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INVESTIGATING DIFFUSION TENSOR IMAGING CORRELATES OF COGNITIVE IMPAIRMENT IN IDIOPATHIC NORMAL PRESSURE HYDROCEPHALUS AND ALZHEIMER'S DISEASE

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A

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ABSTRACT: Modest expansion of the human brain cerebrospinal fluid (CSF)-filled ventricles is normal with aging, and because of this, it can be difficult for physicians to accurately diagnose and treat enlarged ventricles (ventriculomegaly), called hydrocephalus[1] (fluid or water in the brain) Ventriculomegaly occurs due to an obstruction (such as a blood clot or tumor), or a change in CSF absorption[2]. Primary hydrocephalus, also called idiopathic normal pressure hydrocephalus (iNPH), is non-obstructive and may be comorbid with other neurodegenerative diseases such as Alzheimer's disease (AD) or frontotemporal dementia (FTD). Clinically, it can be difficult to tell whether the pathophysiological changes leading to cognitive impairment also led to the ventriculomegaly, as may occur in AD, versus whether the hydrocephalus itself is driving cognitive and motor impairment, i.e. iNPH. The **goal** of this thesis project is to investigate the relationship between iNPH and AD in order to better understand how they may contribute to each other, and to help clinicians distinguish between them. To do this, we compared cognitive performance and white matter integrity between patients with "pure" iNPH, "pure" Alzheimer's disease (AD), and co-morbid iNPH + AD. Our results demonstrated that there are specific periventricular structures in the brain that are associated with cognitive impairment in AD versus iNPH. We conclude that the distribution pattern of AD vs. iNPH may be a valid tool to distinguish between these disorders, and may form the basis for subsequent studies that can further explicate the link between these often-overlapping etiologies.

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Abbreviations

AD	Alzheimer’s Disease
ANOVA	Analysis of Variance
CSF	Cerebrospinal Fluid
DICOM	Digital Imaging and Communications in Medicine
DTI	Diffusion Tensor Imaging
DWI	Diffusion-Weighted Imaging
EPI	Echo-Planar Imaging
FDR	False Discovery Rate
FLAIR	Fluid-Attenuated Inversion Recovery
ICV	Intracranial Volume
iNPH	Idiopathic Normal Pressure Hydrocephalus
mADC	mean Apparent Diffusion Coefficient
mFA	mean Fractional Anisotropy
MMSE	Mini Mental State Examination
MoCA	Montreal Cognitive Assessment
MRI	Magnetic Resonance Imaging
MVPA	multivariate pattern analysis
NDD	Neurodegenerative Disease
NIFTI	Neuroimaging Informatics Technology Initiative
NPH	Normal Pressure Hydrocephalus
PR	pattern recognition
RI-NLM	rotationally invariant non-local means
SANLM	Spatially Adaptive Non-Local Means
SPM8	Statistical Parametric Mapping version 8
TMS	Trimmed Mean Segmentation

1 Introduction

1.1. Normal Pressure Hydrocephalus

Normal Pressure Hydrocephalus (NPH) is a form of chronic hydrocephalus (increase in cerebrospinal fluid (CSF) within the ventricular system) characterized by a triad of symptoms: gait impairment, urinary incontinence and progressive cognitive changes with a frontosubcortical pattern, i.e. changes in attention and executive function[3-6]. NPH is primary or communicative when the hydrocephalus is a result of CSF not being appropriately absorbed, whereas it is considered secondary or obstructive when the hydrocephalus develops because of an obstruction such as a tumor, blood clot, or scar tissue. Most NPH is non-obstructive, meaning symptoms typically present with no increase in intracranial pressure. The prevalence of iNPH is understudied, though preliminary studies suggest that 1%-3% of the population is affected[2].

iNPH is typically diagnosed when clinical and imaging criteria are met. Clinically, the most apparent symptom seen in patients is a “magnetic” gait, where walking is altered as if the feet are magnetically held to the floor. Combined with shorter overall strides taken while keeping a straight posture, iNPH has a tell-tale gait manifestation unique from Parkinson’s disease or other movement disorders.

Urinary incontinence is also common in hydrocephalus. The incontinence is marked with a sharp increase in both urgency and frequency and is a great diagnostic clue for differentiating iNPH from mild cognitive impairment or dementia.

Finally, cognitive impairment usually presents as frontal deficits in attention and concentration. It is also not uncommon to notice subcortical symptoms such as depression.

In terms of brain neuroimaging, signs of hydrocephalus may include an Evans Index over 0.3 (the ratio of the maximum width between the lateral ventricles' frontal horns and the maximum diameter of skull within the same axial imaging slice); a reduced callosal angle on coronal slices; periventricular rimming on FLAIR images and scalloping, loss of the normal lateral ventricular concavity, and an increase in the lateral ventricular size more than the fourth ventricle (suggesting reduced flow between them). However, not all of these imaging findings need be present simultaneously for a diagnosis. Moreover, their positive and negative predictive value is uncertain. Another potential neuroimaging marker for iNPH is an increase in the flow of CSF through the Sylvian aqueduct into the fourth ventricle[7,8]. Notably, these diagnostic criteria are not seen in every patient[45].

As such, non-invasive neuro-imaging biomarkers for iNPH represent a critical need. While many white matter fiber tracts and regions have been explored, it will take a consensus between clinical factors and imaging biomarkers to establish the most sensitive and specific measurements to distinguish hydrocephalus due to iNPH from other neurodegenerative diseases, let alone determine beforehand how patients will perform post-shunting. Without the ability to distinguish patients with separate or co-morbid etiologies, it is currently impossible to predict who will benefit from shunt and why.

It is important to note that while these three symptoms are characteristic of NPH, patients can sometimes present with some combination of the three and still meet criteria for diagnosis. Treatment for iNPH can involve the trial of a diuretic, such as acetazolamide, or the implantation of a ventriculoperitoneal shunt.

A major challenge to iNPH diagnosis and treatment is that the current standard diagnostic techniques (clinical evaluations, neuroimaging, and a CSF “tap test”) did not correlate with outcomes in a recent multi-center trial examining outcomes at 12 months post-procedure[9]. Thus, either clinicians have a difficult time diagnosing pure iNPH, shunting lacks efficacy (which seems unlikely), or there are disorders that co-associate with iNPH that interfere with predicting outcomes.

There are several potential reasons, then, why treatment outcomes after shunting for iNPH lack consistently positive results. The **goal** of this thesis is to test the **hypothesis** that neurodegenerative dementias (NDDs) co-occur with iNPH. As a result, cognitive status after shunting does not improve in some iNPH patients due to a co-occurring NDD. Gait and urinary symptoms may improve post shunt, as they are unlikely to be associated with an NDD.

1.2 Co-Morbidities

As an example of a co-occurring NDD, amyloid deposition in patients with iNPH is often at levels that could be consistent with Alzheimer's[11-14]. Our theory, then, as to why some patients recover post-shunt and some do not, is that a percentage of patients may have a co-morbid NDD, such as AD, that becomes more obvious once the hydrocephalus is fixed. Amyloid deposition, in turn, may occur at a higher rate in iNPH patients due to a reduction of CSF clearance, enhancing proteinopathic build up in the brain.

1.3 Imaging

Magnetic Resonance Imaging (MRI), especially diffusion tensor imaging (DTI), has been used as an *in-vivo* surrogate biomarker for white matter injury due to hydrocephalus[15-17] and other neurodegenerative disorders[18,19]. Previous studies using techniques measuring volumetric changes and axonal integrity have revealed potentially-diagnostic DTI changes in regions of the periventricular white matter when compared to normal and disease controls[16,17,20]. Nevertheless, further work remains before determining which imaging findings are most highly predictive, and hence likely to be clinically relevant.

The mean apparent diffusion coefficient (mADC) is a measure of diffusivity in a volume. While atrophy can be seen on MR, oftentimes the changes seen are to structural volume, rather than microstructural integrity. A loss of tissue density is associated with a loss of neurons, so mADC will be used as a measure of general neuronal injury. The fractional anisotropy (FA) of a tissue describes the level of anisotropy in a system. The minimum value of zero represents a completely unrestricted system in terms of directionality, while a maximum value of one implies complete restriction. In the context of imaging, FA is used here as a proxy for the level of axonal myelination and density[48].

1.4 Clinical Decision Workflow

Figure 2 depicts the clinical decision workflow of patients evaluated for NPH. The overarching goal of this study is to determine which patients will benefit from the invasive placement of a ventriculoperitoneal shunt, and to use that information to provide guidance to clinicians faced with trying to counsel patients regarding their diagnosis and treatment plan.

The **goal** of this investigation is to determine which white matter structural changes are most predictive of iNPH versus AD versus both. Because developing a predictive model requires a multi-modal approach, this project aims to integrate neuroimaging findings with neuropsychological testing and other clinical biomarkers. Specifically, I investigated which fractional anisotropy (FA) and mean apparent diffusion coefficient (mADC) regional values from diffuse tensor imaging (DTI) are specifically associated with poor performance on the Montreal Cognitive Assessment (MoCA).

1.5 Hypothesis

My overarching **hypothesis** is that our current inability to adequately predict clinical outcomes after shunting is due to iNPH often co-occurring with other neurodegenerative disorders. These co-morbidities may be leading patients to undergo brain surgery, yet remain cognitively impaired as these neurodegenerative disorders do not respond to shunting. The **goal** of my thesis project is to determine which structures in the brain may better differentiate patients with isolated iNPH versus AD versus co-morbid iNPH and Alzheimer's disease.

2 Materials and Methods

2.1 Subjects

Subjects were chosen as part of an IRB-approved retrospective-prospective study of patients seen at The University of Texas Health Science Center at Houston (UTHealth) Neurocognitive Disorders Center. Of the 51 patients selected, their working diagnoses were iNPH in 28, AD in 15, and AD plus iNPH in 8. Their mean ages [range] and genders were: iNPH 76 years [62-89] with 21 men and 7

Characteristics (n=51)	Frequency
Gender (M/F)	
NPH	22/7
AD	10/7
AD+NPH	8/2
Total	40/16
Age, Median [IQR]	
NPH	75.5 [74.0 - 80.75]
AD	75.5 [74.25 - 85.5]
AD+NPH	80 [71.75 - 85]
Total	76 [74.0 – 83.0]
MoCA, Median [IQR]	
NPH	23 [18.75 - 24.25]
AD	23 [20.0 - 24.5]
AD+NPH	21 [15.25 - 22.25]
Total	22 [18.5 – 24.0]
Abbreviations: IQR, inter-quartile range	

Table 1: Description of cohort by gender, age, and MoCA

women; AD 76 years [58-90] with 8 men and 7 women; and, AD plus iNPH 79 years [64-91] with 6 men, 2 women.

None of the patients had contraindications to MRI. All patients were first seen at the Center by a board-certified neuropsychiatrist, received an MRI as part of their standard-of-care treatment, and had the results explained to them by the physician in a follow-up appointment. Almost all patients underwent full neuropsychological testing to explicate their diagnosis prior to the follow-up, though only the score of the MoCA was used for these analyses.

2.2 MRI Data Acquisition

Whole-brain MRI data were acquired using a Philips 3.0 T Intera system with a SENSE parallel image receiving head coil with 15 channels. The standard MRI protocol included:

1) 3D fluid-attenuated inversion recovery (FLAIR) and 3D T2-weighted and 3D spoiled gradient echo (T1-weighed) data, field of view = 256× 256 mm (isotropic voxel size = 1 mm).
2) Diffusion-weighted (DWI) data using a single-shot, spin-echo diffusion sensitized echo-planar imaging (EPI) sequence with the balanced Icosa21-encoding scheme[21,22], a diffusion sensitization of $b = 1000\ s\ mm^{-2}$, and repetition and echo times of TR = 7900 ms and TE = 70 ms, respectively.

3) EPI distortion artifacts and scan time were reduced using a SENSE acceleration factor (R) or k-space under sampling equal to 2 (i.e., R = 2)[22-24]. The slice thickness was 3 mm with 48 axial slices covering the entire brain, foramen magnum to vertex, a square field-of-view = 256 × 256 mm^2, and an image matrix of 256 × 256.

The number of non-diffusion-weighted, or b ~ 0 magnitude image averages, was 8. The total DTI acquisition time was approximately 8 min and resulted in signal-to-noise (SNR)-independent DTI metric estimation[25].

2.3 Tissue Segmentation and Parcellation Using T1-Weighted Data

2.3.1 MRICLOUD

Background

MRICloud is an integrated, web-based cloud platform (https://braingps.mricloud.org/home) geared towards performing volumetric segmentation in anatomical high spatial resolution T1-weighted MR images[26]. Submitted images were first processed to produce ~ 289-element regional volume estimates, both in the native space and in standard Montreal Neurological Institute (MNI) space. These are done through usage of probabilistic atlases created from available population data. Each voxel is given a probability to belong to a certain brain structure or tissue type (white matter/grey matter/CSF), which is based on location and signal intensity.

Two separate multi-atlas approaches were then taken; the first involved warping multiple brain atlases upon the image to form a labelled, probabilistic map. This process selected from the user-chosen atlas library and averaged the location of the labels, while also considering signal intensities in each voxel. The second method also applied the same atlases, typically chosen for age or diagnosis, but used sets of consensus algorithms to come to a fused average[27]. The output included a mask containing labels for each structure in both native and MNI space, the average intensities per label, and their volumes.

Methods

Patient DICOMs (Digital Imaging and Communications in Medicine) were pushed directly from the UT MRI Core Lab scanner or PACS onto a shared UT Neurology server for processing. Once received, the DICOMs were sorted into labelled folders and prepared for submission. Analyzed files were created by importing the DICOM using "dcm2niigui", a free conversion program available in MRIcron (https://people.cas.sc.edu/rorden/mricron/index.html), or "MRIConvert", a free bulk-conversion program, if there were issues with the DICOM's header formatting (https://lcni.uoregon.edu/downloads/mriconvert).

T1-weighted MR images were first pre-processed to fix anomalies in image acquisition such as artifacts, rotations, cropping, and general data corruption[27]. Once ready, MRIcro was used to open the sagittal T1 images and convert them to axial by selecting

“Axial -> Sagittal Left”, and “Flip Left/Right.” All patient MRIs using our protocol are 1 mm x 1 mm x 1 mm, but under some circumstances, the output was not isotropic (i.e. not 1 mm on every axis). In these cases, the scans were made 1 mm isotropic in MRIcro using the resizing option.

Following the flipping and potential resizing of the image, the image origin, located in the header, was edited. To do this, the scans were “skull-stripped” in MRIcro with a fractional intensity of 0.1, which creates a new header that can be edited. This new header was modified so that the origin was centered by setting each dimension of the origin as half of the total dimension +1. Specifically, with each image being X = 180, Y = 256, Z = 256, the origin voxel was set to X = 91, Y = 129, Z = 129. This new header overwrote the original, un-editable header to complete the process. The final centered axial image was labelled “XX_Axial_Iso_T1w”, where “XX” is the subject identifier.

Once the header and image files were ready, the BrainGPS pipeline was employed to perform segmentation. Hosted on the MRICloud page (https://mricloud.org), BrainGPS was selected. Then, under “Segmentation”, the “T1-MultiAtlas” option was chosen. The appropriate Header and Image files were selected for upload, with the demographic options of age and gender being entered, though this project did not utilize the MRICloud features that involve them. The Processing Server chosen was Computational Anatomy Science Gateway; the Slice Type was “Sagittal data converted to Axial”; and the atlas library chosen was “Adult50_90yrs_289Labels_19atlases_M2_V7A.”

Ventricular volumes were obtained based on the MRICloud segmentation output. The left and right ventricles were further segmented into Atrium, Body, Frontal, Inferior, and Occipital compartments. A “total ventricular volume” was obtained by combining the left and right ventricle with the third ventricular volume, while “Lateral Ventricular Volume” was the sum of the left and right ventricles. The resultant volumes were standardized between patients by adjusting for intracranial volume (ICV), with the final variable being total lateral ventricular volume / ICV (x100).

2.3.2 volBrain

Background

VolBrain is a suite of automated brain volumetry tools usable through a web-based platform. Depending on the specific pipeline chosen, volBrain uses T1W, T2W, and/or FLAIR scans to apply non-local, patch-based, label fusion techniques for volumetry and lesion load segmentation. Similar to MRICloud, volBrain utilizes multi-atlas label fusions to create its segmentations, separated into three general phases, each with multiple steps.

The first phase is pre-processing, and involves denoising the data using the Spatially Adaptive Non-Local Means (SANLM) Filter[28] to enhance image quality, performing a “coarse” inhomogeneity correction using the N4 method[29], transforming the native image into MNI space, and using SPM8 to correct any inhomogeneities. Finally, volBrain normalizes signal intensities by using the Trimmed Mean Segmentation

(TMS) method[30] to determine mean values and applies a piecewise linear intensity map[31] to lock white matter intensities at 250, grey matter intensities at 150, and CSF intensities at 50.

VolBrain's second phase of processing uses the output from the first phase to segment the brain into white matter, grey matter, and CSF. The third phase further delineates the tissue into hemispheres, and cortical and subcortical structures.

Following processing, the pipeline outputs volumetric results (ICV, white matter, grey matter, CSF, selected subcortical structures separated laterally), segmentations, hemispheric asymmetries, and age/gender-matched comparisons, provided that the submission included demographic information. The structures segmented include the amygdala, brainstem, caudate, cerebellum, cerebrum, hippocampus, pallidus, putamen, nucleus accumbens, and thalamus.

Methods

Patient T1-weighted images were pre-processed similar to MRICloud to ensure isotropic voxel sizes (~ 1 mm x 1 mm x 1 mm) and axial orientation, though instead of Analyze format (*.img/*.hdr), volBrain requires a zipped NIFTI (*.nii) format. Once prepared, volBrain was accessed at https://volbrain.upv.es/, the "volBrain 1.0" pipeline was selected, the appropriate T1W *.zip file was uploaded, and demographic data was entered. Similar to MRICloud, the results that came from demographics (i.e. comparison among age/gender-matched controls) were not used for this project specifically but may be used for future studies. Upon completion, volBrain sends an email with a summary PDF along with the data in a CSV file. Once the output was received, the sum white matter volume, sum grey matter volume, intracranial volume (ICV) (defined earlier), and sum lateral ventricular volumes were recorded. Furthermore, these ventricular volumes were standardized by recording their ratio versus total white matter volume in each subject.

2.4 Lesion load segmentation

Background

LesionBrain is another tool in the volBrain suite, a pipeline utilizing T1W and FLAIR scans as input to segment white matter lesions. The processing pipeline functions similarly to volBrain, as detailed above. An additional step in the pre-processing is that the FLAIR is also registered to the T1W image[65].

Of note, LesionBrain only segments structures in the brain deemed to have a high likelihood of containing lesions. LesionBrain accomplishes this by applying a threshold based on the mean and peak grey matter intensities in the native FLAIR image, along with a running atlas of lesions on the pipeline’s backend to cover any voxels that may be within the lesion itself but under the signal intensity threshold.

Following preprocessing, brain lesions were then segmented with a two-pass method. An extension of the rotationally invariant non-local means (RI-NLM) method[32] was applied first, followed by a pass of a patch-wise NLM denoising filter. The former was used to obtain the lesion probability map, while the latter regularizes said map. The final step is another correction pass to filter out systematic errors and obtain the final segmentation.

Methods

As another pipeline in the volBrain suite, the pre-processing steps for lesionBrain are identical, save for the fact that a FLAIR is also required. The FLAIR images are prepared in the same manner and submitted along with the T1W by selecting the “lesionBrain 1.0” pipeline on the main volBrain page and uploading each file separately. Sex and age values are input, with the same caveat as volBrain.

Upon completion, the pipeline sends an email with the summary PDF and data in a CSV file. The fields are largely similar to the volBrain, albeit with lesion volumes, locations, ratios among sub-cortical structures, and comparisons among age/gender matched controls if possible. Total lesion load was recorded, along with the lesion volumes as a fraction of total white matter and total intracranial volume.

2.5 DTICLOUD: Atlas-based Diffusion Tensor Imaging Segmentation

Background

MRICloud also contains functionality to automate mapping and segmentation of diffusion images. The first phase of preparation includes preparing the data from the raw format followed by submission to the multi-atlas segmentation pipeline. The DTI Multi-Atlas Segmentation (heretofore referred to as DTICloud) takes the pre-processed file to calculate DTI values within each image. The Multi-Atlas portion then takes these values and matches a pre-segmented, MNI-space atlas. Finally, it applies the resultant matched images back unto the native-space diffusion images.

The output are DTI-derived maps in both the native and MNI-space, including the color RGB map, eigenvalues, eigenvectors, FA, mean DWI, b0, 5-label segmentation, and 168-label segmentation[33,34].

Methods

Preparation of the data was done following similar methods as the T1w scan. Images taken during the DTI sequence were 1 mm x 1 mm x 3 mm. None of the cases required resizing of the DTI data. Once converted to the Analyze format, the four resultant files (header, image, bval, bvec) were pulled from the output, discarding any other reformatted or cropped images. The image was then rotated using the same methods described previously, though the orientation for the DTI was set as axial-down. A Data Perimeter File was created for this imaging protocol and used to map the DTI data. Using DTIStudio, average diffusion weighted images and b0 maps, meaning a map acquired with no diffusion attenuation, were generated. With these maps, masks were created for the mean of all DWIs, mean of all b0's, and the six tensors elements.

Once the image files were ready, the DTICloud pipeline was used to upload the masks and reoriented DTIs. The Processing Server chosen was Computational Anatomy

Science Gateway; the Slice Type was “Axial”; and the atlas library chosen was “Adult_168Lables_8atlases_V1”. Upon completion of data processing, the mADC and mFA (defined as mean FA over the region extracted from the atlas analysis) values were extracted. The full list of structures is listed below in Table 2, with each label being assigned a number to make the resultant data Table 3 easier to read.

2.6 Montreal Cognitive Assessment (MoCA)

The Montreal Cognitive Assessment (MoCA) is a single-page test used as a quick screen for cognitive impairment. Similar to the more clinically established Mini Mental State Examination (MMSE), the MoCA is a 10-15 minute test that broadly measures function across a variety of cognitive areas[35].

The MoCA involves fourteen tasks in eight sections. Visuospatial skills are tested through a cube-copying task and a clock-drawing task (the clock also tests frontal executive function), worth one and three points respectively. Short-term recall abilities are tested in two trials of a five-word learning task worth zero points, followed by a test of recalling those words near the end of the test, which is worth 5 points. Between the learning and recall tests, there are tasks of attention, language, and abstraction. The tasks measuring ability in working memory and concentration include a two-point task of repeating a series of digits forward and backwards, a three-point task of serial 7 subtraction, and a one-point test of sustained attention tracking a target letter in a verbally offered series.

Language ability is tested through a naming task involving three animals worth three points total, repetition of two verbally offered sentences worth two points total, and a 60-second fluency task of naming as many nouns as one can starting with a target letter, worth one point. Executive function is measured throughout the test via a trail-following task worth one point, the aforementioned fluency task, drawing a clock spontaneously, and an abstraction task that involves stating the similarity between two objects worth a point each. Lastly, the patient is tested on basic orientation to time and place, worth six points.

MoCA vs. MMSE

For decades, the Mini-Mental State Exam (MMSE) has been used as a quick screen of cognitive function. In recent years, however, the Montreal Cognitive Assessment has been rapidly growing in popularity. The advantage of the MoCA over the MMSE is the range and difficulty of tasks involved. The increased variety provides a level of insight into the regions affected that the MMSE does not, while the increased difficulty of the tasks allows the MoCA to notice milder changes in cognitive impairment[36]. The focus at the enrolling clinic, i.e. the UTHealth Neurocognitive Disorders Center, is early-stage impairment, though we see patients at all stages of progression. The MoCA was used on all subjects in this study.

2.7 Statistical Analysis

Background

In the past, standard analytical techniques have only been able to identify differences between groups. While valuable, it has been an ongoing challenge to translate findings back to an individual patient to make clinical predictions on a subject-by-subject basis[37,38]. Recent developments in machine learning, namely multivariate pattern analysis (MVPA) and pattern recognition (PR) techniques, have shown promise in being able to predict individual subject's clinical outcomes through neuroimaging.

Much of the difficulty stems from the cost-prohibitive nature of these studies leading to samples that, at best, consist of several hundred subjects. Another challenge is the immense number of voxels, or features, per scan, which can number over 100,000. Attempting to analyze data consisting of features (p) that outnumber the sample size (n) by several orders of magnitude leads to a problem in machine learning called the "curse of dimensionality"[39] or "small n large p."[40] As such, without consistently preening the redundant variables and keeping only the relevant ones, any model runs the risk of producing an over-fitted result that cannot be generalized to novel subjects. It is thus key to enforce feature reduction or elimination before attempting a predictive methodology.

Supervised feature reduction techniques take these "small n, large p" neuroimaging datasets and, based on a specified set of outcome variable(s) (e.g., MoCA scores), select features deemed relevant and discard the redundant and noisy features. All of these supervised feature reduction techniques fall under “filter”, “wrapper”, or “embedded” categories, of which this analysis utilized the first and second[41,42]. Filter techniques such as t-tests, ANOVA, and Pearson correlation coefficients use simple statistical measures (e.g., mean, variance, correlation coefficients) to rank features according to their relevance in detecting group-level differences. Secondly, wrapper techniques use an objective function from a classification, or regression machine-learning model, to rank features according to their relevance to the model.

Methods

The “R” statistical package was used for data analysis. Descriptive statistics were used to compute the means and standard deviations of all subjects, though given the non-normal distribution, medians and range between 1st and 3rd quantiles were also recorded. The methodology used was a random forest-based recursive feature elimination (RFE) with 10-fold cross-validation upon the entire dataset for all the regions’ fractional anisotropy and mean diffusivity values in order to compute the importance of each predictor and remove redundant predictors of MoCA scores. After removing these redundant independent variables, and adjusting for age and lesion load, a partial correlation was performed to identify the correlations between MoCA scores and remaining DTI scores. Once these p-values were obtained, a false discovery rate (FDR) analysis of 5% was conducted for multiple-comparison analyses and only the corrected p-values were recorded.

3. Results

3.1 Study Design and Participants

Fifty-six subjects seen at the UTHealth Neurocognitive Disorders Center were included in this study (40 males and 16 females). Five subjects were dropped from the analysis due to corrupted imaging data that could not be rectified in time for analysis. The remaining patients had a working diagnosis of isolated idiopathic Normal Pressure Hydrocephalus (29 patients, 22 male, 7 female), Alzheimer's disease (17 patients, 10 male, 7 female), and concurrent iNPH and Alzheimer's disease (10 patients, 8 male, 2 female).

The mean ages did not differ between groups. The pure NPH group was 76.24 (62-89), the AD group was 75.94 (61-90), and the AD+NPH group was 78 (62-91).

The mean MoCA scores for the NPH group average was 21.29 (13-30). The AD group's was 21.69 (11-29), and the AD+NPH group's was 18.1 (10-25). This data is summarized in Figure 3.

Forty-two patients had other cardiovascular and cognitive risk factors, such as obesity, hypertension, hyperlipidemia, hypertriglyceridemia, diabetes, cardiovascular disease, cerebrovascular accident, post-traumatic stress disorder, mood/anxiety disorder, family history of dementia and tobacco use.

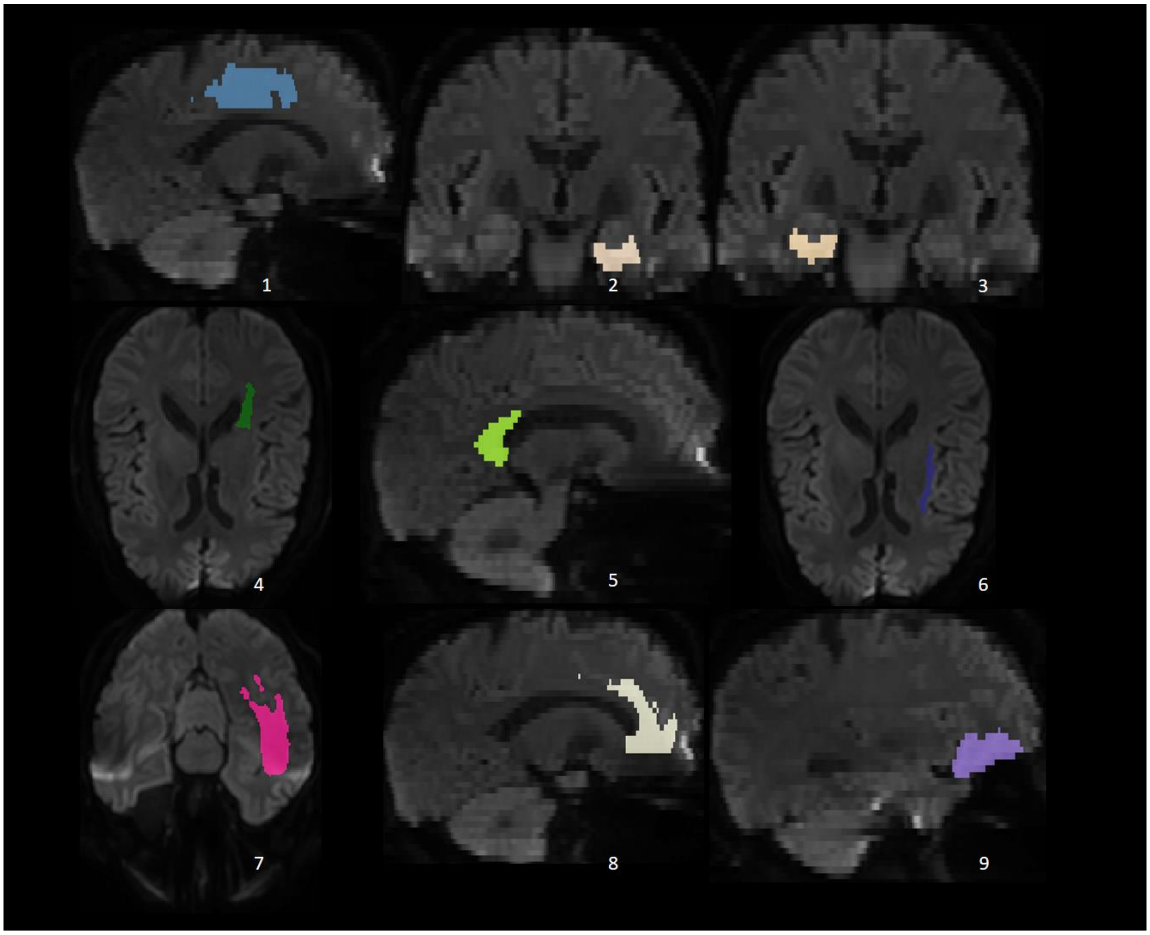
Cognitive issues were the chief complaint on presentation for all patients in all groups, which is undoubtedly influenced by our Center focusing on cognitive disorders. Most patients admitted to experiencing symptoms months or years prior to their consult at the Neurocognitive Disorders Center. Gait changes were present in twenty-six out of twenty-nine patients with iNPH, five of seventeen AD patients, and four of ten AD+iNPH patients. Incontinence was a presenting symptom in twenty out of twenty-nine iNPH patients, four out of seventeen AD patients, and three out of ten AD+NPH patients. Again, the presence of all three symptoms simultaneously is not required for a diagnosis of iNPH to be made.

3.2 Findings

Due to data corruption, five patients' images were not processed (1 NPH, 2 AD, 2 NPH+AD.)

Random forest-based recursive feature elimination (RFE) found nine structures to be important predictors of MoCA scores, though not each structure was significant in every subject cohort. Their corresponding graphs can be found in Figures 14-22.

Figure 1: Structures found to be significant in analysis. Labels provided for illustration above. Structures, significant variable, data label, and significant cohort labelled below



1. Left superior corona radiata mFA (supCoronaRadiata_L) iNPH p= 0.03	2. Left hippocampus mADC (HIPPOCAMPUS_L) N.S. (AD p= 0.11; iNPH p= 0.13)	3. Right hippocampus mADC (HIPPOCAMPUS_R) iNPH p=0.04
4. left posterior corona radiata mADC (PosteriorCoronaRadiata_L) AD p= 0.053	5. left splenium corpus callosum mFA (SpleniumCorpusCallosum_L) AD p= 0.0028	6. left external capsule mADC (ExternalCapsule_L) AD p= 0.032
7. left sagittal stratum mFA (SaggitalStratum_L) AD p= 0.002	8. left anterior corona radiata mADC (AnteriorCoronaRadiata_L) AD p= 0.0015	9. left lateral fronto orbital mADC (LATERAL FRONTO-ORBITAL_L) AD p= 0.022

This study incorporated the entire brain segmentation. However, white matter regional FA and MD values were more associated with the MoCA, and not lateral ventricular volume, despite the ventriculomegaly. This is intuitive because the recursive feature elimination puts all variables in the same "bucket" and tests them against each other. The MoCA score is the one Y value upon which multiple variable random forest regression analyses were ran. This leads to there being 200 independent variables interacting with each other, and in the end acted more like a natural selection method.

One lesson learned in this process is the importance of being selective with variables when doing whole brain analysis, regardless of cohort. Determining which variables are redundant helps the statistical analysis helps the statistical analysis identify the regions more accurately as it reduces the redundant variables/dimensions. Reduction of these redundant variables also helps avoid multiple comparisons or multiple correlations, which necessitate corrections to avoid false discovery rates/inflated correlations.

At the same time, it is also beneficial to consider the whole brain, as opposed to specific brain structures, which is done by much of the existing literature that considers systems. A problem arises if one looks in isolation at the limbic system or fornix or cingulum, for instance, versus MoCA scores. It is difficult to assert that the effect seen is specific to those structures as perhaps it is only a part of some whole brain correlate with cognitive testing. The only way to address this question is to evaluate the whole brain.

3.3 Volumetry

Lateral ventricular volumes were divided by the intracranial volume to correct for differences in patient skull size. The NPH, AD, and NPH+AD groups had median LV/ICVs of 0.0836, 0.0536, and 0.0878, respectively. See Figure 4 for a box plot comparison of LV/ICVs. As the structure with the most distinct finding, the left and right hippocampal volumes were also compared in box plots shown in figures Figures 6 and 7, respectively.

Interestingly, ventricular size did not correlate with total MoCA score. There might be an association; however, due to the statistical method used, some relations between the independent variables may be lost. The method of using the MoCA as the sole dependent variable, with each white matter region being an independent variable can fail to capture relationships between the independent variables, that is, effects changes on one white matter region might have on another region.

3.4 Lesion Analysis

Lesion load for the NPH group was 22.46 cm^3 (2.38-95.20), for the AD group it was 13.84 cm^3 (0.73-51.00), and for the AD+NPH group 19.49 cm^3 (6.10-59.32). While the study did not control for vascular issues, no subjects had a known history of stroke, and other infarcts were not seen on imaging. The pure iNPH group had the highest mean and max lesion load, which matches established knowledge that there are generally greater hyper-intensities in iNPH as a result of the CSF outflow being pushed into the parenchyma. A confounding factor was that subjects were not age-matched, nor was there a healthy control group. This led to a lack of control for the effects of generalized white matter changes as part of normal aging. Future research will need to account for this variable

These measures also serve to assure the quality of the data; that is, ensuring that the cohort most expected to have lesion load actually has it. Lesion load, when adjusted for ICV and/or white matter volume, was not significantly correlated with performance on the MoCA in this population.

3.5 DTI Segmentation

See Table 3 for full results.

4. Discussion

The overarching goal of this study is to determine which patients will benefit from the invasive placement of a ventriculoperitoneal shunt (revise intro as this may be more clinical), and to use that information to provide guidance to clinicians faced with trying to counsel patients regarding their diagnosis and treatment plan. Our programmatic hypothesis is that patients who do not benefit from shunt placement may have an underlying, co-morbid pathology. This thesis is an initial investigation into the links between these etiologies and how their interactions affect patient outcomes.

Fractional anisotropy (FA) is useful for determining the general integrity of the tissue measured, though it does not give specifics as to the type of damage incurred by any degenerated tissue. Mean diffusivity (MD) is a measure of tissue density, the higher the density the lower the diffusivity. Two commonly studied measures not used in this analysis that may be used in future studies are axial and radial diffusivities; the former measures axonal injury in the white matter, while the latter is a measure of white matter demyelination.

Perhaps the most important finding of this study emanating from studying changes in FA and MD is that the mean diffusivity of the right hippocampus appears to differentiate between NPH vs. AD/NPH and AD patients. While only on the right side, the structure distinguishes between NPH and both AD/NPH and AD while not differing significantly in the AD and AD+iNPH groups. Given each hippocampus' MD *p*-value in each group, it seems that the right hippocampus is related to poor performance in NPH whereas the left hippocampus is related to poor performance in AD patients. It is unclear why one side is much more significant in the NPH cohort. Given the phenomenon of asymmetry in hippocampal volumes (Right > Left), it may be due to the right hippocampus retaining function longer, given equal exposure to neurodegenerative forces. It could also be due to the right hippocampus being more utilized in visuospatial function, while the left is more involved in language-focused function. Certain types of symptom onset may also drive patients to be clinically evaluated earlier as the onset is less subtle.

We hypothesize that the finding where the mFA of the superior corona radiata is significantly associated with the NPH group's MoCA score may stem from upward pressure due to the ventriculomegaly. The resulting sulcal effacement, or compression, leads to a pseudo high FA value, leading to poor cognitive performance.

The fact that the left posterior corona radiata mADC and left splenium corpus callosum's mFA are also significantly associated with MoCA performance implies that posterior white matter structures are associated with cognitive performance in AD, but not NPH. This may also be an effect of the repeated added pressures of the CSF flow.

Another important finding, given the locations (corona radiata, fronto-orbital, sagittal stratum, etc) of the structures strongly associated with AD vs. NPH, is that cognitive impairment due to Alzheimer's has more diffuse neural correlates than cognitive impairment due to iNPH. The Left external capsule MD, left sagittal stratum FA, left anterior corona radiata MD, and left lateral fronto-orbital MD were all significant in AD.

One theory that might explain this is that the structures in NPH that correlate with poor MoCA scores may be due to the vertical direction of the pressure, pushing the brain up, and leading to a cohesion pattern (demyelination, essentially) associated with poor cognitive performance.

It is possible that the increased pressure exerted by ventriculomegaly on the superior corona radiata and uncinate fasciculus led to a false coherence (increased FA) and this pattern is associated with a poorer cognitive performance. Increased degeneration in right hippocampus and ITG is related to worse cognitive performance.

Another important finding from this study is that posterior structures were affected in AD and not NPH. This confirms previous studies and our clinical experience, which is that AD affects the posterior parietal structures more rather than the frontal lobe. But NPH is the opposite.

These results are valuable since there are patients we are seeing diagnosed as AD or FTD with ventriculomegaly. However, it can even be difficult for specialists to tell whether the ventriculomegaly is the end-result or whether it is the cause of our patient's symptoms. In other words, DTI is revealing that ventriculomegaly causes issues in the periventricular system, thereby leading to issues in cognitive performance. Moreover, this finding is not seen in other cohorts such as mild traumatic brain injury[46].

5 Future Directions

This section will discuss future directions for this research, including both expansion of methodologies and correction of oversights.

5.1 Group Size

Given the number of groups and the disparity in sample sizes between the groups, it is imperative that we continue to enroll more subjects. While there are no differences in iNPH incidence between males and females, Alzheimer's disease (comorbid in roughly half of iNPH patients) is twice as common in females as males[46] and the current iNPH cohort has more males than females. As such, our control data will need to be screened accordingly. Age is also an important factor for neurodegeneration, which is why subjects in both control groups will need to be age-matched to the NPH cohort. Future analyses will augment group sizes by including data from publicly available databases, such as the Alzheimer's Disease Neuroimaging Initiative (ADNI), which we have been using for other studies.

5.2 Neuropsychological testing

Because the right hippocampus controls visuospatial ability and was significantly associated with NPH, statistical comparison of patients' performance on a visuospatial subscale of the MoCA may be a quick clinical way to discern NPH. Yet, the MoCA's subtests are not validated for independent use in neuropsychological research. As such, only the total sum score of the MoCA can be used without issue. Furthermore, the MoCA is meant to be a screening tool for cognitive impairment, not an exhaustive test of deficits. Future work will necessitate using more advanced neuropsychological testing to better assign profiles of cognitive decline to various observed neuroimaging findings. Example tests would be the Global Clinical Dementia Rating (CDR), the Repeatable Battery for the Assessment of Neuropsychological Status Update (RBANS), and Trail-Making Tests to test attention and memory. Most of our clinical patients enrolled in this study have full neuropsychologic testing results, which can be incorporated into the next level of analysis of this data. We also perform the CDR, RBANS, and TMT on all of our study patients, and they could be added here as well.

5.3 Gait analysis

Knowing the right hippocampus involvement in visuospatial function and its designation of NPH, quantitative gait analysis in the future may allow for definitive clinical diagnosis of NPH. There may be subtle differences in how gait issues present in various groups. Currently, a clinician observing the patient walk 50 feet in clinic, turning around, and walking back, is used to assess gait speed. Then the patient is asked to walk on their heels, their toes, and in tandem (one foot in front of the other) to assess stability. Further gait testing could be quantitative as well, and could involve a video-recorded walking test under five conditions: single task (normal, slowed, max speed), cognitive dual task (walking while performing serial 7 subtractions), and motor dual task (walking while carrying a box) as described previously[28]. Then, an outside, blinded rater could score various aspects of patient's gait. We are currently using video gait assessments in clinic for our Huntington Disease studies. In this way, outside clinicians can objectively assess patient's gait.

It is also the impression of our physicians that there is not a single gait change seen in NPH. For example, some patients have more of a cerebellar ataxic gait. Others have the more classic magnetic-apractic gait. Still others have predominantly unsteadiness going around corners. We hypothesize that our imaging studies may reveal that different patients have more pressure on different gait related pathways, which may correlate with the distinct features of their gait.

5.4 Additional Risk Factors

As profiles of cognitive impairment tied to imaging biomarkers become further developed, mitigating risk factors need to be included in the analyses. Future studies, for example, could better control for other cognitive risk factors such as hypertension, hyperlipidemia, hypertriglyceridemia, obesity, diabetes, cardiovascular disease, cerebrovascular accident, post-traumatic stress disorder, ApoE status, history of psychiatric disorders, family history of dementia, and/or tobacco use.

5.5 CSF Flow Quantification

As noted earlier, CSF flow velocity though the cerebral aqueduct may be a useful biomarker for diagnosing iNPH. Currently, it is not routinely assessed. We have been testing it in our patients, and this may allow us to correlate non-invasive measures of CSF flow with the presence of iNPH.

While most iNPH subjects in this study received a flow measurement sequence during their MRI, the general AD group did not. The flow sequence involves a pulse-synchronized, phase-contrast cine sequence, retrospectively gated, acquired perpendicular to the mid-cerebral aqueduct[43]. From the analyzed sequence comes the peak-to-peak velocity magnitude, taken as the largest change in amplitude within the fluid velocity waveform, the total volume of CSF that flows through the aqueduct per heartbeat, along with the diameter of an aqueduct's cross-section.

Currently all Neurocognitive Disorders Center patients receiving MRIs at the UTHealth MRI Core Lab are undergoing a sequence to measure CSF flow, which will allow for group comparisons in future studies. Unfortunately, there were not enough scans at the time of this analysis to justify including maximum CSF flow as a variable in the RFE.

5.6 Longitudinal analysis

Vital to development of consensus criterion is longitudinal analyses of patients and imaging data. In addition to following patients for years, we aim to develop a screening protocol at our clinic-based and extensive clinic network to refer all patients diagnosed with hydrocephalus and/or related symptoms to our practice. The goal is to (1) gather patients who may have findings of hydrocephalus but are not officially diagnosed with NPH, (2) obtain follow-up MRIs on shunted patients to analyze white matter differences between patients who benefited vs. those who did not, and (3) to measure their regional and tract mean diffusivity, radial diffusivity, axial diffusivity, fractional anisotropy, volumetry, and CSF flow.

5.7 Machine Learning

Given the small sample size, this study utilized what is closer to an agnostic, hypothesis-generating approach instead of a hypothesis driven one. This preliminary study has generated findings that lead to the next step, which is a hypothesis-driven line of research and will serve future directions for larger trials with more patients and other clinical cohorts.

To that end, while we have gathered a wide range of data, correlating all the variables will be a complex task. After basic statistical analyses are performed, we will transition to using machine-learning techniques to create and hone a testable diagnostic criterion and improve it through prospective usage. Specificity and sensitivity will be prioritized as further data is collected[41,44]. First, machine-learning algorithms allow predictions at an individual subject level and therefore are able to facilitate individualized clinical decisions. Second, these algorithms are largely multivariate and therefore are able to analyze multiple biological measurements simultaneously, as opposed to traditional univariate statistical methods, which are able to analyze only single measurements at a time. Third, machine learning algorithms use robust cross-validation methods to establish generalizability of results by testing the algorithm using previously unseen observations.

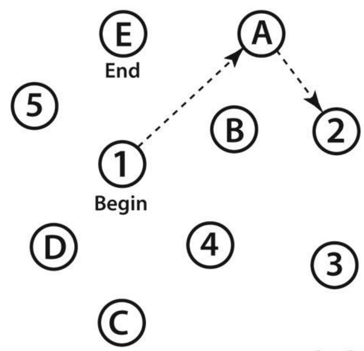
If more detailed neuropsychological testing is gathered, the patterns themselves can be used for group analysis. For instance, if there are sixty patients with three different patterns (frontosubcortical, hippocampal, and temporal-parietal), they can be grouped based on those patterns to find predictors. The pattern itself would be used as a dependent variable for logistic regressions to determine which regions predict certain patterns.

Appendix A1: Montreal Cognitive Assessment

MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

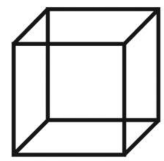
NAME :
Education :
Sex :
Date of birth :
DATE :

		POINTS
VISUOSPATIAL / EXECUTIVE		



[ ]

Copy cube



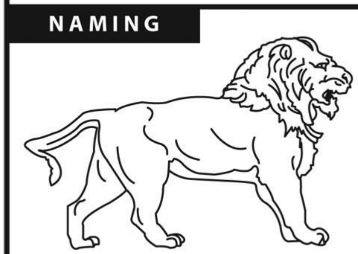
[ ]

Draw CLOCK (Ten past eleven)
(3 points)

[ ] Contour [ ] Numbers [ ] Hands

___/5

NAMING



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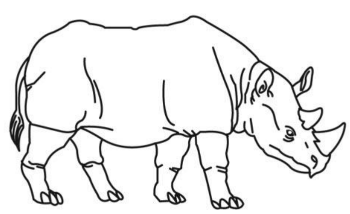

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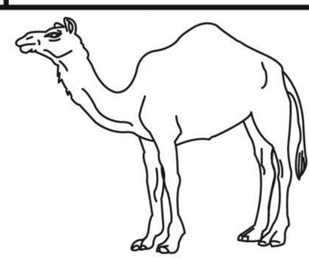

[ ]

___/3

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order [ ] 2 1 8 5 4
Subject has to repeat them in the backward order [ ] 7 4 2
___/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors
[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B
___/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65
4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**
___/3

LANGUAGE Repeat : I only know that John is the one to help today. [ ]
The cat always hid under the couch when dogs were in the room. [ ]
___/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] _____ (N ≥ 11 words)
___/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler
___/2

DELAYED RECALL	Has to recall words **WITH NO CUE**	FACE [ ]	VELVET [ ]	CHURCH [ ]	DAISY [ ]	RED [ ]	Points for UNCUED recall only	___/5
Optional	Category cue							
	Multiple choice cue							

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City
___/6

 www.mocatest.org Normal ≥ 26 / 30

TOTAL ___/30
Add 1 point if ≤ 12 yr edu

Administered by: ______________________

TABLES AND FIGURES

Table 2: Numbering log for each mFA and mADC regional variable for ease of viewing data in Appendix 2. Structures are named verbatim as they are referred to in the pipeline. Abbreviations: superior (sup), middle (mid), inferior (inf), left/right (L/R)

#	Structure_Hemisphere_mFA	#	Structure_Hemisphere_mFA
1	sup PARIETAL_L_mFA	51	Fornix _L_mFA
2	CINGULATE _L_mFA	52	GenuCorpusCallosum_L_mFA
3	sup FRONTAL _L_mFA	53	BodyCorpusCallosum_L_mFA
4	mid FRONTAL _L_mFA	54	SpleniumCorpusCallosum_L_mFA
5	inf FRONTAL _L_mFA	58	Tapatum_L_mFA
6	PRECENTRAL _L_mFA	61	THALAMUS_L_mFA
7	POSTCENTRAL _L_mFA	66	sup PARIETAL _R_mFA
8	ANGULAR _L_mFA	67	CINGULATE _R_mFA
9	PRE-CUNEUS_L_mFA	68	sup FRONTAL _R_mFA
10	CUNEUS_L_mFA	69	mid FRONTAL _R_mFA
11	LINGUAL _L_mFA	70	inf FRONTAL _R_mFA
12	FUSIFORM _L_mFA	71	PRECENTRAL _R_mFA
13	PARAHIPPOCAMPAL _L_mFA	72	POSTCENTRAL _R_mFA
14	sup OCCIPITAL _L_mFA	73	ANGULAR _R_mFA
15	inf OCCIPITAL_L_mFA	74	PRE-CUNEUS_R_mFA
16	mid OCCIPITAL_L_mFA	75	CUNEUS_R_mFA
17	ENTORHINAL AREA_L_mFA	76	LINGUAL _R_mFA
18	sup TEMPORAL_L_mFA	77	FUSIFORM _R_mFA
19	inf TEMPORAL_L_mFA	78	PARAHIPPOCAMPAL _R_mFA
20	mid TEMPORAL_L_mFA	79	sup OCCIPITAL _R_mFA
21	LATERAL FRONTO-ORBITAL_L_mFA	80	inf OCCIPITAL _R_mFA
22	mid FRONTO-ORBITAL_L_mFA	81	mid OCCIPITAL _R_mFA
23	SUPRAMARGINAL_L_mFA	82	ENTORHINAL AREA_R_mFA
24	RECTUS_L_mFA	83	sup TEMPORAL _R_mFA
25	INSULA_L_mFA	84	inf TEMPORAL _R_mFA
26	AMYGDALA_L_mFA	85	mid TEMPORAL _R_mFA
27	HIPPOCAMPUS_L_mFA	86	LATERAL FRONTO-ORBITAL _R_mFA
34	AnteriorLimbInternalCapsule_L_mFA	87	mid FRONTO-ORBITAL _R_mFA
36	PosteriorThalamicRadiation_L_mFA	88	SUPRAMARGINAL _R_mFA
37	AnteriorCoronaRadiata_L_mFA	89	RECTUS_R_mFA
38	supCoronaRadiata_L_mFA	90	INSULA_R_mFA
39	PosteriorCoronaRadiata_L_mFA	91	AMYGDALA_R_mFA
40	Cingulum_L_mFA	92	HIPPOCAMPUS_R_mFA
41	CingulumHippocampal_L_mFA	99	AnteriorLimbInternalCapsule_R_mFA
42	FornixStriaTerminalis_L_mFA	101	PosteriorThalamicRadiation_R_mFA

43	supLongitudinalFasciculus_L_mFA	102	AnteriorCoronaRadiata_R_mFA
45	infFronto-occipitalFasciculus_L_mFA	103	supCoronaRadiata_R_mFA
46	SagittalStratum_L_mFA	104	PosteriorCoronaRadiata_R_mFA
47	ExternalCapsule_L_mFA	105	Cingulum_R_mFA
48	UncinateFasciculus_L_mFA	106	CingulumHippocampal_R_mFA
107	FornixStriaTerminalis_R_mFA	27	HIPPOCAMPUS_L_mADC
108	supLongitudinalFasciculus_R_mFA	34	AnteriorLimbInternalCapsule_L_mADC
110	infFronto-occipitalFasciculus_R_mFA	36	PosteriorThalamicRadiation_L_mADC
111	SagittalStratum_R_mFA	37	AnteriorCoronaRadiata_L_mADC
112	ExternalCapsule_R_mFA	38	supCoronaRadiata_L_mADC
113	UncinateFasciculus_R_mFA	39	PosteriorCoronaRadiata_L_mADC
116	Fornix_R_mFA	40	Cingulum_L_mADC
117	GenuCorpusCallosum_R_mFA	41	CingulumHippocampal_L_mADC
118	BodyCorpusCallosum_R_mFA	42	FornixStriaTerminalis_L_mADC
119	SpleniumCorpusCallosum_R_mFA	43	supLongitudinalFasciculus_L_mADC
123	Tapatum_R_mFA	45	infFronto-occipitalFasciculus_L_mADC
126	THALAMUS_R_mFA	46	SagittalStratum_L_mADC
131	Nucleus accumbens_L_mFA	47	ExternalCapsule_L_mADC
132	Nucleus accumbens_R_mFA	48	UncinateFasciculus_L_mADC
#	**Structure_Hemisphere_MeanDiffusivity**	51	Fornix _L_mADC
1	sup PARIETAL_L_mADC	52	GenuCorpusCallosum_L_mADC
2	CINGULATE _L_mADC	53	BodyCorpusCallosum_L_mADC
3	sup FRONTAL _L_mADC	54	SpleniumCorpusCallosum_L_mADC
4	mid FRONTAL _L_mADC	58	Tapatum_L_mADC
5	inf FRONTAL _L_mADC	61	THALAMUS_L_mADC
6	PRECENTRAL _L_mADC	66	sup PARIETAL _R_mADC
7	POSTCENTRAL _L_mADC	67	CINGULATE _R_mADC
8	ANGULAR _L_mADC	68	sup FRONTAL _R_mADC
9	PRE-CUNEUS_L_mADC	69	mid FRONTAL _R_mADC
10	CUNEUS_L_mADC	70	inf FRONTAL _R_mADC
11	LINGUAL _L_mADC	71	PRECENTRAL _R_mADC
12	FUSIFORM _L_mADC	72	POSTCENTRAL _R_mADC
13	PARAHIPPOCAMPAL _L_mADC	73	ANGULAR _R_mADC
14	sup OCCIPITAL _L_mADC	74	PRE-CUNEUS_R_mADC
15	inf OCCIPITAL_L_mADC	75	CUNEUS_R_mADC
16	mid OCCIPITAL_L_mADC	76	LINGUAL _R_mADC
17	ENTORHINAL AREA_L_mADC	77	FUSIFORM _R_mADC
18	sup TEMPORAL_L_mADC	78	PARAHIPPOCAMPAL _R_mADC
19	inf TEMPORAL_L_mADC	79	sup OCCIPITAL _R_mADC
20	mid TEMPORAL_L_mADC	80	inf OCCIPITAL _R_mADC
21	LATERAL FRONTO-ORBITAL_L_mADC	81	mid OCCIPITAL _R_mADC

22	mid FRONTO-ORBITAL_L_mADC	82	ENTORHINAL AREA_R_mADC
23	SUPRAMARGINAL_L_mADC	83	sup TEMPORAL _R_mADC
24	RECTUS_L_mADC	84	inf TEMPORAL _R_mADC
25	INSULA_L_mADC	85	mid TEMPORAL _R_mADC
26	AMYGDALA_L_mADC	86	LATERAL FRONTO-ORBITAL _R_mADC
87	mid FRONTO-ORBITAL _R_mADC		
88	SUPRAMARGINAL _R_mADC		
89	RECTUS_R_mADC		
90	INSULA_R_mADC		
91	AMYGDALA_R_mADC		
92	HIPPOCAMPUS_R_mADC		
99	AnteriorLimbInternalCapsule_R_mADC		
101	PosteriorThalamicRadiation_R_mADC		
102	AnteriorCoronaRadiata_R_mADC		
103	supCoronaRadiata_R_mADC		
104	PosteriorCoronaRadiata_R_mADC		
105	Cingulum_R_mADC		
106	CingulumHippocampal_R_mADC		
107	FornixStriaTerminalis_R_mADC		
108	supLongitudinalFasciculus_R_mADC		
110	infFronto-occipitalFasciculus_R_mADC		
111	SagittalStratum_R_mADC		
112	ExternalCapsule_R_mADC		
113	UncinateFasciculus_R_mADC		
116	Fornix_R_mADC		
117	GenuCorpusCallosum_R_mADC		
118	BodyCorpusCallosum_R_mADC		
119	SpleniumCorpusCallosum_R_mADC		
122	Substancia Nigra _R_mADC		
123	Tapatum_R_mADC		
126	THALAMUS_R_mADC		
131	Nucleus accumbens_L_mADC		
132	Nucleus accumbens_R_mADC		

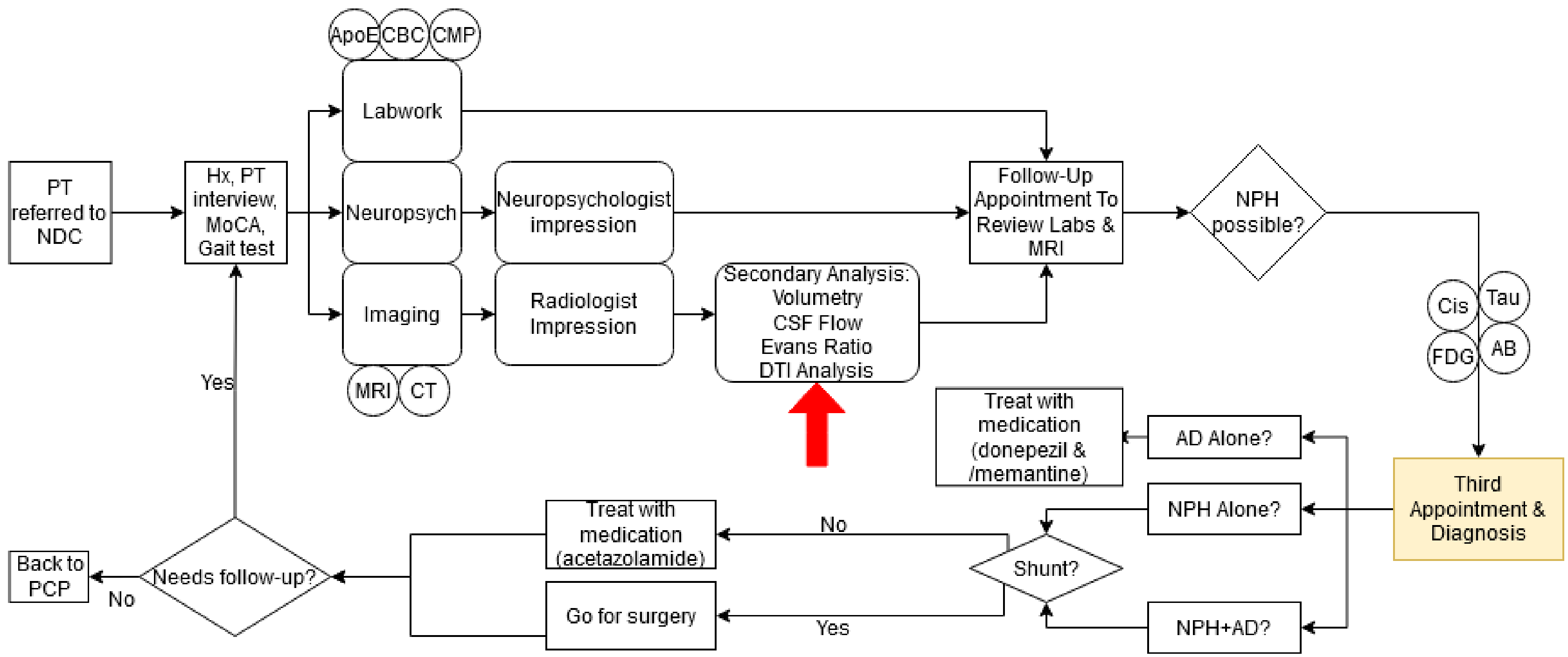

Figure 2: Clinic workflow for a typical iNPH case coming to the UTHealth Neurocognitive Disorders Center

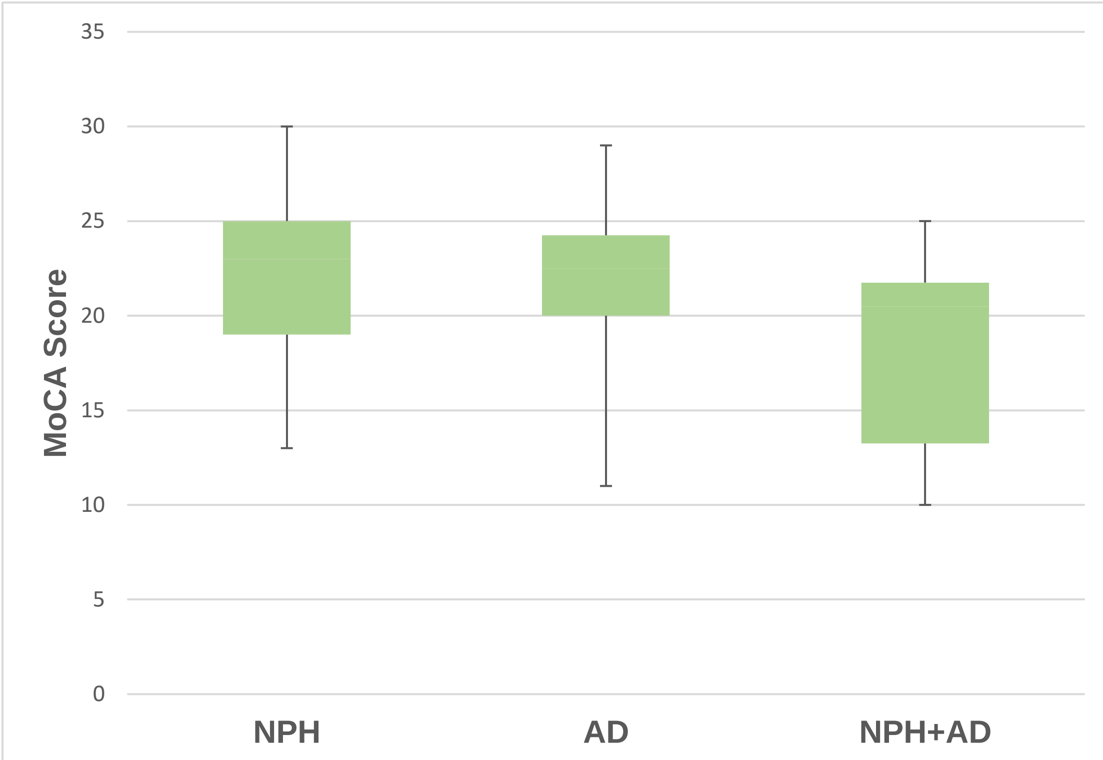

Figure 3: Box and whisker plot comparing MoCA scores across each study group

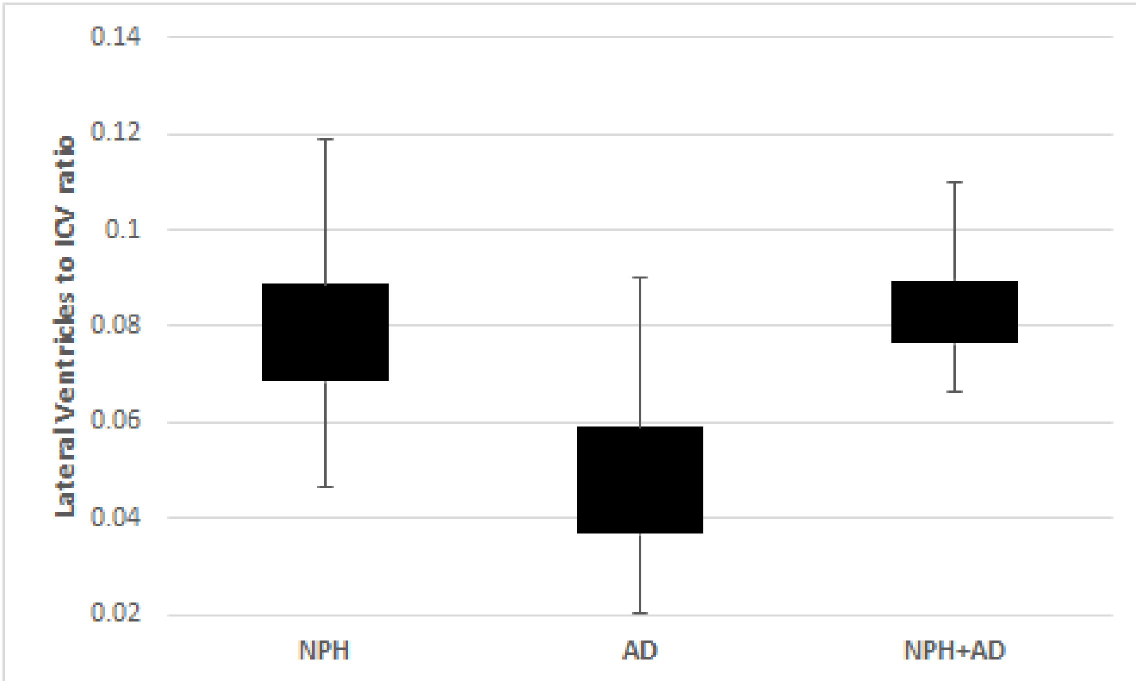

Figure 4: Box and whisker plot comparing proportions of lateral ventricles to intracranial volume (ICV) in each study group. This comparison also serves to show differences in levels of ventriculomegaly in each group.

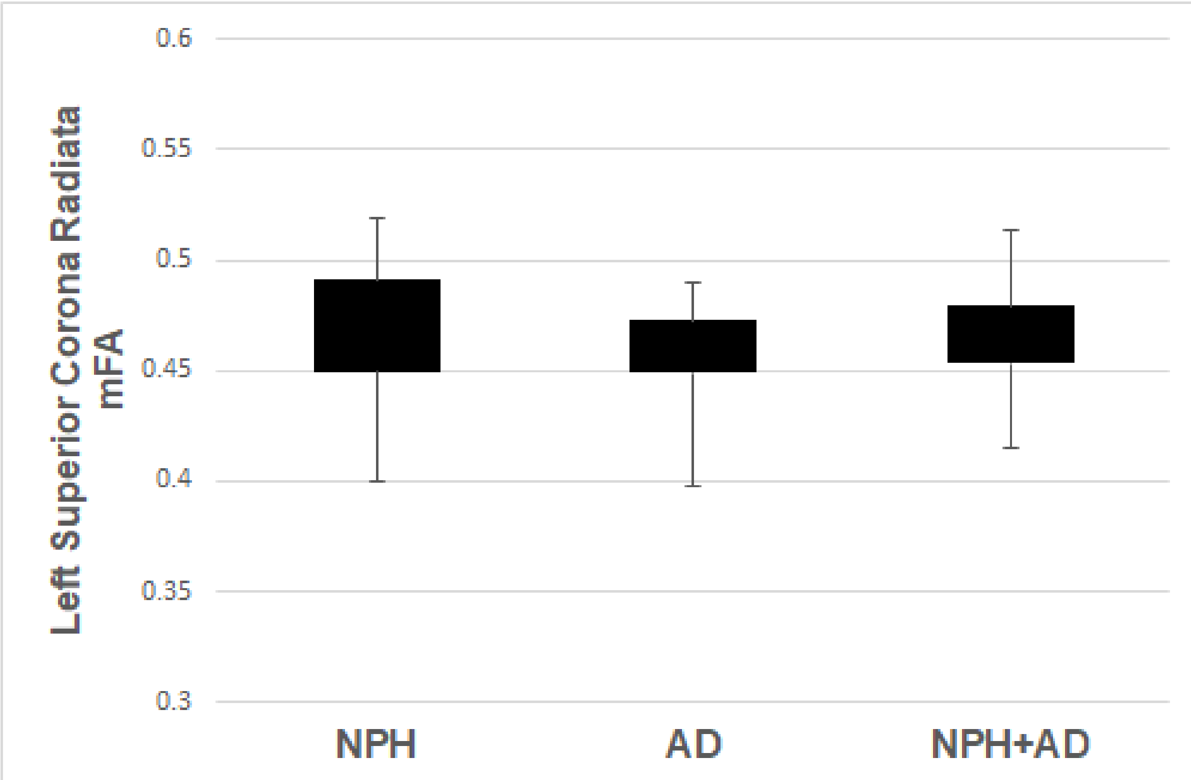

Figure 5: Box and whisker plot comparing the mean fractional anisotropy of the left superior corona radiata between each group

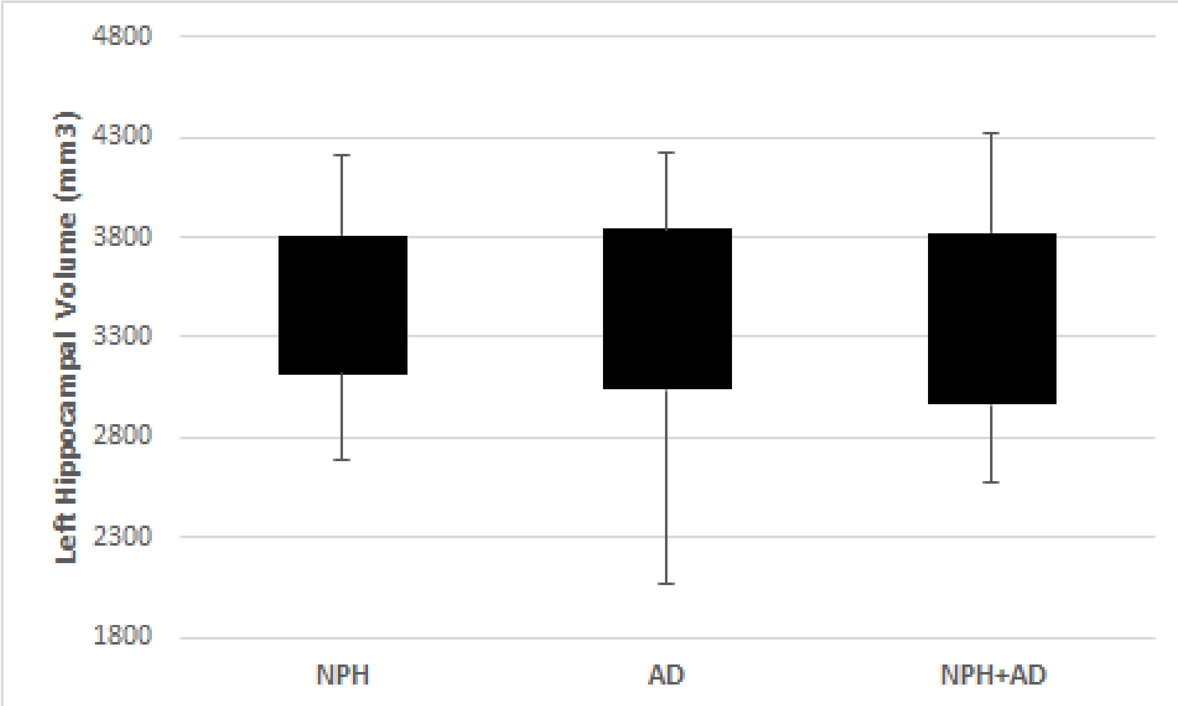

Figure 6: Box and whisker plot comparing left hippocampal volumes in each group. Note the amount of overlap between the groups, suggesting that left hippocampal volume alone is not a worthy biomarker for differentiating between groups.

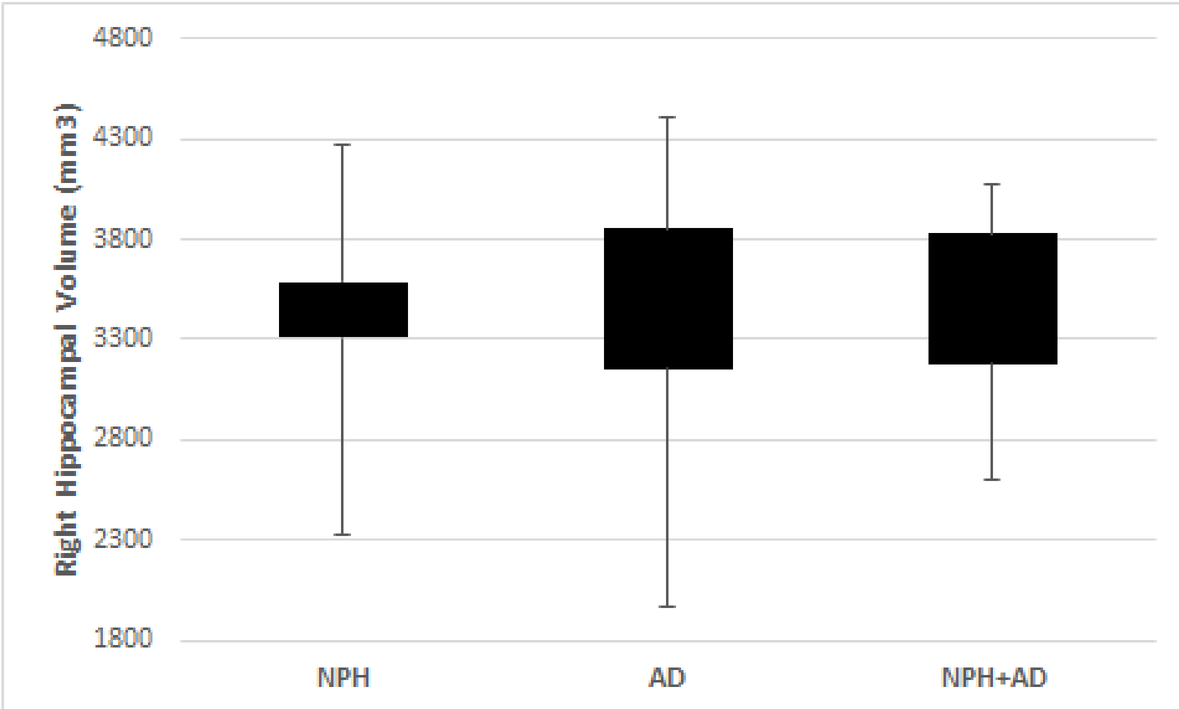

Figure 7: Box and whisker plot comparing the right hippocampal volume between groups. Despite the mADC of this structure being a potential distinguishing biomarker, volumetry of the structure alone does not seem to differentiate between groups.

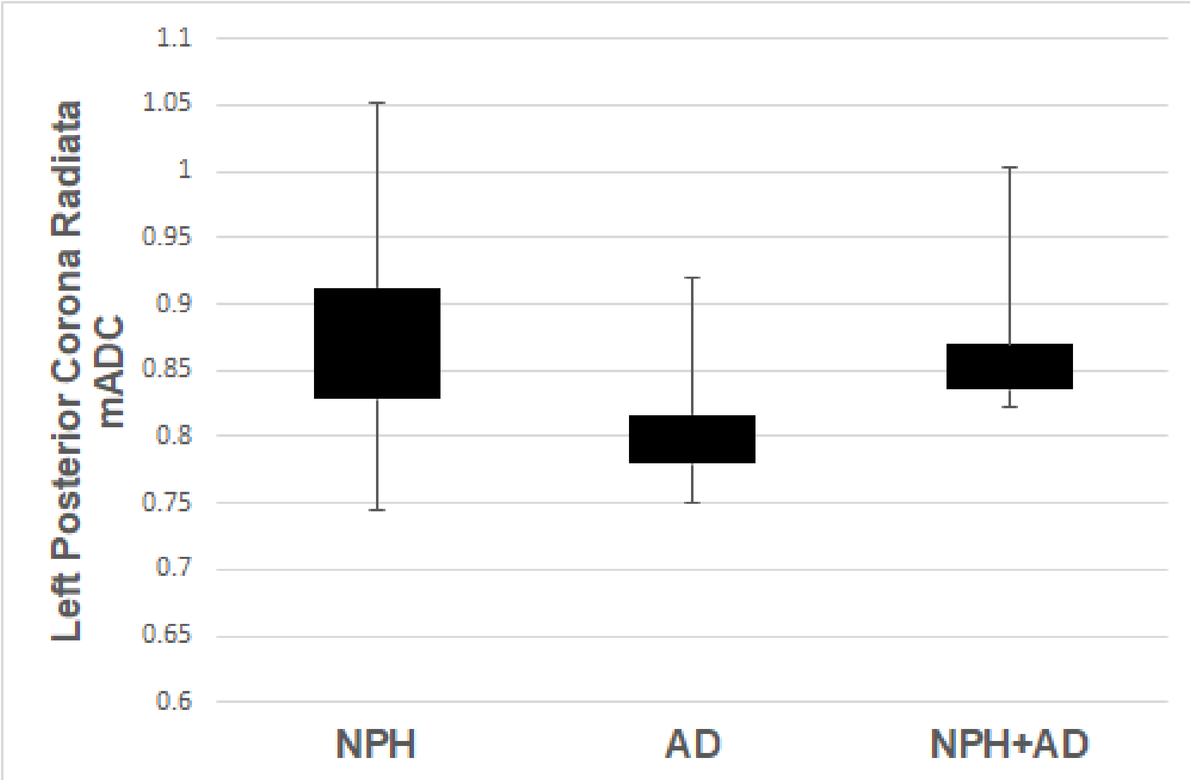

Figure 8: Box and whisker plot comparing the mADCs of the left posterior corona radiata between groups.

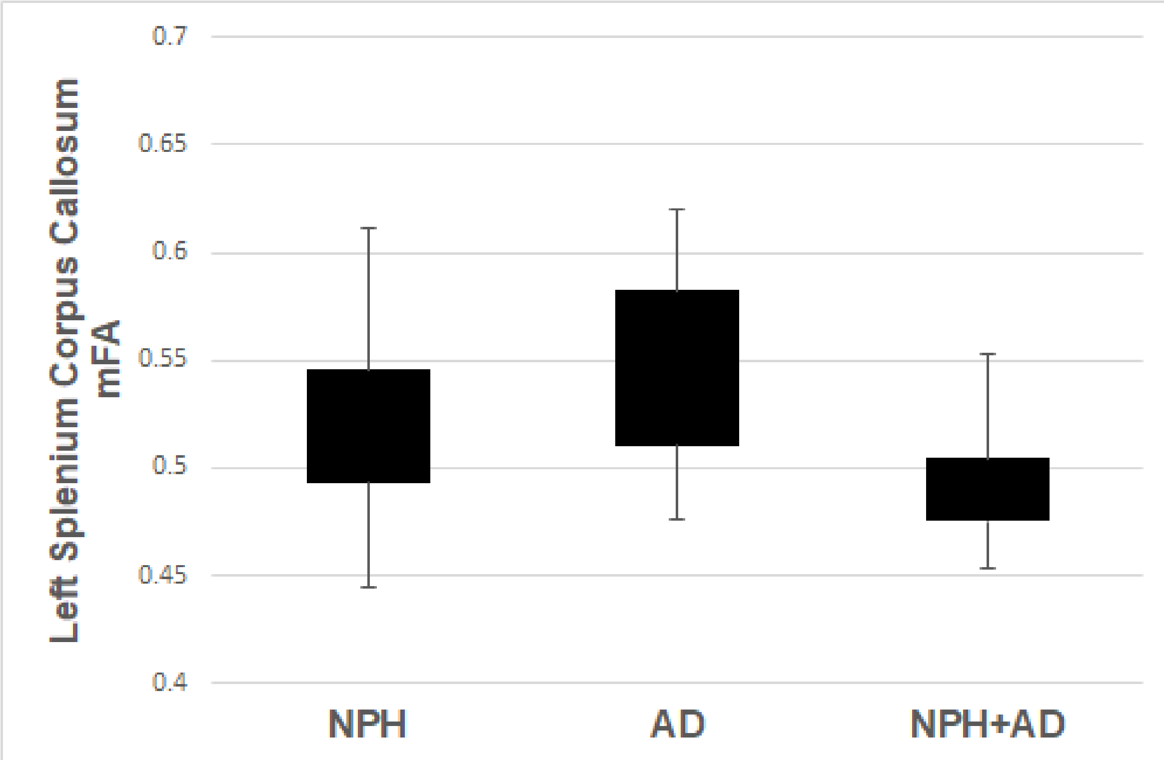

Figure 9: Box and whisker plot comparing mean fractional anisotropies of the left splenium corpus callosum between groups.

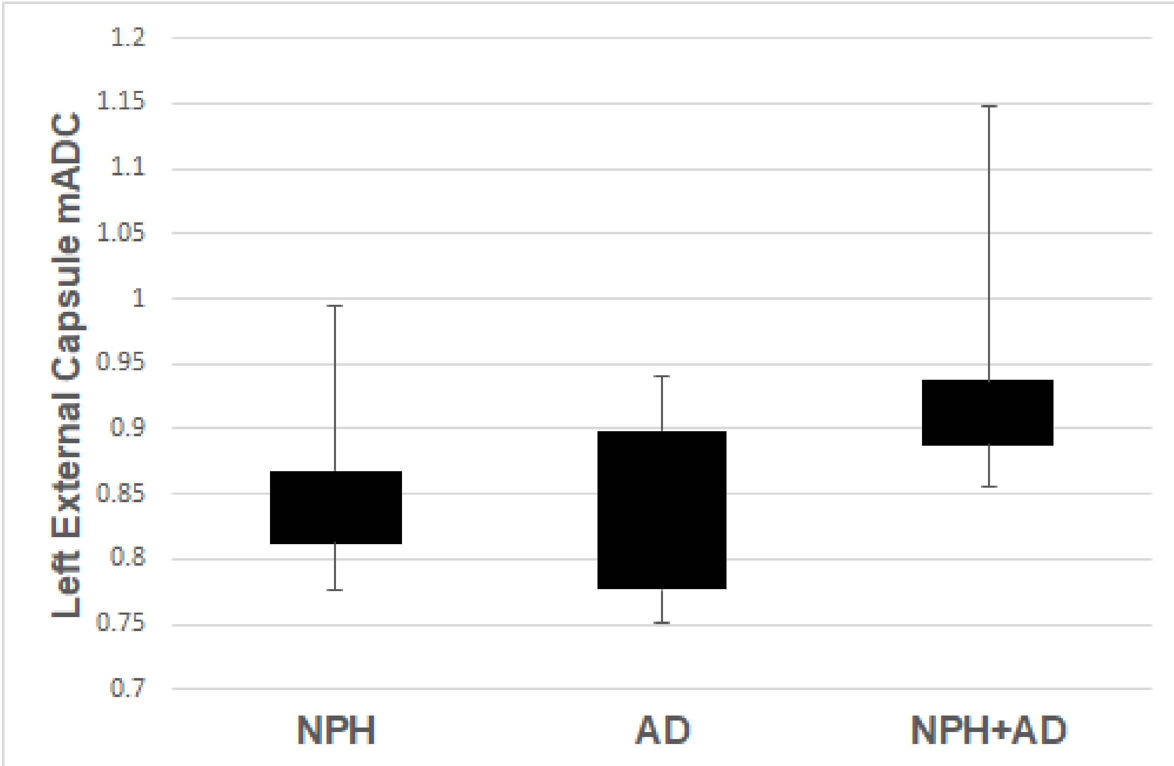

Figure 10: Box and whisker plot comparing mADC values of the left external capsule between groups.

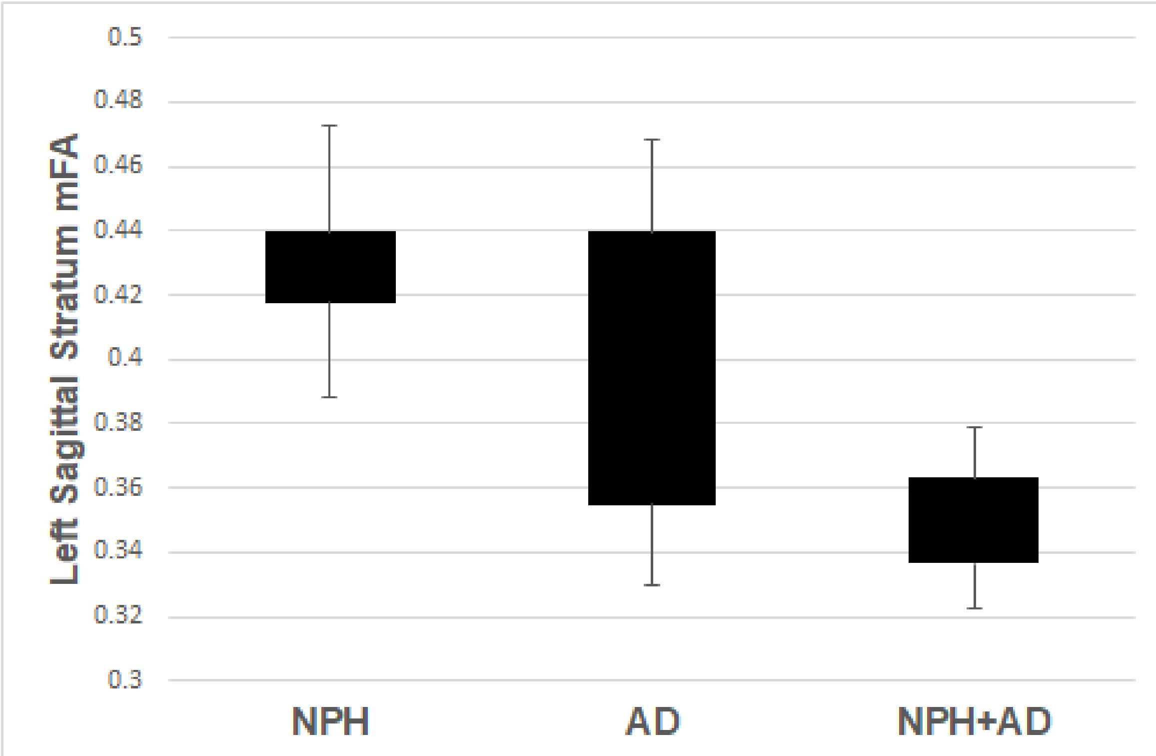

Figure 11: Comparison of left sagittal striatum mFA values between groups

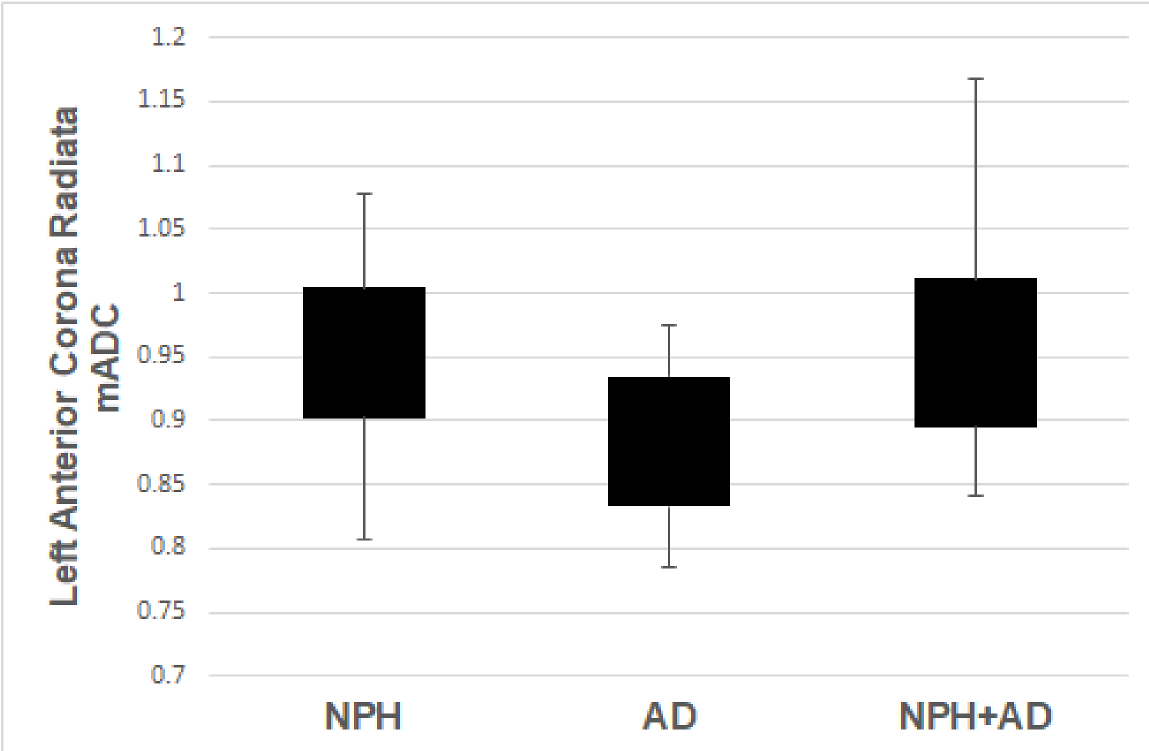

Figure 12: Comparison of left anterior corona radiata mADC between groups.

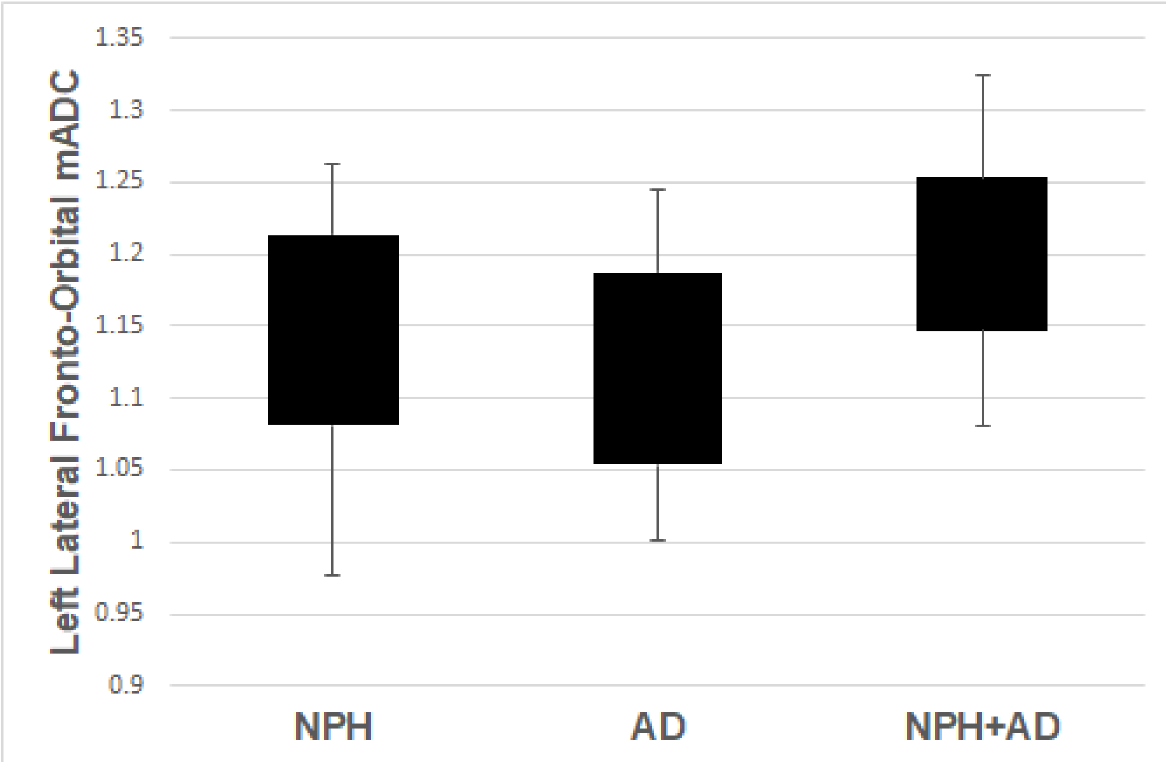

Figure 13: Comparison of left lateral fronto-orbital diffusivity between groups

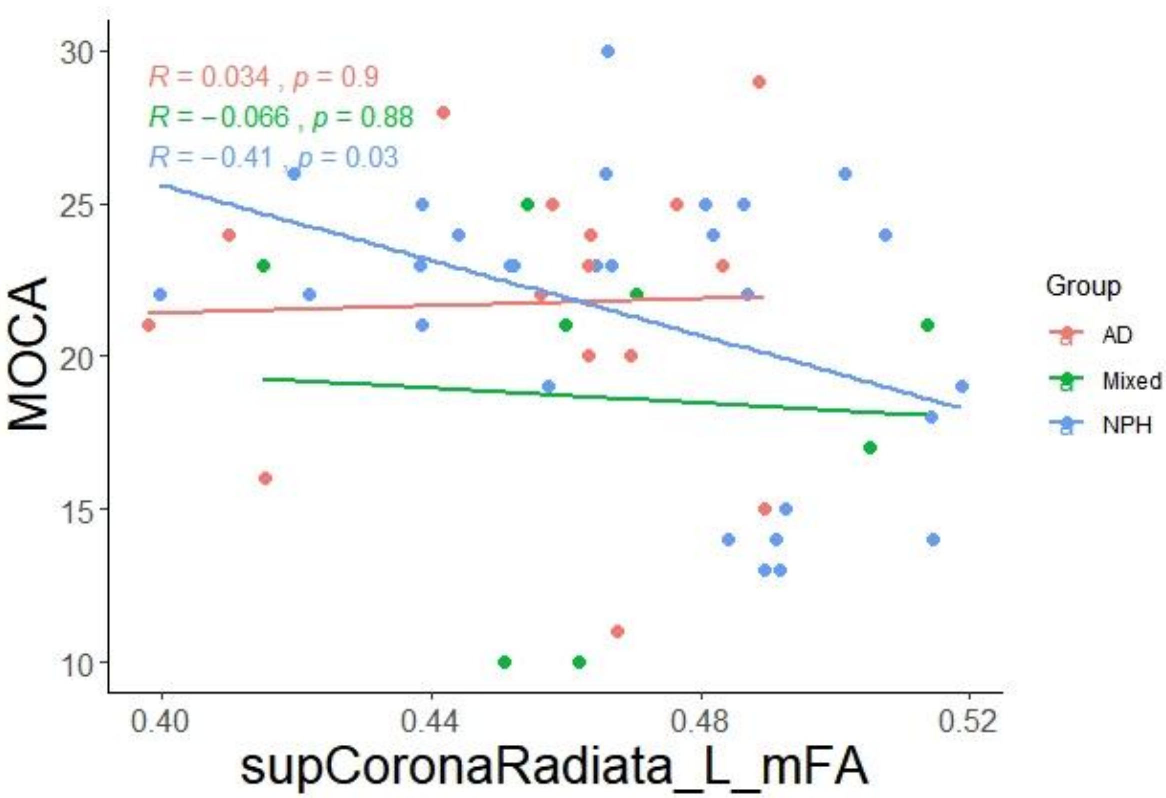

Figure 14: Scatter plot of left superior corona radiate mean fractional anisotropy (mFA) versus MoCA score. This structure was significantly associated with performance on the MoCA in the NPH group.

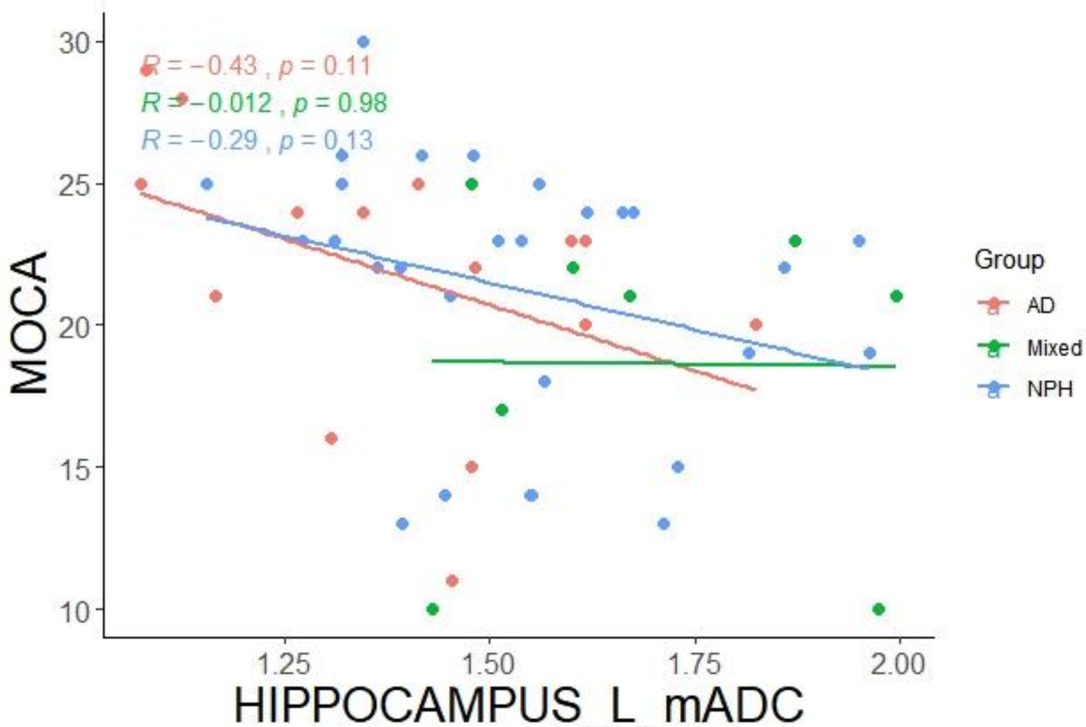

Figure 15: Scatter plot of the left hippocampus' mADC versus MoCA scores in each group

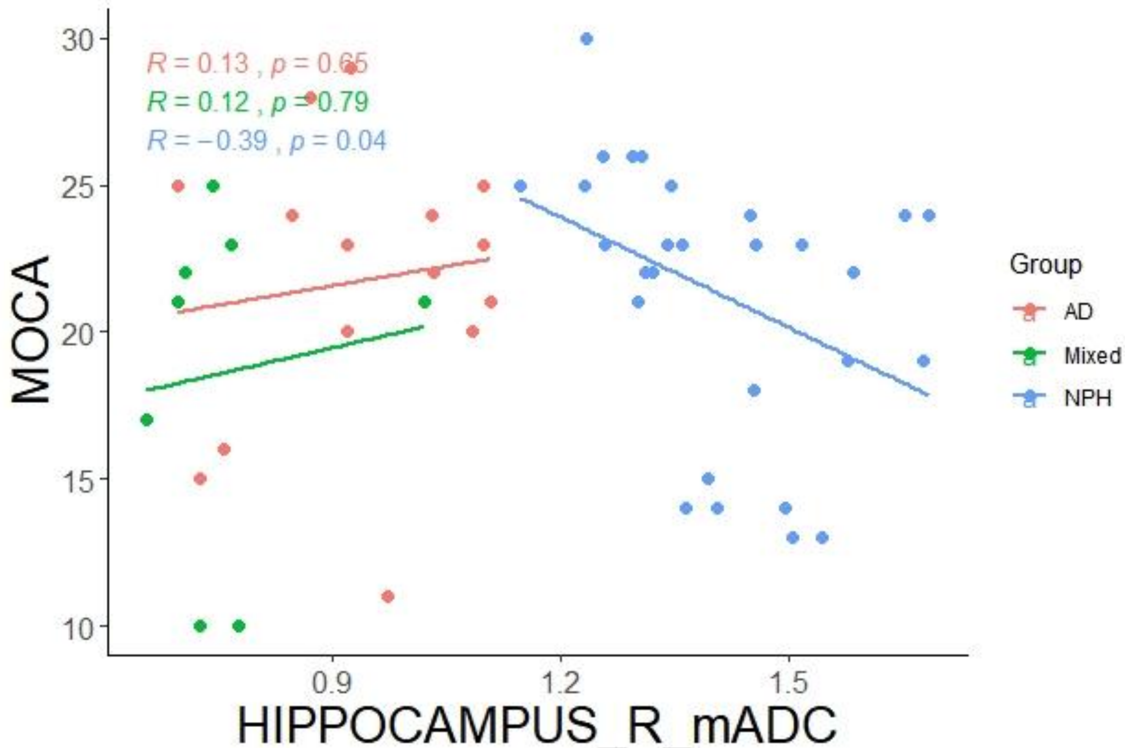

Figure 16: Scatter plot of right hippocampal mean diffusivity versus MoCA scores in each group

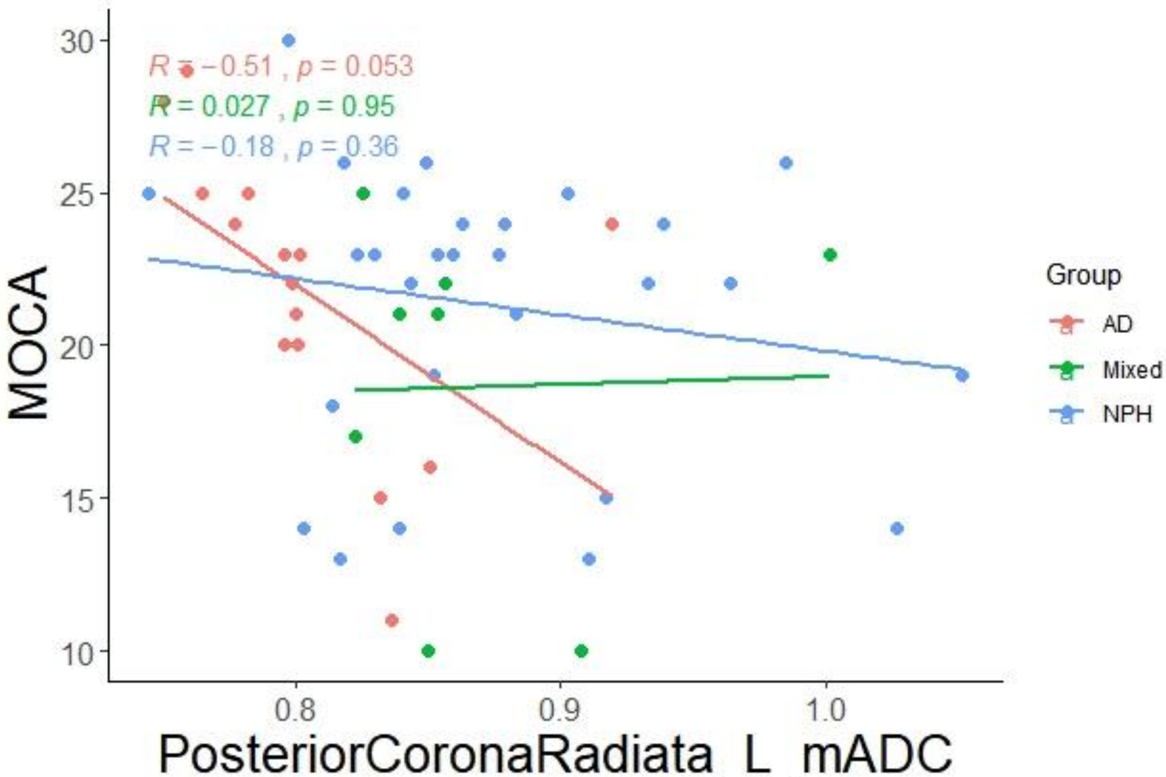

Figure 17: Scatter plot of the left posterior corona radiata mADC versus MoCA scores in each group.

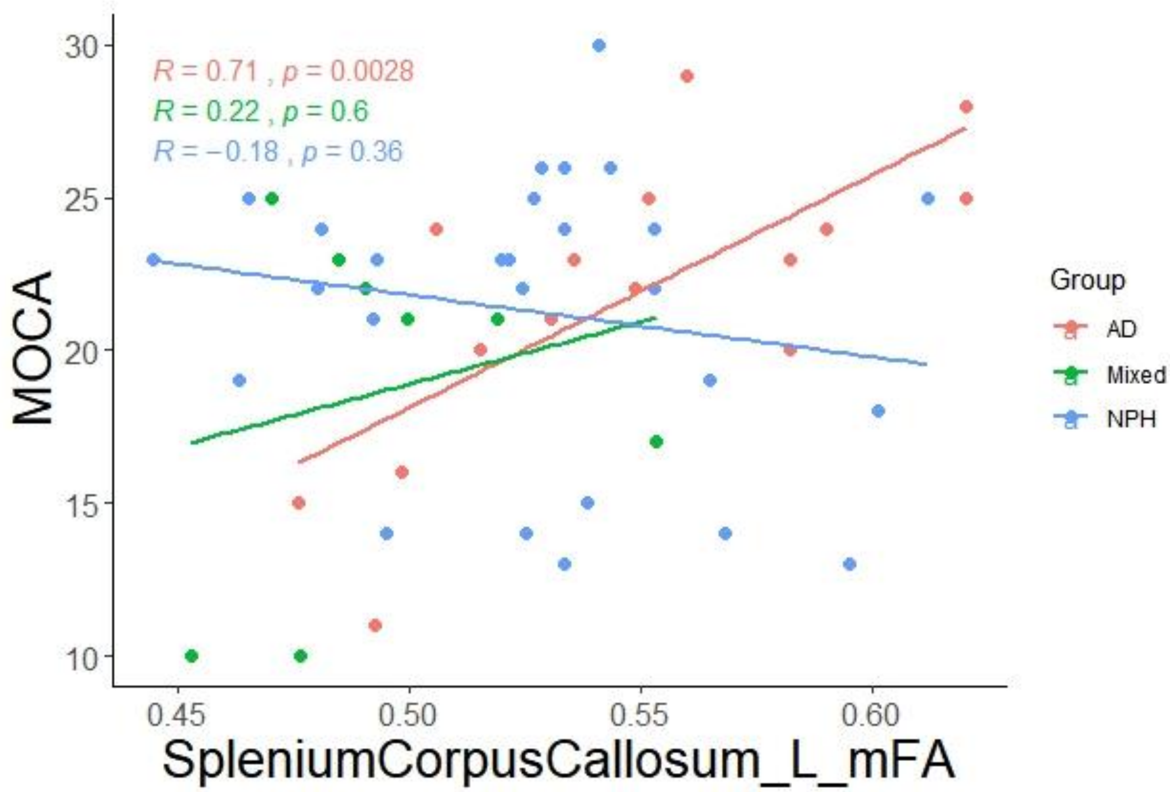

Figure 18: Scatter plot of the left splenium corpus callosum mFA versus MoCA scores in each group.

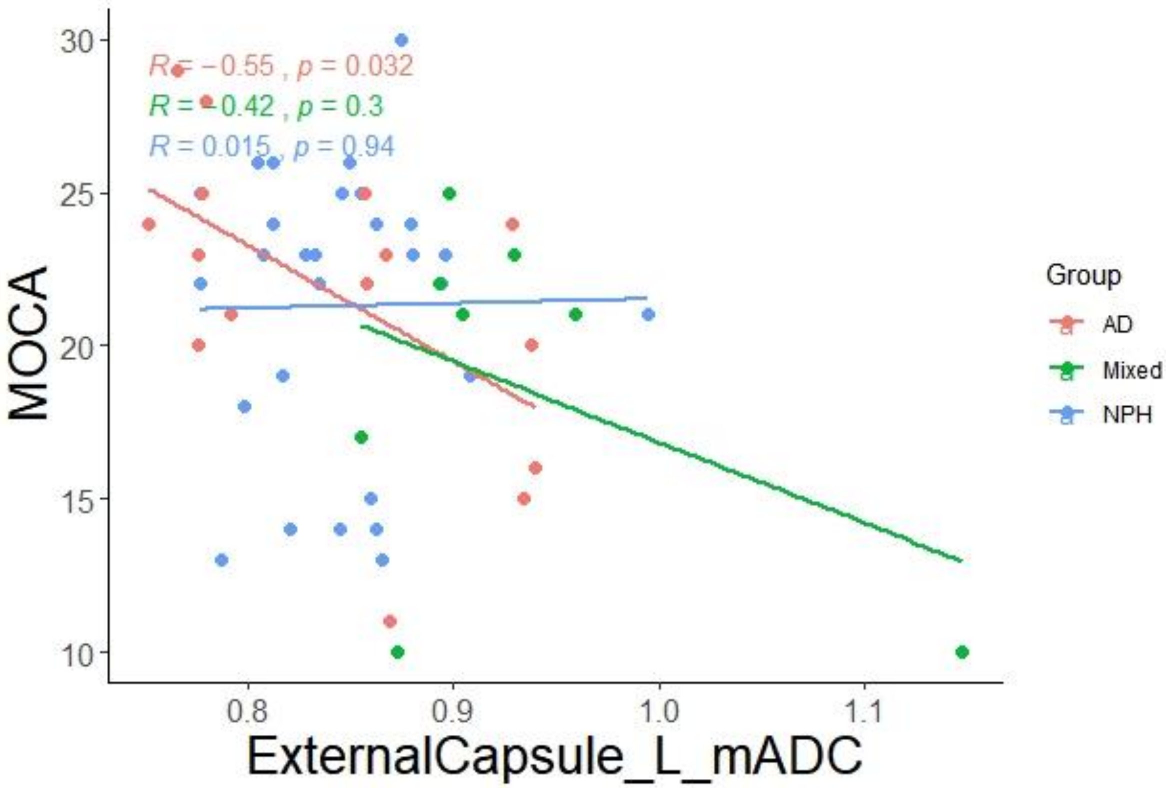

Figure 19: Scatter plot of the left external capsule mADC versus MoCA scores in each groups.

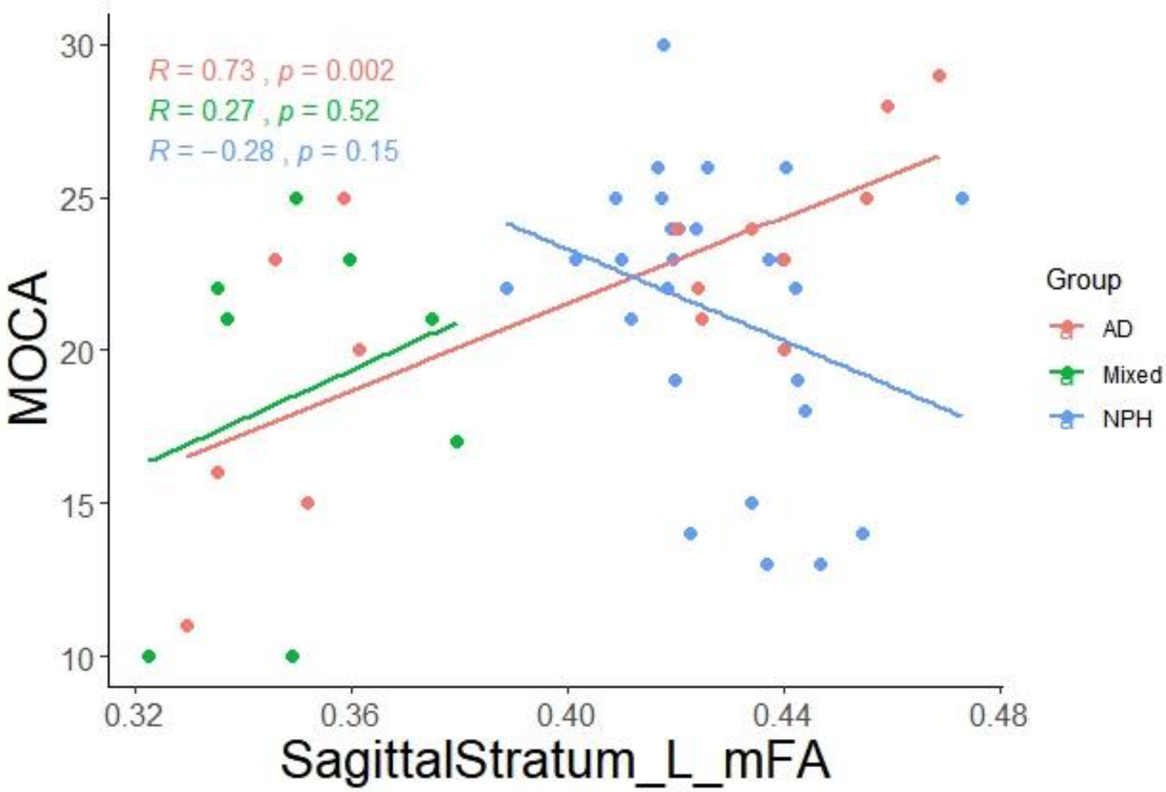

Figure 20: Scatter plot of the left sagittal striatum mFA versus MoCA scores in each group.

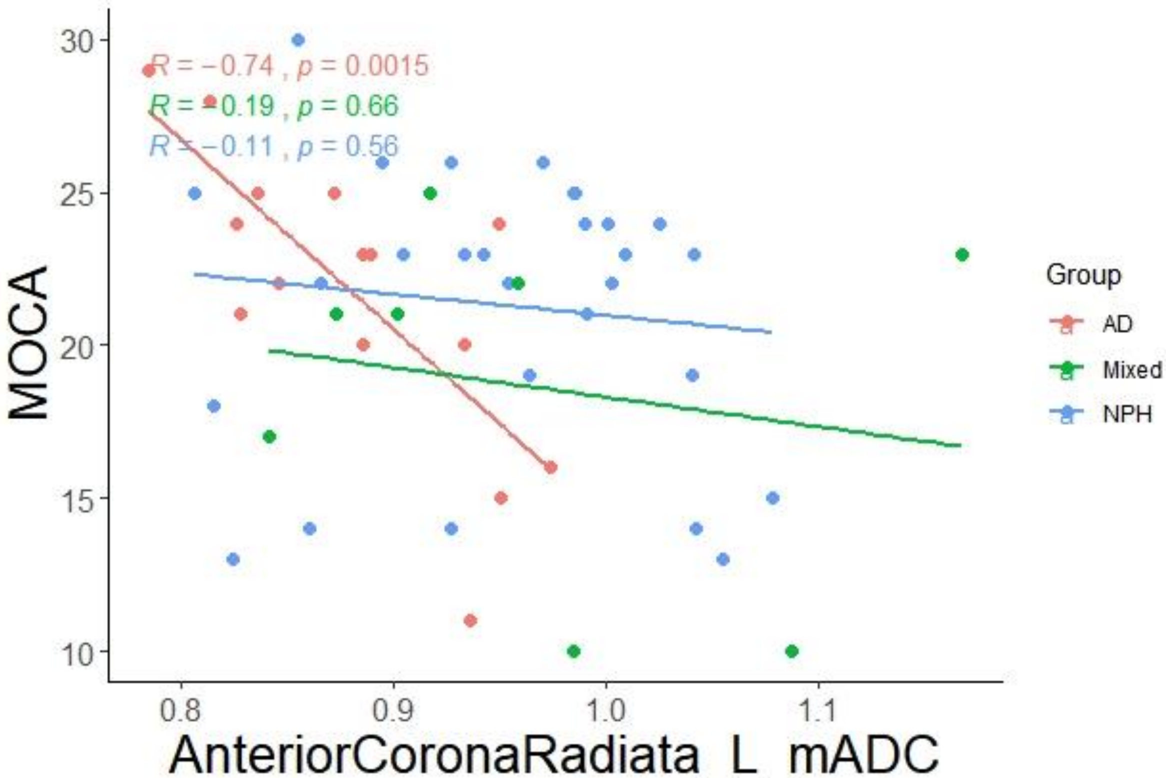

Figure 21: Scatter plot of the left anterior corona radiata mADC versus MoCA scores in each group

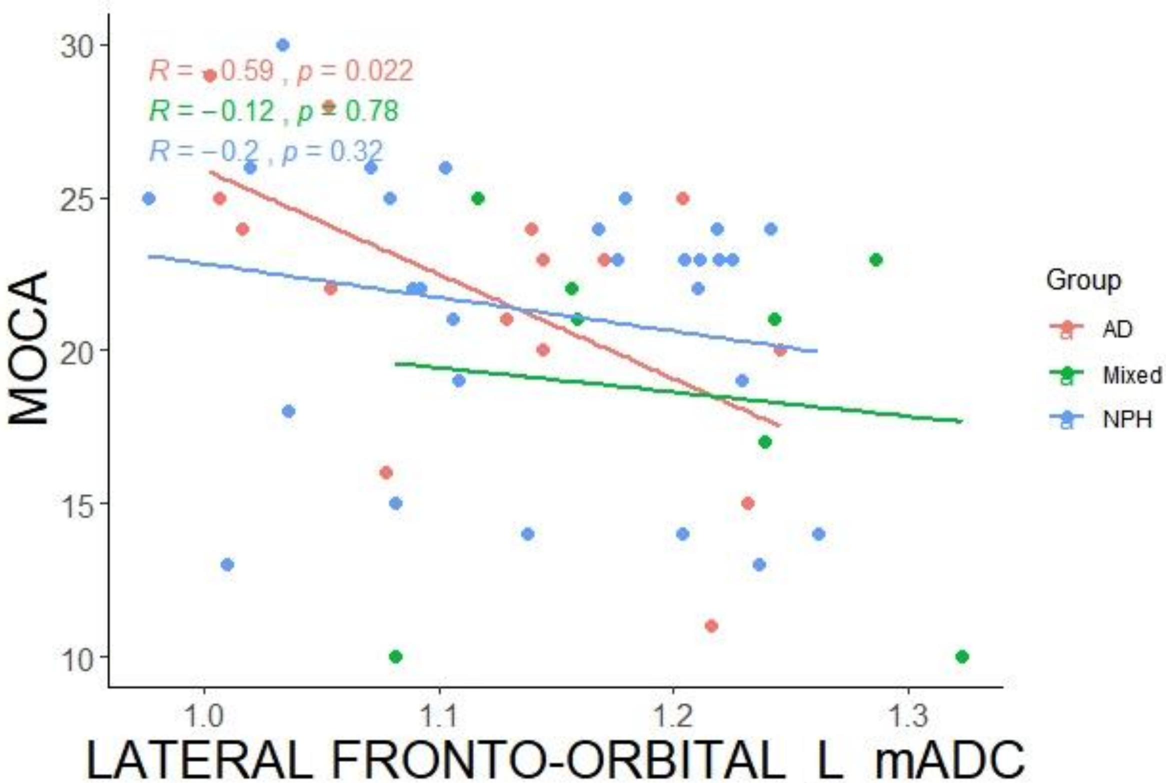

Figure 22: Scatter plot of the left lateral fronto-orbital mADC versus MoCA scores in each groups.

Table 3: mFA and mADC values for each patient in each structure. Please refer to Table 2 to see which structures are linked to witch mFA structure number. Abbreviations: Intracranial Volume (ICV), Lesion Load (LesLoad), Study ID (sID), white matter (WM).

sID	NPH001	NPH002	NPH003	NPH004	NPH005	NPH006	NPH007
Gender	F	M	F	M	M	F	F
ICV	1387233	1193298	1140083	1349019	1527928	1323473	1136152
volbrainICV	1543.841	1333.235	1271.83	1545.506	1704.34	1472.286	1296.103
volbrainWM	459.63	433.35	336.79	415.74	348.43	453.26	342.79
LesLoad	51.8455	2.3757	40.2653	8.2999	29.3335	51.3056	7.8616
LL/ICV	0.033582	0.001782	0.031659	0.00537	0.017211	0.034848	0.006066
LL/WM	0.112798	0.005482	0.119556	0.019964	0.084188	0.113192	0.022934
LV_Vol	98.968	81.063	100.462	83.173	168.651	113.945	59.984
LV/ICV	0.064105	0.060802	0.07899	0.053816	0.098954	0.077393	0.04628
LV/WM	0.215321	0.187061	0.298293	0.20006	0.484031	0.25139	0.174988
MOCA	22	25	21	25	22	14	30
Delayed Recall	2	4	0	2	0	0	5
Attention	4	5	5	5	6	3	6
Age	74	78	75	64	83	89	83
Fractional Anisotropy (mFA)							
1	0.236198		0.25316	0.221995	0.235624	0.197075	0.242239
2	0.174384		0.181444	0.191685	0.176732	0.196797	0.161813
3	0.209793		0.19959	0.211326	0.2045	0.21929	0.200402
4	0.171864		0.163203	0.180111	0.158704	0.169848	0.162095
5	0.194025		0.192047	0.19684	0.182969	0.188442	0.197577
6	0.270177		0.275848	0.304555	0.248421	0.26849	0.263927
7	0.17833		0.182154	0.213081	0.171573	0.189406	0.175747
8	0.146171		0.169112	0.155146	0.169008	0.155559	0.168328
9	0.161757		0.181859	0.139659	0.164725	0.163235	0.146887
10	0.181837		0.210288	0.161977	0.17913	0.150698	0.160677
11	0.181185		0.201613	0.186787	0.174846	0.175608	0.199024
12	0.18619		0.195039	0.208856	0.176803	0.202991	0.172551
13	0.294602		0.28524	0.26045	0.2652	0.226124	0.226402
14	0.277092		0.227146	0.242256	0.245799	0.229901	0.253905
15	0.165043		0.179841	0.168131	0.168954	0.185259	0.159047
16	0.154258		0.181364	0.159786	0.163259	0.149067	0.161995
17	0.162629		0.186122	0.260397	0.162018	0.213372	0.181754
18	0.180249		0.17721	0.239387	0.16992	0.184132	0.168634
19	0.217038		0.218254	0.277782	0.196623	0.218504	0.224192
20	0.164906		0.177846	0.231538	0.160079	0.176984	0.169591
21	0.176076		0.174587	0.179197	0.14957	0.172939	0.177164
22	0.172853		0.176786	0.210195	0.141376	0.188086	0.185165

23	0.160559	0.153574	0.207267	0.158482	0.158377	0.159371
24	0.191327	0.189226	0.200152	0.151597	0.193317	0.176903
25	0.14978	0.149415	0.197449	0.144909	0.149382	0.144235
26	0.188722	0.179628	0.267618	0.193303	0.208429	0.180684
27	0.186137	0.183558	0.230481	0.179625	0.200677	0.184789
34	0.495158	0.362725	0.468826	0.486629	0.567637	0.493516
36	0.479063	0.436331	0.434131	0.40208	0.440867	0.466397
37	0.339357	0.283473	0.347214	0.35298	0.357808	0.343695
38	0.399702	0.438681	0.438579	0.421714	0.514568	0.466041
39	0.472566	0.493076	0.467976	0.504611	0.495049	0.464554
40	0.480715	0.431581	0.403441	0.426017	0.47377	0.436248
41	0.42654	0.423122	0.374541	0.417533	0.414619	0.423911
42	0.451452	0.417641	0.402376	0.385804	0.378102	0.423817
43	0.421256	0.407294	0.419859	0.389412	0.394327	0.393955
45	0.408711	0.346506	0.350819	0.388716	0.389562	0.403904
46	0.441945	0.411685	0.417341	0.388449	0.422652	0.417691
47	0.345898	0.293413	0.323616	0.345644	0.360857	0.343928
48	0.372663	0.322689	0.310477	0.355561	0.390866	0.330747
51	0.309094	0.330192	0.271898	0.252461	0.274202	0.350511
52	0.476165	0.461739	0.383271	0.449011	0.516569	0.47221
53	0.423864	0.447892	0.461601	0.461998	0.522627	0.475639
54	0.524456	0.492234	0.465207	0.480167	0.495189	0.540728
58	0.523455	0.583915		0.354272	0.57495	0.487139
61	0.332877	0.317086	0.36838	0.353336	0.35833	0.333046
66	0.255609	0.235365	0.246845	0.239075	0.247879	0.260508
67	0.14029	0.155108	0.157772	0.142067	0.155806	0.136897
68	0.200459	0.193855	0.191673	0.193617	0.200032	0.193948
69	0.182344	0.176477	0.166393	0.166423	0.17102	0.181234
70	0.193115	0.186362	0.18881	0.179672	0.188259	0.202916
71	0.25768	0.244828	0.247204	0.212379	0.250219	0.24934
72	0.153295	0.156714	0.150526	0.160859	0.174765	0.15428
73	0.133979	0.151742	0.148417	0.152481	0.151202	0.144387
74	0.138468	0.169031	0.123718	0.147206	0.13805	0.128183
75	0.154334	0.211944	0.152275	0.182169	0.158122	0.150808
76	0.189809	0.216606	0.182795	0.172223	0.194916	0.184447
77	0.179118	0.175744	0.177706	0.159719	0.183394	0.163126
78	0.210963	0.202368	0.187035	0.162657	0.187774	0.156875
79	0.274623	0.25038	0.233709	0.242267	0.271447	0.25426
80	0.193582	0.19631	0.17919	0.15538	0.210861	0.174166
81	0.161755	0.181691	0.173431	0.153166	0.18311	0.16216
82	0.161125	0.187517	0.204744	0.139856	0.182229	0.200473

83	0.177169	0.174915	0.160556	0.161603	0.163391	0.1643
84	0.201237	0.197711	0.203271	0.191919	0.207499	0.196383
85	0.197897	0.18769	0.194899	0.172478	0.184135	0.188202
86	0.168137	0.173623	0.181409	0.159387	0.173753	0.177675
87	0.184979	0.156933	0.220315	0.152169	0.177417	0.177822
88	0.176129	0.180416	0.179953	0.169253	0.171385	0.168651
89	0.182794	0.192012	0.18034	0.148214	0.171896	0.187648
90	0.169509	0.178864	0.175444	0.163502	0.172272	0.169075
91	0.171723	0.165545	0.206571	0.1513	0.191547	0.171218
92	0.170296	0.182029	0.181832	0.167876	0.188472	0.175082
99	0.490248	0.457767	0.478101	0.471013	0.500497	0.511586
101	0.478325	0.436964	0.443433	0.396235	0.461201	0.475745
102	0.333473	0.324567	0.343781	0.346591	0.352102	0.357597
103	0.405737	0.411418	0.440199	0.397695	0.416034	0.439377
104	0.462151	0.444218	0.436341	0.408375	0.438908	0.464286
105	0.414054	0.373161	0.341618	0.371572	0.386698	0.36336
106	0.428241	0.394277	0.354989	0.397681	0.397827	0.411326
107	0.46363	0.372026	0.431297	0.352017	0.431569	0.432898
108	0.418487	0.415759	0.393904	0.400929	0.394348	0.399327
110	0.395586	0.393003	0.372237	0.411265	0.382506	0.382044
111	0.455694	0.414016	0.400933	0.383598	0.417747	0.417177
112	0.382204	0.338941	0.361739	0.382003	0.389494	0.336554
113	0.340759	0.329894	0.320351	0.309111	0.330662	0.337296
116	0.493857	0.447543	0.376567	0.325221	0.391267	0.430918
117	0.458893	0.454422	0.341379	0.450119	0.494563	0.476945
118	0.473413	0.510677	0.409026	0.429972	0.464368	0.455661
119	0.547487	0.476892	0.442804	0.51925	0.534167	0.555668
123	0.33801	0.294101	0.351026	0.152017	0.362152	0.331689
126	0.313563	0.31235	0.318137	0.317822	0.342191	0.313441
131	0.300123	0.298708	0.360638	0.297096	0.414418	0.299667
132	0.286593	0.276903	0.280124	0.253283	0.336264	0.312221
Mean Diffusivity (mADC)						
1	0.907437	0.870704	1.04583	0.97617	1.16835	1.0624
2	0.972153	0.982292	1.062	1.15763	1.03736	1.00142
3	1.01848	1.03758	1.16179	1.04661	1.0045	0.966498
4	1.17229	1.25107	1.19744	1.22071	1.24081	1.13733
5	1.11313	1.11419	1.02916	1.25969	1.14905	1.05612
6	0.862051	0.860415	0.949415	0.94277	0.868158	0.884182
7	1.14549	1.10928	1.24975	1.3113	1.11489	1.18848
8	1.09771	1.09027	1.20877	1.26219	1.26897	1.22425
9	0.945793	0.896599	1.15845	1.0516	1.10121	1.14148

10	1.01339	0.881437	1.04006	1.1741	1.35042	1.07547
11	1.20311	1.14688	1.10113	1.45053	1.43855	1.04433
12	0.96507	0.919953	0.968674	1.0711	0.94413	1.02749
13	1.05667	1.06525	1.21274	1.37593	1.07478	1.11441
14	0.790927	0.787585	0.93605	0.956123	0.987606	0.906461
15	0.940112	0.904412	0.91767	0.974644	0.974856	1.0285
16	0.950742	0.865107	1.00288	1.01845	1.10984	1.1252
17	0.920026	0.88923	1.06192	1.02401	0.869048	0.914277
18	1.16458	1.20917	1.16269	1.34342	1.15105	1.16465
19	0.976631	0.959047	1.03068	1.02127	0.95974	0.938088
20	1.01385	1.02169	1.04161	1.12148	1.07113	1.08866
21	1.08893	1.10582	1.07882	1.21005	1.13737	1.03349
22	1.02851	1.03673	1.01724	1.2734	1.05415	0.951819
23	1.18993	1.22747	1.24908	1.45011	1.16427	1.25839
24	0.977859	1.0852	1.02676	1.1701	1.15953	0.973919
25	1.25842	1.402	1.23537	1.58812	1.3386	1.2004
26	0.943006	0.998088	0.997419	1.22053	0.910033	0.931455
27	1.36296	1.45249	1.31983	1.85802	1.55128	1.34475
34	0.815223	0.945876	0.820188	0.772698	0.785418	0.816035
36	0.897324	1.02077	0.941458	1.13932	0.958319	0.86282
37	0.954739	0.991019	0.985009	1.00283	1.04227	0.855168
38	0.931784	0.850754	0.823759	0.923706	0.880314	0.791872
39	0.933423	0.882915	0.840406	0.964332	1.02694	0.797283
40	0.814325	0.816618	0.821745	0.853893	0.841829	0.764265
41	0.836854	0.843958	0.947632	0.875997	0.903017	0.820269
42	1.05879	0.953753	1.0945	1.09401	1.03693	1.02232
43	0.806058	0.818445	0.824524	0.887581	0.839143	0.781304
45	0.84933	0.984416	0.872926	0.852909	0.821229	0.876367
46	0.900704	0.943692	0.943172	1.05431	0.885575	0.882511
47	0.894288	0.994807	0.84542	0.83433	0.844363	0.874145
48	0.902142	0.913296	0.910442	0.923046	0.845746	0.92863
51	2.00044	2.01912	2.35252	2.39224	2.38311	2.0186
52	1.20967	1.27929	1.38434	1.39571	1.26732	1.19172
53	1.24118	1.21156	1.20027	1.36282	1.3086	1.12163
54	1.19676	1.28816	1.26053	1.4368	1.39271	0.998959
58	1.30647	1.16796		1.76847	1.26125	1.22639
61	0.939585	0.98801	0.96885	0.99647	0.974447	0.912086
66	0.856615	0.867675	0.967582	1.02309	0.946989	0.957549
67	1.22776	1.16121	1.184	1.49232	1.18957	1.19825
68	1.05513	1.07223	1.16786	1.1044	1.0365	1.00988
69	1.14856	1.204	1.0793	1.1693	1.19685	1.05945

70	1.13175	1.14654	0.998448	1.22643	1.12356	1.02377
71	0.877597	0.897114	0.884298	0.96189	0.890545	0.878409
72	1.21282	1.22771	1.28127	1.27936	1.12525	1.25583
73	1.05636	1.13946	1.17234	1.17025	1.18849	1.28182
74	1.32201	0.963664	1.32519	1.42186	1.15742	1.35658
75	1.19393	0.87508	1.04467	1.2639	1.15516	1.09154
76	1.13219	1.10509	1.0217	1.32405	1.06066	1.01696
77	0.978611	0.999513	0.970355	1.28223	0.981228	1.03312
78	1.1809	1.25427	1.3168	1.70216	1.15871	1.2562
79	0.881666	0.821518	0.921896	1.03714	0.864649	0.901607
80	0.872192	0.820733	0.88692	1.02567	0.844098	0.965789
81	0.897284	0.854058	0.957312	1.04645	0.969407	1.07321
82	1.33413	1.01446	1.34598	1.28558	1.21354	1.16042
83	1.20164	1.23441	1.10877	1.33076	1.19711	1.19275
84	0.877073	0.905875	0.925172	1.05592	0.933971	0.940781
85	0.947989	0.996171	0.936389	1.11919	1.03754	1.01182
86	1.02216	1.06417	1.01217	1.18809	1.06655	0.944477
87	1.08394	1.16294	0.993206	1.21043	1.10522	0.962703
88	1.07539	1.15079	1.05584	1.32093	1.10479	1.13879
89	1.09362	1.12873	1.25843	1.30633	1.15226	0.994239
90	1.03744	1.08735	1.02098	1.14137	1.00372	1.02758
91	0.985089	1.04576	1.00668	1.25509	1.02358	0.92615
92	1.31178	1.30241	1.23095	1.58607	1.36573	1.23413
99	0.86959	0.902304	0.814613	0.829592	0.856077	0.732582
101	0.887586	1.01833	0.917463	1.19335	0.892136	0.81904
102	0.971014	1.05455	1.01079	1.00525	1.00991	0.824017
103	0.932334	0.898022	0.797454	0.998617	0.965944	0.774489
104	0.892539	1.01467	0.855422	1.28459	0.887112	0.767337
105	0.795237	0.812069	0.795325	0.854732	0.81732	0.74246
106	0.837514	0.838707	0.863958	0.879913	0.827803	0.782033
107	0.98508	1.14869	1.0371	1.13734	0.977218	0.976759
108	0.817042	0.828295	0.773219	0.90033	0.809414	0.742659
110	0.875306	0.912232	0.869556	0.81908	0.854162	0.827074
111	0.866643	0.980787	0.937042	1.04513	0.875633	0.844738
112	0.864454	0.953352	0.778831	0.843036	0.809919	0.823313
113	0.894604	0.961128	0.914443	0.946799	0.870281	0.847559
116	1.43662	1.4808	1.81661	2.00872	1.98044	1.29998
117	1.27625	1.26203	1.50158	1.39026	1.22244	1.21002
118	1.156	1.18336	1.17938	1.48628	1.23403	1.11188
119	1.08505	1.23522	1.1308	1.26742	1.1158	0.972739
122	0.804452	0.798877	0.789661	0.794065	0.831345	0.715711

123	1.75954		2.10415	1.88342	2.83687	1.82515	1.73247
126	1.00848		1.04887	0.988566	1.15531	1.04093	0.983456
131	0.919726		0.979032	1.01841	0.881191	0.955054	0.946548
132	1.58034		1.64772	1.54246	1.931	1.5849	1.2675

sID	NPH008	NPH009	NPH010	NPH011	NPH012	NPH013	NPH014
Gender	M	M	M	M	M	F	M
ICV	1238659	1538404	1529302	1263719	1385963	1201214	1387772
volbrainICV	1372.506	1711.706	1697.082	1413.632	1600.313	1361.063	1583.777
volbrainWM	427.88	590.26	425.28	377.75	442.66	331.25	371.35
LesLoad	3.7108	14.8097	36.0375	32.8856	35.0232	16.606	14.1762
LL/ICV	0.002704	0.008652	0.021235	0.023263	0.021885	0.012201	0.008951
LL/WM	0.008673	0.02509	0.084738	0.087057	0.07912	0.050131	0.038175
LV_Vol	104.991	133.784	175.086	132.977	101.359	75.261	119.895
LV/ICV	0.076496	0.078158	0.103169	0.094068	0.063337	0.055296	0.075702
LV/WM	0.245375	0.226653	0.411696	0.352024	0.228977	0.227203	0.322863
MOCA	22	18	19	13	24	19	23
Delayed Recall	1	1	0	0	1	0	1
Attention	6	5	4	3	5	6	5
Age	75	74	76	84	84	86	77
Fractional Anisotropy (mFA)							
1	0.248551	0.262356	0.263183	0.26968	0.244929	0.264398	0.226978
2	0.193658	0.163969	0.209801	0.198704	0.165974	0.168875	0.167458
3	0.207518	0.218752	0.21814	0.226435	0.201672	0.208979	0.204249
4	0.154331	0.16495	0.158143	0.174505	0.164871	0.162135	0.175458
5	0.20465	0.204841	0.190996	0.203414	0.185172	0.197339	0.193763
6	0.261034	0.294293	0.256518	0.276997	0.277294	0.281962	0.254689
7	0.18154	0.176901	0.207271	0.204541	0.164665	0.177776	0.137524
8	0.166629	0.146127	0.226974	0.20556	0.159151	0.162601	0.148328
9	0.167305	0.1452	0.157877	0.170917	0.145223	0.143909	0.148925
10	0.183529	0.17228	0.175726	0.176932	0.164354	0.173849	0.169794
11	0.181601	0.211707	0.196443	0.20372	0.185721	0.189054	0.173236
12	0.185725	0.186212	0.185978	0.187848	0.176593	0.178004	0.183965
13	0.319936	0.261539	0.257197	0.206683	0.237507	0.222991	0.278623
14	0.255684	0.285129	0.269279	0.31479	0.235822	0.264008	0.250211
15	0.160897	0.159691	0.166394	0.184586	0.16078	0.147303	0.155086
16	0.168671	0.151578	0.163964	0.185234	0.146386	0.162055	0.153713
17	0.206832	0.177943	0.186358	0.160471	0.186656	0.182627	0.180366
18	0.170032	0.159774	0.16364	0.184999	0.157878	0.180223	0.172505
19	0.204096	0.198167	0.226785	0.218967	0.2243	0.208497	0.201764

20	0.165361	0.152131	0.173741	0.17842	0.166939	0.155195	0.179635
21	0.161629	0.169942	0.17392	0.161421	0.148461	0.147879	0.191364
22	0.183654	0.172404	0.20203	0.176466	0.172434	0.162259	0.209682
23	0.155792	0.144611	0.163569	0.178476	0.144318	0.165906	0.149145
24	0.165525	0.165852	0.172208	0.164056	0.171235	0.182366	0.188171
25	0.14301	0.133786	0.143219	0.145711	0.139839	0.146581	0.155035
26	0.217361	0.185256	0.180774	0.172745	0.175897	0.246291	0.225869
27	0.183778	0.187781	0.194376	0.186022	0.170592	0.184907	0.17733
34	0.53676	0.558394	0.541207	0.506721	0.480652	0.501682	0.511402
36	0.487547	0.463606	0.45791	0.496877	0.416944	0.473088	0.415516
37	0.355314	0.370091	0.406984	0.348702	0.355213	0.351387	0.366582
38	0.487085	0.51434	0.518947	0.489568	0.444058	0.457486	0.438352
39	0.560706	0.510444	0.538377	0.546274	0.45111	0.455538	0.462976
40	0.495456	0.475144	0.494217	0.474388	0.47664	0.445319	0.443328
41	0.436805	0.425107	0.435926	0.43448	0.400965	0.432881	0.393353
42	0.399024	0.433404	0.45306	0.392341	0.381517	0.375757	0.383807
43	0.42106	0.422992	0.384922	0.406387	0.413022	0.390098	0.385434
45	0.407184	0.417393	0.376284	0.397045	0.4189	0.379444	0.36568
46	0.418094	0.443622	0.442226	0.436489	0.420263	0.419693	0.401347
47	0.362694	0.369474	0.333192	0.38435	0.305602	0.369925	0.312335
48	0.356046	0.38269	0.348502	0.367226	0.355983	0.387217	0.343711
51	0.349329	0.352234	0.361956	0.476658	0.292499	0.207737	0.23747
52	0.518308	0.534983	0.449867	0.421958	0.478491	0.501182	0.431842
53	0.528845	0.531702	0.43152	0.487734	0.458858	0.495646	0.401053
54	0.55273	0.600935	0.463127	0.533572	0.552867	0.564682	0.444848
58	0.586021	0.644365	0.209141	0.482467	0.546874	0.581079	0.471942
61	0.384784	0.356169	0.377958	0.348186	0.332372	0.344856	0.332785
66	0.239047	0.255862	0.234033	0.269599	0.25352	0.268961	0.233752
67	0.143326	0.132162	0.15499	0.157175	0.129015	0.136236	0.149252
68	0.196821	0.196553	0.195506	0.21815	0.195757	0.197616	0.195736
69	0.171293	0.185006	0.18373	0.192368	0.183909	0.181842	0.182898
70	0.190698	0.196523	0.189047	0.193805	0.196189	0.195717	0.178702
71	0.234484	0.25604	0.235626	0.267919	0.262237	0.257187	0.226177
72	0.158261	0.138701	0.172814	0.187772	0.130931	0.154419	0.151025
73	0.140757	0.139001	0.174696	0.175579	0.138364	0.14624	0.149451
74	0.143153	0.1307	0.133647	0.148682	0.11854	0.122529	0.133857
75	0.153398	0.166462	0.161757	0.158052	0.149287	0.147815	0.168
76	0.187274	0.197513	0.189603	0.192469	0.169468	0.172959	0.18009
77	0.175472	0.177955	0.16854	0.171991	0.175054	0.168541	0.192099
78	0.256103	0.211116	0.215889	0.158671	0.193608	0.188963	0.239356
79	0.238169	0.240659	0.245421	0.282674	0.243435	0.263605	0.23084

80	0.170881	0.16166	0.194383	0.195791	0.177008	0.178629	0.171964
81	0.168303	0.161342	0.181323	0.183331	0.148492	0.164479	0.161111
82	0.19481	0.17066	0.195699	0.159176	0.188362	0.17389	0.182576
83	0.161748	0.148722	0.168661	0.168927	0.162608	0.169327	0.168932
84	0.193435	0.171179	0.214594	0.198496	0.18622	0.197599	0.203001
85	0.170209	0.169639	0.184106	0.183479	0.180768	0.180155	0.195235
86	0.162466	0.180496	0.198223	0.163408	0.170688	0.151075	0.186172
87	0.174735	0.184438	0.207875	0.185247	0.186006	0.156879	0.205626
88	0.165232	0.157613	0.15616	0.201607	0.161954	0.182991	0.167828
89	0.168312	0.156312	0.165946	0.163541	0.164997	0.167251	0.175262
90	0.171026	0.16613	0.176074	0.171998	0.169672	0.185685	0.165909
91	0.188862	0.168455	0.16312	0.164957	0.198475	0.213462	0.169276
92	0.180209	0.191331	0.183652	0.174989	0.175608	0.182672	0.184723
99	0.539893	0.525761	0.521347	0.500032	0.486759	0.477459	0.48121
101	0.474968	0.430169	0.459946	0.475969	0.39855	0.451459	0.41541
102	0.36548	0.387016	0.36528	0.342155	0.36021	0.358698	0.360001
103	0.468328	0.486332	0.485355	0.452003	0.402857	0.424543	0.425839
104	0.486143	0.463668	0.438282	0.501591	0.433247	0.41563	0.436674
105	0.415505	0.405523	0.384719	0.407342	0.404381	0.378466	0.387164
106	0.431718	0.400502	0.403591	0.403223	0.39088	0.398694	0.402479
107	0.418226	0.415147	0.405042	0.408077	0.404153	0.402288	0.362315
108	0.411321	0.423868	0.430629	0.408443	0.430618	0.379067	0.434658
110	0.404585	0.422644	0.387525	0.407709	0.394795	0.390912	0.375221
111	0.415717	0.42347	0.422045	0.424218	0.386769	0.401844	0.396862
112	0.376968	0.403051	0.354082	0.414845	0.391254	0.399426	0.344199
113	0.35363	0.338409	0.322675	0.304916	0.347145	0.354771	0.343557
116	0.471506	0.458854	0.380482	0.51119		0.363274	0.334584
117	0.50319	0.541393	0.425558	0.403981	0.486443	0.483367	0.397838
118	0.512878	0.523893	0.389799	0.484584	0.444579	0.509995	0.41459
119	0.570576	0.580745	0.456755	0.538536	0.551945	0.575119	0.479715
123	0.293079	0.317084	0.123157	0.222092	0.413928	0.423836	0.212556
126	0.35065	0.345304	0.351439	0.326688	0.316461	0.323536	0.302969
131	0.374166	0.275139	0.330783	0.369883	0.266011	0.466276	0.338008
132	0.34173	0.288447	0.241958	0.274464	0.223501	0.299216	0.291308
Mean Diffusivity (mADC)							
1	0.867479	1.03919	1.31067	0.849811	1.25896	1.0494	1.05677
2	0.935544	0.987649	1.1298	1.07641	1.2323	1.05288	1.14377
3	1.02197	0.96675	1.08305	1.05554	1.27605	1.06397	1.15708
4	1.21564	1.12406	1.28633	1.21695	1.4276	1.22571	1.31419
5	1.10079	0.960226	1.11591	1.24367	1.21552	1.1396	1.14713
6	0.858345	0.816575	0.939853	0.829989	1.00661	0.871742	0.929605

7	1.12935	1.21805	1.18271	1.01756	1.49232	1.28573	1.42155
8	1.0949	1.33135	1.36885	0.931308	1.59428	1.32042	1.27255
9	0.868019	1.17629	1.27511	1.02709	1.52544	1.23341	1.521
10	0.964441	1.07896	1.12499	1.18134	1.35683	1.10012	1.16476
11	1.14233	1.1095	1.31857	1.18305	1.27402	1.05957	1.40339
12	0.929617	1.05007	1.06955	1.02111	1.13977	1.1066	1.15556
13	1.0445	1.09135	1.68052	1.44046	1.36117	1.13914	1.39013
14	0.791059	0.936551	0.874552	0.803468	1.10397	0.927556	0.94447
15	0.903813	1.07233	1.01955	0.839401	1.09887	1.01899	1.11946
16	0.903005	1.2426	1.06659	0.901846	1.42511	1.09386	1.13673
17	0.952549	1.112	1.01262	1.04221	0.93736	1.44706	1.19802
18	1.2603	1.11187	1.25417	1.27136	1.33696	1.22479	1.27395
19	0.995453	1.06583	0.986615	0.957016	1.06753	1.21818	1.1391
20	1.07264	1.14595	1.09453	1.02601	1.23631	1.19814	1.17251
21	1.09193	1.03592	1.10835	1.23657	1.24151	1.22884	1.22477
22	1.04128	0.924975	1.06991	1.20062	1.19534	1.22798	1.19932
23	1.28012	1.21095	1.21357	1.36966	1.54139	1.18837	1.26533
24	1.04216	0.912499	1.01382	1.37399	1.12416	1.08457	1.28977
25	1.23787	1.28985	1.31738	1.43374	1.37364	1.35538	1.46008
26	1.05689	1.06675	1.01771	1.00387	1.03592	1.38268	1.52082
27	1.39057	1.56605	1.81638	1.71246	1.61762	1.96226	1.95004
34	0.739391	0.734629	0.778244	0.893451	0.83142	0.808831	0.796797
36	0.88988	0.884512	1.11463	0.92651	1.00347	0.868908	1.02118
37	0.866584	0.815266	1.04043	1.05567	1.02588	0.964741	0.942739
38	0.78939	0.737031	0.94231	0.895149	0.839588	0.816519	0.819269
39	0.843358	0.814211	1.05194	0.910784	0.87924	0.85242	0.876866
40	0.783387	0.759549	0.910874	0.826849	0.810828	0.804049	0.802045
41	0.826267	0.827773	0.894449	0.834739	0.868623	0.833506	0.895999
42	0.854168	1.04555	0.922172	1.00795	1.07927	1.00367	1.17584
43	0.803934	0.748453	0.9136	0.806221	0.825733	0.78749	0.832065
45	0.82941	0.798958	0.888747	0.850457	0.872333	0.87558	0.879708
46	0.887467	0.904268	0.943615	0.913586	0.891937	0.878113	0.907461
47	0.776841	0.798177	0.907926	0.865296	0.87945	0.816364	0.828095
48	0.862397	0.898393	0.861208	0.928419	0.90263	1.03823	1.02068
51	2.07035	1.92793	1.97492	1.66	3.46824	2.32784	2.87808
52	1.17204	1.0488	1.37514	1.4595	1.21447	1.2703	1.45798
53	1.10675	1.06277	1.47385	1.32527	1.28511	1.15647	1.3016
54	1.16655	1.01253	1.54957	1.25534	1.11697	1.01982	1.26971
58	1.21381	1.06998	2.43327	1.57984	1.29909	1.17237	1.41115
61	0.897655	0.946309	1.07873	1.01531	1.17557	0.928933	0.953699
66	0.862935	0.972806	1.23582	0.792892	1.16298	0.963159	0.953917

67	1.1637	1.21939	1.31886	1.29323	1.54967	1.2853	1.40306
68	1.02994	1.02553	1.12423	1.04894	1.27616	1.09423	1.16391
69	1.13341	1.04392	1.18943	1.12474	1.34017	1.1755	1.21005
70	1.09012	1.00476	1.08592	1.26009	1.23185	1.13933	1.22453
71	0.893567	0.826348	0.932909	0.860122	0.993546	0.887516	0.982108
72	1.22444	1.27449	1.27498	1.18117	1.64976	1.34421	1.32186
73	1.16817	1.27954	1.15488	0.974217	1.61236	1.28082	1.27009
74	1.03831	1.26495	1.31548	1.1741	1.78012	1.41724	1.32226
75	1.02711	1.16953	1.24499	1.28529	1.45511	1.17774	1.09401
76	1.06473	1.17491	1.18301	1.18809	1.28594	1.11995	1.31771
77	0.988305	1.21479	1.12474	1.07544	1.18593	1.11105	1.12135
78	1.20748	1.4272	1.58825	1.63173	1.57587	1.43441	1.69594
79	0.866172	0.994598	0.929509	0.868146	1.1852	0.901912	0.932638
80	0.915284	1.14061	0.937791	0.905728	1.06632	0.994946	1.04199
81	0.920603	1.20607	0.906789	0.90853	1.37573	1.11976	1.0956
82	1.00294	1.27902	1.2459	1.08143	1.43918	1.8085	1.50369
83	1.24511	1.18988	1.25154	1.4547	1.40143	1.25398	1.33676
84	0.962308	1.22776	0.910765	1.03589	1.141	1.05946	1.08786
85	1.02345	1.13927	1.01647	1.09839	1.15759	1.051	1.07794
86	1.07718	0.992557	1.07759	1.21967	1.22634	1.15798	1.26134
87	1.10229	1.02979	1.01799	1.3747	1.2906	1.24231	1.18086
88	1.20366	1.19463	1.2651	1.40446	1.38997	1.12621	1.29362
89	1.21583	1.0172	1.10199	1.59293	1.29404	1.22989	1.645
90	1.08151	1.05753	1.08895	1.29078	1.17009	1.0495	1.15174
91	1.0401	1.0572	1.04388	1.05979	1.09855	1.10196	1.41387
92	1.32194	1.45437	1.5778	1.50637	1.68651	1.67791	1.51803
99	0.815077	0.777895	0.817922	0.900971	0.809024	0.824915	0.813775
101	0.885855	0.997654	1.03066	0.894853	1.0487	0.930572	1.09108
102	0.870874	0.846018	1.04348	1.07649	1.0689	0.999755	1.05346
103	0.8518	0.776548	0.991534	0.953645	0.925182	0.866785	0.867983
104	0.898975	0.895165	1.35877	0.954938	0.967203	0.907176	0.983272
105	0.810769	0.775845	0.819902	0.817997	0.848697	0.816705	0.794898
106	0.837115	0.854779	0.833078	0.841395	0.869447	0.851059	0.866796
107	1.04392	0.970256	0.979938	1.19036	1.29388	0.985339	1.25575
108	0.784914	0.794847	0.870606	0.800601	0.829966	0.808416	0.806817
110	0.819815	0.802847	0.864063	0.829637	0.868597	0.849832	0.873529
111	0.975568	0.982551	0.969834	0.981414	0.985583	0.919308	1.00019
112	0.778343	0.769897	0.85978	0.836644	0.797188	0.818032	0.833122
113	0.9238	0.956172	0.912293	0.899629	1.0079	0.971982	0.979412
116	1.52725	1.39938	1.91271	1.48336		1.69131	1.95059
117	1.15559	1.00239	1.31414	1.44574	1.31829	1.21622	1.50352

118	1.11019	1.11094	1.45614	1.29213	1.34439	1.10556	1.30049
119	1.02044	1.0653	1.35575	1.258	1.09208	1.01284	1.22187
122	0.769312	0.761526	0.731375	0.84413	0.863568	0.765756	0.834582
123	2.02474	1.91949	2.80065	2.45431	1.79564	1.64923	2.42068
126	1.05253	1.04997	1.20069	1.15479	1.29905	1.04349	1.13286
131	0.993571	0.892495	0.957729	1.02879	1.14962	0.950147	1.11615
132	1.41683	1.4463	2.09074	1.71221	2.27357	1.50136	1.95796

sID	NPH015	NPH016	NPH017	NPH018	NPH019	NPH020	NPH021
Gender	M	F	M	M	M	M	M
ICV	1285008	1255941	1234997	1232193	1516164	1504730	1342841
volbrainICV	1437.886	1377.13	1406.063	1378.687	1657.312	1667.965	1503.957
volbrainWM	429.22	381.39	416.78	389.08	459.96	582.88	316.57
LesLoad	4.5924	9.3506	18.9904	3.8874	29.5896	95.2023	9.1532
LL/ICV	0.003194	0.00679	0.013506	0.00282	0.017854	0.057077	0.006086
LL/WM	0.010699	0.024517	0.045565	0.009991	0.064331	0.163331	0.028914
LV_Vol	99.315	104.981	112.847	80.709	128.7	104	159.335
LV/ICV	0.06907	0.076232	0.080257	0.05854	0.077656	0.062351	0.105944
LV/WM	0.231385	0.275259	0.270759	0.207435	0.279807	0.178424	0.503317
MOCA	23	26	14	14	23	26	24
Delayed Recall	4	4	0	0	2	1	1
Attention	5	6	3	3	5	6	6
Age	62	78	78	76	74	74	80
Fractional Anisotropy (mFA)							
1	0.221362	0.260206	0.231981	0.258451	0.25571	0.232078	0.232248
2	0.164785	0.180707	0.161162	0.184438	0.189446	0.192277	0.200424
3	0.198772	0.219905	0.194976	0.225139	0.224998	0.225575	0.208571
4	0.153648	0.160994	0.147514	0.16405	0.178231	0.182159	0.173117
5	0.180509	0.202226	0.193899	0.215413	0.200887	0.207647	0.194945
6	0.246031	0.26373	0.252655	0.277596	0.257403	0.268135	0.249706
7	0.161921	0.181579	0.163508	0.186952	0.183632	0.20962	0.183553
8	0.15639	0.172089	0.138623	0.177223	0.182075	0.175653	0.155703
9	0.14829	0.167532	0.127204	0.171881	0.199552	0.18695	0.161084
10	0.162342	0.171171	0.160951	0.172614	0.20786	0.20585	0.179221
11	0.177598	0.190765	0.180811	0.198322	0.194828	0.202609	0.198319
12	0.171893	0.174643	0.182619	0.195583	0.205968	0.188757	0.199321
13	0.255239	0.325007	0.187637	0.198743	0.269007	0.21252	0.243681
14	0.197637	0.251974	0.22899	0.262244	0.218057	0.234596	0.231022
15	0.147983	0.159118	0.135408	0.179728	0.18518	0.150002	0.164027
16	0.144379	0.176127	0.143672	0.172828	0.185949	0.189614	0.164592
17	0.155429	0.173745	0.172665	0.165974	0.164587	0.178287	0.17816

18	0.156638	0.16006	0.152828	0.183226	0.17796	0.189409	0.169886
19	0.18691	0.225524	0.215819	0.240521	0.217543	0.221287	0.218628
20	0.149195	0.169379	0.165678	0.197333	0.189274	0.177361	0.170014
21	0.148306	0.154083	0.148585	0.156851	0.154032	0.181404	0.169461
22	0.13407	0.171801	0.153983	0.160005	0.152719	0.180143	0.178255
23	0.151987	0.162369	0.151899	0.164439	0.165468	0.173902	0.154787
24	0.145884	0.152647	0.156971	0.170042	0.166058	0.164845	0.182286
25	0.131151	0.144731	0.140227	0.142233	0.146718	0.173494	0.138693
26	0.190901	0.207461	0.201582	0.20338	0.206976	0.176439	0.175851
27	0.192805	0.184706	0.18813	0.183629	0.184418	0.209811	0.194448
34	0.512966	0.559007	0.500365	0.533257	0.499275	0.547773	0.534965
36	0.447913	0.50105	0.457153	0.479184	0.470147	0.422287	0.455755
37	0.368596	0.40551	0.360704	0.39033	0.342529	0.362989	0.396495
38	0.464501	0.501438	0.484239	0.491198	0.466809	0.419536	0.507507
39	0.529381	0.531403	0.517182	0.510454	0.517963	0.527935	0.525512
40	0.457777	0.479105	0.436899	0.49685	0.467762	0.489093	0.459176
41	0.407302	0.414638	0.409926	0.424362	0.434867	0.421562	0.439487
42	0.428068	0.428419	0.383646	0.413018	0.425247	0.456608	0.41047
43	0.405711	0.428797	0.427489	0.427245	0.420946	0.387848	0.41635
45	0.39088	0.402695	0.382156	0.426854	0.391697	0.434033	0.397904
46	0.419283	0.440347	0.422498	0.454351	0.436996	0.425767	0.418812
47	0.317294	0.362435	0.337577	0.376985	0.373078	0.391689	0.367673
48	0.345561	0.346517	0.370632	0.382046	0.39684	0.337733	0.344233
51	0.252141	0.167922	0.255105	0.229746	0.305322	0.307611	0.26577
52	0.480695	0.479977	0.450023	0.516665	0.472919	0.53015	0.442887
53	0.461673	0.507764	0.490843	0.516404	0.452988	0.490297	0.436686
54	0.49289	0.533216	0.524967	0.567975	0.520004	0.543106	0.481
58	0.42302	0.539875	0.498236	0.50847	0.620331	0.415263	0.413899
61	0.339945	0.350851	0.368668	0.337611	0.345776	0.350408	0.374294
66	0.217926	0.283057	0.238264	0.249681	0.244253	0.24076	0.240914
67	0.129526	0.13824	0.127675	0.145374	0.148234	0.157	0.159436
68	0.180948	0.210097	0.186242	0.21785	0.21698	0.203991	0.197321
69	0.160207	0.167564	0.168098	0.168447	0.17809	0.166624	0.174379
70	0.180046	0.197309	0.177576	0.203001	0.186288	0.195815	0.188531
71	0.237257	0.255884	0.237948	0.257	0.238204	0.258708	0.253046
72	0.137416	0.157048	0.139204	0.157879	0.162458	0.19153	0.182408
73	0.125807	0.151027	0.13427	0.151091	0.162236	0.145589	0.158565
74	0.120118	0.148725	0.103201	0.142284	0.172541	0.169292	0.15626
75	0.147413	0.152967	0.137037	0.156889	0.185037	0.177027	0.191391
76	0.165282	0.18525	0.180626	0.20227	0.203148	0.184429	0.192134
77	0.157824	0.170047	0.163904	0.187887	0.20013	0.186525	0.192322

78	0.175642	0.214633	0.14879	0.17891	0.177806	0.195725	0.244344
79	0.216111	0.259783	0.242996	0.250081	0.250734	0.233904	0.24414
80	0.152029	0.188113	0.170438	0.193625	0.219764	0.169006	0.200265
81	0.138956	0.170289	0.15373	0.167862	0.200654	0.177586	0.180025
82	0.132884	0.166853	0.13405	0.199243	0.161409	0.179465	0.142513
83	0.15069	0.165419	0.152711	0.16011	0.174862	0.183986	0.165389
84	0.165015	0.192051	0.20629	0.211244	0.215038	0.210808	0.215618
85	0.152805	0.183523	0.17945	0.191696	0.196167	0.197444	0.180413
86	0.155051	0.16127	0.145517	0.155164	0.152865	0.174498	0.167054
87	0.141221	0.166195	0.159381	0.172621	0.153535	0.172609	0.15248
88	0.143696	0.176815	0.153646	0.187484	0.171108	0.185038	0.17135
89	0.159179	0.150191	0.158665	0.18252	0.149662	0.175931	0.164846
90	0.157039	0.169195	0.157446	0.16166	0.187516	0.180306	0.174007
91	0.180891	0.178468	0.166962	0.181303	0.159032	0.164786	0.170312
92	0.183295	0.169809	0.175194	0.178065	0.176556	0.194241	0.200237
99	0.527012	0.526416	0.506394	0.49564	0.497998	0.514812	0.519497
101	0.442207	0.4716	0.457512	0.448457	0.467283	0.433383	0.449501
102	0.369141	0.382474	0.368489	0.384187	0.351906	0.327891	0.3864
103	0.458304	0.494649	0.454835	0.463054	0.426533	0.387511	0.482689
104	0.451329	0.498504	0.483428	0.472038	0.475055	0.475405	0.480864
105	0.383305	0.410275	0.374781	0.387823	0.402026	0.432962	0.410424
106	0.393807	0.388454	0.414842	0.394176	0.418528	0.443873	0.418719
107	0.443822	0.435919	0.38574	0.336317	0.448217	0.428346	0.427554
108	0.413999	0.435263	0.403266	0.449997	0.427936	0.399045	0.433409
110	0.383905	0.391144	0.369572	0.420312	0.3948	0.430015	0.401934
111	0.408436	0.433365	0.408851	0.431131	0.443079	0.405521	0.397411
112	0.364273	0.411009	0.365723	0.404912	0.396338	0.395006	0.408743
113	0.317296	0.312406	0.32569	0.325502	0.340018	0.318239	0.305085
116	0.367194	0.395867		0.436839	0.407697	0.402695	0.350301
117	0.427575	0.466578	0.454938	0.468044	0.469382	0.509862	0.434507
118	0.429258	0.490937	0.463987	0.513463	0.459098	0.514295	0.41928
119	0.499098	0.56777	0.518264	0.595166	0.525707	0.580696	0.500419
123	0.186874	0.318309	0.284001	0.339083	0.214888	0.364026	0.214373
126	0.318751	0.337556	0.326292	0.336448	0.354128	0.330321	0.375414
131	0.335497	0.317535	0.354335	0.353428	0.283788	0.37586	0.304384
132	0.296296	0.269387	0.230519	0.319928	0.305397	0.294715	0.296555
Mean Diffusivity (mADC)							
1	0.913296	0.910546	1.06929	0.853178	0.815904	0.992716	0.909704
2	1.0444	0.989794	1.14971	1.02698	1.06189	1.11739	0.931988
3	1.07503	0.970069	1.19267	1.02816	0.99229	1.00934	0.948107
4	1.30827	1.1034	1.37007	1.25861	1.12164	1.12474	1.10371

5	1.17448	1.03351	1.13279	1.15723	1.14579	1.04362	1.13948
6	0.925659	0.842478	0.962423	0.865672	0.835701	0.881459	0.865914
7	1.19971	1.04966	1.36911	1.10131	1.0592	1.09251	1.07112
8	1.15203	1.04595	1.41523	0.968944	0.975256	1.12067	1.07444
9	1.06012	0.984546	1.24451	1.05692	0.812382	1.0543	0.952377
10	1.13675	1.06435	1.11843	1.1626	0.977531	1.12884	1.05212
11	1.25113	1.02617	1.22209	1.14427	1.25804	1.12696	1.24124
12	1.07725	0.948539	1.0347	0.977738	0.87933	0.963989	0.967427
13	1.15713	1.16446	1.50953	1.43581	1.2376	1.23275	1.43461
14	0.97453	0.863426	0.896907	0.799213	0.785875	1.00248	0.885061
15	1.1622	0.884288	1.10349	0.853535	0.83514	1.0141	0.988924
16	1.0998	0.919931	1.15186	0.925195	0.847565	0.926229	0.96756
17	0.984993	0.960845	0.959022	1.00369	0.915979	0.954654	0.989461
18	1.25376	1.19703	1.32102	1.25048	1.2236	1.11323	1.22467
19	1.11283	0.906832	1.14735	0.954876	0.897235	0.924024	0.938757
20	1.16688	0.962254	1.14737	1.00189	0.985065	1.03128	1.05841
21	1.2049	1.10228	1.20377	1.26217	1.21937	1.01962	1.16828
22	1.26527	1.01386	1.20446	1.27689	1.29451	1.04343	1.11157
23	1.26293	1.06759	1.43217	1.18969	1.31416	1.29261	1.29845
24	1.16787	1.12543	1.10464	1.17714	1.10217	1.00908	1.11765
25	1.37972	1.29785	1.28692	1.45358	1.34495	1.16113	1.45429
26	0.925416	0.948849	1.04502	1.00396	0.868377	0.917524	1.01358
27	1.51097	1.41657	1.54824	1.44581	1.31109	1.3204	1.67466
34	0.787414	0.810822	0.88651	0.767489	0.888614	0.793088	0.762337
36	0.943898	0.888879	0.930385	0.838494	0.904829	1.1198	1.01189
37	0.904922	0.927376	0.927396	0.860367	1.00939	0.97033	0.990569
38	0.792845	0.795131	0.797958	0.78326	0.803981	0.981281	0.84769
39	0.829787	0.818407	0.838897	0.80283	0.823144	0.985372	0.9386
40	0.783288	0.81359	0.772113	0.801827	0.823262	0.794436	0.788862
41	0.835618	0.898377	0.862187	0.896983	0.862468	0.843236	0.906327
42	1.00918	1.02926	1.08458	1.06779	1.04996	0.8663	1.03468
43	0.788377	0.795509	0.761061	0.767741	0.780318	0.858911	0.816113
45	0.823701	0.857556	0.854659	0.826623	0.899137	0.839207	0.809224
46	0.896711	0.933874	0.884429	0.86779	0.872301	0.961962	0.971106
47	0.807495	0.849305	0.862448	0.820116	0.88011	0.812272	0.812172
48	0.838038	0.901025	0.832742	0.884263	0.846073	0.876262	0.904409
51	2.31997	2.64064	2.34549	2.24904	2.13846	2.08726	2.04223
52	1.30782	1.32095	1.22626	1.29213	1.26521	1.12176	1.33005
53	1.18934	1.20682	1.1663	1.22907	1.21515	1.16699	1.47821
54	1.18109	1.20224	1.1196	1.11663	1.24814	1.19722	1.35817
58	1.46552	1.27443	1.41823	1.48254	1.14158	1.55119	1.63492

61	0.915339	0.92814	0.97796	0.960376	0.916299	0.937297	0.957387
66	0.965772	0.834428	1.02374	0.847169	0.792489	1.01115	0.914965
67	1.2992	1.19504	1.39456	1.37425	1.29468	1.25084	1.18816
68	1.10419	1.01341	1.22593	1.0348	0.979732	1.05083	0.985456
69	1.21205	1.06597	1.28353	1.1415	1.09013	1.14546	1.08025
70	1.19985	1.0462	1.1663	1.15476	1.12249	1.09695	1.07584
71	0.915869	0.845751	0.972249	0.862423	0.866163	0.93057	0.849751
72	1.31886	1.08385	1.51506	1.30749	1.16095	1.14879	1.07132
73	1.2314	0.9924	1.42554	1.06452	0.99115	1.2505	1.0118
74	1.19389	1.02184	1.49827	1.1484	1.12354	1.11295	1.02211
75	1.15646	1.04386	1.18768	1.24066	1.09963	1.10106	1.07506
76	1.20488	1.06835	1.11038	1.15746	1.12041	1.11352	1.19643
77	1.08749	0.953008	1.11213	1.03003	0.908864	1.02824	0.985644
78	1.27849	1.43001	1.4843	1.62849	1.25757	1.22615	1.43842
79	0.938649	0.812303	0.927802	0.848313	0.780865	0.984846	0.858874
80	1.03792	0.856554	1.06595	0.863783	0.783109	0.945141	0.854363
81	1.14531	0.879248	1.14039	0.940293	0.803821	0.975214	0.870516
82	1.38813	1.05897	1.31162	1.24791	1.44078	1.44025	1.09032
83	1.25679	1.13363	1.31803	1.32286	1.22522	1.10996	1.22132
84	1.08751	0.885872	1.07026	1.04516	0.793391	0.915992	0.878974
85	1.09568	0.932738	1.13017	1.05463	0.924425	1.02237	0.993046
86	1.12463	1.05579	1.15463	1.22791	1.14932	1.02679	1.09755
87	1.26389	1.08714	1.28157	1.29877	1.16322	1.08862	1.2956
88	1.23354	0.991453	1.38985	1.38674	1.22679	1.16743	1.26907
89	1.35853	1.22975	1.27791	1.43261	1.21149	1.04557	1.20566
90	1.11323	1.04726	1.09968	1.15983	1.07023	1.04351	1.03331
91	0.987598	1.0258	1.05321	1.04879	0.953921	0.964484	1.13903
92	1.36052	1.30581	1.49588	1.40669	1.25773	1.25627	1.44949
99	0.763003	0.799012	0.871909	0.80258	0.881818	0.822137	0.757052
101	0.923111	0.90438	0.882641	0.872296	0.88598	1.07316	1.04096
102	0.87955	0.967902	0.965217	0.900252	1.04647	1.07669	1.03371
103	0.795432	0.837109	0.84829	0.804803	0.9297	1.03842	1.01041
104	0.913917	0.808945	0.861791	0.809798	0.888612	1.11904	1.04802
105	0.784369	0.804857	0.801174	0.814432	0.821697	0.820874	0.836602
106	0.826843	0.898166	0.873092	0.866518	0.848429	0.826766	0.876755
107	1.02877	1.12671	1.12704	1.23653	1.15689	1.1801	0.949267
108	0.782706	0.770968	0.768213	0.763207	0.804136	0.886046	0.81615
110	0.819457	0.839311	0.831362	0.821113	0.870378	0.819485	0.812593
111	0.906045	0.920558	0.932008	0.891979	0.872257	0.962297	0.982508
112	0.786019	0.820422	0.86221	0.786218	0.837621	0.82451	0.757397
113	0.85325	0.899131	0.87395	0.906845	0.878537	0.907807	0.928027

116	1.833	1.70135		1.64551	1.68774	1.55279	2.10679
117	1.2737	1.29368	1.2694	1.37439	1.24396	1.10448	1.38406
118	1.15797	1.16127	1.2364	1.20326	1.26065	1.14118	1.48679
119	1.16515	1.09985	1.0967	1.0214	1.23123	1.09485	1.4062
122	0.765086	0.794241	0.779168	0.808312	0.764042	0.841179	0.77827
123	2.36589	1.93434	2.01452	1.94153	2.47329	1.69139	2.45867
126	1.04081	0.957007	1.1599	1.00456	1.0068	1.0228	1.06395
131	1.03141	0.942017	0.94599	1.0473	0.992585	0.835218	0.924202
132	1.49991	1.62635	2.10502	1.55978	1.41178	1.36276	1.772

sID	NPH022	NPH023	NPH024	NPH025	NPH026	NPH027	NPH028
Gender	M	M	M	M	F	M	M
ICV	1478371	1442553	1264007	1405493	1215804	1315946	1400223
volbrainICV	1646.937	1649.166	1415.649	1558.845	1337.823	1476.288	1539.093
volbrainWM	469.74	606.17	444.49	438.76	439.66	480.2	445.37
LesLoad	26.6652	16.5911	6.0254	8.2703	3.7949	13.4703	39.2108
LL/ICV	0.016191	0.01006	0.004256	0.005305	0.002837	0.009124	0.025477
LL/WM	0.056766	0.02737	0.013556	0.018849	0.008631	0.028051	0.088041
LV_Vol	101.679	66.861	86.602	138.906	60.63	93.148	166.505
LV/ICV	0.061738	0.040542	0.061175	0.089108	0.04532	0.063096	0.108184
LV/WM	0.216458	0.110301	0.194835	0.316588	0.137902	0.193978	0.373858
MOCA	23	13	23	25	25	26	15
Delayed Recall	2	0	4	3	2	3	0
Attention	5	3	5	6	6	5	2
Age	75	75	63	70	71	69	79
Fractional Anisotropy (mFA)							
1	0.273858	0.269282	0.222494	0.243491	0.275011	0.241257	0.25552
2	0.186109	0.173004	0.164363	0.182384	0.183394	0.17841	0.205279
3	0.240512	0.226178	0.191085	0.207457	0.22357	0.217466	0.217333
4	0.190763	0.179989	0.145836	0.161485	0.171165	0.169753	0.17553
5	0.209708	0.209717	0.174732	0.177706	0.22766	0.211819	0.197791
6	0.285587	0.307961	0.240584	0.263651	0.292153	0.277778	0.266066
7	0.181302	0.19464	0.155957	0.181135	0.198883	0.185872	0.178182
8	0.180942	0.156891	0.153106	0.172021	0.176957	0.171337	0.176212
9	0.180633	0.14928	0.15354	0.154137	0.155026	0.151173	0.16503
10	0.182232	0.166066	0.165305	0.179605	0.190757	0.173915	0.166345
11	0.183057	0.206307	0.180514	0.190764	0.189646	0.210032	0.193748
12	0.200013	0.192439	0.164789	0.175333	0.19797	0.174852	0.200269
13	0.246078	0.25226	0.233069	0.244258	0.274179	0.23596	0.276814
14	0.234009	0.297257	0.194758	0.222453	0.276742	0.24391	0.216778

15	0.161307	0.164409	0.135248	0.144838	0.19495	0.169588	0.188359
16	0.167299	0.166357	0.14098	0.166404	0.178488	0.152506	0.168622
17	0.217558	0.199396	0.159806	0.145317	0.159278	0.165872	0.182934
18	0.178014	0.174985	0.149128	0.156471	0.184485	0.173191	0.181817
19	0.235332	0.207736	0.194401	0.209977	0.203016	0.212946	0.219356
20	0.188871	0.153978	0.138626	0.154696	0.177773	0.181956	0.179315
21	0.165039	0.173273	0.144359	0.165347	0.166169	0.167365	0.17282
22	0.168049	0.189885	0.13167	0.188949	0.175527	0.168814	0.196928
23	0.166741	0.16017	0.143772	0.145256	0.162302	0.164677	0.166865
24	0.182455	0.169699	0.149601	0.159881	0.173273	0.167772	0.171848
25	0.140545	0.144012	0.13241	0.144293	0.160962	0.148871	0.155909
26	0.197462	0.197362	0.18346	0.190552	0.215556	0.178007	0.194295
27	0.20257	0.198277	0.181528	0.186699	0.203707	0.193884	0.196986
34	0.498958	0.54613	0.50875	0.524529	0.562517	0.543805	0.524166
36	0.481077	0.457974	0.444342	0.435158	0.510661	0.435771	0.425797
37	0.347897	0.38911	0.354058	0.35611	0.386755	0.349088	0.393029
38	0.452373	0.491752	0.451524	0.480685	0.486295	0.465859	0.492686
39	0.508647	0.485382	0.498304	0.518654	0.501083	0.489931	0.531075
40	0.470479	0.517051	0.42841	0.488231	0.514698	0.465472	0.497421
41	0.441959	0.419498	0.402082	0.423157	0.443909	0.377725	0.45976
42	0.453129	0.437226	0.419906	0.446622	0.438651	0.436634	0.448133
43	0.418846	0.424664	0.402242	0.378345	0.437658	0.417796	0.419632
45	0.387718	0.42356	0.380493	0.345736	0.445887	0.402979	0.41686
46	0.439473	0.446452	0.409711	0.408863	0.472877	0.41653	0.433665
47	0.363529	0.388884	0.323179	0.356314	0.379587	0.362612	0.357297
48	0.398514	0.353764	0.344574	0.335192	0.362585	0.339942	0.327591
51	0.337673	0.463672	0.262475	0.294831	0.4065	0.325121	0.272981
52	0.489847	0.586076	0.436187	0.481651	0.570372	0.497245	0.517026
53	0.449017	0.539533	0.398087	0.489897	0.531664	0.4822	0.486094
54	0.521509	0.595038	0.492838	0.526783	0.611725	0.528616	0.538441
58	0.534973	0.613844	0.492057	0.513604	0.499896	0.55684	0.488099
61	0.337141	0.339065	0.327426	0.36839	0.36917	0.360156	0.397722
66	0.257469	0.264212	0.23879	0.231538	0.292903	0.266421	0.236508
67	0.137582	0.143779	0.128141	0.141167	0.15022	0.151676	0.161847
68	0.222363	0.202095	0.181568	0.191303	0.203299	0.206301	0.196705
69	0.188482	0.19775	0.164538	0.168562	0.182392	0.180769	0.182205
70	0.196672	0.217046	0.180328	0.177994	0.212394	0.205291	0.200026
71	0.238146	0.275194	0.235303	0.23294	0.281346	0.241054	0.240664
72	0.161749	0.165363	0.13697	0.150779	0.179607	0.156752	0.17212
73	0.173353	0.161008	0.132658	0.137814	0.148772	0.152502	0.151082
74	0.1449	0.129191	0.12363	0.137283	0.136923	0.144961	0.139487

75	0.154144	0.150094	0.139578	0.168031	0.170066	0.143467	0.16135
76	0.181923	0.172495	0.155427	0.183857	0.194676	0.194926	0.18533
77	0.241898	0.20813	0.19119	0.166783	0.18321	0.173276	0.198009
78	0.196618	0.212221	0.187548	0.200287	0.195275	0.161542	0.204444
79	0.239519	0.263624	0.214685	0.234736	0.264137	0.226997	0.213636
80	0.19785	0.262969	0.213364	0.167677	0.207084	0.173718	0.228048
81	0.209848	0.182526	0.169156	0.165991	0.184356	0.164797	0.194912
82	0.16749	0.19874	0.150269	0.128722	0.158412	0.169302	0.18326
83	0.200664	0.196538	0.222274	0.151538	0.177214	0.161809	0.187704
84	0.243664	0.207335	0.216335	0.18256	0.187251	0.193942	0.23593
85	0.216152	0.221175	0.226073	0.18424	0.199259	0.194585	0.236439
86	0.177083	0.194048	0.162099	0.164003	0.168233	0.171886	0.176509
87	0.175773	0.214917	0.148157	0.182712	0.163001	0.189353	0.173568
88	0.232326	0.22035	0.16528	0.165861	0.179012	0.178371	0.177843
89	0.168161	0.173536	0.171302	0.16172	0.171364	0.169679	0.145867
90	0.190284	0.178119	0.171059	0.166708	0.187535	0.185349	0.181861
91	0.199032	0.181312	0.157234	0.163008	0.183759	0.166424	0.214148
92	0.203406	0.212392	0.184413	0.181582	0.196788	0.187023	0.256793
99	0.486303	0.501163	0.514906	0.500437	0.549116	0.521677	0.504297
101	0.382467	0.397743	0.413911	0.418416	0.501639	0.430234	0.398382
102	0.353603	0.396171	0.368705	0.347296	0.399767	0.358063	0.378616
103	0.423601	0.460385	0.438144	0.441165	0.474944	0.459328	0.476239
104	0.453391	0.416933	0.434507	0.44303	0.496888	0.485798	0.490693
105	0.410208	0.401367	0.384425	0.414129	0.432511	0.402504	0.39184
106	0.422365	0.402817	0.372233	0.397847	0.438884	0.388577	0.460247
107	0.451956	0.419653	0.382632	0.377812	0.430445	0.400748	0.404201
108	0.440861	0.416843	0.421994	0.372512	0.459239	0.430503	0.4104
110	0.385899	0.423526	0.390214	0.372702	0.431611	0.394252	0.389331
111	0.442184	0.401108	0.383585	0.379046	0.468854	0.418905	0.418776
112	0.392825	0.398802	0.37317	0.362229	0.431612	0.403825	0.412231
113	0.338084	0.331793	0.319381	0.287565	0.322312	0.351469	0.305922
116	0.458254	0.477132	0.409814	0.390947	0.533175	0.479859	0.443552
117	0.47322	0.538112	0.418732	0.460489	0.534662	0.443307	0.442393
118	0.450243	0.508594	0.417157	0.454079	0.550072	0.5489	0.454366
119	0.556162	0.590557	0.514498	0.532988	0.643561	0.556554	0.543707
123	0.264276	0.398266	0.226922	0.312572	0.44562	0.382188	0.40336
126	0.332798	0.319313	0.307295	0.334241	0.359946	0.345005	0.342134
131	0.32248	0.295927	0.330902	0.341238	0.235144	0.335544	0.453484
132	0.287639	0.276344	0.289909	0.275455	0.313761	0.312798	0.28992
Mean Diffusivity (mADC)							
1	0.895964	1.02231	0.994072	0.944917	0.877492	0.93774	0.984273

2	1.09948	0.987554	1.0451	1.07404	0.906547	0.988871	1.05621
3	1.04393	0.952916	1.08157	1.03991	0.906718	0.917068	1.016
4	1.12455	1.07021	1.28028	1.20567	1.05929	1.08442	1.16042
5	1.11587	0.946014	1.13284	1.15753	0.958585	1.05982	1.06027
6	0.87506	0.834962	0.937645	0.876235	0.826008	0.822904	0.888369
7	1.14816	1.18581	1.23199	1.0664	1.03235	1.08281	1.21301
8	1.06238	1.24181	1.2	1.09014	1.07631	1.10888	1.19477
9	0.951483	1.17571	1.13223	1.01043	0.981196	1.03212	1.1604
10	1.02726	1.07372	1.18909	0.994435	0.959866	1.07343	1.2295
11	1.19346	1.05326	1.29235	1.1421	0.977531	1.07691	1.29094
12	0.899378	1.04174	1.07536	1.01885	0.875623	1.00601	1.01813
13	1.29804	1.34946	1.35916	1.18717	1.03909	1.12293	1.25964
14	0.845162	0.922905	1.04489	0.872498	0.83095	0.880167	0.996783
15	0.91344	1.04284	1.17516	0.966899	0.877491	0.985376	0.927362
16	0.963155	1.13624	1.18489	0.956861	0.933271	1.08143	1.07728
17	0.902438	0.917837	0.947181	1.01287	0.903132	0.948414	0.972231
18	1.20309	1.07268	1.25436	1.17937	1.04261	1.15897	1.1302
19	0.905326	1.10192	1.07084	1.02285	0.912342	0.944811	0.978726
20	0.991696	1.12084	1.13521	1.10346	0.968318	1.02538	1.01452
21	1.17586	1.00959	1.21162	1.17971	0.976215	1.07098	1.08159
22	1.20418	0.988588	1.26149	1.12686	0.935837	1.06933	1.00927
23	1.33945	1.14935	1.24839	1.19624	1.09825	1.22962	1.17435
24	1.11891	0.942736	1.20727	1.17647	0.931673	1.18293	1.0474
25	1.28545	1.19801	1.34179	1.35586	1.12675	1.2854	1.16406
26	0.904868	1.00028	0.966226	1.01028	0.90489	0.927441	0.997417
27	1.27129	1.39359	1.5388	1.55897	1.15501	1.47922	1.7292
34	0.919825	0.754389	0.833882	0.789298	0.732642	0.770129	0.822236
36	0.910972	0.910012	0.969829	0.943999	0.781224	0.935977	1.04619
37	1.04195	0.824816	0.93374	0.9855	0.806849	0.894925	1.07835
38	0.844021	0.759695	0.822603	0.869924	0.738006	0.793488	0.870166
39	0.859781	0.816921	0.854	0.903079	0.744713	0.849367	0.9169
40	0.841323	0.797921	0.816273	0.813944	0.768844	0.793554	0.786234
41	0.856592	0.883752	0.886808	0.856263	0.820348	0.885339	0.856041
42	0.975603	0.900336	0.998533	0.944254	0.982143	1.0373	0.924726
43	0.801919	0.776481	0.817601	0.880684	0.740579	0.786063	0.796724
45	0.921468	0.844588	0.843686	0.865128	0.798474	0.828099	0.829264
46	0.879438	0.909929	0.901223	0.917778	0.81011	0.899467	0.940653
47	0.896016	0.786781	0.832424	0.854889	0.776536	0.804492	0.859634
48	0.87608	0.909568	0.875503	0.883432	0.820502	0.885326	0.947823
51	2.13068	1.433	2.42884	2.19572	1.69266	1.86884	2.29116
52	1.31697	1.02295	1.38965	1.28199	1.04854	1.22134	1.17167

53	1.18708	1.057	1.31635	1.25204	0.99298	1.11254	1.29373
54	1.24727	1.02888	1.19009	1.126	0.9444	1.11909	1.21035
58	1.2732	1.10386	1.29577	1.3601	1.08067	1.09611	1.14603
61	0.939636	0.888852	0.963665	0.913843	0.828515	0.974689	1.1854
66	0.855444	1.00597	0.977237	0.914468	0.82782	0.86421	0.9869
67	1.31717	1.22715	1.28354	1.28474	1.09183	1.19377	1.30751
68	1.01831	0.991209	1.09822	1.06434	0.937291	0.944494	1.09018
69	1.12668	0.969633	1.18524	1.15138	1.00035	1.0802	1.15934
70	1.11551	0.945074	1.14386	1.15687	0.939512	1.05348	1.08517
71	0.895246	0.873913	0.906822	0.902178	0.800561	0.841362	0.917178
72	1.21658	1.22635	1.30365	1.17627	1.04658	1.16005	1.1
73	1.06642	1.26334	1.28901	1.13721	1.08131	1.12611	1.17274
74	1.20604	1.32099	1.27942	1.16673	1.12204	1.13946	1.43338
75	1.14526	1.13563	1.22567	1.06843	1.01322	1.18113	1.2807
76	1.29825	1.20006	1.29049	1.12842	0.98716	1.13451	1.16971
77	1.06484	1.16724	1.17873	1.0508	0.916615	1.03923	1.1961
78	1.70012	1.86271	1.86347	1.47573	1.00063	1.28675	1.51685
79	0.840494	0.936877	1.0055	0.884987	0.828531	0.962453	0.993937
80	2.00485	1.10349	1.07725	0.928726	0.855985	0.976091	1.10613
81	0.969584	1.16671	1.16321	0.932309	0.91234	1.04995	1.03971
82	1.48997	1.00548	1.43208	1.12086	1.28165	1.17622	1.47467
83	1.21522	1.22036	1.18103	1.24388	1.0637	1.15595	1.25174
84	0.909572	1.24744	1.02633	1.05481	0.923503	0.937544	1.16722
85	1.06017	1.06658	1.03319	1.05397	0.915968	0.974766	0.97969
86	1.14641	0.948177	1.12683	1.13898	0.945105	1.02492	1.04815
87	1.22159	1.06704	1.25889	1.16821	1.0734	1.11432	1.09059
88	1.09195	1.02846	1.11029	1.1389	1.05082	1.11046	1.14698
89	1.25267	1.04641	1.35702	1.30125	1.11004	1.16443	1.20836
90	1.06607	1.03341	1.09438	1.05596	0.947977	1.02084	1.04377
91	0.98875	1.04622	1.02353	1.03947	1.00055	0.995307	1.10269
92	1.33966	1.54431	1.45771	1.34629	1.14754	1.29449	1.39468
99	0.930204	0.789138	0.815086	0.805638	0.750303	0.80303	0.851344
101	1.06676	0.983507	0.97446	0.993236	0.769663	0.954342	1.02425
102	1.08105	0.805415	0.920218	0.952722	0.844462	0.936528	1.14456
103	0.932182	0.763851	0.816426	0.891327	0.756418	0.846802	0.959135
104	0.8474	0.858252	1.00902	0.897964	0.774038	0.901924	0.872009
105	0.837602	0.8152	0.809953	0.817673	0.763955	0.801321	0.79404
106	0.883628	0.955508	0.901449	0.862016	0.812274	0.860395	0.823175
107	1.17725	1.1056	1.08926	1.09387	1.06604	1.14295	1.1335
108	0.79791	0.778007	0.792956	0.857367	0.71834	0.788145	0.789435
110	0.899948	0.820319	0.877297	0.870397	0.775389	0.847018	0.886568

111	1.00541	1.0191	1.1449	0.955775	0.817624	0.917113	1.07856
112	0.878096	0.776219	0.808627	0.829507	0.729996	0.787938	0.807843
113	0.885269	0.939554	0.889021	0.943667	0.828425	0.913476	0.954084
116	1.59848	1.48127	1.88933	1.67264	1.24908	1.40402	1.8239
117	1.20331	0.916372	1.31476	1.29724	1.03214	1.25403	1.30192
118	1.24975	0.955868	1.17631	1.26711	1.00626	1.12585	1.16907
119	1.10306	0.988307	1.13631	1.0793	0.908873	1.08706	1.07007
122	0.844878	0.74067	0.818171	0.848352	0.761753	0.799811	0.719035
123	1.99628	1.2669	2.43969	1.86696	1.47937	1.72249	1.84117
126	1.11471	0.961587	1.13402	1.00304	0.861328	1.07283	1.52674
131	0.868752	0.878902	0.887427	0.937856	0.891681	0.918993	1.12446
132	2.11852	1.61762	1.7859	1.71255	1.17173	1.63437	2.26022

sID	NPH029	AD001	AD002	AD003	AD004	AD005	AD006
Gender	M	F	M	F	M	M	M
ICV	1229890	1213797	1401352	1143424	1449320	1283475	1170577
volbrainICV	1386.834	1449.744	1569.016	1275.005	1608.596	1495.761	1344.159
volbrainWM	349.19	414.13	477.09	347.61	411.66	326.4	306.12
LesLoad	21.9035	29.3935	1.2907	43.6038	12.3176	1.1135	17.7538
LL/ICV	0.015794	0.020275	0.000823	0.034199	0.007657	0.000744	0.013208
LL/WM	0.062727	0.070977	0.002705	0.125439	0.029922	0.003411	0.057996
LV_Vol	108.974	71.371	77.921	42.067	130.286	75.762	62.738
LV/ICV	0.078578	0.04923	0.049662	0.032994	0.080994	0.050651	0.046675
LV/WM	0.312077	0.17234	0.163326	0.121018	0.316489	0.232114	0.204946
MOCA	24	23	20	16	21	25	
Delayed Recall	2	4	0	0	2	1	
Attention	6	5	6	3	6	6	
Age	84	75	76	90	71	87	84
Fractional Anisotropy (mFA)							
1	0.244054	0.24605	0.24605	0.227551		0.256791	
2	0.18586	0.166121	0.166121	0.172		0.168373	
3	0.20768	0.208235	0.208235	0.204299		0.195871	
4	0.159305	0.172	0.172	0.172144		0.167852	
5	0.191502	0.200796	0.200796	0.18442		0.19144	
6	0.267164	0.29017	0.29017	0.269355		0.272394	
7	0.171129	0.188909	0.188909	0.198799		0.157571	
8	0.180472	0.153396	0.153396	0.151116		0.155779	
9	0.15997	0.147152	0.147152	0.160586		0.140407	
10	0.167042	0.180798	0.180798	0.175727		0.169809	
11	0.206218	0.193189	0.193189	0.179523		0.171662	

12	0.188906	0.176444	0.176444	0.185652	0.187192
13	0.208772	0.285256	0.285256	0.311493	0.251851
14	0.269736	0.28592	0.28592	0.241128	0.233371
15	0.147038	0.13951	0.13951	0.167856	0.155093
16	0.169078	0.16061	0.16061	0.147583	0.168701
17	0.160448	0.165435	0.165435	0.170261	0.182219
18	0.169764	0.162745	0.162745	0.18359	0.172612
19	0.213294	0.183132	0.183132	0.197696	0.221411
20	0.171697	0.1502	0.1502	0.161974	0.177433
21	0.160931	0.163352	0.163352	0.169703	0.166086
22	0.16911	0.176574	0.176574	0.20427	0.17359
23	0.150958	0.168548	0.168548	0.167102	0.152465
24	0.169906	0.182367	0.182367	0.180231	0.158556
25	0.139578	0.145506	0.145506	0.165229	0.151666
26	0.174017	0.180119	0.180119	0.1825	0.179693
27	0.181364	0.183064	0.183064	0.173548	0.179282
34	0.502961	0.533947	0.533947	0.484966	0.477878
36	0.48241	0.461712	0.461712	0.428961	0.47578
37	0.355643	0.374295	0.374295	0.336324	0.371929
38	0.481854	0.463256	0.463256	0.41537	0.476378
39	0.541216	0.502572	0.502572	0.44457	0.511995
40	0.505788	0.465157	0.465157	0.419953	0.469619
41	0.429536	0.413964	0.413964	0.392811	0.4168
42	0.400281	0.44145	0.44145	0.435438	0.408396
43	0.403302	0.419256	0.419256	0.390816	0.426701
45	0.386252	0.413388	0.413388	0.417891	0.439745
46	0.423634	0.439796	0.439796	0.335104	0.35831
47	0.358171	0.355916	0.355916	0.352237	0.393219
48	0.35935	0.361026	0.361026	0.427256	0.451963
51	0.30317	0.312258	0.312258	0.507801	0.48353
52	0.420526	0.517386	0.517386	0.468897	0.438554
53	0.461739	0.564447	0.564447	0.555356	0.586728
54	0.533458	0.582191	0.582191	0.498343	0.551745
58	0.536753	0.260747	0.260747	0.198326	0.225289
61	0.341684	0.26833	0.26833	0.417439	0.415005
66	0.251411	0.132377	0.132377	0.189298	0.190164
67	0.145596	0.19806	0.19806	0.16894	0.176461
68	0.193605	0.187354	0.187354	0.176822	0.19044
69	0.170143	0.198194	0.198194	0.249626	0.246364
70	0.186182	0.268373	0.268373	0.164404	0.141591
71	0.256076	0.158175	0.158175	0.144237	0.154948

72	0.167867	0.145879	0.145879	0.140431	0.119162
73	0.190766	0.118764	0.118764	0.161035	0.172083
74	0.142645	0.167975	0.167975	0.177323	0.176735
75	0.125651	0.188295	0.188295	0.175411	0.178932
76	0.23443	0.177331	0.177331	0.191106	0.191204
77	0.200353	0.217134	0.217134	0.224304	0.232618
78	0.181068	0.270019	0.270019	0.183589	0.180008
79	0.216538	0.181636	0.181636	0.161493	0.164388
80	0.268402	0.184684	0.184684	0.198324	0.186091
81	0.213609	0.147621	0.147621	0.166973	0.173193
82	0.172918	0.162845	0.162845	0.204466	0.202734
83	0.174031	0.193155	0.193155	0.188616	0.184501
84	0.214571	0.183053	0.183053	0.160687	0.177498
85	0.183897	0.152881	0.152881	0.187156	0.177541
86	0.155445	0.198278	0.198278	0.175464	0.165813
87	0.174577	0.183188	0.183188	0.166168	0.168643
88	0.215167	0.174882	0.174882	0.175614	0.169626
89	0.155039	0.16183	0.16183	0.170603	0.174332
90	0.164737	0.165406	0.165406	0.163846	0.17073
91	0.165598	0.180029	0.180029	0.186999	0.20314
92	0.18979	0.210046	0.210046	0.50702	0.538758
99	0.493468	0.667995	0.667995	0.412975	0.472137
101	0.540532	0.380377	0.380377	0.392486	0.464484
102	0.354783	0.447995	0.447995	0.378845	0.477964
103	0.444842	0.455824	0.455824	0.358508	0.401639
104	0.465326	0.397356	0.397356	0.405155	0.409386
105	0.406027	0.404676	0.404676	0.405965	0.391672
106	0.409945	0.444463	0.444463	0.376708	0.44266
107	0.410347	0.433518	0.433518	0.35312	0.408491
108	0.400035	0.440877	0.440877	0.374237	0.431476
110	0.399599	0.437914	0.437914	0.368914	0.356522
111	0.421483	0.392419	0.392419	0.322338	0.447746
112	0.379851	0.31872	0.31872	0.407574	0.514455
113	0.309933	0.39626	0.39626	0.453699	0.401295
116	0.408256	0.521939	0.521939	0.455704	0.60497
117	0.408313	0.544186	0.544186	0.566405	0.549622
118	0.440092	0.591797	0.591797	0.514613	0.409803
119	0.504193	0.562064	0.562064	0.330636	0.38849
123	0.290135	0.236988	0.236988	0.195289	0.250932
126	0.342001	0.381405	0.381405	0.385687	0.422333
131	0.347635	0.321533	0.321533	0.303606	0.287889

132	0.265711	0.358659	0.358659	0.332331	0.497169
Mean Diffusivity (mADC)					
1	0.990318	1.10095	1.10095	1.00949	1.11445
2	1.10182	1.07553	1.07553	0.973992	1.10906
3	1.1235	1.07894	1.07894	1.00241	1.1235
4	1.29081	1.25151	1.25151	1.14725	1.2874
5	1.22066	1.11504	1.11504	1.11732	1.18831
6	0.865905	0.874004	0.874004	0.897325	0.91944
7	1.20716	1.21982	1.21982	1.14146	1.39566
8	1.10796	1.37798	1.37798	1.15289	1.45083
9	1.13253	1.29779	1.29779	1.05298	1.38202
10	1.29164	1.02689	1.02689	0.982967	1.17277
11	1.19035	1.098	1.098	1.05363	1.2121
12	0.997496	1.02498	1.02498	1.01372	1.04616
13	1.46227	1.08349	1.08349	0.997393	1.30506
14	0.854506	0.89801	0.89801	0.925936	1.05803
15	0.933926	1.09426	1.09426	0.984153	1.05198
16	1.03375	1.08418	1.08418	1.07613	1.19065
17	1.05449	0.955031	0.955031	0.945899	0.936475
18	1.29342	1.25258	1.25258	1.18737	1.33396
19	0.991492	1.18902	1.18902	1.10685	1.04829
20	1.07486	1.23304	1.23304	1.12196	1.17981
21	1.21874	1.14447	1.14447	1.07763	1.20412
22	1.18566	1.02014	1.02014	0.985084	1.13546
23	1.30141	1.22882	1.22882	1.16015	1.42236
24	1.29441	1.00991	1.00991	0.966544	1.27631
25	1.45521	1.36559	1.36559	1.19311	1.39322
26	1.00626	1.0212	1.0212	0.970627	0.967384
27	1.66216	1.61737	1.61737	1.30572	1.41302
34	0.88152	0.731631	0.731631	0.830609	0.845748
36	0.927379	0.906877	0.906877	0.980809	0.903459
37	1.00144	0.885825	0.885825	0.973916	0.872014
38	0.867368	0.769095	0.769095	0.840766	0.764391
39	0.863309	0.795477	0.795477	0.850704	0.764414
40	0.841888	0.774425	0.774425	0.826744	0.760356
41	0.867803	0.850509	0.850509	0.84683	0.828933
42	1.04098	0.886873	0.886873	0.954831	1.22527
43	0.798362	0.760087	0.760087	0.823068	0.748214
45	0.845808	0.830153	0.830153	0.921552	0.892638
46	0.906879	0.911351	0.911351	0.83742	0.824487
47	0.862116	0.776179	0.776179	0.940006	0.857036

48	0.88266	0.900353	0.900353	0.843138	0.786483
51	2.19951	2.00231	2.00231	1.22363	1.35597
52	1.44624	1.21214	1.21214	1.16871	1.21873
53	1.33049	1.03657	1.03657	1.11364	1.05103
54	1.25932	0.976991	0.976991	0.817057	0.794007
58	1.41545	0.916301	0.916301	0.78356	0.743391
61	1.05641	0.744646	0.744646	0.820881	0.93114
66	0.971071	1.28088	1.28088	1.01237	1.17409
67	1.34418	1.06217	1.06217	1.07943	1.21135
68	1.12198	1.13944	1.13944	1.08095	1.13524
69	1.24476	1.13284	1.13284	0.923713	0.94179
70	1.23338	0.886278	0.886278	1.2478	1.48051
71	0.885058	1.31527	1.31527	1.12533	1.3723
72	1.24866	1.34598	1.34598	1.14514	1.74072
73	1.23119	1.46086	1.46086	1.04429	1.24752
74	1.27611	1.04943	1.04943	1.02402	1.22213
75	1.78663	1.06222	1.06222	0.981262	1.13747
76	1.66662	1.04053	1.04053	1.12165	1.79697
77	1.08777	1.34197	1.34197	0.935567	1.09444
78	2.24402	0.914254	0.914254	0.87169	0.960963
79	1.29601	0.924637	0.924637	0.977371	1.17003
80	1.21642	1.02005	1.02005	1.12472	1.26673
81	1.14512	1.50056	1.50056	1.13849	1.37643
82	1.31899	1.21391	1.21391	0.908096	1.0244
83	1.36791	1.03422	1.03422	0.979411	1.15532
84	1.03551	1.06513	1.06513	1.0338	1.15601
85	1.17515	1.09185	1.09185	1.02162	1.18738
86	1.22991	1.02602	1.02602	1.0936	1.24477
87	1.32059	1.13795	1.13795	1.12927	1.36635
88	1.24891	1.13847	1.13847	1.02199	1.19829
89	1.41487	1.1018	1.1018	0.959762	1.10051
90	1.18709	1.05686	1.05686	1.17285	1.50146
91	1.00849	1.41615	1.41615	0.860747	1.05184
92	1.65516	0.918173	0.918173	0.754751	0.695872
99	0.89984	0.708371	0.708371	0.960728	0.944303
101	1.06828	0.862944	0.862944	0.865037	0.788366
102	1.0272	0.754688	0.754688	0.980424	0.795983
103	0.933318	0.804899	0.804899	0.843601	0.783745
104	0.883502	0.769776	0.769776	0.817378	0.849493
105	0.829548	0.864902	0.864902	1.0693	1.22841
106	0.868066	1.02317	1.02317	0.838129	0.748473

107	1.19996	0.746356	0.746356	0.998852		0.861879	
108	0.789737	0.777752	0.777752	0.810591		0.928968	
110	0.829262	0.868199	0.868199	0.82027		0.893992	
111	1.06546	0.747643	0.747643	0.852495		0.797366	
112	0.839273	0.884319	0.884319	0.853073		0.758405	
113	0.875382	0.867082	0.867082	0.729108		1.80325	
116	1.78792	1.11291	1.11291	1.20202		1.01572	
117	1.35883	1.02581	1.02581	1.04627		0.822455	
118	1.37147	0.933753	0.933753	0.829016		0.79546	
119	1.20427	0.7735	0.7735	0.785905		1.86131	
122	0.848194	1.25037	1.25037	1.12455		1.18196	
123	2.08375	0.736489	0.736489	0.796523		1.09014	
126	1.14889	0.974729	0.974729	0.918822		1.15037	
131	0.873759	1.08546	1.08546	1.10488		1.67884	
132	1.85045	0.99043	0.99043	0.974152		1.40123	

sID	AD007	AD008	AD009	AD010	AD011	AD012	AD013
Gender	M	M	M	F	F	M	F
ICV	1444119	1365420	1464392	1375425	1209041	1142753	1188069
volbrainICV	1626.572	1531.813	1649.963	1520.794	1355.719	1293.546	1335.894
volbrainWM	515.74	505.1	502.69	506.55	380.28	371.66	350.92
LesLoad	51.0005	8.7726	10.3332	1.5179	28.7051	0.72972	14.7724
LL/ICV	0.031355	0.005727	0.006263	0.000998	0.021173	0.000564	0.011058
LL/WM	0.098888	0.017368	0.020556	0.002997	0.075484	0.001963	0.042096
LV_Vol	53.659	47.735	86.896	34.754	81.58	23.246	67.212
LV/ICV	0.032989	0.031162	0.052665	0.022853	0.060175	0.017971	0.050312
LV/WM	0.104043	0.094506	0.172862	0.068609	0.214526	0.062546	0.191531
MOCA	24	22	24	25	11	21	15
Delayed Recall	0	0	1	3	0	1	4
Attention	5	6	5	4	2	6	1
Age	78	74	75	61	75	64	84
Fractional Anisotropy (mFA)							
1	0.216608	0.305896	0.270382	0.250571	0.236463	0.252651	0.268227
2	0.160309	0.217771	0.16497	0.174455	0.163968	0.160697	0.178368
3	0.202171	0.268616	0.205327	0.214252	0.218644	0.196361	0.214396
4	0.174068	0.228344	0.168518	0.183248	0.170681	0.162505	0.180379
5	0.196332	0.252902	0.204531	0.224331	0.194358	0.202864	0.207426
6	0.25422	0.348171	0.275398	0.290359	0.258785	0.283719	0.307106
7	0.169324	0.232922	0.182749	0.186285	0.167209	0.167159	0.193498
8	0.152219	0.215565	0.171379	0.164675	0.182067	0.17922	0.174245

9	0.139794	0.192264	0.173255	0.155404	0.153196	0.142831	0.158991
10	0.167358	0.223486	0.181549	0.164502	0.165916	0.161127	0.182145
11	0.171848	0.237273	0.191791	0.176805	0.175666	0.183379	0.216909
12	0.175171	0.215307	0.178618	0.185516	0.166897	0.176116	0.181281
13	0.292701	0.367525	0.253304	0.218738	0.264648	0.221972	0.239254
14	0.220123	0.31757	0.256697	0.263162	0.273556	0.244955	0.279124
15	0.167511	0.223607	0.180187	0.14731	0.152785	0.176695	0.161585
16	0.155078	0.215824	0.165132	0.156176	0.155867	0.161816	0.167487
17	0.166788	0.173179	0.141138	0.19867	0.190512	0.159318	0.155422
18	0.172442	0.214659	0.172951	0.179539	0.172798	0.162614	0.184834
19	0.22432	0.220117	0.212132	0.224412	0.209433	0.220265	0.205243
20	0.173446	0.214449	0.16669	0.16678	0.1651	0.164737	0.174192
21	0.181928	0.229162	0.175144	0.180312	0.155853	0.150089	0.165443
22	0.202859	0.204367	0.190563	0.181379	0.163684	0.153432	0.192825
23	0.161205	0.200173	0.162684	0.162104	0.163147	0.158812	0.169186
24	0.19377	0.193692	0.180812	0.183718	0.174661	0.161308	0.179318
25	0.158228	0.185692	0.14799	0.155385	0.142741	0.14085	0.160514
26	0.171049	0.234402	0.190113	0.18904	0.177912	0.171425	0.211755
27	0.190276	0.222978	0.187726	0.182537	0.181607	0.162534	0.183353
34	0.474188	0.593012	0.527998	0.519833	0.528717	0.505514	0.534655
36	0.402516	0.487917	0.455052	0.462324	0.488163	0.442607	0.442267
37	0.356046	0.414441	0.380097	0.364644	0.357907	0.333077	0.369077
38	0.409838	0.456083	0.46352	0.457924	0.467547	0.397949	0.489641
39	0.419496	0.458976	0.477912	0.471725	0.510566	0.396966	0.482548
40	0.423049	0.519147	0.490948	0.464496	0.45887	0.406708	0.491771
41	0.377028	0.437447	0.418205	0.426291	0.394718	0.383492	0.411198
42	0.443095	0.487857	0.398308	0.454454	0.445031	0.398339	0.401935
43	0.341342	0.430703	0.422174	0.411094	0.432849	0.374067	0.414189
45	0.36298	0.472921	0.425995	0.390554	0.446305	0.366015	0.437298
46	0.419864	0.423788	0.433664	0.454924	0.329514	0.424512	0.351795
47	0.31619	0.425528	0.391628	0.377272	0.35368	0.340171	0.326908
48	0.355735	0.521757	0.400012	0.381372	0.443176	0.33863	0.437678
51	0.271562	0.628839	0.351388	0.396924	0.44635	0.265195	0.511636
52	0.532462	0.588737	0.498721	0.566142	0.459474	0.599923	0.462683
53	0.463472	0.629366	0.526771	0.502214	0.518821	0.502326	0.534832
54	0.505812	0.54859	0.590088	0.620097	0.492466	0.530379	0.476106
58	0.22483	0.339779	0.239769	0.583044	0.274215	0.477443	0.223169
61	0.26687	0.418531	0.279659	0.341142	0.263976	0.315613	0.422102
66	0.130582	0.170086	0.138625	0.259917	0.144025	0.253686	0.207196
67	0.196092	0.245939	0.194668	0.141852	0.205258	0.136296	0.188203
68	0.179599	0.243651	0.178772	0.201306	0.174423	0.187271	0.203333

69	0.180251	0.243792	0.204301	0.194109	0.184174	0.176235	0.269348
70	0.233019	0.322174	0.245648	0.221995	0.244125	0.194068	0.164036
71	0.150629	0.221292	0.155708	0.270281	0.156808	0.266504	0.163098
72	0.140818	0.19336	0.153889	0.170397	0.143157	0.160589	0.146501
73	0.122753	0.165256	0.146353	0.152812	0.135143	0.141027	0.164218
74	0.147346	0.204512	0.16661	0.124579	0.14628	0.122312	0.205591
75	0.172587	0.228142	0.189792	0.14791	0.169828	0.148973	0.181084
76	0.167089	0.210332	0.165008	0.177279	0.164676	0.161579	0.177491
77	0.192777	0.267584	0.170423	0.174422	0.175358	0.165625	0.257378
78	0.220701	0.320878	0.253403	0.1631	0.244596	0.158842	0.200437
79	0.175742	0.270403	0.187452	0.254513	0.162908	0.238493	0.176596
80	0.152176	0.22795	0.170089	0.174114	0.163249	0.177188	0.15017
81	0.16998	0.21674	0.130768	0.160423	0.183684	0.169161	0.179227
82	0.162847	0.211133	0.1671	0.168022	0.15683	0.16229	0.189103
83	0.205028	0.220103	0.183446	0.166109	0.181292	0.154506	0.194258
84	0.184157	0.235624	0.177502	0.200701	0.184352	0.180678	0.186813
85	0.18452	0.217993	0.16366	0.192158	0.155727	0.18269	0.208352
86	0.226068	0.19565	0.162053	0.184298	0.156359	0.153571	0.186755
87	0.176377	0.239412	0.185962	0.190268	0.173449	0.155063	0.199707
88	0.203609	0.190259	0.151901	0.184709	0.172366	0.189805	0.162233
89	0.163222	0.221996	0.167716	0.178494	0.152687	0.152039	0.175143
90	0.16868	0.213802	0.163588	0.184341	0.185714	0.162292	0.181072
91	0.19024	0.231859	0.182629	0.162992	0.166272	0.152176	0.205827
92	0.192559	0.246534	0.198898	0.174854	0.178125	0.160186	0.506815
99	0.559992	0.644766	0.636017	0.50504	0.645307	0.476094	0.444624
101	0.337293	0.408812	0.382253	0.460569	0.349049	0.452174	0.457276
102	0.396833	0.424107	0.45767	0.375152	0.446986	0.364937	0.487976
103	0.383219	0.454119	0.470338	0.432594	0.463652	0.397711	0.421594
104	0.363581	0.441955	0.404732	0.454739	0.392187	0.39525	0.435723
105	0.402194	0.446515	0.416742	0.396022	0.376358	0.354847	0.436148
106	0.417784	0.478799	0.486778	0.408794	0.406895	0.367979	0.422395
107	0.373492	0.453248	0.424477	0.466556	0.427719	0.427323	0.39741
108	0.367221	0.429277	0.461617	0.402277	0.407883	0.391163	0.427387
110	0.396192	0.465304	0.430014	0.392342	0.429733	0.387835	0.300649
111	0.34502	0.432141	0.397712	0.431609	0.365718	0.415681	0.42004
112	0.306354	0.391715	0.362495	0.374383	0.348482	0.368017	0.48245
113	0.353472	0.486507	0.359707	0.332738	0.419656	0.322089	0.442427
116	0.503948	0.590367	0.505173	0.497562	0.429081	0.402816	0.568882
117	0.478852	0.558241	0.509361	0.548011	0.4045	0.543343	0.506832
118	0.543753	0.664684	0.599337	0.498196	0.530516	0.464554	0.48475
119	0.477311	0.536217	0.538249	0.63567	0.516574	0.577138	0.472241

123	0.17931	0.361641	0.226967	0.468451	0.231541	0.175923	0.325836
126	0.312229	0.46966	0.409402	0.322426	0.385669	0.275299	0.437059
131	0.274381	0.362028	0.298617	0.337643	0.292665	0.260919	0.395763
132	0.276379	0.468124	0.327816	0.301704	0.305651	0.317927	0.457716
Mean Diffusivity (mADC)							
1	1.11206	1.03285	0.856166	0.967516	1.01674	1.01839	0.98664
2	1.03694	1.12453	0.905785	0.983598	1.04458	1.00647	1.20405
3	1.08937	1.07603	0.916232	0.949559	0.980101	1.03165	1.16517
4	1.24117	1.21264	1.06097	1.08563	1.23416	1.12534	1.32618
5	1.14619	1.09096	1.00576	1.02187	1.11566	0.964911	1.17812
6	0.940353	0.886219	0.780981	0.82662	0.851148	0.853169	0.925236
7	1.29875	1.25855	1.00943	1.06486	1.14528	1.1868	1.35871
8	1.28609	1.2163	1.00764	1.15164	1.12088	1.0372	1.31852
9	1.19572	1.22251	0.942326	1.0626	1.12217	1.26846	1.2889
10	1.11133	1.04732	0.968608	1.11144	1.05744	1.03024	1.17227
11	1.09587	1.06802	1.0166	1.0098	1.18605	0.970945	1.16436
12	1.00808	1.10419	0.874284	0.888222	1.00938	0.90746	1.09653
13	1.1614	0.955582	1.09664	1.00182	1.21183	1.13892	1.32751
14	1.07257	0.907109	0.951771	0.853861	0.780054	0.96208	0.918892
15	1.03326	0.988723	0.850477	0.958548	1.00379	0.91928	1.06808
16	1.11065	1.10422	0.902001	0.991821	1.04616	1.00265	1.09255
17	0.967839	0.91764	1.01679	0.837397	0.837425	0.928287	1.0794
18	1.19576	1.17055	1.09609	1.06847	1.30054	1.05833	1.32489
19	0.990542	1.14881	0.931116	0.900358	0.930222	0.919107	1.17454
20	1.1106	1.0976	0.977988	1.008	1.06769	0.944288	1.15746
21	1.13917	1.05384	1.01619	1.00633	1.21643	1.12872	1.23146
22	1.10442	1.13017	1.01469	0.952646	1.16888	1.05546	1.19928
23	1.21399	1.27834	1.05525	1.11827	1.16658	1.05318	1.32512
24	0.983179	1.07111	0.959732	0.904593	1.19665	1.02012	1.18049
25	1.27453	1.18347	1.13843	1.12303	1.35033	1.11031	1.45192
26	0.924427	0.946786	1.00262	0.8695	0.910594	0.890997	1.14021
27	1.26512	1.48129	1.34663	1.0756	1.4534	1.16639	1.47749
34	0.863954	0.72426	0.700445	0.743295	0.730149	0.737725	0.785997
36	0.981632	0.864774	0.897153	0.847115	0.844404	0.855634	0.890376
37	0.949698	0.845909	0.826389	0.836679	0.93602	0.828153	0.95056
38	0.883292	0.791526	0.749963	0.759867	0.793843	0.760981	0.80249
39	0.919093	0.798816	0.777062	0.781744	0.836367	0.80013	0.831757
40	0.880804	0.787781	0.750334	0.776801	0.795359	0.770629	0.806371
41	0.908949	0.869114	0.798002	0.833601	0.875458	0.848735	0.843452
42	1.01397	0.909286	0.978169	0.936703	1.11975	0.98162	0.986105
43	0.936174	0.794633	0.739701	0.772465	0.76537	0.766867	0.793343

45	0.91621	0.865552	0.772697	0.795898	0.869167	0.80566	0.85386
46	0.903323	0.804944	0.875316	0.843526	0.847457	0.861538	0.862209
47	0.928457	0.857997	0.751894	0.778137	0.868739	0.79161	0.934342
48	0.930934	0.770042	0.841418	0.851232	0.787974	0.857161	0.85628
51	2.22718	0.993358	2.06985	1.67921	1.38096	2.08541	1.21041
52	1.15191	1.04001	1.1748	1.04003	1.24468	1.05381	1.17503
53	1.14917	0.924325	1.05069	1.00154	1.15525	1.1074	1.07892
54	1.08621	0.814121	1.00349	0.937697	0.844332	0.993159	0.830356
58	0.956144	0.820026	0.795958	1.05475	0.957301	1.08572	0.847646
61	0.83166	0.795075	0.711151	0.798482	0.83736	0.854796	0.874799
66	1.28605	1.42128	1.12907	0.899993	1.28529	0.940271	1.18691
67	1.09609	1.13383	0.958849	1.13184	1.03064	1.13794	1.25213
68	1.18037	1.13358	0.989303	0.970391	1.16391	1.05127	1.19077
69	1.17152	1.11142	0.994615	1.0179	1.10846	1.05789	0.927416
70	0.945621	0.912741	0.804369	0.993504	0.847758	0.99934	1.38696
71	1.34959	1.34295	1.05797	0.842086	1.1601	0.859923	1.3276
72	1.30319	1.32975	1.0399	1.15339	1.11939	1.25527	1.46696
73	1.27654	1.41687	1.02619	1.1605	1.30878	1.10854	1.2633
74	1.18582	1.13827	0.980833	1.27184	1.14579	1.34353	1.16217
75	1.13989	1.10202	0.997705	1.11071	1.13092	1.03611	1.07863
76	1.04445	1.18877	0.939056	0.997624	1.0122	0.976272	1.29536
77	1.50887	1.42635	1.18473	0.940196	1.37164	0.933364	1.07047
78	0.994488	0.941332	0.819038	1.0977	0.904147	1.46657	0.981622
79	0.988646	0.931213	0.875285	0.8411	0.914611	0.890385	0.999023
80	1.09112	1.08895	0.899236	0.891805	1.00585	0.847888	1.22318
81	1.14682	1.23085	1.31354	0.978454	1.46318	0.939285	1.29405
82	1.2642	1.28253	1.09754	1.06889	1.26619	1.33095	1.10028
83	0.980885	1.24545	0.950897	1.11622	0.942147	1.09281	1.06829
84	1.05245	1.1051	0.968973	0.898901	0.980053	0.932618	1.24577
85	1.07315	1.0784	0.990217	0.959345	1.12064	0.951891	1.2195
86	1.09923	1.20642	1.04309	0.936001	1.18618	1.01392	1.2632
87	1.21322	1.14226	1.01349	0.920018	1.05471	1.15872	1.42291
88	1.10752	1.17046	1.14723	1.08342	1.23941	0.960316	1.16185
89	1.06551	1.04515	1.00201	0.963198	1.09381	1.11596	1.16247
90	1.04901	1.06862	1.10448	0.947167	0.94491	0.983769	1.38692
91	1.24763	1.54508	1.30377	0.89888	1.38103	0.907953	0.991062
92	1.02884	1.03261	0.844781	1.09786	0.970766	1.10794	0.724636
99	0.85233	0.751085	0.747383	0.745676	0.712189	0.737372	0.887201
101	0.969537	0.850871	0.889242	0.848275	0.925358	0.832383	0.818486
102	0.906796	0.808943	0.782422	0.83974	0.822051	0.811146	0.823494
103	1.02993	0.847799	0.796418	0.762245	0.804644	0.755576	0.80611

104	0.864949	0.824645	0.751846	0.786828	0.776493	0.804494	0.817509
105	0.872145	0.906981	0.770946	0.772329	0.805643	0.772526	1.16152
106	1.12881	0.95755	0.90207	0.824936	1.21242	0.8321	0.793101
107	0.950411	0.788774	0.747989	0.93202	0.743317	0.960934	0.82399
108	1.04893	0.878062	0.801499	0.763634	0.888625	0.751459	0.863557
110	0.958265	0.930079	0.889983	0.787507	0.85774	0.783547	0.916418
111	0.907767	0.79859	0.744652	0.83681	0.787907	0.848441	0.831581
112	0.931457	0.938424	0.885147	0.752953	0.863913	0.736886	0.763356
113	0.800492	0.781881	0.81125	0.849547	0.785547	0.849389	1.63378
116	1.11937	1.04321	1.18327	1.41147	1.31482	1.83369	0.996766
117	1.19672	1.01237	1.05565	1.04037	1.26295	1.06152	0.870038
118	1.04594	0.8777	0.960641	0.970991	1.1062	1.04343	0.791752
119	0.908748	0.863567	0.808043	0.90231	0.785917	0.982674	1.55896
122	1.59976	1.12541	1.18181	0.729323	1.31678	1.52837	1.01116
123	1.21286	0.775865	0.691402	1.46463	0.700263	1.0426	0.861746
126	0.980336	0.900018	0.884188	0.857052	1.05869	0.834243	1.06759
131	1.59607	1.10991	1.06934	0.854642	1.01842	1.39808	1.38674
132	1.1735	1.01199	0.902663	1.21025	0.980404	0.930606	1.3705

sID	AD014	AD015	AD016	AD017	ADN001	ADN002	ADN003
Gender	F	M	F	M	M	M	F
ICV	1026305	1191197	1321554	1270074	1185802	1455720	1114116
volbrainICV	1190.028	1333.63	1470.845	1486.658	1352.663	1648.71	1233.94
volbrainWM	321.72	423.71	486.15	388.16	287.57	481.45	317.83
LesLoad	8.6188	3.5629	0.52413	1.2952	8.7637	17.4677	59.3156
LL/ICV	0.007243	0.002672	0.000356	0.000871	0.006479	0.010595	0.04807
LL/WM	0.02679	0.008409	0.001078	0.003337	0.030475	0.036281	0.186627
LV_Vol	46.399	33.788	54.627	80.136	88.427	129.533	122.455
LV/ICV	0.03899	0.025335	0.03714	0.053903	0.065373	0.078566	0.099239
LV/WM	0.144222	0.079743	0.112367	0.206451	0.307497	0.269048	0.385285
MOCA	20	28	29	23	17	23	10
Delayed Recall	0	4	4	0	0	0	0
Attention	5	6	6	6	5	5	1
Age	86		58	87	91	82	84
Fractional Anisotropy (mFA)							
1	0.250507	0.273692	0.25701	0.261934	0.282031	0.245486	0.211879
2	0.176267	0.167461	0.174431	0.17699	0.200431	0.193814	0.160681
3	0.20857	0.208436	0.223377	0.214453	0.225054	0.213303	0.178327
4	0.170239	0.16916	0.177336	0.183956	0.187615	0.1674	0.149107
5	0.198916	0.215125	0.218023	0.187075	0.205507	0.203289	0.177334

6	0.293379	0.300891	0.30386	0.29715	0.27866	0.272456	0.253641
7	0.182493	0.190316	0.190719	0.180959	0.199143	0.185453	0.157876
8	0.164022	0.173683	0.176071	0.150546	0.185716	0.180226	0.143624
9	0.148171	0.152868	0.157644	0.147063	0.189151	0.167176	0.135242
10	0.177988	0.17654	0.18337	0.17221	0.223424	0.220561	0.162366
11	0.195084	0.172633	0.183205	0.17459	0.189141	0.195149	0.183428
12	0.185572	0.173762	0.190264	0.178043	0.19483	0.22217	0.186943
13	0.284661	0.24917	0.352557	0.227948	0.240774	0.265265	0.26074
14	0.264544	0.284024	0.255654	0.259547	0.247918	0.251683	0.220251
15	0.16425	0.171055	0.17219	0.164117	0.198163	0.231106	0.165179
16	0.165379	0.166283	0.164564	0.163575	0.182644	0.207483	0.153771
17	0.18572	0.16389	0.209613	0.165459	0.209681	0.163505	0.170546
18	0.186484	0.182498	0.17145	0.163504	0.190102	0.197087	0.152395
19	0.210188	0.218685	0.23312	0.209261	0.240713	0.234288	0.224775
20	0.177312	0.1892	0.184259	0.171644	0.176737	0.193073	0.169443
21	0.168089	0.158762	0.171705	0.157915	0.150081	0.158068	0.171006
22	0.173486	0.149894	0.168429	0.164266	0.176071	0.163154	0.167693
23	0.172644	0.169568	0.171181	0.151409	0.172822	0.16567	0.14317
24	0.18573	0.161591	0.191458	0.145594	0.181608	0.17823	0.160738
25	0.154116	0.150084	0.149998	0.144057	0.140574	0.152788	0.155832
26	0.211827	0.176546	0.228843	0.171225	0.18676	0.208586	0.186797
27	0.191359	0.177796	0.215844	0.167745	0.188706	0.175184	0.169924
34	0.490568	0.519648	0.547545	0.492067	0.586964	0.529523	0.495014
36	0.475353	0.479527	0.47257	0.477437	0.473589	0.461089	0.433711
37	0.359888	0.375376	0.434118	0.38263	0.393442	0.319941	0.350432
38	0.469529	0.441823	0.488587	0.483193	0.5053	0.414858	0.450865
39	0.472167	0.464734	0.48864	0.521883	0.530299	0.439784	0.459424
40	0.475953	0.484167	0.471654	0.45592	0.508026	0.454901	0.387996
41	0.404577	0.396685	0.430806	0.381561	0.473673	0.418043	0.353459
42	0.373866	0.421311	0.429588	0.39394	0.415601	0.416578	0.402759
43	0.407921	0.41358	0.422679	0.433965	0.433815	0.396995	0.386928
45	0.430105	0.400054	0.419482	0.430635	0.427833	0.426747	0.395869
46	0.36115	0.458791	0.468434	0.345797	0.379207	0.359542	0.322446
47	0.356953	0.362736	0.381374	0.395593	0.329816	0.373231	0.313299
48	0.418327	0.378483	0.396109	0.416763	0.501135	0.417684	0.351592
51	0.474643	0.364817	0.372	0.486169	0.529823	0.439022	0.351128
52	0.465487	0.613417	0.5275	0.46023	0.531028	0.464015	0.434038
53	0.574112	0.54892	0.50072	0.564464	0.511015	0.539236	0.445794
54	0.5151	0.620186	0.55983	0.53536	0.553077	0.484895	0.476673
58	0.243673	0.208554	0.245146	0.200974	0.274277	0.194862	0.240021
61	0.327551	0.262355	0.314095	0.298588	0.460577	0.409012	0.386133

66	0.13954	0.138417	0.147011	0.140163	0.206456	0.210468	0.172051
67	0.206657	0.204442	0.212289	0.211174	0.189492	0.173695	0.156044
68	0.176149	0.188779	0.186866	0.190262	0.201056	0.18964	0.175114
69	0.195914	0.201956	0.226143	0.182818	0.258888	0.260175	0.235662
70	0.275767	0.280549	0.278541	0.270327	0.17476	0.176175	0.139332
71	0.150767	0.16067	0.165456	0.169117	0.172463	0.152316	0.138157
72	0.141627	0.148413	0.164305	0.151465	0.176452	0.14438	0.117513
73	0.1251	0.140696	0.130451	0.124264	0.181445	0.196181	0.141494
74	0.150265	0.160381	0.172385	0.177691	0.189438	0.198266	0.17979
75	0.194534	0.163757	0.193319	0.175498	0.195526	0.187259	0.175447
76	0.184743	0.178871	0.177655	0.172012	0.163679	0.21779	0.189481
77	0.21311	0.206269	0.208148	0.175933	0.264956	0.271917	0.219068
78	0.243955	0.246017	0.256752	0.25588	0.200458	0.197183	0.161739
79	0.208032	0.17766	0.193908	0.178082	0.183161	0.199778	0.165178
80	0.175673	0.168444	0.171355	0.165076	0.161417	0.241515	0.224999
81	0.171075	0.169007	0.192135	0.174089	0.167226	0.177733	0.153103
82	0.173229	0.176087	0.162388	0.163124	0.210839	0.220449	0.192848
83	0.210209	0.194981	0.217987	0.187587	0.199102	0.200683	0.185655
84	0.188564	0.201625	0.190661	0.178304	0.170864	0.165121	0.175637
85	0.171963	0.174419	0.173193	0.160818	0.159607	0.166526	0.176929
86	0.177185	0.177428	0.18264	0.158622	0.196794	0.181378	0.158504
87	0.191023	0.199383	0.183564	0.158505	0.177207	0.179335	0.161067
88	0.190155	0.170251	0.194417	0.166943	0.178762	0.169336	0.173368
89	0.172029	0.17336	0.178964	0.16214	0.19186	0.183463	0.188152
90	0.171187	0.181573	0.203834	0.167287	0.195133	0.182439	0.172217
91	0.190071	0.169654	0.211416	0.163399	0.189302	0.190491	0.200318
92	0.205492	0.222087	0.196507	0.193189	0.587313	0.497677	0.479744
99	0.630011	0.606649	0.625247	0.621659	0.472543	0.468613	0.422556
101	0.369553	0.406792	0.42424	0.388872	0.46216	0.396361	0.417578
102	0.446165	0.436425	0.474162	0.491084	0.441685	0.440003	0.416163
103	0.45941	0.478247	0.45553	0.488445	0.411651	0.409018	0.326136
104	0.414714	0.432428	0.391749	0.41137	0.437561	0.405426	0.334601
105	0.382133	0.39945	0.41631	0.381293	0.417734	0.358019	0.395115
106	0.394748	0.414863	0.435645	0.33958	0.433017	0.418489	0.380156
107	0.433697	0.434456	0.417997	0.442523	0.39816	0.391246	0.40179
108	0.375227	0.394802	0.482712	0.399322	0.43013	0.427729	0.349615
110	0.437665	0.445463	0.434223	0.399017	0.433525	0.32913	0.353565
111	0.402306	0.405947	0.391667	0.348431	0.372915	0.427732	0.274101
112	0.321781	0.33261	0.350316	0.416167	0.44508	0.518837	0.385958
113	0.392804	0.460677	0.4463	0.51072	0.610829	0.442954	0.444522
116	0.447136	0.545186	0.518137	0.440719	0.480194	0.554075	0.40388

117	0.475741	0.565413	0.487349	0.599685	0.556718	0.526351	0.446853
118	0.602847	0.665784	0.572729	0.549908	0.585035	0.374824	0.490836
119	0.532002	0.531134	0.526883	0.427903	0.393146	0.320737	0.393857
123	0.246445	0.179542	0.204292	0.323247	0.363937	0.25908	0.309144
126	0.349706	0.280261	0.325728	0.246118	0.373277	0.393883	0.285277
131	0.335276	0.298153	0.262808	0.326067	0.361911	0.45764	0.30641
132	0.360406	0.379387	0.325596	0.341214	0.330139	0.374838	0.401006
Mean Diffusivity (mADC)							
1	1.08467	0.986232	0.932675	1.14845	0.805129	0.872673	1.0276
2	1.20464	1.00883	0.944157	1.19405	0.920009	1.06865	1.04497
3	1.15245	1.04247	0.978235	1.17199	0.991109	1.08079	1.0613
4	1.40221	1.17439	1.08701	1.32989	1.14339	1.2837	1.18784
5	1.27906	1.03126	0.979506	1.19133	1.07282	1.18734	1.04601
6	0.914093	0.850948	0.814306	0.953456	0.790366	0.874861	0.836598
7	1.44567	1.22373	1.12748	1.38615	0.962806	1.18886	1.19767
8	1.39542	1.18177	1.0341	1.45272	0.919571	0.986255	1.21569
9	1.31578	1.25426	1.0572	1.49746	0.851996	0.990589	1.19107
10	1.20175	1.11575	0.972851	1.18305	0.929861	1.00137	1.05951
11	1.33259	1.13766	1.01632	1.2918	1.21268	1.37964	1.08764
12	1.16461	1.04592	0.857976	1.08569	1.00046	0.97647	0.942703
13	1.27509	1.18077	1.01237	1.86809	0.996263	1.36167	1.31601
14	0.886388	1.03067	0.877945	0.946785	0.772203	0.79829	0.948528
15	1.0934	1.07789	0.889445	1.04872	0.894745	0.76888	0.916889
16	1.16522	1.06853	0.943897	1.25718	0.91437	0.848333	1.00073
17	1.17575	0.876386	0.827525	0.993419	0.974308	0.946343	1.06789
18	1.38847	1.10566	1.03508	1.36113	1.13639	1.26001	1.11036
19	1.17565	0.927903	0.894366	1.10089	0.922992	0.978201	0.939049
20	1.21977	1.02645	0.911935	1.18472	1.04551	0.972572	0.989197
21	1.24541	1.05289	1.00193	1.17013	1.23878	1.28634	1.08137
22	1.34068	1.10289	0.994462	1.15974	1.1362	1.23175	1.06089
23	1.57895	1.0864	1.08325	1.43141	1.11677	1.23218	1.20641
24	1.2494	0.96934	0.880407	1.23955	1.12512	1.20195	1.04955
25	1.59572	1.17905	1.03082	1.4691	1.44747	1.42225	1.20239
26	1.11389	0.894743	0.862779	0.968926	0.934769	1.02923	0.98477
27	1.82362	1.12533	1.08168	1.59982	1.51558	1.87173	1.43003
34	0.765467	0.778561	0.696353	0.864514	0.710599	0.818011	0.748372
36	0.848564	0.858785	0.868939	0.945246	0.90813	0.994897	0.929808
37	0.934017	0.813649	0.785355	0.889619	0.841563	1.16814	0.985368
38	0.803889	0.738572	0.733331	0.798559	0.742766	0.977455	0.781793
39	0.800699	0.750497	0.758903	0.801567	0.822228	1.00203	0.850054
40	0.794975	0.758378	0.766864	0.786285	0.727951	0.811726	0.80022

41	0.902948	0.838122	0.845651	0.921236	0.784869	0.871216	0.898444
42	1.05898	0.986359	1.01481	1.21059	0.923837	1.05648	0.949997
43	0.793276	0.741509	0.740127	0.765378	0.728528	0.844894	0.792784
45	0.87422	0.798727	0.823109	0.94707	0.849564	0.917312	0.929239
46	0.806835	0.862111	0.832897	0.867561	0.745984	0.889193	0.79265
47	0.938159	0.779241	0.766043	0.86692	0.85494	0.929806	0.872814
48	0.883013	0.846019	0.819208	0.804751	0.796548	0.851914	0.911396
51	1.2949	1.95217	1.85831	1.27249	1.13507	1.38598	1.44718
52	1.25342	1.03661	1.10196	1.22559	1.1052	1.35747	1.21325
53	1.03664	1.02677	1.01788	1.1316	1.26544	1.19394	1.21515
54	0.800041	0.978973	0.9832	0.834929	0.791926	0.900209	0.830111
58	0.998123	0.896739	0.756953	1.20558	0.681846	0.873029	0.697985
61	0.776446	0.788049	0.713877	0.966136	0.828455	0.944466	0.885206
66	1.50227	1.34812	1.09734	1.55768	1.08816	1.08171	1.10423
67	1.18191	1.05181	0.985895	1.22334	1.10234	1.22791	1.12305
68	1.35725	1.09797	1.05517	1.25859	1.121	1.22759	1.04668
69	1.26857	1.01424	0.981177	1.17877	0.825615	0.871501	0.865379
70	0.935071	0.862964	0.834051	0.961551	1.03048	1.17007	1.25495
71	1.60644	1.31972	1.20838	1.46901	1.00431	1.05485	1.17586
72	1.39251	1.32179	1.07264	1.38384	0.942715	1.14927	1.36827
73	1.42446	1.43741	1.15535	1.82271	1.10077	1.16404	1.10113
74	1.25316	1.27797	0.969076	1.22836	1.18856	1.30656	1.02717
75	1.19727	1.43134	0.973111	1.27272	1.0496	1.09593	0.960309
76	1.26768	1.16014	0.931773	1.18264	1.18393	1.55918	1.32345
77	1.45819	1.40316	1.39663	1.71066	0.821987	0.811264	0.914042
78	0.953875	1.13527	0.859493	1.0264	0.880189	0.833062	0.890395
79	0.991287	1.13054	0.836083	1.00897	0.943746	0.844019	0.965502
80	1.08297	1.18317	0.920444	1.22373	1.29227	0.996727	1.32454
81	1.66426	1.26595	1.15249	1.24115	1.17264	1.31528	1.1382
82	1.40553	1.19027	1.08603	1.37913	0.928252	0.967368	0.918542
83	1.10084	0.95332	0.862376	1.07378	0.999279	0.999902	0.954761
84	1.12592	1.03811	0.911529	1.16329	1.14441	1.19659	1.01368
85	1.24449	1.00468	0.962235	1.13203	1.25463	1.20359	1.06319
86	1.45497	0.987473	0.977735	1.1861	0.992327	1.14335	1.08407
87	1.26772	1.06746	1.06678	1.27014	1.31254	1.44858	1.26237
88	1.51838	1.11319	0.944457	1.45985	1.02364	1.17152	1.04363
89	1.15261	0.993912	0.941853	1.20034	0.991266	1.0342	0.995268
90	1.10781	0.887442	0.901707	1.07505	1.3125	1.56172	1.26322
91	1.69246	1.13997	1.04523	1.58923	1.05613	0.995546	0.945463
92	1.08233	0.869383	0.923412	1.09889	0.654307	0.764803	0.72375
99	0.739442	0.729494	0.704087	0.757781	0.872131	1.0152	0.903686

101	0.925665	0.816847	0.791701	0.939231	0.815991	1.02582	0.806189
102	0.809032	0.749631	0.736339	0.81028	0.904043	0.959427	0.866005
103	0.812221	0.770836	0.788832	0.825588	0.743294	0.817697	0.797007
104	0.805749	0.775577	0.762943	0.81141	0.782752	0.898689	0.857841
105	0.869796	0.807533	0.822617	0.893688	1.19009	1.40178	1.12016
106	1.16502	1.0186	1.01325	1.28778	0.748902	0.79933	0.784525
107	0.767709	0.744827	0.746193	0.765308	0.763676	0.871792	0.857014
108	0.937792	0.886163	0.712237	0.850156	0.783882	0.945139	0.817544
110	0.866863	0.890683	0.838376	0.786811	0.750148	0.919065	0.777911
111	0.768024	0.74823	0.742206	0.89923	0.82445	0.953996	0.924675
112	0.92574	0.860616	0.855884	0.809518	0.754564	0.808988	0.911816
113	0.914912	0.775047	0.762204	0.770046	0.748878	2.01042	0.75635
116	1.30342	1.04928	1.04546	1.2492	1.14172	1.16703	1.15233
117	1.24582	1.045	0.988989	1.02843	1.03958	0.833631	1.13447
118	0.993466	0.940011	0.919471	0.829569	0.779078	0.866218	0.835114
119	0.784835	0.803308	0.785467	0.769372	0.909589	2.00244	0.736475
122	1.31909	1.43179	1.52354	0.728642	0.710582	1.15746	0.71882
123	0.681379	1.17026	0.932506	1.23548	1.00728	0.96352	1.00532
126	1.04486	0.748051	0.726584	1.02938	0.772143	1.23394	0.831917
131	0.992196	1.23761	1.20569	1.33404	0.967167	1.40864	1.07283
132	0.982816	0.906881	0.984753	1.68608	1.35509	1.57576	1.35453

sID	ADN004	ADN005	ADN006	ADN007	ADN008	ADN009	ADN010
Gender	M	M	M	F	M	M	M
ICV	1340009	1194054	1463968	1206161	1324925	1313810	1486829
volbrainICV	1533.491		1652.212	1340.926	1526.538	1471.684	1661.364
volbrainWM	375.13		405.13	412.15	383.79	372.6	449.45
LesLoad	17.1994		7.5644	33.112	6.1029	18.9831	6.9383
LL/ICV	0.011216		0.004578	0.024693	0.003998	0.012899	0.004176
LL/WM	0.045849		0.018672	0.08034	0.015902	0.050948	0.015437
LV_Vol	89.019	88.623	127.799	106.389	107.94	117.686	134.56
LV/ICV	0.05805		0.07735	0.07934	0.070709	0.079967	0.080994
LV/WM	0.237302		0.315452	0.258132	0.281248	0.315851	0.299388
MOCA	25	12	21	10	21	22	20
Delayed Recall	2	0	0	0	1	0	1
Attention	5	3	6	3	5	5	5
Age	64		68	88	73	78	65
Fractional Anisotropy (mFA)							
1	0.21881		0.262084	0.235464	0.229912	0.232958	
2	0.181398		0.172274	0.174103	0.169702	0.174909	

3	0.212946	0.215612	0.210785	0.196896	0.202639
4	0.173675	0.166785	0.171419	0.155054	0.15476
5	0.216591	0.211222	0.195175	0.187607	0.190001
6	0.269493	0.274185	0.269396	0.266887	0.256585
7	0.18361	0.186163	0.172478	0.183944	0.167505
8	0.171888	0.16768	0.16703	0.148034	0.156808
9	0.159282	0.154485	0.150319	0.139698	0.161409
10	0.166743	0.178947	0.160582	0.163189	0.154956
11	0.194014	0.206175	0.184454	0.187869	0.17759
12	0.185918	0.188141	0.172173	0.182256	0.186127
13	0.255046	0.260581	0.293553	0.232596	0.223822
14	0.236478	0.26317	0.255294	0.249427	0.264761
15	0.156036	0.1876	0.151626	0.151505	0.153848
16	0.153167	0.16886	0.147263	0.155733	0.152557
17	0.188345	0.146945	0.198075	0.176021	0.194219
18	0.181371	0.178564	0.171847	0.166697	0.158879
19	0.216519	0.215737	0.186436	0.195164	0.210689
20	0.159811	0.168931	0.158416	0.14805	0.167566
21	0.16184	0.16283	0.157015	0.161655	0.170187
22	0.191243	0.151592	0.175692	0.16778	0.156796
23	0.159214	0.152954	0.167693	0.144273	0.154109
24	0.16889	0.166265	0.176292	0.166405	0.166938
25	0.145568	0.148579	0.151613	0.142234	0.145213
26	0.169546	0.204612	0.236872	0.163886	0.176376
27	0.209411	0.173509	0.187977	0.170224	0.18527
34	0.509553	0.533638	0.505545	0.499201	0.518974
36	0.428827	0.475449	0.411755	0.440433	0.447767
37	0.379022	0.401535	0.333496	0.351179	0.356824
38	0.454355	0.513601	0.462015	0.459997	0.470348
39	0.507914	0.557546	0.478223	0.499807	0.523785
40	0.490071	0.485804	0.433789	0.458693	0.46493
41	0.394077	0.41334	0.423368	0.390898	0.400243
42	0.502622	0.385819	0.392401	0.394006	0.401506
43	0.418734	0.439869	0.388887	0.384657	0.376283
45	0.433572	0.435951	0.401917	0.410389	0.423786
46	0.349521	0.37467	0.348829	0.336808	0.335098
47	0.336884	0.340171	0.329855	0.321719	0.354364
48	0.432625	0.460684	0.442524	0.428218	0.435162
51	0.508563	0.510341	0.491259	0.472619	0.481588
52	0.484292	0.494723	0.475427	0.44071	0.450881
53	0.497348	0.547807	0.517177	0.55675	0.51382

54	0.470256	0.519144	0.452969	0.499616	0.490359
58	0.263896	0.230639	0.191724	0.209944	0.211665
61	0.417088	0.276495	0.398226	0.41533	0.425292
66	0.194265	0.14125	0.201705	0.175599	0.190168
67	0.179847	0.199288	0.180051	0.174546	0.168305
68	0.20278	0.170819	0.186032	0.189107	0.180465
69	0.256949	0.198646	0.24586	0.236084	0.222894
70	0.169163	0.254261	0.15401	0.150829	0.144001
71	0.156868	0.151628	0.140089	0.130783	0.142701
72	0.13489	0.144168	0.119551	0.107222	0.13486
73	0.161867	0.12979	0.147984	0.152043	0.151796
74	0.197244	0.158101	0.180662	0.188095	0.184255
75	0.180624	0.192848	0.166575	0.173652	0.164877
76	0.202898	0.1829	0.170235	0.20978	0.193198
77	0.252677	0.186748	0.244773	0.258261	0.227195
78	0.176588	0.267895	0.159274	0.169355	0.1729
79	0.164935	0.204575	0.15116	0.152471	0.147687
80	0.15778	0.174538	0.170032	0.142007	0.170275
81	0.168372	0.138424	0.162025	0.166735	0.148731
82	0.189767	0.168081	0.18094	0.196143	0.188637
83	0.169908	0.198143	0.171774	0.18241	0.175444
84	0.164997	0.188489	0.165844	0.168558	0.186689
85	0.202463	0.174112	0.191156	0.180096	0.169256
86	0.176909	0.150351	0.169598	0.168595	0.158841
87	0.187247	0.189704	0.175569	0.203178	0.163872
88	0.162443	0.16564	0.175518	0.16386	0.161635
89	0.175132	0.172756	0.184218	0.170382	0.167321
90	0.19542	0.167563	0.179496	0.17925	0.171084
91	0.206051	0.174891	0.177107	0.187804	0.190783
92	0.500608	0.205895	0.466992	0.567538	0.524745
99	0.442614	0.675171	0.417708	0.428717	0.435934
101	0.453594	0.377907	0.430616	0.450358	0.436897
102	0.394615	0.469897	0.441724	0.450488	0.464556
103	0.397061	0.487758	0.383182	0.379527	0.384127
104	0.402573	0.379352	0.372278	0.368047	0.38817
105	0.447291	0.396712	0.393234	0.378515	0.418252
106	0.406549	0.380938	0.391603	0.390353	0.388544
107	0.476186	0.448509	0.367935	0.46697	0.400691
108	0.390998	0.393214	0.399011	0.38635	0.393903
110	0.380658	0.41729	0.300461	0.354668	0.339381
111	0.303383	0.306004	0.446305	0.300404	0.398946

112	0.397832	0.424334	0.490856	0.387921	0.500434
113	0.508068	0.501493	0.415043	0.50914	0.396711
116	0.495419	0.465766	0.56823	0.478462	0.523971
117	0.50583	0.588506	0.493804	0.582173	0.47986
118	0.509028	0.554053	0.417569	0.484951	0.378148
119	0.420643	0.504679	0.291649	0.435584	0.275086
123	0.35994	0.257472	0.244488	0.336205	0.27517
126	0.324237	0.380734	0.425685	0.261104	0.419882
131	0.399912	0.28964	0.348337	0.33923	0.303537
132	0.366566	0.307509	0.445993	0.272386	0.316173
Mean Diffusivity (mADC)					
1	1.0087	1.02579	1.03139	1.11508	0.963676
2	1.02996	1.04401	1.19384	1.13761	1.02557
3	1.09523	1.07589	1.12058	1.17684	1.02241
4	1.2432	1.28069	1.2969	1.35653	1.27588
5	1.06055	1.10521	1.22779	1.1689	1.09612
6	0.902168	0.872666	0.936264	0.982812	0.867392
7	1.20009	1.30337	1.27177	1.34908	1.19252
8	1.2032	1.2887	1.25035	1.41423	1.272
9	1.08173	1.19484	1.17251	1.40044	1.08238
10	1.12916	1.05447	1.2531	1.25383	1.1381
11	1.19264	1.12588	1.2811	1.29555	1.14557
12	1.04166	1.1235	1.14604	1.16288	0.97881
13	1.37258	1.3783	1.26299	1.6038	1.26973
14	0.970405	0.890556	0.932749	1.07011	0.845999
15	1.04778	0.892759	1.11032	1.23079	0.979151
16	1.14675	1.04859	1.1753	1.22977	1.06062
17	1.06037	1.18562	1.30668	1.01537	0.932568
18	1.19312	1.2629	1.37332	1.26609	1.2394
19	1.03824	1.11676	1.23382	1.20329	1.01491
20	1.18109	1.1424	1.26736	1.28727	1.10515
21	1.11667	1.15902	1.3235	1.24274	1.15663
22	1.16564	1.1846	1.23874	1.19959	1.17978
23	1.32789	1.45236	1.26233	1.40296	1.26509
24	1.12255	1.06982	1.18523	1.0705	1.08632
25	1.29289	1.46234	1.53307	1.3963	1.38612
26	1.11537	1.15061	1.54688	0.995	1.03687
27	1.47783	1.99611	1.97437	1.66951	1.6008
34	0.78691	0.749677	0.873346	0.77924	0.82408
36	1.06555	0.927935	0.998919	1.00443	0.917856
37	0.917381	0.873128	1.08771	0.902431	0.958592

38	0.818743	0.792369	0.852593	0.832047	0.827589
39	0.825639	0.853982	0.9077	0.839331	0.856863
40	0.834466	0.777987	0.859007	0.817395	0.792748
41	0.909868	0.919726	0.855756	0.905717	0.886046
42	0.925298	1.02895	1.03246	1.07607	1.02626
43	0.823843	0.774361	0.832129	0.849753	0.82257
45	0.953952	0.914691	0.988651	0.937639	0.899735
46	0.834907	0.787338	0.889462	0.836119	0.857219
47	0.897611	0.959394	1.1476	0.903954	0.893012
48	0.868445	0.832515	0.906188	0.8742	0.835726
51	1.18622	1.19414	1.27845	1.24725	1.24119
52	1.1574	1.16382	1.28401	1.23703	1.25369
53	1.25347	1.06903	1.17363	1.07396	1.18251
54	0.863763	0.81485	0.9451	0.869273	0.842881
58	0.707581	1.10532	0.896887	0.765053	0.826234
61	0.866728	0.800535	0.967853	0.942085	0.873509
66	1.13756	1.25307	1.12758	1.21279	1.05994
67	1.19113	1.1381	1.24923	1.2137	1.17142
68	1.06374	1.21492	1.24878	1.14009	1.10034
69	0.889255	1.09262	0.941491	0.957154	0.908216
70	1.24081	0.89202	1.3468	1.44896	1.28547
71	1.2187	1.38725	1.31983	1.37883	1.21813
72	1.26103	1.36682	1.38402	1.62821	1.21682
73	1.17083	1.40164	1.29108	1.24736	1.14325
74	1.13283	1.12999	1.20966	1.27776	1.11996
75	1.12828	1.1059	1.09776	1.13067	1.03936
76	1.21903	1.06129	1.34043	1.62281	1.27086
77	0.932549	1.34442	0.932225	1.02246	0.853583
78	1.02164	0.87319	1.04564	1.07026	0.92551
79	1.08043	0.920883	1.13071	1.19887	1.06794
80	1.4456	1.04643	1.48428	1.69992	1.0598
81	1.23809	1.27711	1.38296	1.18827	1.23079
82	1.09088	1.2546	1.09479	1.11634	0.985081
83	1.13063	1.06259	1.15997	1.12274	1.00556
84	1.12393	1.0586	1.23463	1.11996	1.0534
85	1.13923	1.07857	1.26257	1.10875	1.16043
86	1.17997	1.22572	1.22084	1.19375	1.19064
87	1.19278	1.14969	1.38792	1.22569	1.23993
88	1.04383	1.24951	1.14878	1.09665	1.08381
89	1.17139	1.08365	1.06863	1.02065	0.989583
90	1.35912	1.04615	1.50071	1.40086	1.40409

91	1.08397	1.39329	1.08047	1.11132	0.97212
92	0.74028	1.02148	0.774941	0.69416	0.704154
99	1.02113	0.751931	0.982902	1.02125	0.905587
101	0.825424	0.887216	0.908409	0.847389	0.882155
102	1.03064	0.825565	0.943546	0.887717	0.903864
103	0.841418	0.82457	0.834007	0.812417	0.791665
104	0.829376	0.778077	0.863037	0.878222	0.849669
105	0.993563	0.849604	0.97282	1.22919	1.04006
106	0.841366	1.07536	0.822424	0.837314	0.813525
107	0.846765	0.768065	0.869322	0.796198	0.818514
108	0.843256	0.804276	0.982019	0.855698	0.920263
110	0.810527	0.761928	0.934577	0.837655	0.898227
111	0.955606	0.92484	0.8518	0.913153	0.827999
112	0.814357	0.882396	0.795892	0.869466	0.745825
113	0.736734	0.764712	1.85169	0.781449	1.68156
116	1.14858	1.18925	1.10467	1.20766	1.12303
117	1.178	1.02303	0.908204	1.02384	0.898883
118	0.857809	0.81853	0.77103	0.881662	0.786386
119	0.83548	0.673463	2.1837	0.8473	2.14919
122	0.70474	1.45431	1.1069	0.734063	1.08052
123	0.969384	0.695855	0.945715	1.19829	0.903144
126	0.839093	1.03774	1.08063	0.865461	1.18599
131	1.03179	1.05074	1.6015	1.02898	1.74233
132	1.43737	1.05409	1.58515	1.74821	1.34274

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