ADNI GO MRI Core

Toronto April 2010

GO and ADNI 2 MRI protocol – organizing principles

- **ADNI 1 carry forward subjects: *maintain MRI methodological consistency***
  - same 1.5T scanner, using ADNI 1 1.5T protocol
  - Discontinue dual 3T/1.5T scans for those in "3T arm" of ADNI-1
- **new GO/ADNI 2 enrollees: *modernize & expand MRI protocol***
  - 3T
  - limit ~ 30-35 minutes (limits # possible sequences in protocol)
  - only product sequences – no WIPS – scanners run in clinical mode
  - requires parallel protocols with 2 scanners/site
  - Core protocol on all scanners, and vendor specific "experimental" sub studies

ADNI 2 MRI 3T Protocol

- 3D T1 volume un-accelerated (MPRAGE Siemens and Phillips, IR SPGR GE)
- 3D T1 volume 2X accelerated
- FLAIR
- long TE 2D gradient echo

==========

- Experimental: Siemens (ASL), GE (DTI), Phillips (resting state EPI-BOLD

- Phantom (once per day if > 1 ADNI patient)

MAYO CLINIC

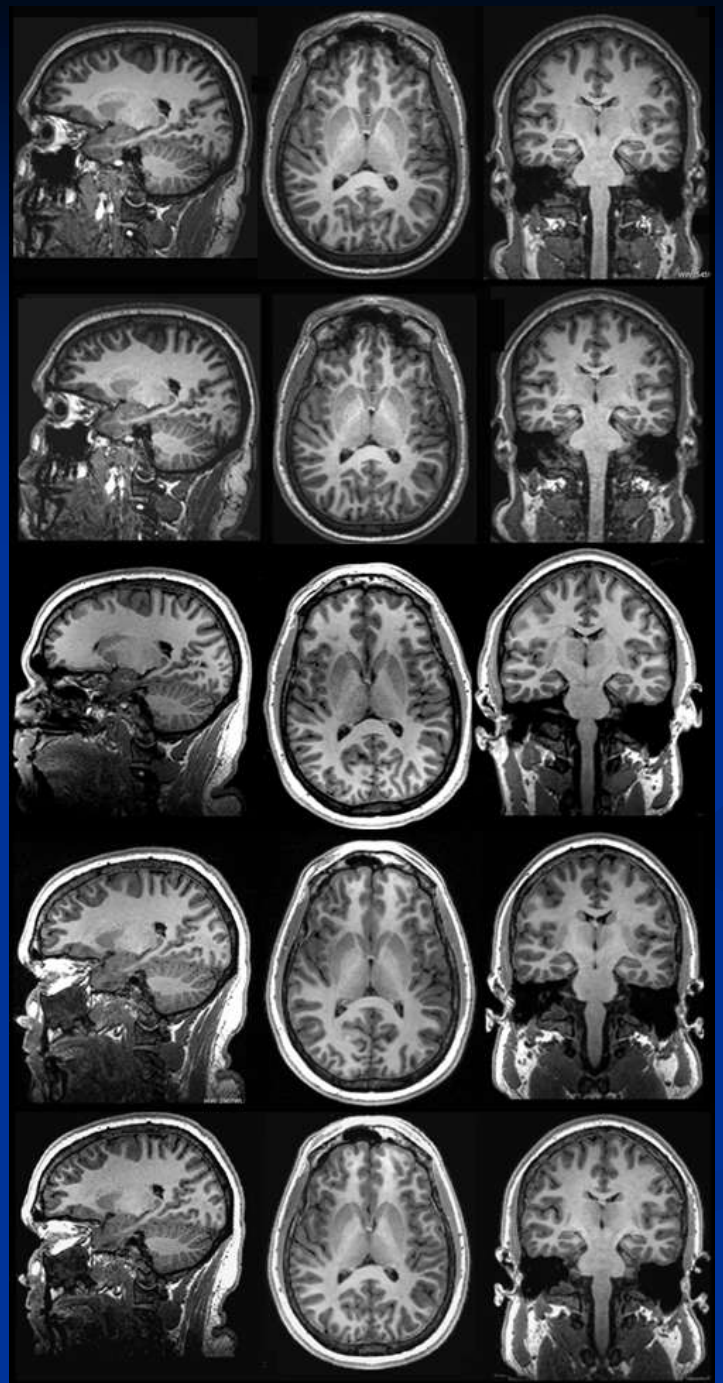
Comparison

3T

3D T1

35 yo

volunteer



Phillips MPRAGE unaccel 9:06

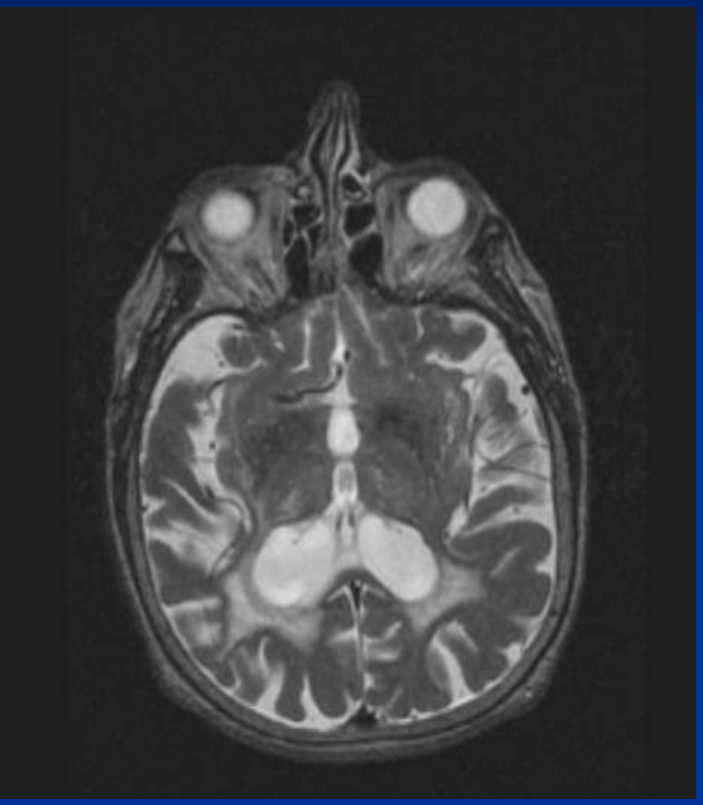
Phillips MPRAGE accel 5:35

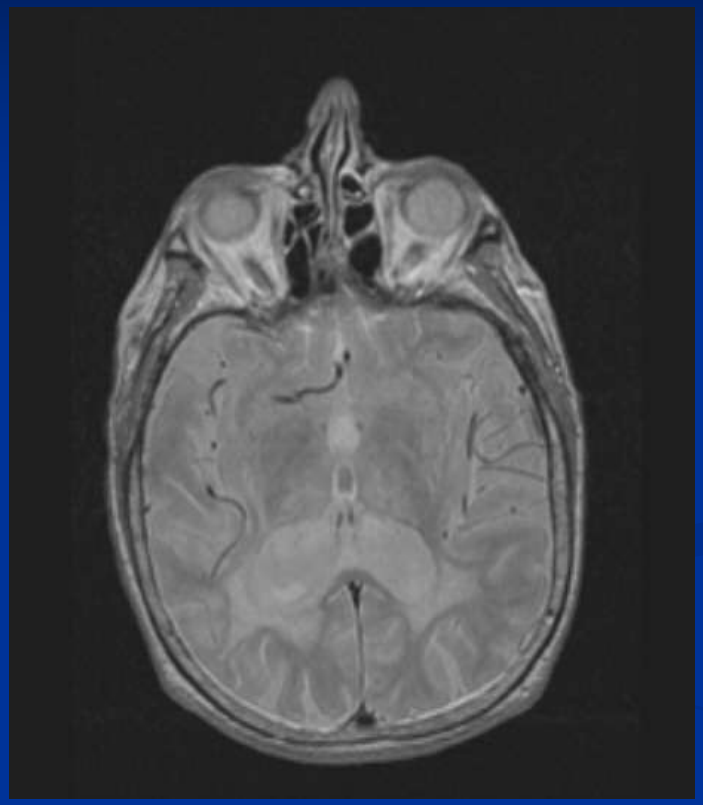
GE MPRAGE (ADNI-1) 9:17

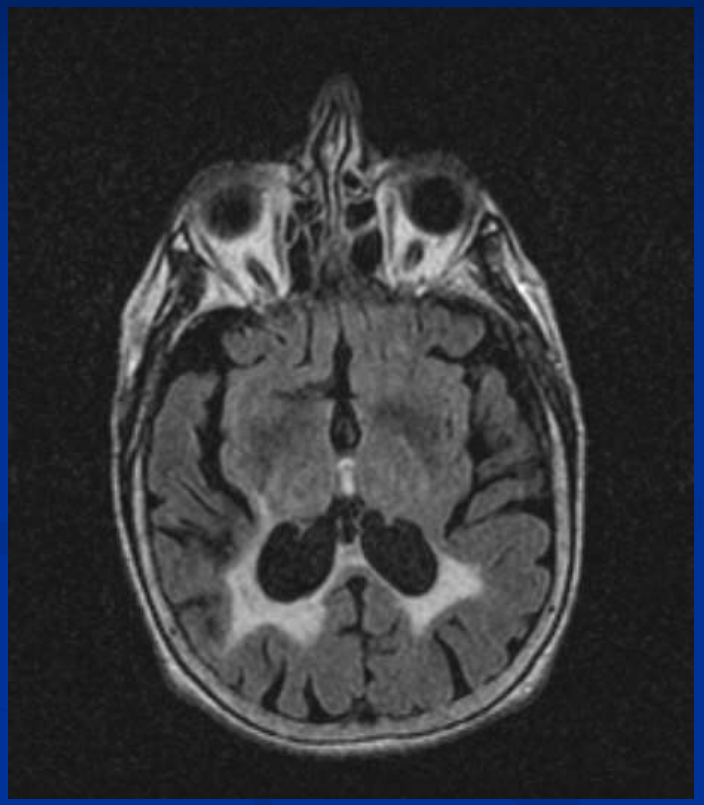
GE IR-FSPGR (ADNI-GO) 9:41

GE IR-FSPGR (ADNI-GO) 5:34

FLAIR







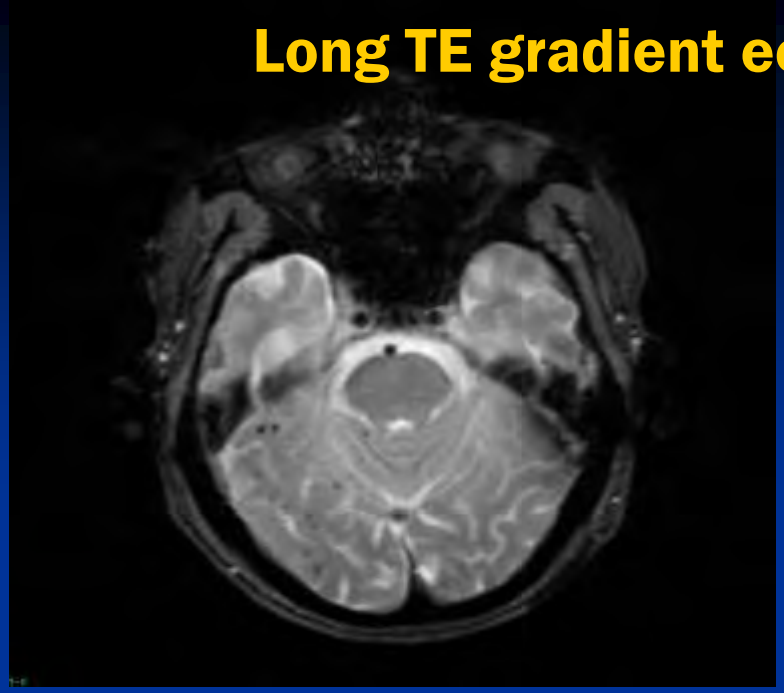
PD/T2

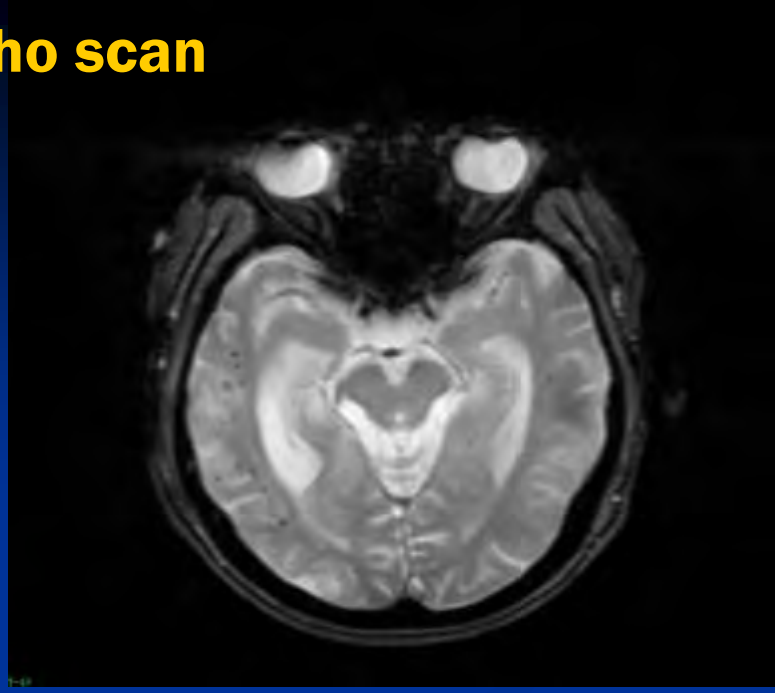
FLAIR

MAYO CLINIC

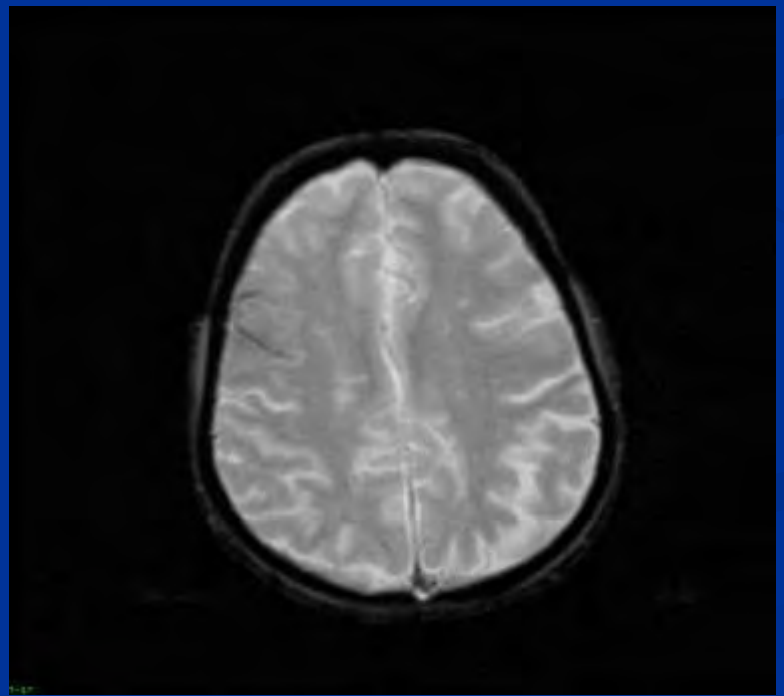
Long TE gradient echo scan

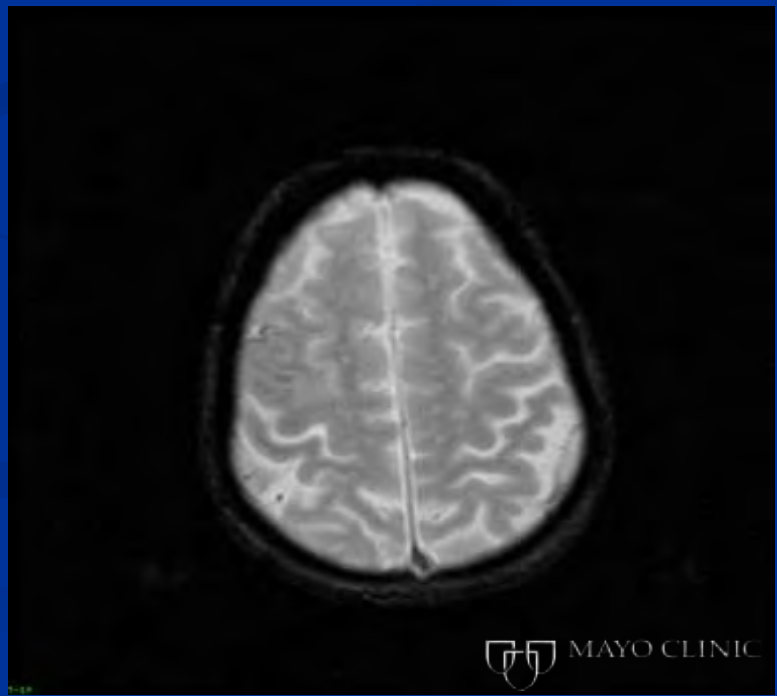
Micro Hemorrhages





Superficial Hemosiderosis





Analysis Groups ADNI GO

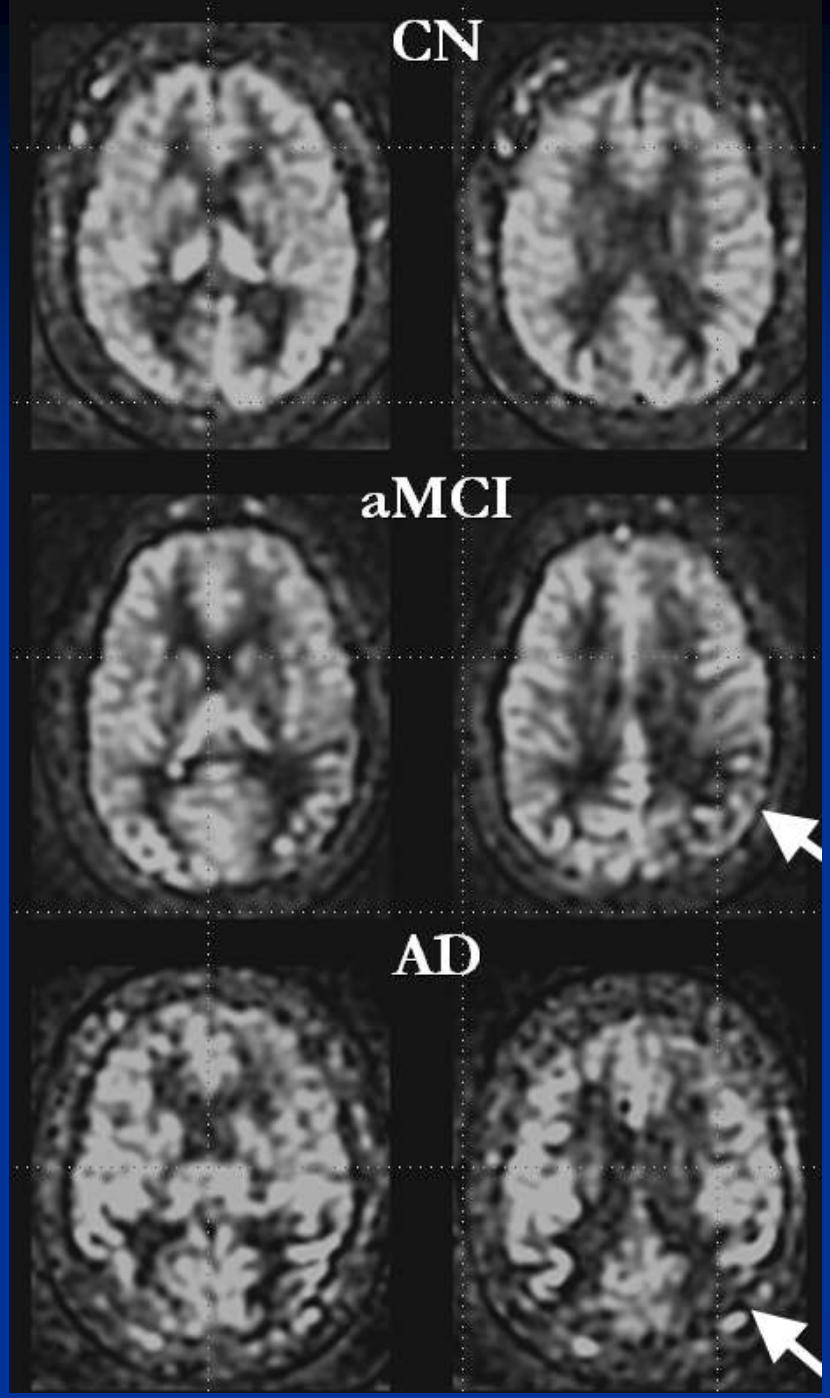
- Paul Thompson –TBM of 3D T1; "DTI"
- Nick Fox –BSI and hippocampal volume of 3D T1
- Cliff Jack - STAND score of 3D T1; micro hemorrhages; "resting state fMRI"
- Charlie DeCarli – vascular disease FLAIR; "DTI"
- Norbert Schuff - FreeSurfer of 3D T1; "ASL"

Progress

- different platforms for new 3T ADNI GO protocol
  - GE 14.0, 15.0, 20.0
  - Phillips 2.6
  - Siemens VB15, VB17
- PDFs sent to LONI/ADNI for posting – week of April 5
- Protocols are ready for delivery to any site that is ready to qualify
- 26 (50%) sites protocol delivered
- 9 (18%) sites qualified

QC

- Little used in ADNI-1: 2 MPRAGE + repeat exam option
- ADNI-GO: 5 sequences per exam, only repeat exam if unaccel 3D T1 bad
- ADNI-GO: QC information, greater need by user base
- Simplify linking QC to image files – K. Crawford + users
- Simplify form: excellent; good; fair; poor OR pass/fail
- Experimental sequences: in addition to raw files, QC maps

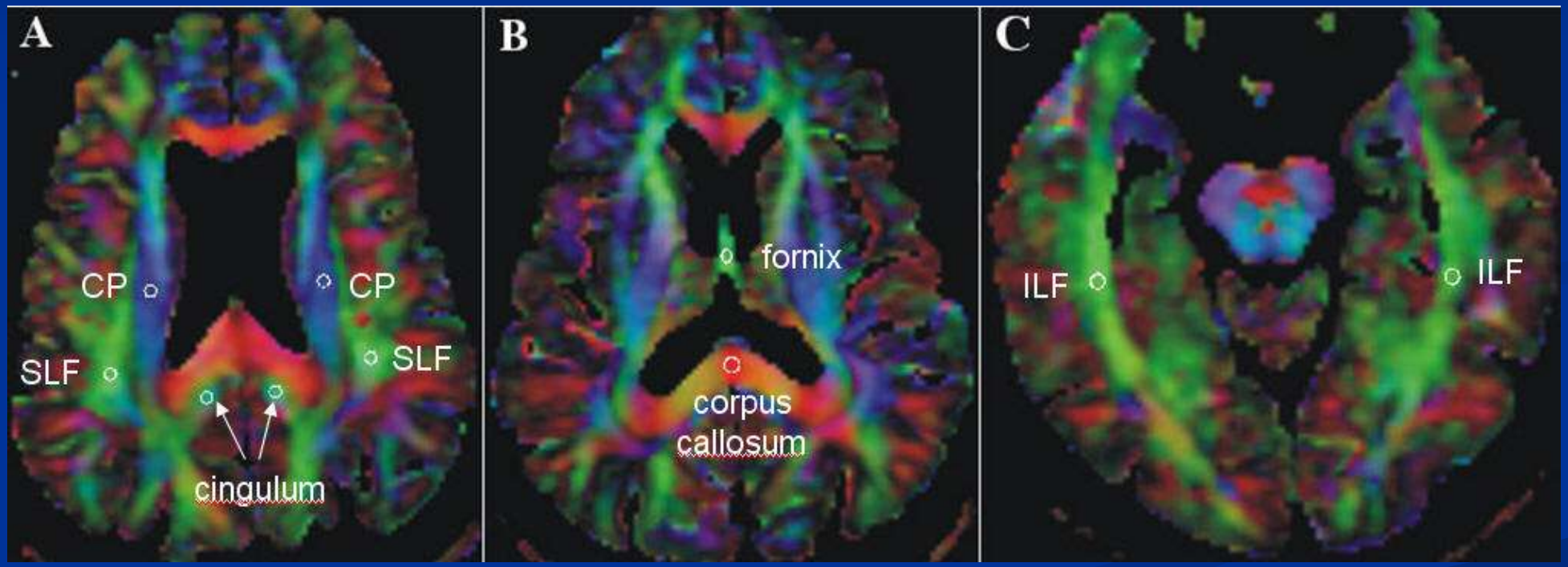


MR perfusion imaging - ASL

From Vemuri et al, submitted

MAYO CLINIC

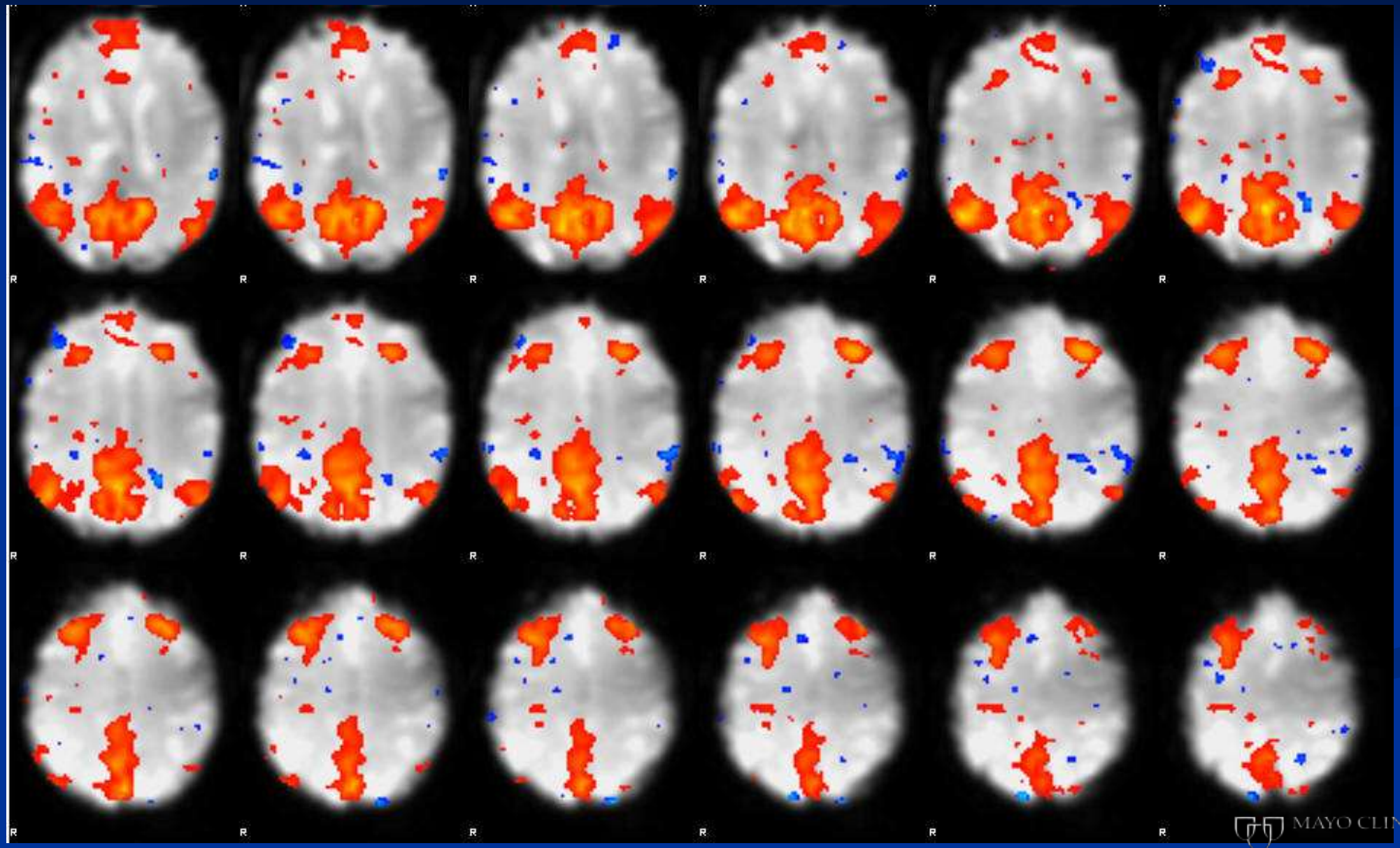
DTI - Color Coded FA Maps



From Kantarci et al, submitted

MAYO CLINIC

Resting State Default Network



Current issues

ADNI-1 carry forward, 1.5T – 3 possibilities at each site

- Same 1.5T system available for ADNI GO
- If change to comparable 1.5T system then qualify new 1.5T system
- But if 1.5T vendor or major HW change ➔ stay on ADNI-1 scanner as long as possible then move site to 3T protocol ➔ ADNI-1 treated as *new* patients from MRI perspective)

Current issues

- File sizes: ADNI-1 vs ADNI-GO - # DICOM images per exam

ADNI1	GO GE	GO Siemens	GO Phillips
800	2700	825	10650 (>13X)

- Upload speed – esp. Phillips (2:15)
- problem solved -- Karen Crawford
- Ron Killiany* - Phillips