SUPPLEMENTARY MATERIALS

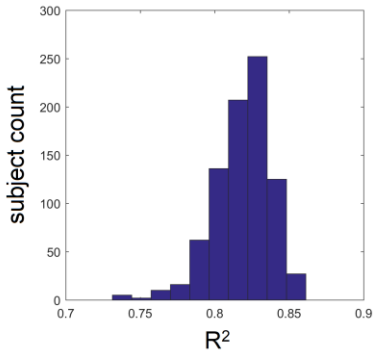


Fig. S1 The histogram showing the empirical distribution of the goodness-of-fit values of the spatial normalization. The goodness-of-fit was quantified by the R^2 value between each subject's normalized anisotropy map and the template. The distribution shows a skewed function with a tail of lower goodness-of-fit values, which allowed us to examine datasets with potential quality issues.

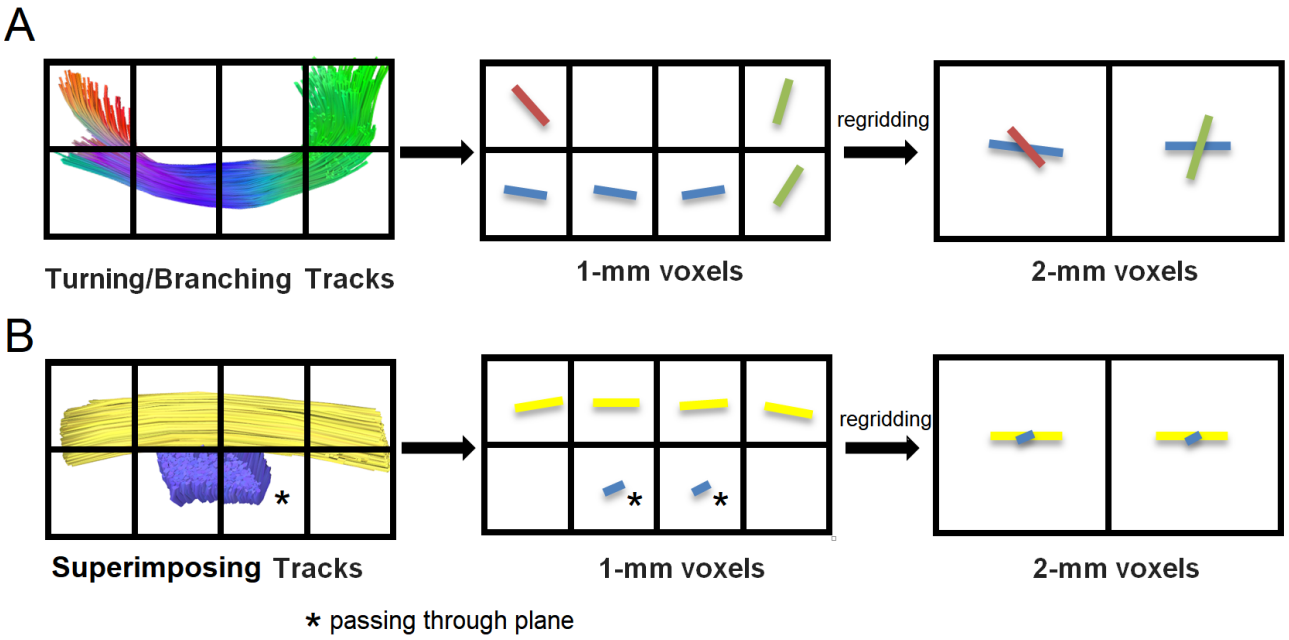
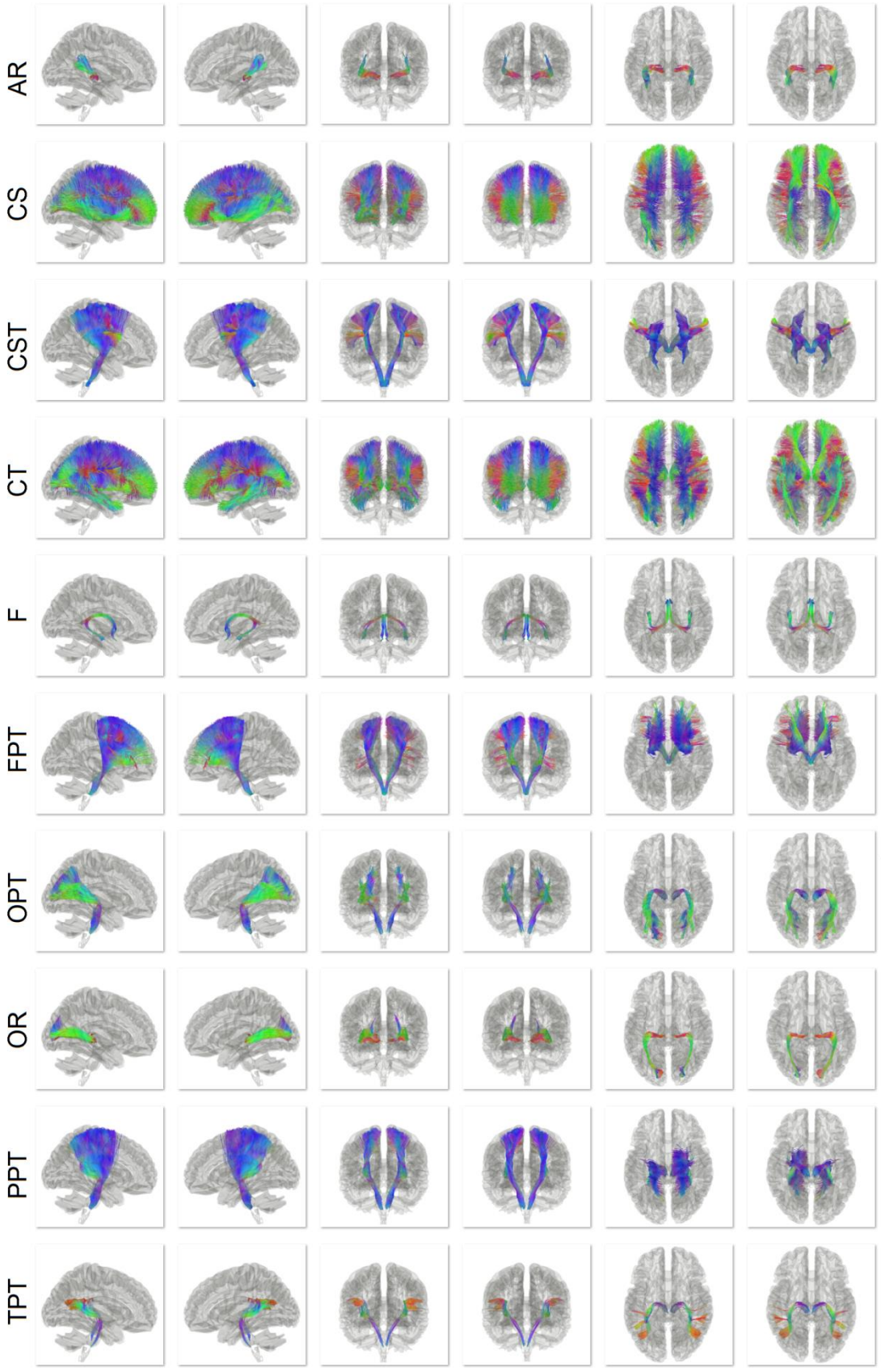


Fig. S2 Spatial resolution affects whether a voxel resolving one ~~o~~r multiple fiber populations. (A) The 1-mm voxels may resolve only one fiber population in branching (red) and turning (green) part of the tracks because the local fiber directions (color bars) do not have a substantial variation that is greater than the angular resolution within the voxel range. In comparison, the 2-mm voxels tend to detect more fiber orientations due to the inclusion of a longer segment of the fibers that lead to a larger difference in the local fiber directions. The larger variation in the local fiber directions can be resolved as multiple fiber populations. (B) The superimposing tracks (yellow) and it nearby through-plane pathways (blue) crossed at the right angle can be independently resolved as single fiber population at 1-mm resolution, but the

2-mm voxels include both of them and appear to have multiple fiber population due to partial volume



effect.

Fig. S3 The fiber bundles in the projection pathways, including acoustic radiation (AR), corticostriatal pathway (CS), corticospinal tract (CST), corticothalamic pathway (CT), fornix (F), frontopontine tract(FPT), occipitopontine tract (OPT), optic radiation (OR), parietopontine tract (PPT), and temporopontine tract (TPT).

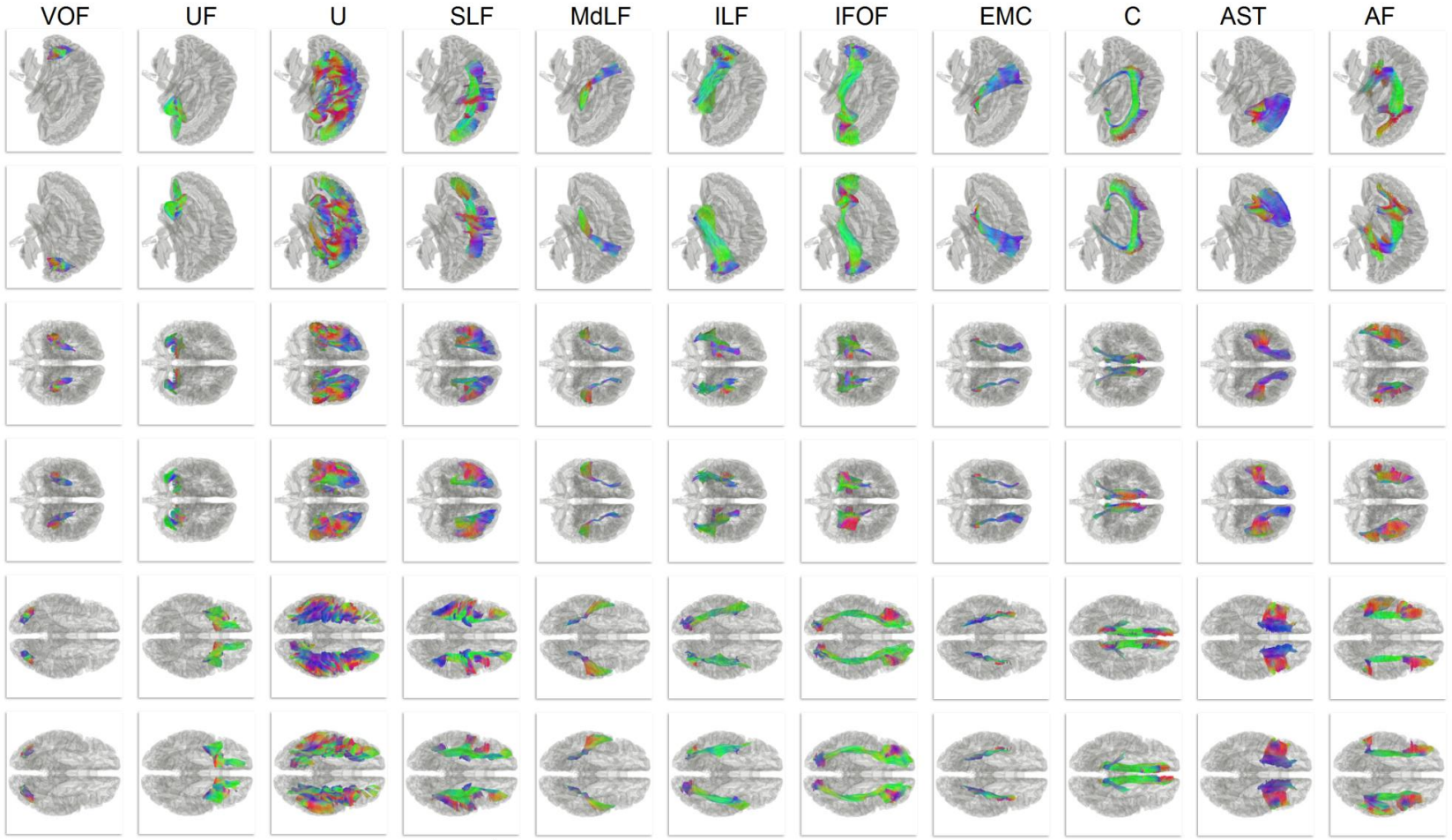

VOF
UF
U
SLF
MdLF
ILF
IFOF
EMC
C
AST
AF

Fig. S4 The fiber bundles in the association pathways, including arcuate fasciculus (AF), frontal aslant tract (AST), cingulum (C), extreme Capsule (EMC), inferior fronto-occipital fasciculus (IFOF), inferior longitudinal fasciculus (ILF), middle longitudinal fasciculus (MdLF), superior longitudinal fasciculus (SLF), U-fibers (U), uncinate fasciculus (UF), and vertical occipital fasciculus (VOF).

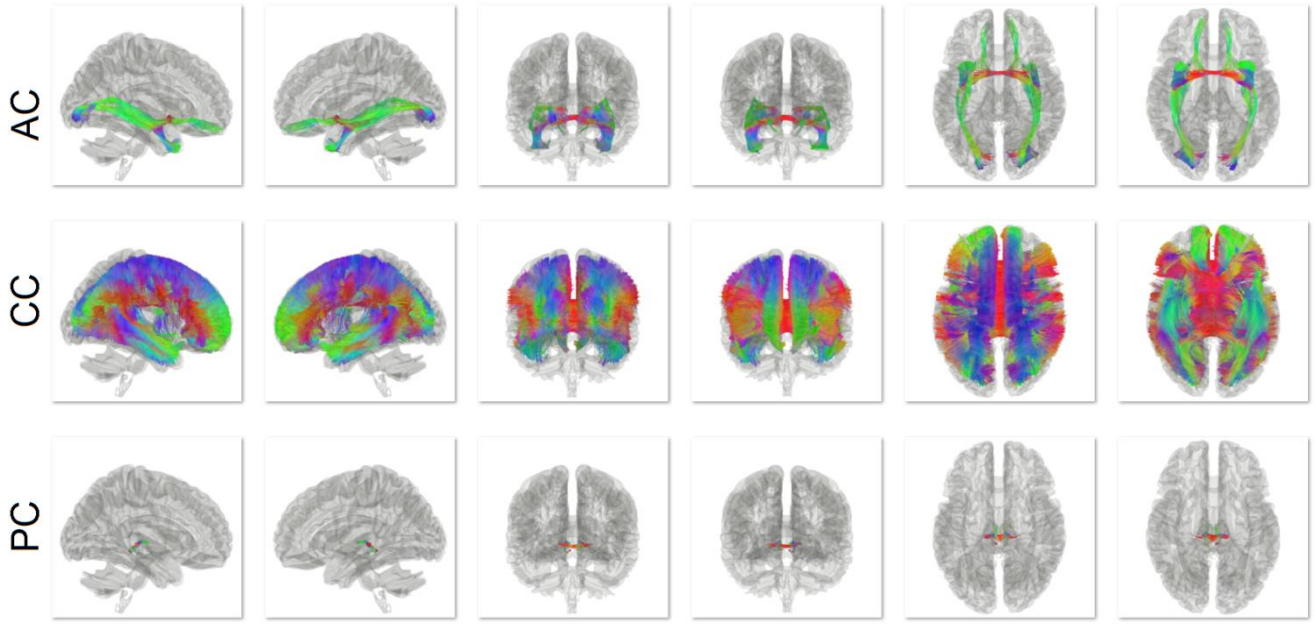


Fig. S5 The fiber bundles in the commissural pathways, including the anterior commissure (AC), corpus callosum (CC), and posterior commissure (PC).

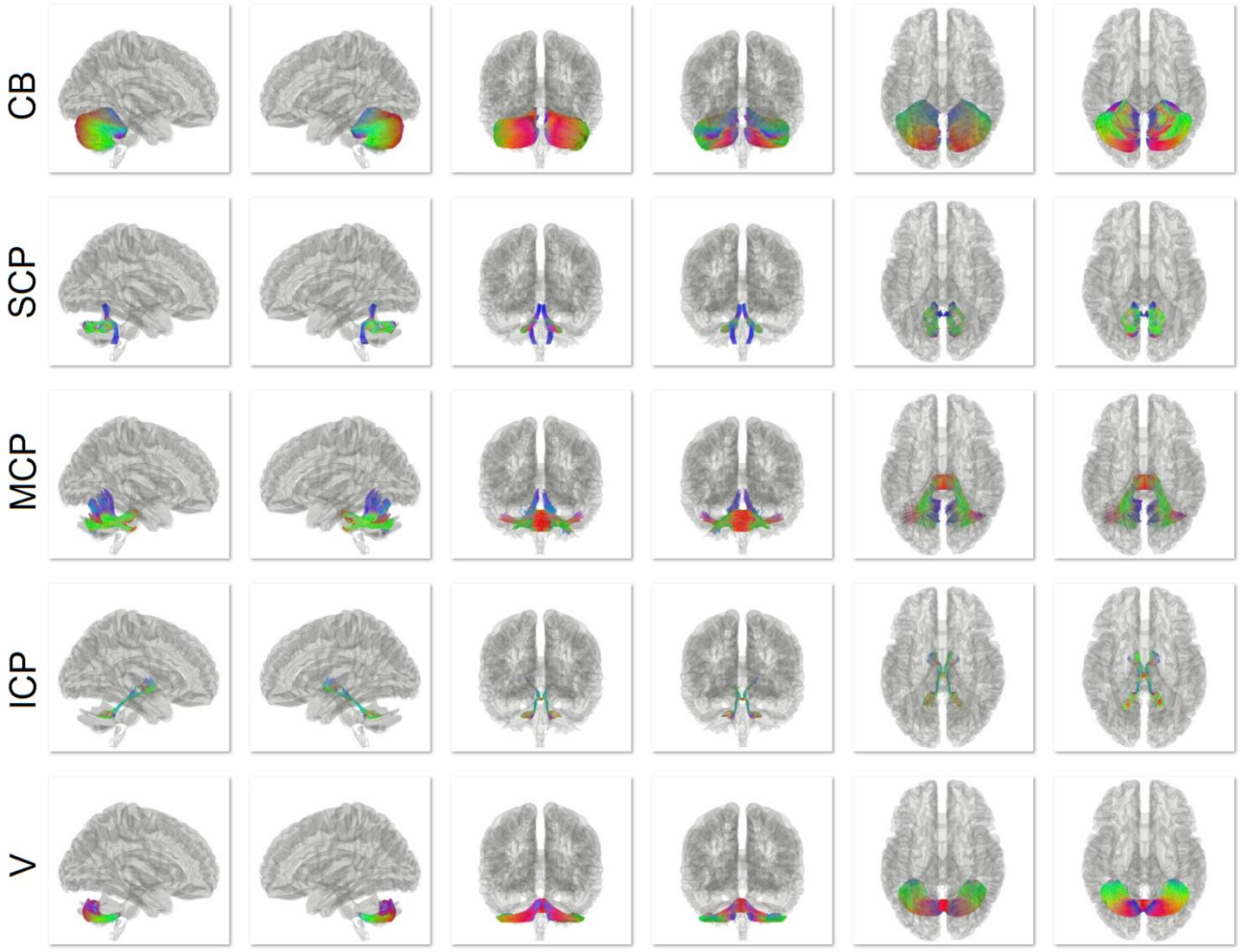


Fig. S6 The fiber bundles in the cerebellar pathways, including the cerebellum (CB), superior cerebellar Peduncle (SCP), middle cerebellar peduncle (MCP), inferior cerebellar peduncle (ICP), and vermis (V)

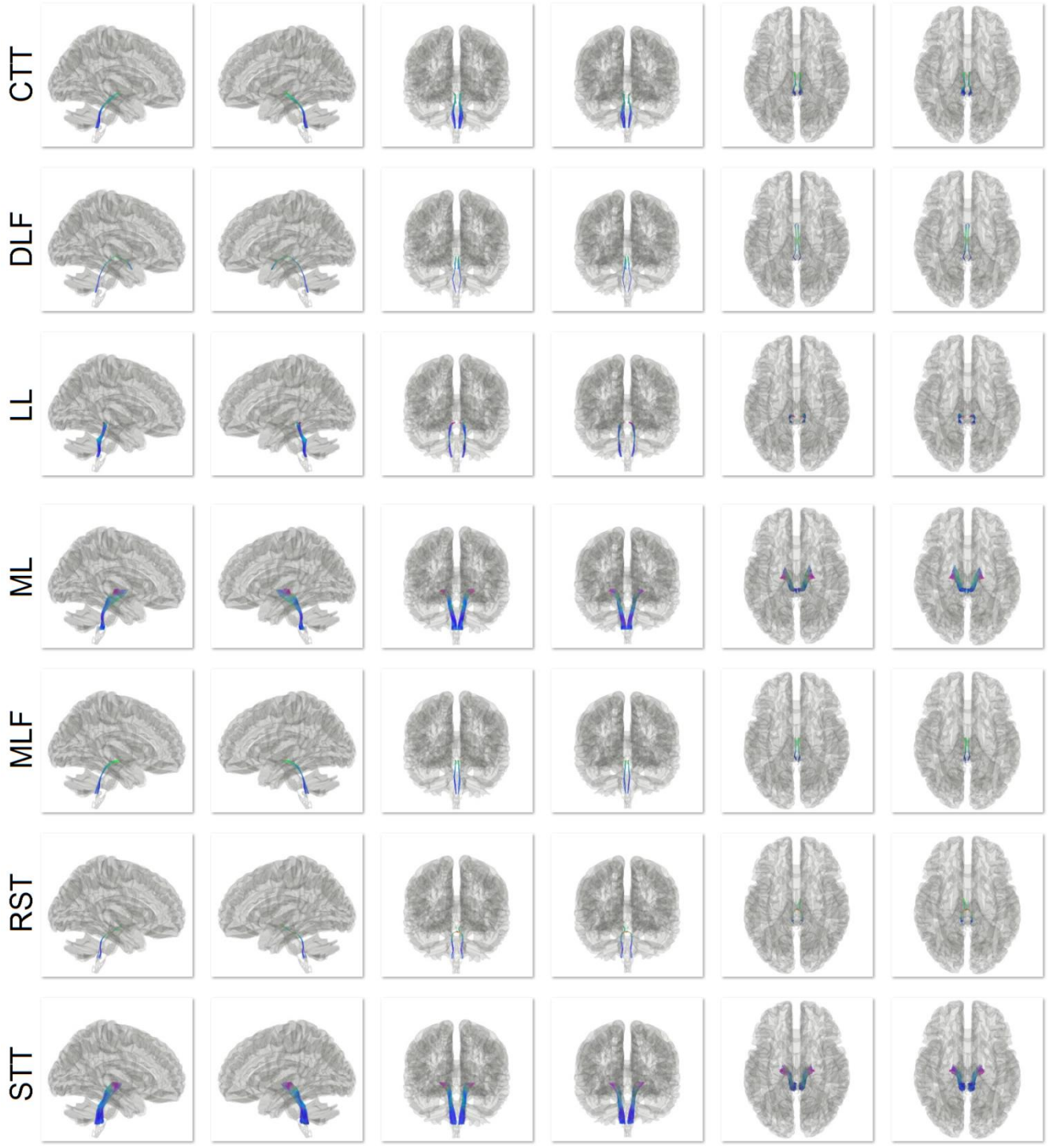


Fig. S7 The fiber bundles in the brainstem, including central tegmental tract (CTT), dorsal longitudinal

fasciculus (DLF), lateral lemniscus (LL), medial lemniscus (ML), medial longitudinal fasciculus (MLF), rubrospinal tract (RST), and spinothalamic tract (STT).

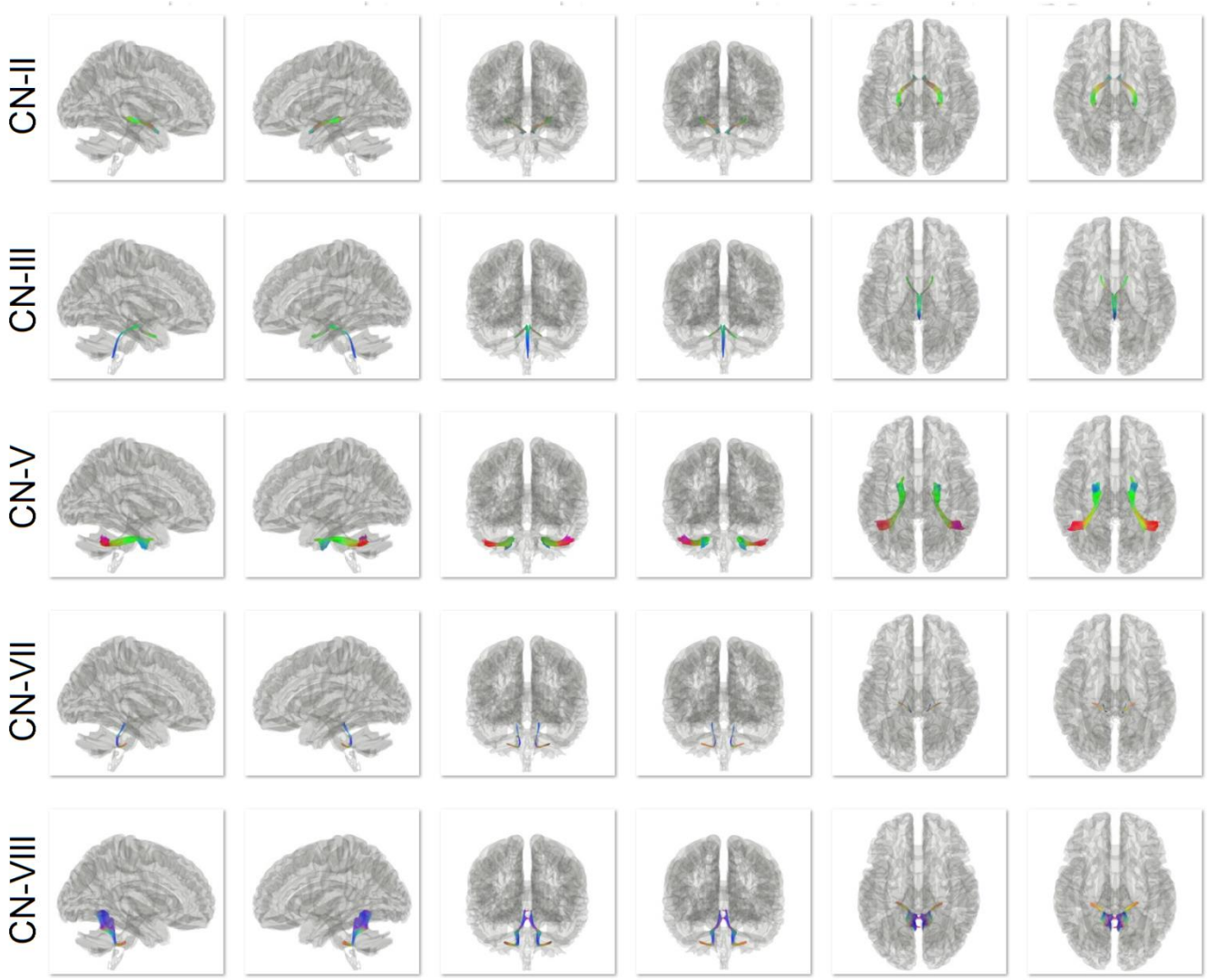


Fig. S8 The cranial nerves included in the atlas, including the visual nerve (CN II), oculomotor (CN III), trigeminal nerve (CN V), facial nerve (CN VII), and auditory nerve (CN VIII).

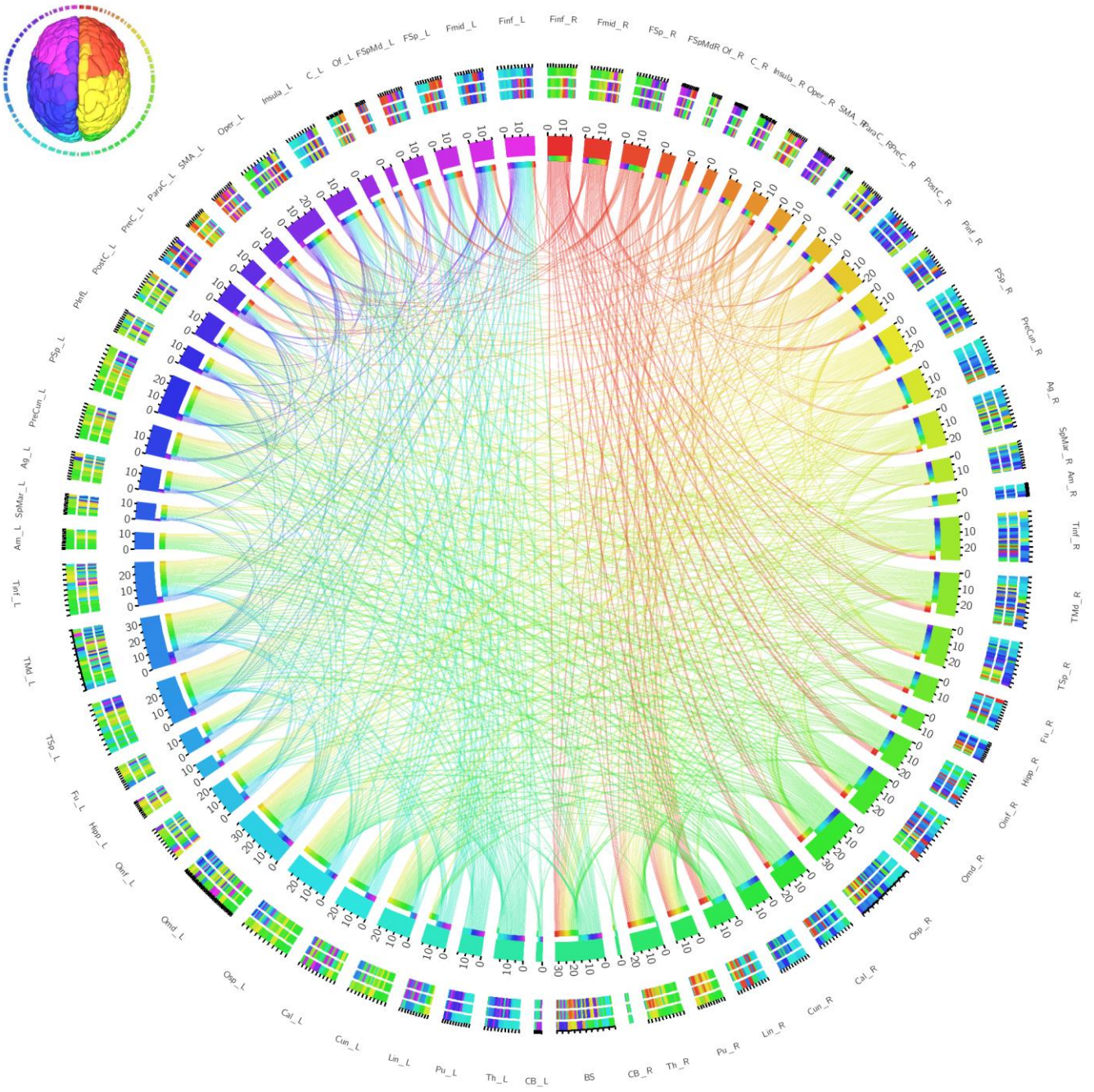


Fig. S9 The first level connectogram of the entire human brain connections. The brain is parcellation into regions, and each region is color-coded as shown in the inset figure to the left upper corner. The left side of the connectogram corresponds to the left hemisphere, whereas the right side of the connectogram

corresponds to the right hemisphere. The connectogram of the human brain shows a dense network topology between the brain regions, forming a complicated architecture.

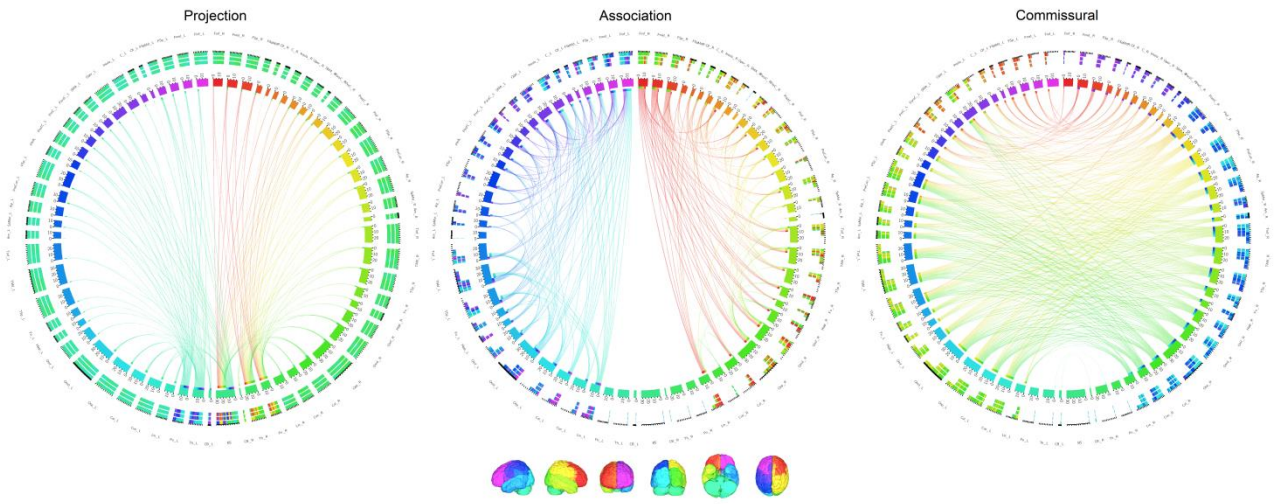


Fig. S10 The second level connectograms of the projection, association, and commissural pathways showing the network topology of each pathway system. The projection pathway forms a hub structure in thalamus, putamen, and brainstem. The association pathway forms numerous clusters within each hemisphere. The commissural pathway provides long ranged communication between the two hemispheres.

Supplementary Table 1: Abbreviations of the fiber pathways and related references

Projection Pathways	
Acoustic Radiation (AR)	
Corticospinal Tract (CST)	(Thiebaut de Schotten et al., 2011b)
Corticobulbar Tract (CBT)	
Corticostriatal Pathway (CS)	(Fernandez-Miranda et al., 2008; Torgerson et al., 2015)
Corticothalamic Pathway (CT)	(Behrens et al., 2003; Wakana et al., 2004)
Fornix (F)	(Catani et al., 2002; Catani and Thiebaut de Schotten, 2008; Thiebaut de Schotten et al., 2011b; Wakana et al., 2004)
Optic Radiation (OR)	(Rubino et al., 2005; Thiebaut de Schotten et al., 2011b)
Frontopontine Tract(FPT)	(Meola et al., 2016c)
Occipitopontine Tract (OPT)	(Meola et al., 2016c)
Parietopontine Tract (PPT)	(Meola et al., 2016c)
Temporopontine Tract (TPT)	(Meola et al., 2016c)
Association Pathways	
Arcuate Fasciculus (AF)	(Axer et al., 2013; Fernandez-Miranda et al., 2015; Rilling et al., 2008; Saur et al., 2008; Thiebaut de Schotten et al., 2012)
Cingulum (C)	(Catani et al., 2002; Catani and Thiebaut de Schotten, 2008; Thiebaut de Schotten et al., 2012; Thiebaut de Schotten et al., 2011b; Wakana et al., 2004)
Extreme Capsule (EMC)	(Makris and Pandya, 2009)
Frontal Aslant Tract (FAT)	(Catani et al., 2012; Thiebaut de Schotten et al., 2012)
Inferior Fronto Occipital Fasciculus (IFOF)	(Catani et al., 2002; Forkel et al., 2014; Makris et al., 2007; Meola et al., 2015; Schmahmann and Pandya, 2007; Thiebaut de Schotten et al., 2012; Thiebaut de Schotten et al., 2011b; Wakana et al., 2004)
Inferior Longitudinal Fasciculus (ILF)	(Amemiya and Naito, 2016; Catani et al., 2002; Catani and Thiebaut de Schotten, 2008; Grossi et al., 2014; Koldewyn et al., 2014; Latini, 2015; Mandonnet et al., 2007; Thiebaut de Schotten et al., 2011b; Tusa and Ungerleider, 1985; Wakana et al., 2004)
Middle Longitudinal Fasciculus (MdLF)	(Makris et al., 2009; Makris et al., 2013; Wang et al., 2013)
Superior Longitudinal	(Budisavljevic et al., 2016; Karlsgodt et al., 2008; Makris et al.,

Fasciculus (SLF)	2005; Thiebaut de Schotten et al., 2011a; Wakana et al., 2004; Wang et al., 2016)
U-fiber (U)	
Uncinate Fasciculus (UF)	(Catani and Thiebaut de Schotten, 2008; Leng et al., 2016; Thiebaut de Schotten et al., 2012; Thiebaut de Schotten et al., 2011b; Wakana et al., 2004)
Vertical Occipital Fasciculus (VOF)	(Takemura et al., 2016; Yeatman et al., 2014)

Commissural Pathways	
Anterior Commissure (AC)	(Catani et al., 2002; Catani and Thiebaut de Schotten, 2008; Thiebaut de Schotten et al., 2011b)
Corpus Callosum (CC)	(Catani and Thiebaut de Schotten, 2008; Huang et al., 2005; Thiebaut de Schotten et al., 2011b; Wakana et al., 2004)
Posterior Commissure (PC)	(Keene, 1938)

Cerebellum	
Cerebellum (CB)	(Catani and Thiebaut de Schotten, 2008; Dell'Acqua et al., 2013; Meola et al., 2016a; Meola et al., 2016c; Wakana et al., 2004)
Superior Cerebellar Peduncle (SCP)	
Middle Cerebellar Peduncle (MCP)	
Inferior Cerebellar Peduncle (ICP)	
Vermis (V)	

Brainstem	
Central Tegmental Tract (CTT)	(Meola et al., 2016c)
Dorsal Longitudinal Fasciculus (DLF)	
Lateral Lemniscus (LL)	
Medial Lemniscus (ML)	
Medial Longitudinal	

Fasciculus (MLF)	
Rubrospinal Tract (RST)	
Spinothalamic Tract (STT)	
Cranial Nerves	(Yoshino et al., 2016b)

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Table S2	Abbreviations of the brain regions
Finf_L	Frontal Inferior Left
Fmid_L	Frontal Middle Left
FSp_L	Frontal Superior Left
FSpMd_L	Frontal Superior Medial Left
Of_L	Olfactory Left
C_L	Cingulum Left
Insula_L	Insula Left
Oper_L	Oper Left
SMA_L	Supp Motor Area Left
ParaC_L	Paracentral Left
PreC_L	Precentral Left
PostC_L	Postcentral Left
PInfL	Parietal Inferior Left
PSp_L	Parietal Superior Left
PreCun_L	Precuneus Left
Ag_L	Angular Left
SpMar_L	SupraMarginal Left
Am_L	Amygdala Left
Tinf_L	Temporal Inferior Left
TMd_L	Temporal Middle Left
TSp_L	Temporal Superior Left
Fu_L	Fusiform Left
Hipp_L	Hippocampus Left
Oinf_L	Occipital Inferior Left
Omd_L	Occipital Middle Left
Osp_L	Occipital Superior Left
Cal_L	Calcarine Left
Cun_L	Cuneus Left
Lin_L	Lingual Left
Pu_L	Putamen Left
Th_L	Thalamus Left
CB_L	Cerebelum Left
BS	BrainStem

CB_R	Cerebelum Right
Th_R	Thalamus Right
Pu_R	Putamen Right
Lin_R	Lingual Right
Cun_R	Cuneus Right
Cal_R	Calcarine Right
Osp_R	Occipital Superior Right
Omd_R	Occipital Middle Right
Oinf_R	Occipital Inferior Right
Hipp_R	Hippocampus Right
Fu_R	Fusiform Right
TSp_R	Temporal Superior Right
TMd_R	Temporal Middle Right
Tinf_R	Temporal Inferior Right
Am_R	Amygdala Right
SpMar_R	SupraMarginal Right
Ag_R	Angular Right
PreCun_R	Precuneus Right
PSp_R	Parietal Superior Right
Pinf_R	Parietal Inferior Right
PostC_R	Postcentral Right
PreC_R	Precentral Right
ParaC_R	Paracentral Right
SMA_R	Supp Motor Area Right
Oper_R	Oper Right
Insula_R	Insula Right
C_R	Cingulum Right
Of_R	Olfactory Right
FSpMdR	Frontal Superior_Medial Right
FSp_R	Frontal Superior Right
Fmid_R	Frontal Middle Right
Finf_R	Frontal Inferior Right