

The MIND Clinical Imaging Consortium Summary of Calibration and Clinical Study DTI Acquisition

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Background and Significance

- The MIND Clinical Imaging Consortium (MCIC) was founded in 2003 as a collaboration among four university research groups engaged in multi-site psychiatric research:
 - The University of Minnesota, The University of New Mexico, The University of Iowa, and Harvard University.
 - The chief mission of the MCIC study is to address questions that are important for understanding the course and neural mechanisms of schizophrenia, that optimally require relatively large samples, and that can best be implemented through a cooperative team approach with a multi-site design.
 - The domains of research utilized in the MCIC research protocol include: socio-demographic assessments, comprehensive neurological and psychiatric assessments, a neuropsychological battery, genetic sample, an anatomical neuroimaging session that collects morphological and diffusion-weighted sequences, and a functional neuroimaging session that collects calibration information and two cognitive tasks conditions.



MIND Clinical Imaging Consortium Summary of Calibration Study

- 10 Healthy Normal Volunteers were sent to Harvard, New Mexico, Iowa, and Minnesota for two visits each that collected sMRI, DTI, and fMRI tasks.
 - Visits were usually 24 hours apart but varied up to 1 week between scan-rescan
 - All subjects were right handed, and ranged from age 27 - 60 with 5 males and 5 females



Summary of MCIC calibration study sMRI and DTI Acquisition Parameters

3T (Siemens Trio) Scan Parameters using 8-channel coil

	T1			
	(Coronal, MPRAGE)	T2 (Coronal, TSE)	DTI1	DTI2
TR	2530 ms	10000 ms	10500	8000
TE	3.79	14	98	83
FA	7	149		IPAT=2
ТІ	1100			
Bandwidth	181	193	1346	1302
voxel size (x,y)	0.625x0.625 mm	0.625x0.625 mm	2.0x2.0 mm	2.5x2.5 mm
slice thickness (z)	1.5 mm	1.8 mm	2.0 mm	2.0 mm
matrix size (x,y,z)	256x256x128	256x256x128	128x128x64	128x128x64
FOV (x,y)	^ 16x16 cm	^ 16x16 cm	25.6x25.6 cm	32x32 cm
NEX	1	1	2	3
scan time	* 11 min (each)	* 9 min (each)	04:45	06:10
Slice prescription	Full brain coverage	Full brain coverage	Align parallel to ACPC	Align parallel to ACPC
Phase partial fourier	1	1	6/8	6/8
Raw filter	Off	Off	weak	weak
Diffusion directions	n/a	n/a	12	12

1.5 T (Siemens Sonata) Scan Parameters using 8-Channel Coil

	T1				
	(Coronal, GRE)	T2 (Coronal, TSE)	DTI	Field Map (Phase)	Field Map (Magnitude)
TR	12	9000 ms	9800 ms	1180	1180
TE	4.76	64	86	10,14.76	10,14.76
FA	20	180	n/a	90	90
TI			n/a	n/a	n/a
Bandwidth	110	149	1502	260	260
voxel size (x,y,z)	0.625x0.625	0.625x0.625	2.0x2.0 mm	2.0x2.0 mm	2.0x2.0 mm
slice thickness	1.5 mm	1.8 mm	2.0mm	2.0mm	2.0mm
matrix size (x,y,z)	256x256x128	256x256x128	128x128x64	128x128x64	128x128x64
FOV (x,y)	^ 16x16 cm	^ 16x16 cm	25.6x25.6 cm	25.6x25.6 cm	25.6x25.6 cm
NEX	3	2	4	1	1
scan time	22 minutes	18 minutes	5 minutes	4 minutes	4 minutes
Slice prescription	Full brain coverage	Full brain coverage	Align parallel to ACPC	Align parallel to ACPC	Align parallel to ACPC
Phase partial fourier	1	1	6/8	6/8	6/8
Raw filter	Off	Off	On (weak)	Off	Off
Diffusion directions	n/a	n/a	6	n/a	n/a



MCIC Calibration Study FA Maps







MCIC Calibration Study FA Maps

















grouping O O Visit1 harv * * * visit1 newm * * * visit2 minn O O O Visit2 newm O O O Visit2 minn O O O Visit2 minn





000 visit2 newm

FA Measures for r nfrontal box

National Alliance for Medical Image Computing http://na-mic.org

* * * visit2 minn



MIND Clinical Imaging Consortium Summary of Clinical Study Protocol

Domain	Item	0	12
	Neurological		All
	Exam	All	Longitudinal
	SCID	All	
			First Episode
	PSYCH	All Patients	Patients
			First Episode
	Premorbid	All Patients	Patients
			First Episode
	PHI-R	All Patients	Patients
			First Episode
	Quality of Life	All Patients	Patients
			First Episode
	Calgary	All Patients	Patients
			First Episode
	AIMS	All Patients	Patients
	Barnes		First Episode
	Akathisia	All Patients	Patients
Clinical	Simpson		First Episode
Assesments	Angus	All Patients	Patients
Demographic	Baseline Info	All	•
	Structural/DTI	All	Longitudinal
Neuroimaging	Functional	All	
Neuropsychol			
ogy	Battery	All	Longitudinal
Genetic	ISNP analyses	IAII	



Summary of MCIC DTI clinical sample demographics

- The DTI sample is comprised of 15 first episode patients, 63 chronic patients, and 94 controls.
- The mean age at scan time was 33.8 (sd=11.5). First episode patients had a mean age of 23.1 (sd=4.6) and chronic patients had a mean age of 38.0 (sd=11.1).
- The median length of illness was 0.48 years for first episode patients and 12.5 years for chronic patients.