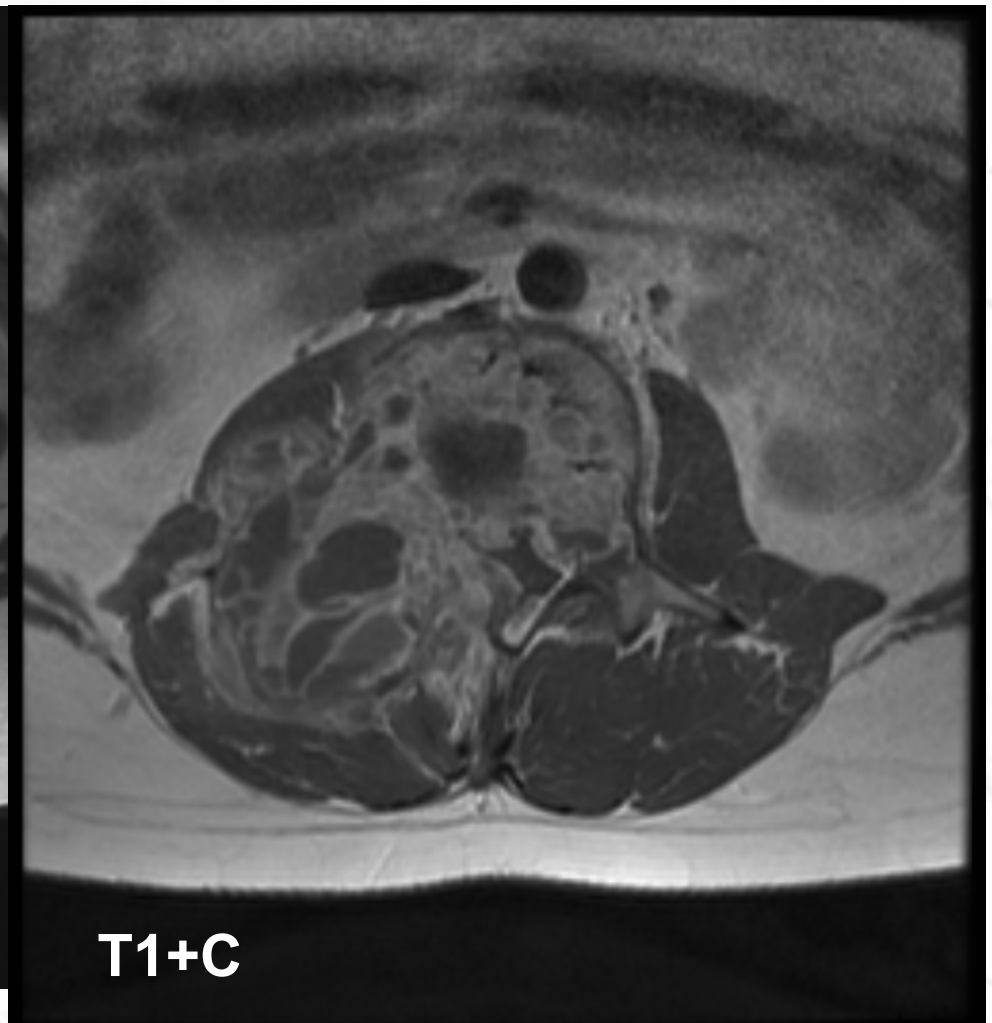
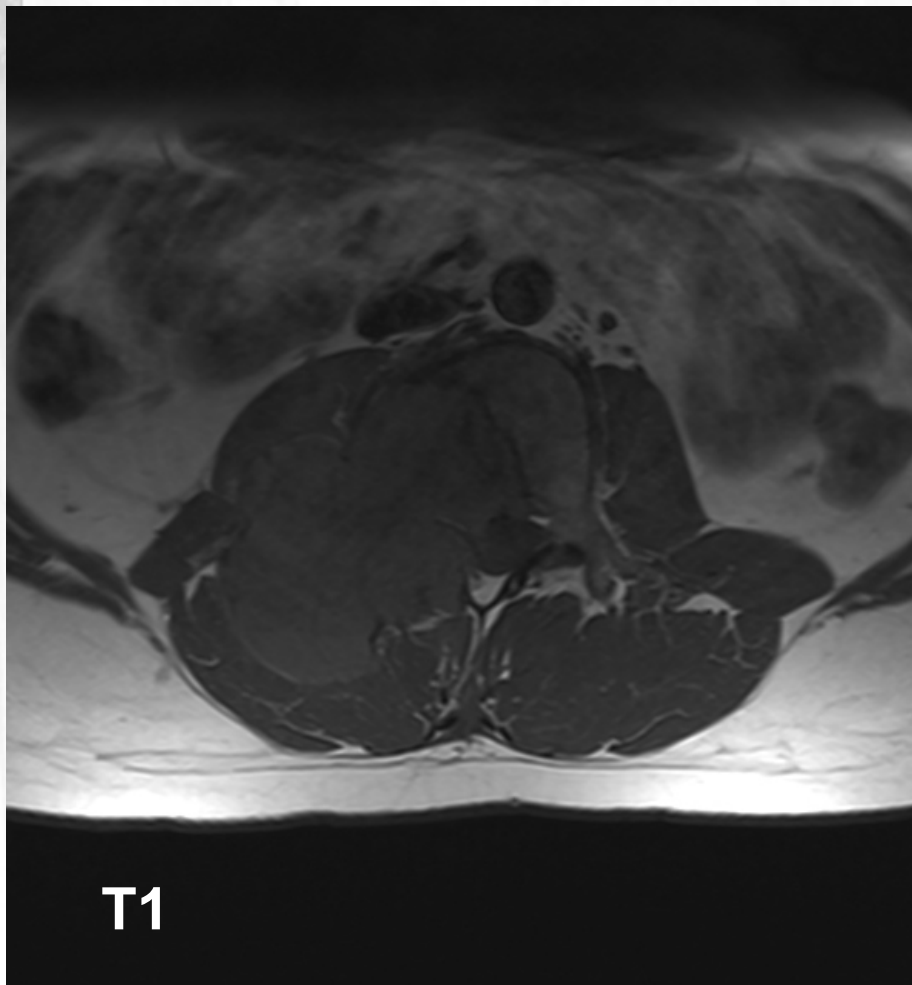
Võimalik teostada dünaamiline mitmefaasiline uuring

Paljudel fokaalsetel muutustel tüüpilised kontrasteerumismustrid

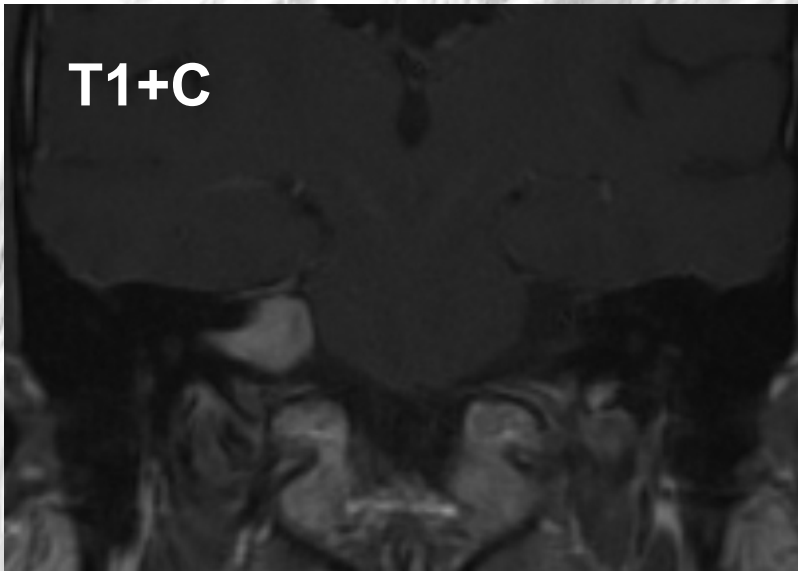
Kontrasteeruv tuumor- T1 pre- ja postkontrast



Spinaalne tuumor T1 natiiv ja kontrastainega

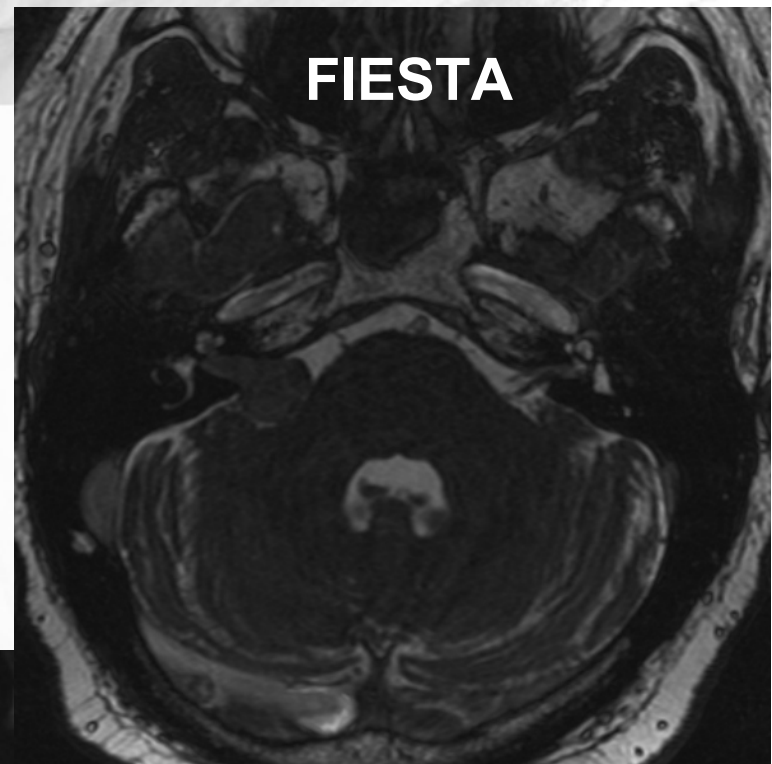


T1+C

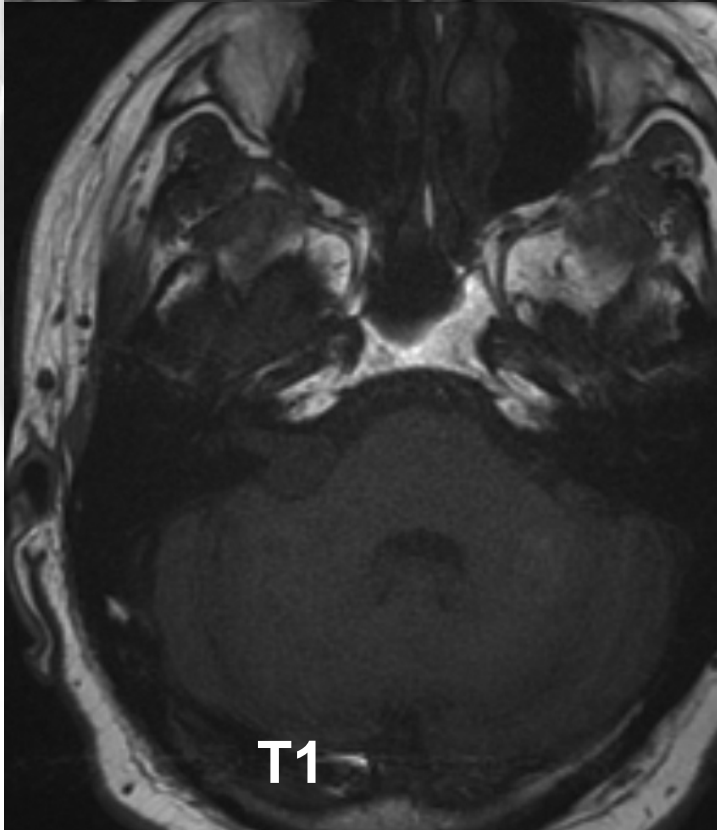


Neurinoom

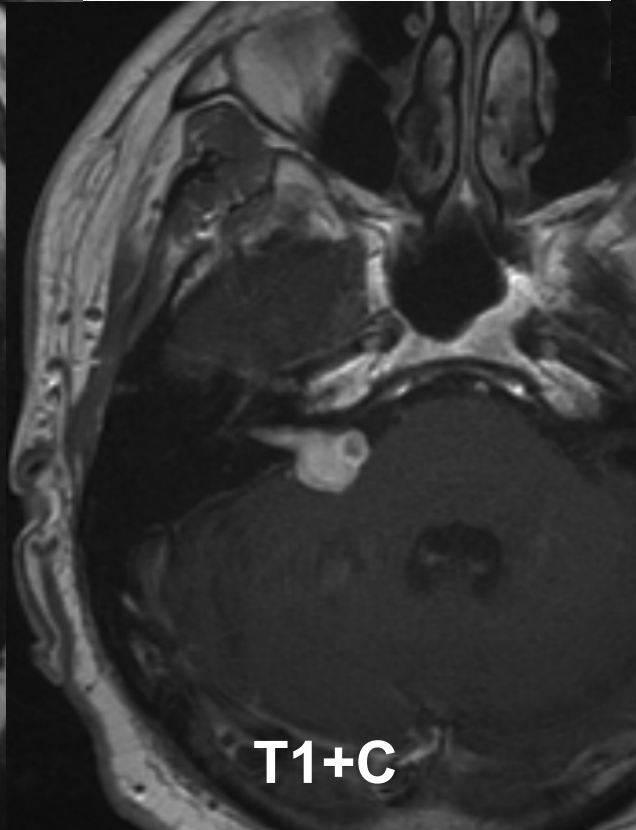
FIESTA



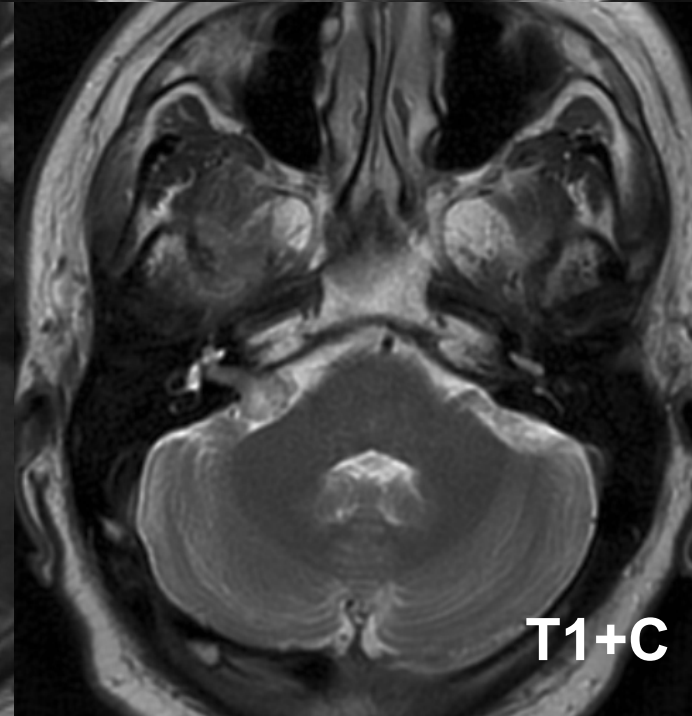
T1



T1+C



T1+C



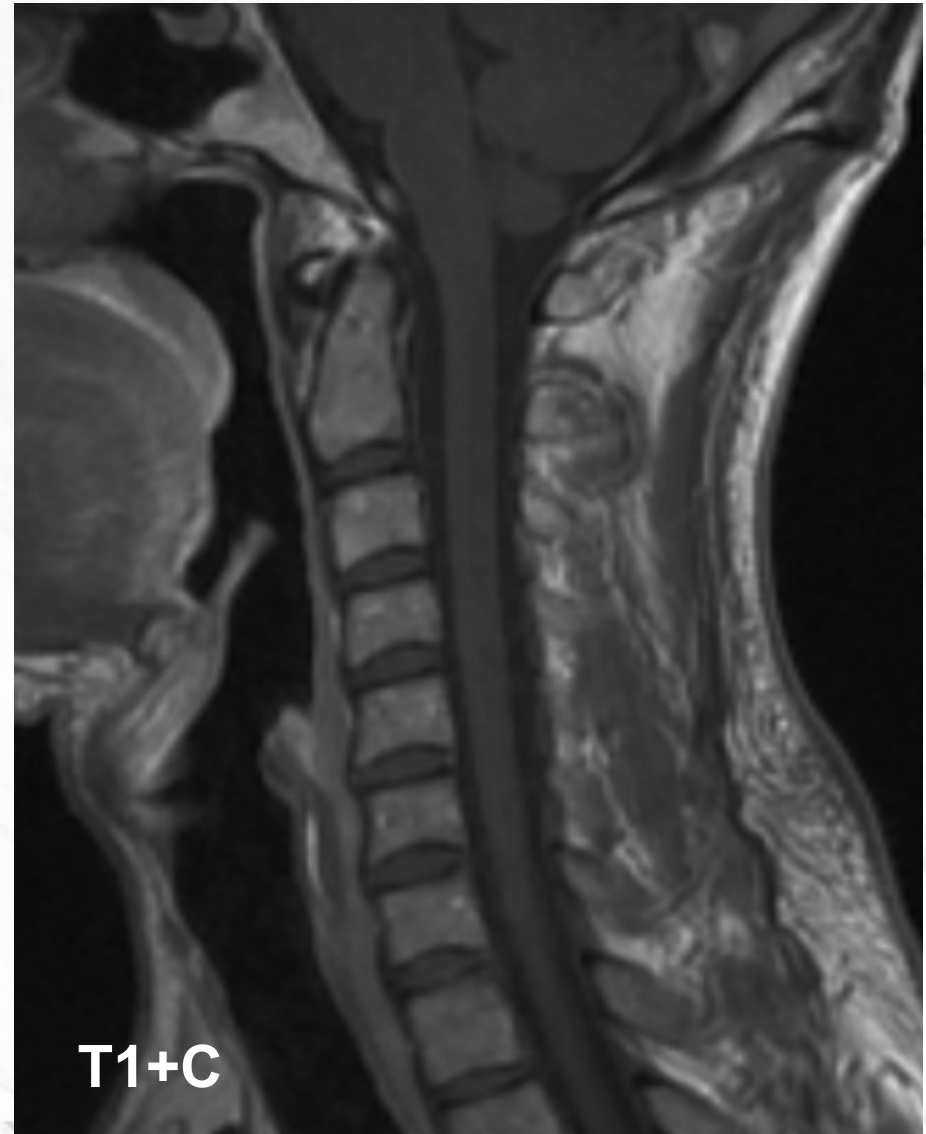
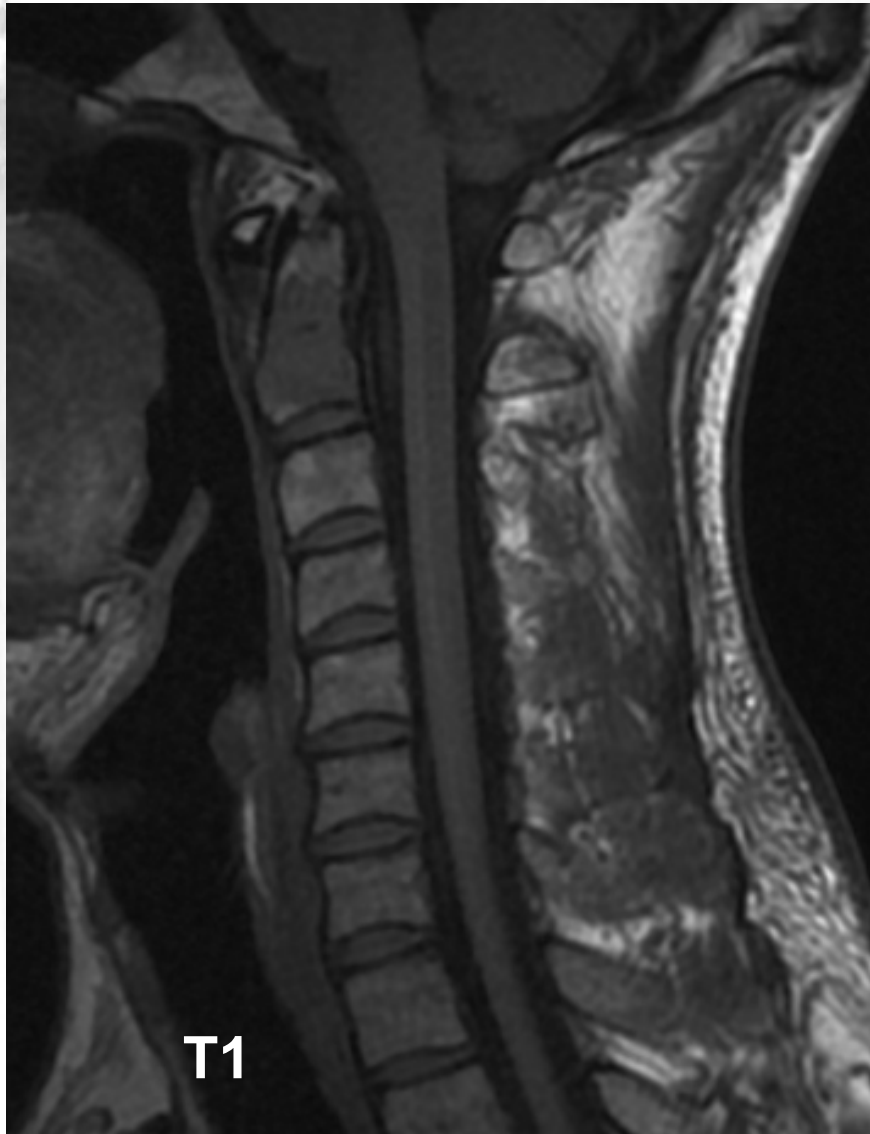
Rasvsupressiooni lisamine kontrastainega seeriatele

Kasutatakse kontrastaine efekti paremaks
väljatoomiseks

T1 kujutistel on rasvkude hele- kontrasteeruv
muutus on heledal foonil halvasti eristuv

T1 rasvsupressiooniga kujutistel on rasva
signaal maha surutud- tume; kontrasteeruv
muutus on tumedal foonil heledana hästi
eristuv

C2 kolle: T1 natiiv ja T1 kontrastainega



Rasvsupressiooniga T1 sekventsid

T1 (*SE, FSE, TSE*) FS

T1 (*SE, FSE, TSE*) Fat Sat

LAVA (GE)

VIBE (Siemens)

THRIVE (Philips)

Lüli mts

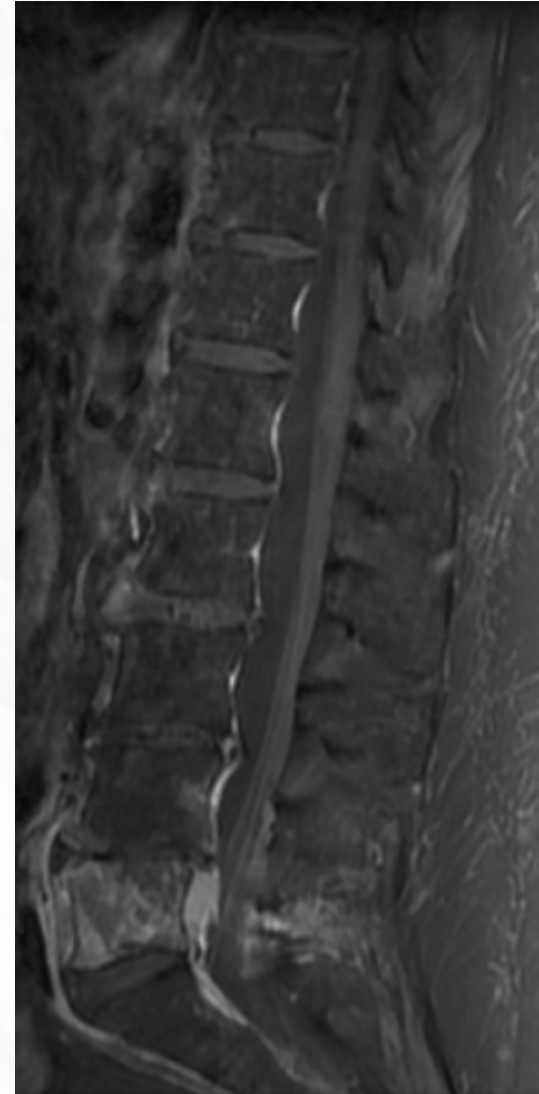
T1



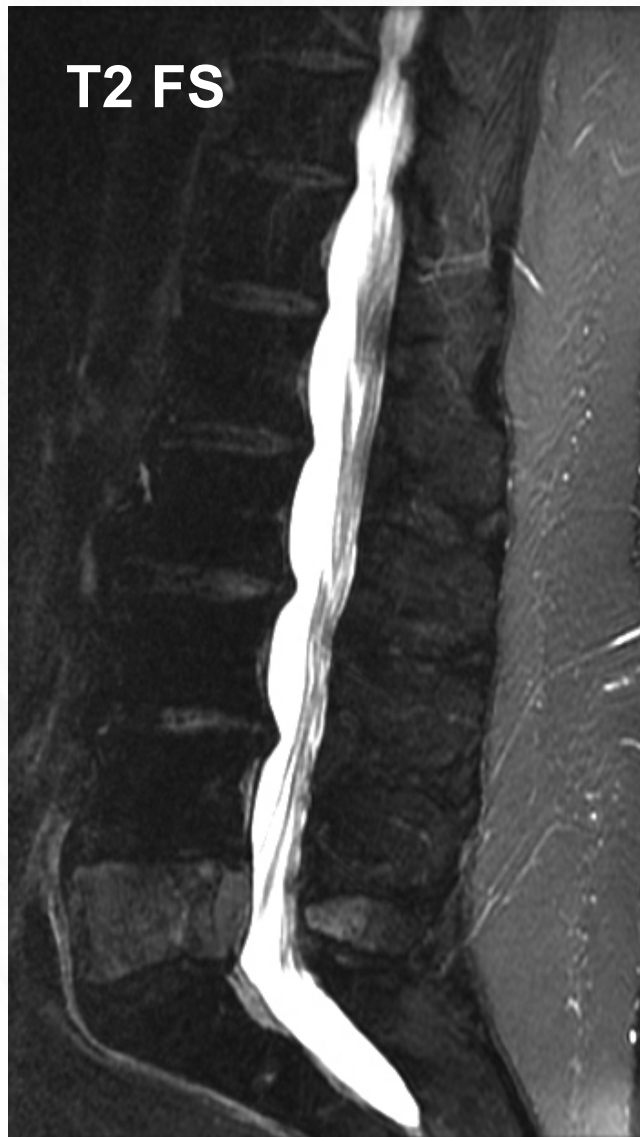
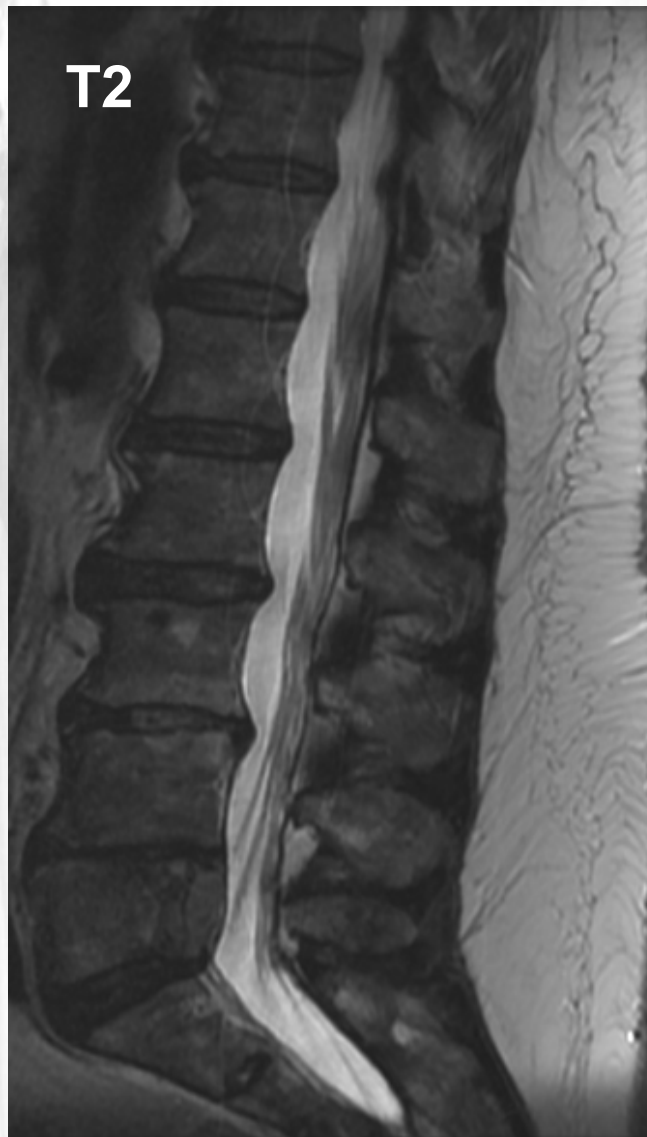
T1+ kontrast;



T1FS+kontrast

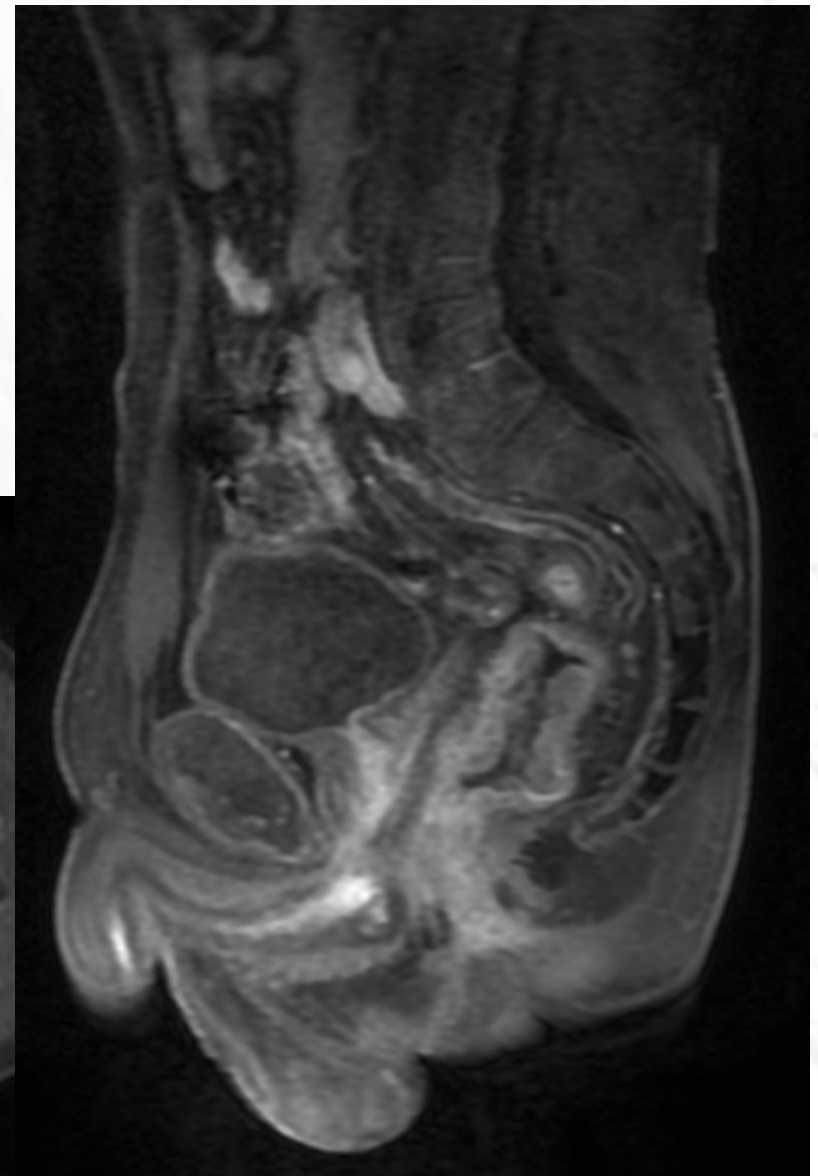
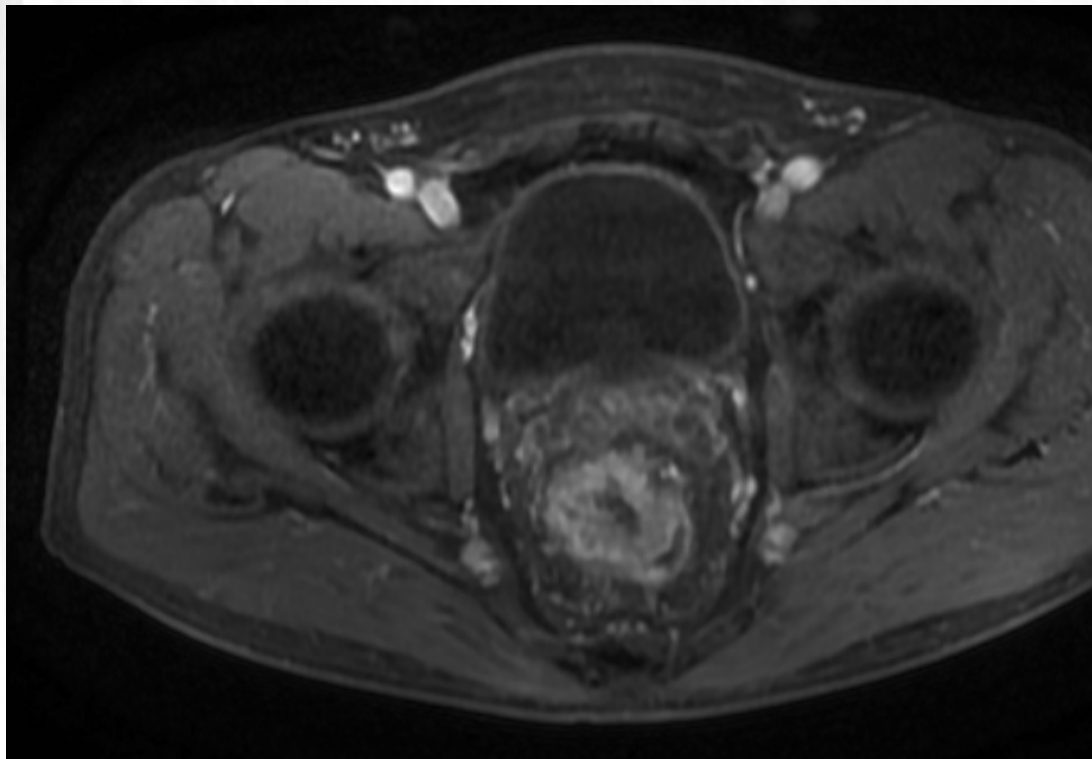


Lüli mts

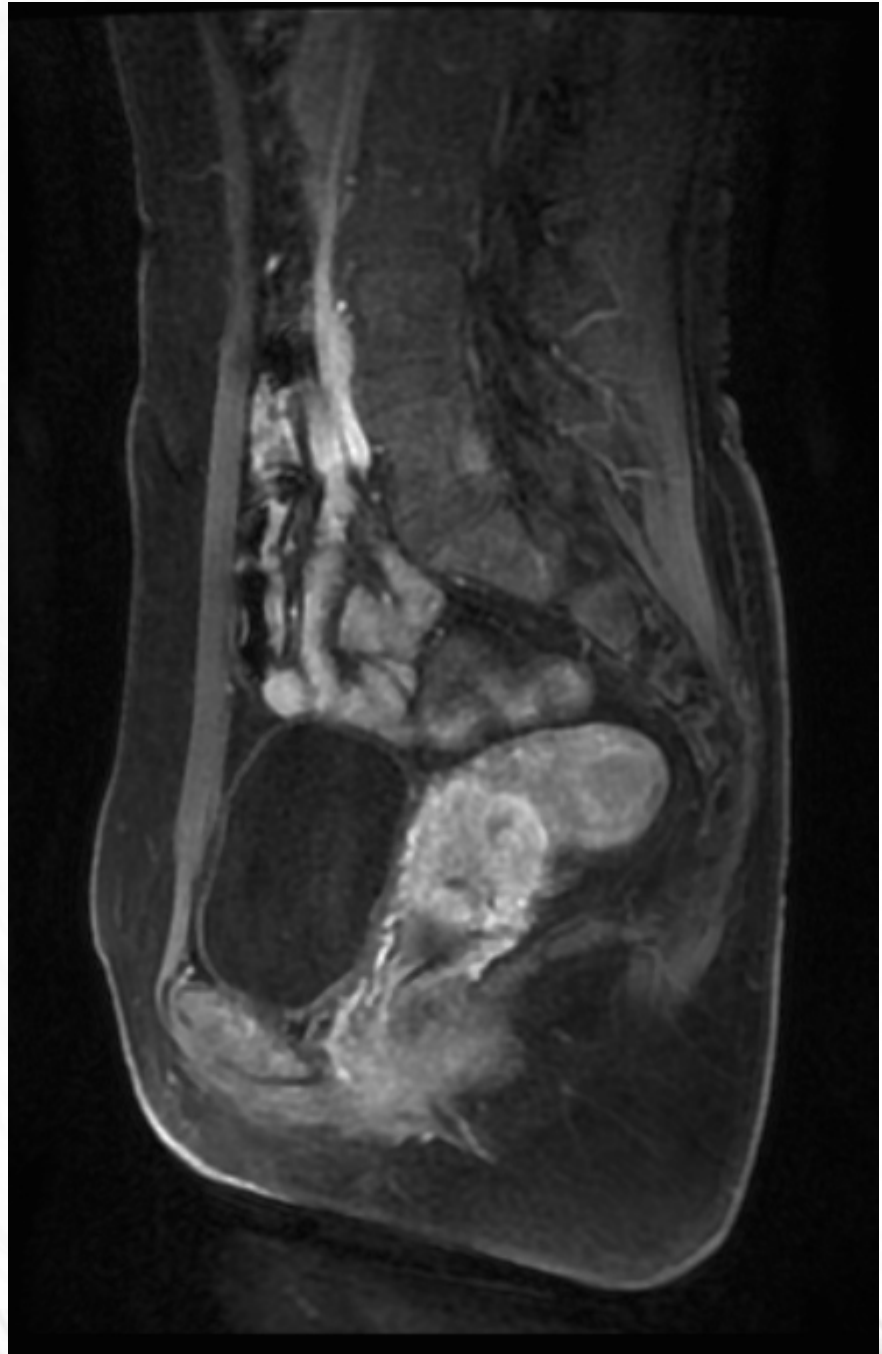


Rektumi tuumor

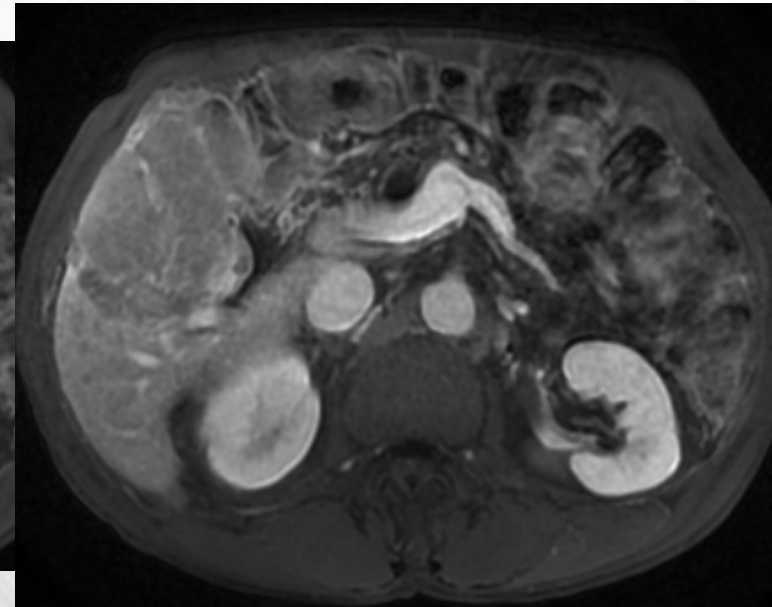
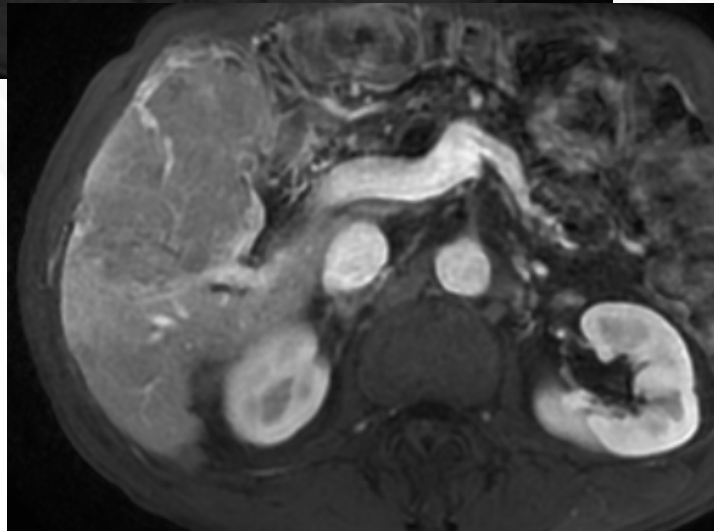
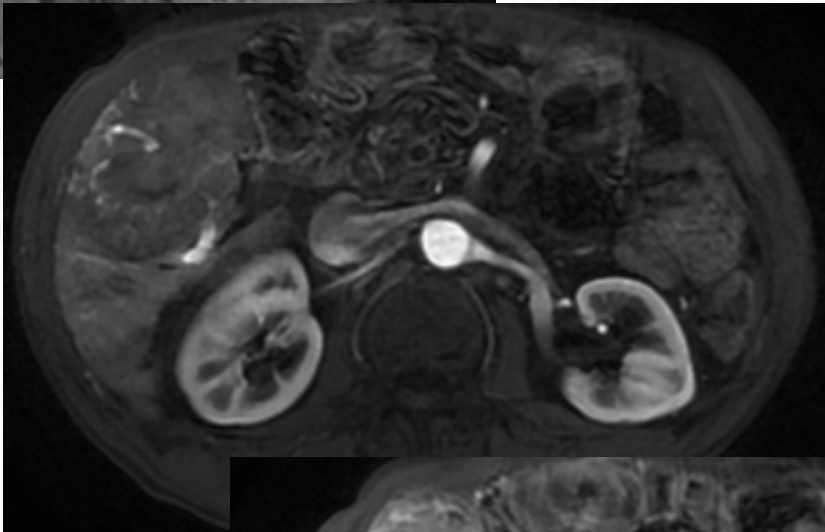
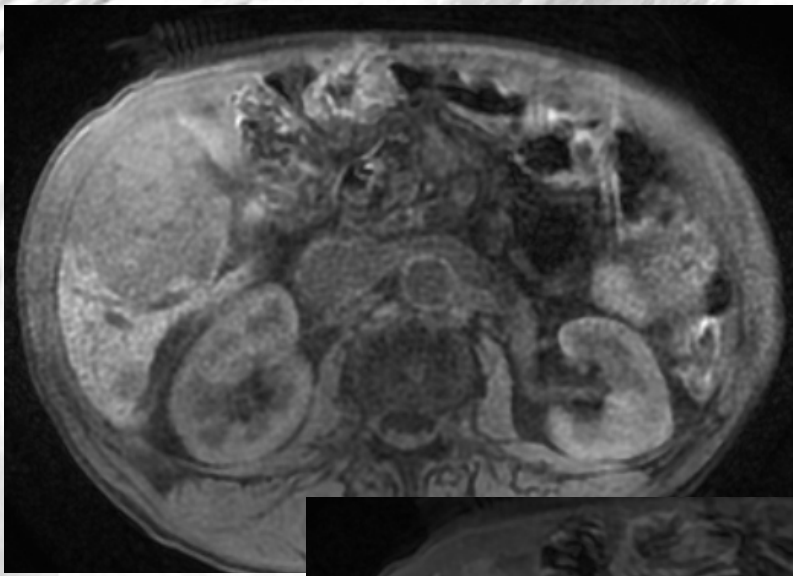
LAVA kontrastainega



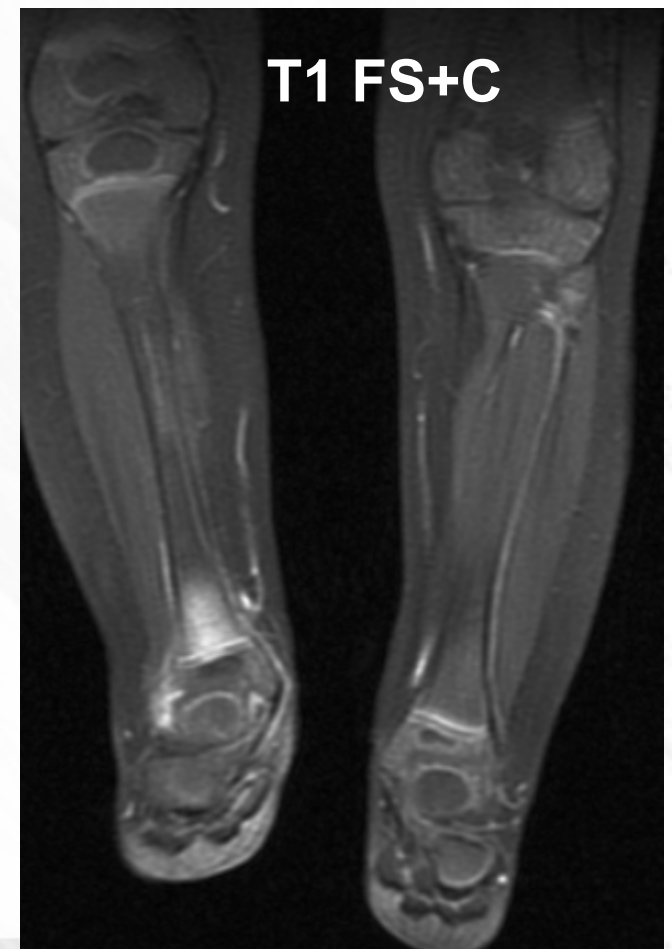
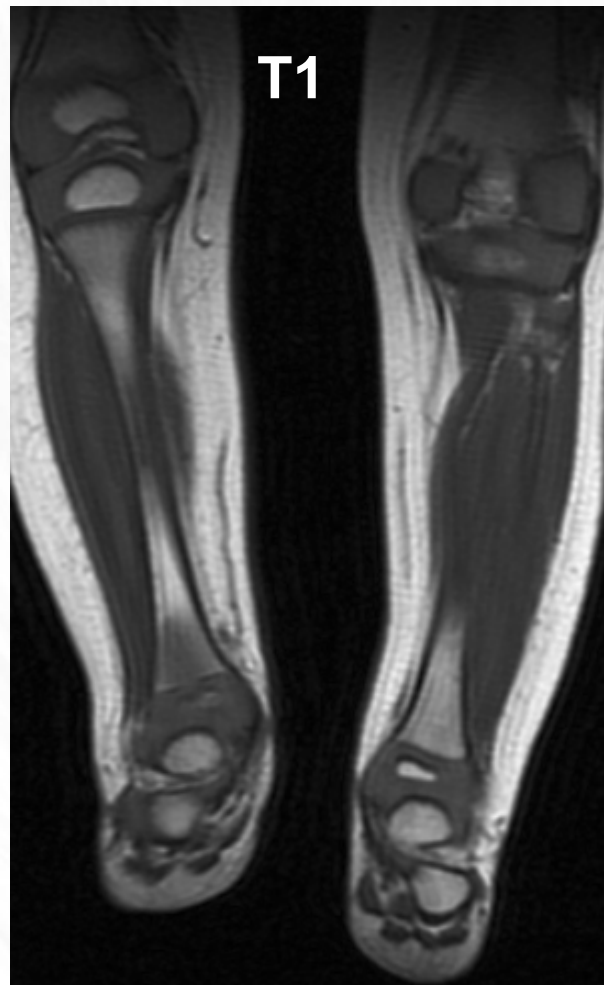
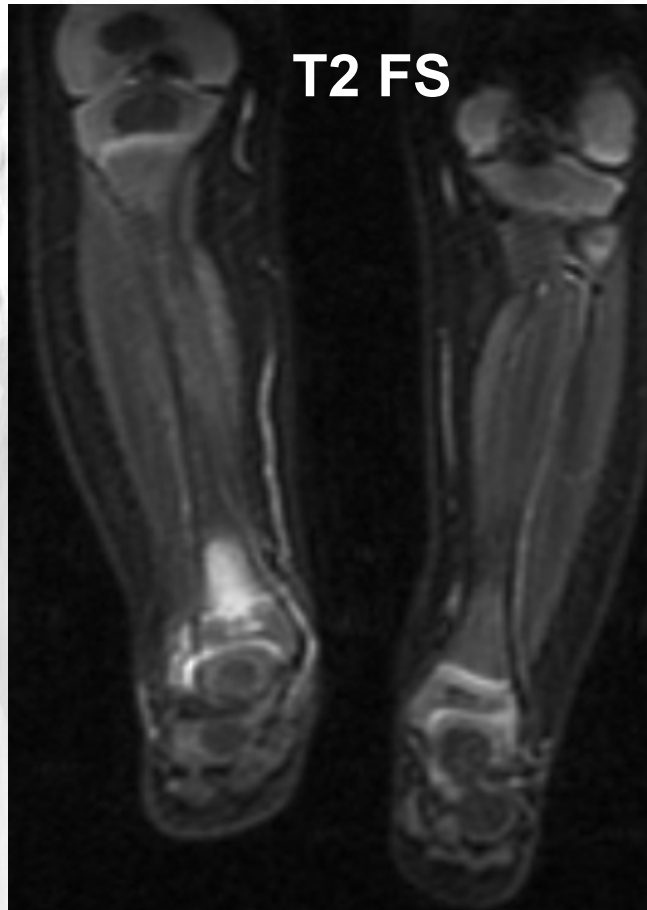
Emakakaela
tuumor,
LAVA
kontrastainega



Dünaamiline kontrasteerimine



Osteomüeliit



Uuringualgoritmi valik

Uuring koosneb erinevate sekventsides kombinatsioonist erinevates tasapindades

Sekventsides valik sõltub kliinilisest probleemist

Adekvaatse uuringualgoritmi valikuks on vajalikud kliinilised andmed, kliiniline probleem, küsimuseasetus

Uuringualgoritmi valik

Erinevad koed on erinevate MR
karakteristikutega:

erinev T1, T2 signaali intensiivsus

erinev rasvsupressiooniga seotud signaali
intensiivsus

erinev kontrasteerumismuster

erinev ajaline kestvus

Erinevatel sekventsidel on erinev ajaline kestvus

kiired sekventsid- aeg sekundites

konventsionaalsed sekventsid- aeg minutites

oluline kõhu ja rindkere piirkonnas- hingamine,
südame pulsatsioonid

kiired sekventsid- saab kasutada
hingamiskeetusega- **BH** (**B**reath **H**old)

aeglased sekventsid- vabal hingamisel **RT**
(**R**espiratory **T**riggerved)

Aju uuringud

Rutiin (SI 5 mm, Sp 1mm, FOV 22- 24 mm)

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T2 kujutised

T1 kujutised

FLAIR kujutised

DWI kujutised

T2*GRE (MERGE, SWAN)

Erinevad tasapinnad: aksiaalid, sagitaalid,
koronaarid

Erinevate kliiniliste probleemide puhul võib lisada võimaliku täiendavat infot andvaid sekventse

Hüdrotseefalus- liikvoriteede läbitavuse hindamiseks *FIESTA (CISS, DRIVE)*

Kraniaalnärvide hindamiseks FIESTA

Epilepsia- T1 IR kortikaalse hallaine hindamiseks

Sclerosis multiplex- PD kujutised

Ebaselge koldeleiu täpsustamiseks-
kontrastainega T1

Vaskulaarse patoloogia kahtlusel
arteritele kaalutud TOF angio
veenidele kaalutud TOF angio
malformatsioonidele kaalutud TOF angio

Orbitate, koljupõhimiku muutuste hindamiseks-
rasvsupressiooni lisamine

Hüpopfüüsi patoloogia- piirkonnale suunatud
kõrgema resolutsiooniga kujutised

Lülisamba uuringud

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T2 kujutised

T1 kujutised

T2 FS kujutised

Erinevad tasapinnad: aksiaalid, sagitaalid, koronaarid

Erinevatel tootjatel lisaks spetsiaalselt disainitud sekventse, nt. *COSMIC, MERGE* kaela uuringutel (GE)

Erinevate kliiniliste probleemide puhul võib
lisada võimaliku täiendavat infot andvaid
sekventse

PD kujutised- sclerosis multiplex

T2*GRE- vere otsimiseks- trauma, vaskulaarne
patoloogia

kontrastaine lisamine koldeleiu täpsustamiseks
intrasпинаalne muutus, m.h. seljaaju kolle ei vaja
rasvsupressiooni lisamist

lülisamba koldemuutus- rasvsupressiooniga

Liigeste uuringud

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T1 kujutised

PD Fat Sat kujutised

T2 Fat Sat kujutised

Erinevad tasapinnad: aksiaalid, sagitaalid, koronaarid

GRE kujutised- võib lisada luu kontuuride, labrumite paremaks visualiseerimiseks, vere leidmiseks

DWI kujutised- põletiku- abstsessi otsimiseks

Liigeste uuringud intra- artikulaarse kontrasteerimisega

Süstitakse i/a Gd sisaldavat kontrastainet

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T1 Fat Sat kujutised

PD Fat Sat kujutised

T2 Fat Sat kujutised

T1 kujutised

Erinevad tasapinnad: aksiaalid, sagitaalid, koronaarid

T1 FS+C

Õlg i/a
kontrastainega

T1 FS+C

T1 FS+C

Kõhu piirkonna uuringud

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T2 kaalutud kujutised rasvsupressiooniga ja/või rasvsupressioonita

T1 kaalutud kujutised (Dualecho in- phase/ out-phase)

DWI kujutised

Kontrastainega uuring- enamasti dünaamilise kontrasteerimisega (*LAVA, THRIVE, VIBE*)

Erinevad tasapinnad: aksiaalid, sagitaalid, koronaarid

FNH

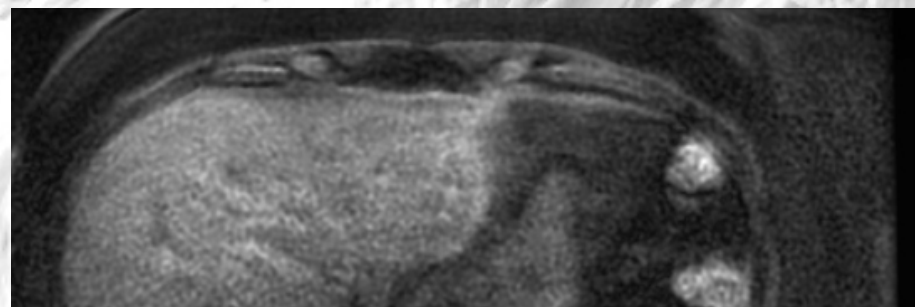
T2 ja DWI kujutised

DWI

T2 FS

T2

FNH dünaamiline uuring k/a-qa



natiiv



arteriaalne



portovenosne



ekviliibrium



**hilis- e.
maksaspetsiifiline
faas**

Erinevate kliiniliste probleemide puhul
võib lisada võimalikku täiendavat infot
andvaid sekventse

MRCPG- sapiteede, pankrease juha, tsüstilise
haiguse korral

MRU- urotrakti probleemide korral

T1 FSPGR- hea tundlikkusega pankrease
tuumorite korral

spetsiaalsed sekventsids erinevatelt tootjatelt
nt. *FIESTA* (GE)

Vaagna piirkonna uuringud

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T2 kujutised

DWI kujutised

T1 kaalutud kujutised

T2 Fat Sat kujutised

kontrastainega seeriad- vastavalt vajadusele

Erinevad tasapinnad: aksiaalid, sagitaalid, koronaarid

Pehmete kudede uuringud

3 plane loc (*localizer, pilot, scout, survey, plan scan*)

T2 Fat Sat kujutised

T1 kujutised

DWI kujutised

kontrastainega seeriad- vastavalt vajadusele

Erinevad tasapinnad: aksiaalid, sagitaalid,
koronaarid

Lõpetuseks

Erinevatelt skentsidelt saame erinevat infot

Erinevat infot kokku pannes saame tervikpildi

Vajab aega harjumiseks/ harjutamiseks

Väga oluline on kliiniline info- sellest sõltub
uuringu planeerimine, sageli ka dif. dgn. õige
diagnoosini jõudmine

Vajab head anatoomia tundmist, aega
süvenemiseks- eriti keerulisematel juhtudel

Kindlasti on põnev!

