

**Supplementary Table 1.** Anatomic location of statistically significant regions revealed by voxel-wise analysis for total sodium concentration (TSC), fractional anisotropy (FA), mean diffusivity (MD), radial diffusivity (RD) and axial diffusivity (AD) in ALS patients, Fast progressors, slow progressors, compared to healthy controls.

	Cluster size	Minimal p-value		MNI coordinates		
		DTI	TSC	X	Y	Z
<b>ALS versus HC</b>						
<b>TSC <math>\cap</math> FA</b>						
Body of corpus callosum, superior corona radiata left, corticospinal tract left, posterior corona radiata left.	1584	0.036	0.048	-20	-20	37
Body of corpus callosum, superior corona radiata right, corticospinal tract right, genu of corpus callosum, posterior corona radiata right, Superior longitudinal fasciculus right, forceps minor, superior longitudinal fasciculus right, splenium of corpus callosum.	1565	0.024	0.048	16	-16	34
Body of corpus callosum, genu of corpus callosum, forceps minor.	60	0.047	0.042	-17	25	18
Anterior corona radiata right, anterior thalamic radiation right, Inferior fronto-occipital fasciculus right.	33	0.015	0.046	22	31	7
Inferior fronto-occipital fasciculus right, anterior corona radiata right.	19	0.044	0.048	24	28	1
Genu of corpus callosum, forceps minor.	13	0.044	0.048	14	31	8
Unclassified.	7	0.047	0.040	-24	-20	44

Inferior fronto-occipital fasciculus right, anterior corona radiata right.	2	0.036	0.040	25	27	9
Unclassified	1	0.039	0.036	16	3	51
Body of corpus callosum.	1	0.039	0.034	14	-8	35
Body of corpus callosum.	1	0.019	0.034	11	-3	29
Body of corpus callosum.	1	0.005	0.028	19	17	25
Genu of corpus callosum, forceps minor.	1	0.003	0.029	10	29	8
<b>TSC <math>\cap</math> MD</b>						
Superior corona radiata left, corticospinal tract left, body of corpus callosum, posterior corona radiata left.	737	0.027	0.048	-24	-20	33
Superior corona radiata right, corticospinal tract right, Superior longitudinal fasciculus right, superior longitudinal fasciculus right.	311	0.050	0.044	24	-13	32
Posterior limb of internal capsule left, corticospinal tract left.	28	0.049	0.046	-26	-19	15
Body of corpus callosum.	20	0.030	0.033	-16	8	28
Superior corona radiata left, posterior limb of internal capsule left, corticospinal tract left.	16	0.049	0.033	-22	-11	18
Superior corona radiata right.	1	0.028	0.033	25	-13	35
Superior corona radiata left.	1	0.032	0.029	-30	-19	26
Superior corona radiata left.	1	0.023	0.029	-26	-9	24
<b>TSC <math>\cap</math> RD</b>						

Superior corona radiata right, body of corpus callosum, corticospinal tract right, Superior longitudinal fasciculus right, superior longitudinal fasciculus right, posterior corona radiata right, genu of corpus callosum, forceps minor, splenium of corpus callosum.	1771	0.048	0.048	19	-18	36
Superior corona radiata left, body of corpus callosum, corticospinal tract left, posterior corona radiata left.	1599	0.047	0.048	-24	-22	34
Body of corpus callosum.	31	0.037	0.046	-16	10	27
Unclassified.	18	0.046	0.036	17	-3	46
Genu of corpus callosum, forceps minor.	17	0.046	0.048	-17	25	18
Unclassified.	9	0.047	0.042	-24	-20	44
Unclassified.	7	0.049	0.044	-35	-24	39
Body of corpus callosum.	3	0.049	0.044	-16	17	24
Body of corpus callosum.	1	0.041	0.046	14	-8	35
Body of corpus callosum.	1	0.040	0.044	13	-6	34
Body of corpus callosum.	1	0.040	0.038	11	3	28
Body of corpus callosum.	1	0.048	0.038	19	15	26
Body of corpus callosum.	1	0.033	0.035	19	17	25
Body of corpus callosum.	1	0.035	0.042	-16	14	25
Genu of corpus callosum.	1	0.034	0.033	-17	20	22
Genu of corpus callosum, forceps minor.	1	0.007	0.029	16	31	14
Genu of corpus callosum, forceps minor.	1	0.009	0.028	17	32	12
<b>Fast versus HC</b>						
<b>TSC <math>\cap</math> FA</b>						

Body of corpus callosum, genu of corpus callosum, forceps minor, superior corona radiata right, superior corona radiata left, corticospinal tract left, anterior corona radiata right, corticospinal tract right, posterior corona radiata right, posterior corona radiata left, anterior corona radiata left, splenium of corpus callosum.	4334	0.031	0.049	-18	-20	34
Genu of corpus callosum, forceps minor.	20	0.040	0.049	-12	25	-6
Superior corona radiata left, corticospinal tract left.	13	0.032	0.049	-26	-20	32
Body of corpus callosum.	8	0.023	0.049	8	-27	24
Body of corpus callosum.	5	0.019	0.044	11	-25	26
Unclassified.	5	0.040	0.044	-8	16	-8
Body of corpus callosum.	4	0.032	0.035	9	-7	28
Body of corpus callosum.	1	0.040	0.041	10	-20	26
Body of corpus callosum.	1	0.040	0.041	7	-19	25
Body of corpus callosum.	1	0.019	0.024	8	-21	25
Genu of corpus callosum, forceps minor.	1	0.021	0.022	-13	29	-3
Genu of corpus callosum.	1	0.005	0.013	-12	22	-7
<b>TSC <math>\cap</math> MD</b>						
Superior corona radiata right, body of corpus callosum, corticospinal tract right, Superior longitudinal fasciculus right, superior longitudinal fasciculus right, anterior corona radiata right, genu of corpus callosum.	1648	0.045	0.049	26	-12	30

Superior corona radiata left, body of corpus callosum, corticospinal tract left, posterior corona radiata left.	1114	0.024	0.026	-24	-20	33
Genu of corpus callosum, forceps minor, body of corpus callosum, anterior corona radiata right.	752	0.044	0.049	-4	28	6
Anterior limb of internal capsule right, superior fronto-occipital fasciculus (could be a part of anterior internal capsule) right, superior corona radiata right, posterior limb of internal capsule right, anterior thalamic radiation right, corticospinal tract right.	164	0.040	0.049	23	0	18
Anterior limb of internal capsule left, superior corona radiata left, anterior corona radiata left, superior fronto-occipital fasciculus (could be a part of anterior internal capsule) left, anterior thalamic radiation left, external capsule left.	136	0.045	0.044	-23	-1	19
Inferior fronto-occipital fasciculus right, anterior corona radiata right, anterior limb of internal capsule right, anterior thalamic radiation right.	110	0.040	0.049	23	26	0
Genu of corpus callosum, anterior corona radiata left, body of corpus callosum, superior corona radiata left.	62	0.045	0.049	-19	12	27
Unclassified.	46	0.043	0.035	15	10	47
Anterior corona radiata right, anterior thalamic radiation right, Inferior fronto-occipital fasciculus right.	45	0.021	0.049	25	28	10

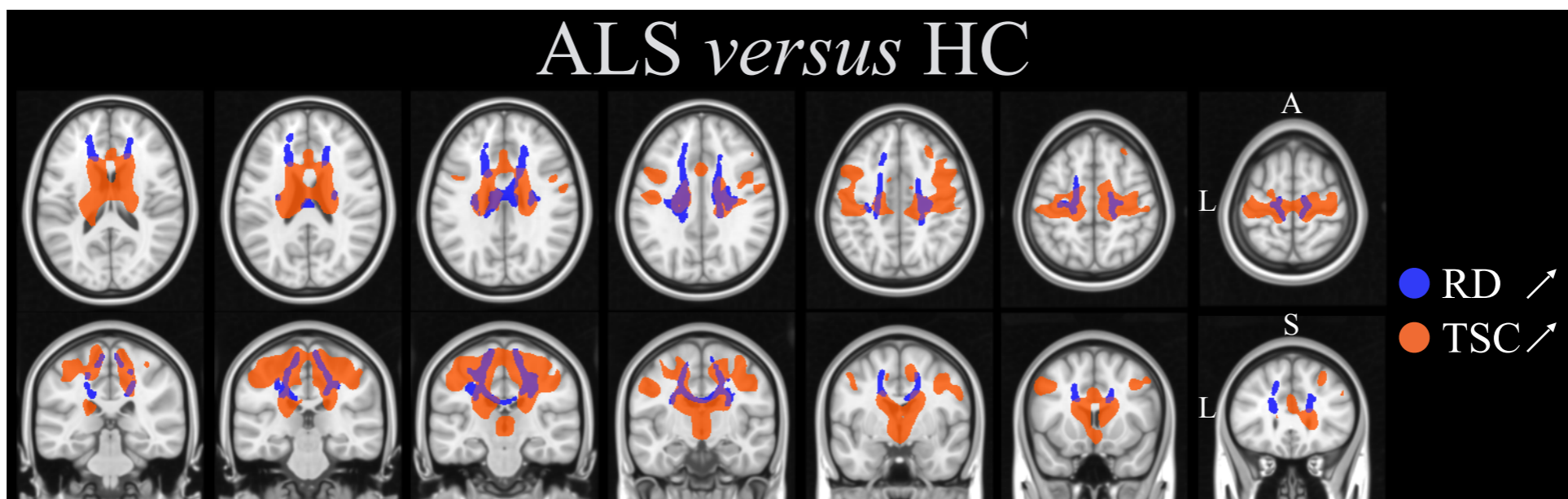
Anterior corona radiata right, superior corona radiata right, anterior limb of internal capsule right.	41	0.045	0.049	25	15	16
Superior corona radiata right, anterior corona radiata right.	39	0.041	0.049	23	16	28
Body of corpus callosum.	21	0.039	0.041	-9	-24	26
Posterior limb of internal capsule left, superior corona radiata left.	20	0.043	0.044	-23	-11	17
Unclassified.	14	0.041	0.044	18	28	30
Anterior corona radiata right.	7	0.040	0.049	25	21	16
Body of corpus callosum.	5	0.041	0.049	-15	15	24
Posterior limb of internal capsule left, corticospinal tract left.	5	0.043	0.038	-26	-16	17
Anterior corona radiata left, anterior thalamic radiation left, Inferior fronto-occipital fasciculus left.	4	0.048	0.028	-24	19	12
Genu of corpus callosum.	3	0.017	0.038	20	23	22
Genu of corpus callosum, forceps minor.	3	0.045	0.016	-11	31	4
Superior corona radiata right.	2	0.036	0.049	29	-12	23
Inferior fronto-occipital fasciculus right, anterior corona radiata right.	2	0.041	0.038	25	25	13
Genu of corpus callosum, forceps minor.	2	0.030	0.013	-13	31	8
Inferior fronto-occipital fasciculus right, anterior corona radiata right.	2	0.041	0.033	21	25	-3
Superior corona radiata left.	1	0.038	0.031	-19	0	32

Unclassified.	1	0.036	0.031	18	28	28
Superior corona radiata left.	1	0.035	0.021	-19	10	28
Body of corpus callosum.	1	0.049	0.015	-16	16	26
Unclassified.	1	0.029	0.016	-17	38	24
Superior corona radiata right.	1	0.036	0.024	25	7	24
Body of corpus callosum.	1	0.018	0.013	6	10	22
Superior corona radiata right.	1	0.033	0.015	25	8	21
Anterior thalamic radiation right, anterior corona radiata right.	1	0.035	0.016	23	31	18
Corticospinal tract left, posterior limb of internal capsule left.	1	0.016	0.013	-26	-21	17
Forceps minor, anterior corona radiata right.	1	0.014	0.013	18	34	9
<b>TSC <math>\cap</math> RD</b>						
Body of corpus callosum, genu of corpus callosum, forceps minor, superior corona radiata right, superior corona radiata left, corticospinal tract left, corticospinal tract right, anterior corona radiata right, posterior corona radiata right, posterior corona radiata left, anterior corona radiata left, Superior longitudinal fasciculus right, superior longitudinal fasciculus right, splenium of corpus callosum.	4113	0.029	0.049	-18	-15	34
Superior corona radiata left, corticospinal tract left, posterior corona radiata left.	93	0.041	0.041	-26	-19	32
Unclassified.	72	0.049	0.049	-11	42	35

Unclassified.	12	0.031	0.049	-12	31	41
Unclassified.	8	0.037	0.049	-17	38	24
Genu of corpus callosum, forceps minor.	7	0.031	0.049	-12	31	8
Unclassified.	7	0.029	0.044	-8	17	-8
Body of corpus callosum.	4	0.023	0.049	9	-10	27
Unclassified.	3	0.037	0.049	-15	37	30
Unclassified.	3	0.041	0.049	18	28	30
Body of corpus callosum.	3	0.041	0.049	5	-20	24
Body of corpus callosum.	2	0.049	0.044	-13	-23	28
Body of corpus callosum.	2	0.037	0.049	9	-13	27
Superior corona radiata right.	2	0.041	0.049	29	-13	23
Unclassified.	1	0.020	0.049	15	-38	38
Unclassified.	1	0.041	0.044	-13	37	34
Unclassified.	1	0.031	0.044	-13	42	30
Unclassified.	1	0.037	0.044	-14	40	30
Unclassified.	1	0.032	0.044	18	28	28
Superior corona radiata left.	1	0.041	0.044	-19	10	28
Body of corpus callosum.	1	0.029	0.035	10	-20	26
Body of corpus callosum.	1	0.049	0.035	7	-19	25
Body of corpus callosum.	1	0.032	0.044	8	-21	25
Genu of corpus callosum.	1	0.041	0.035	-16	22	24
Unclassified.	1	0.041	0.022	0	-21	23

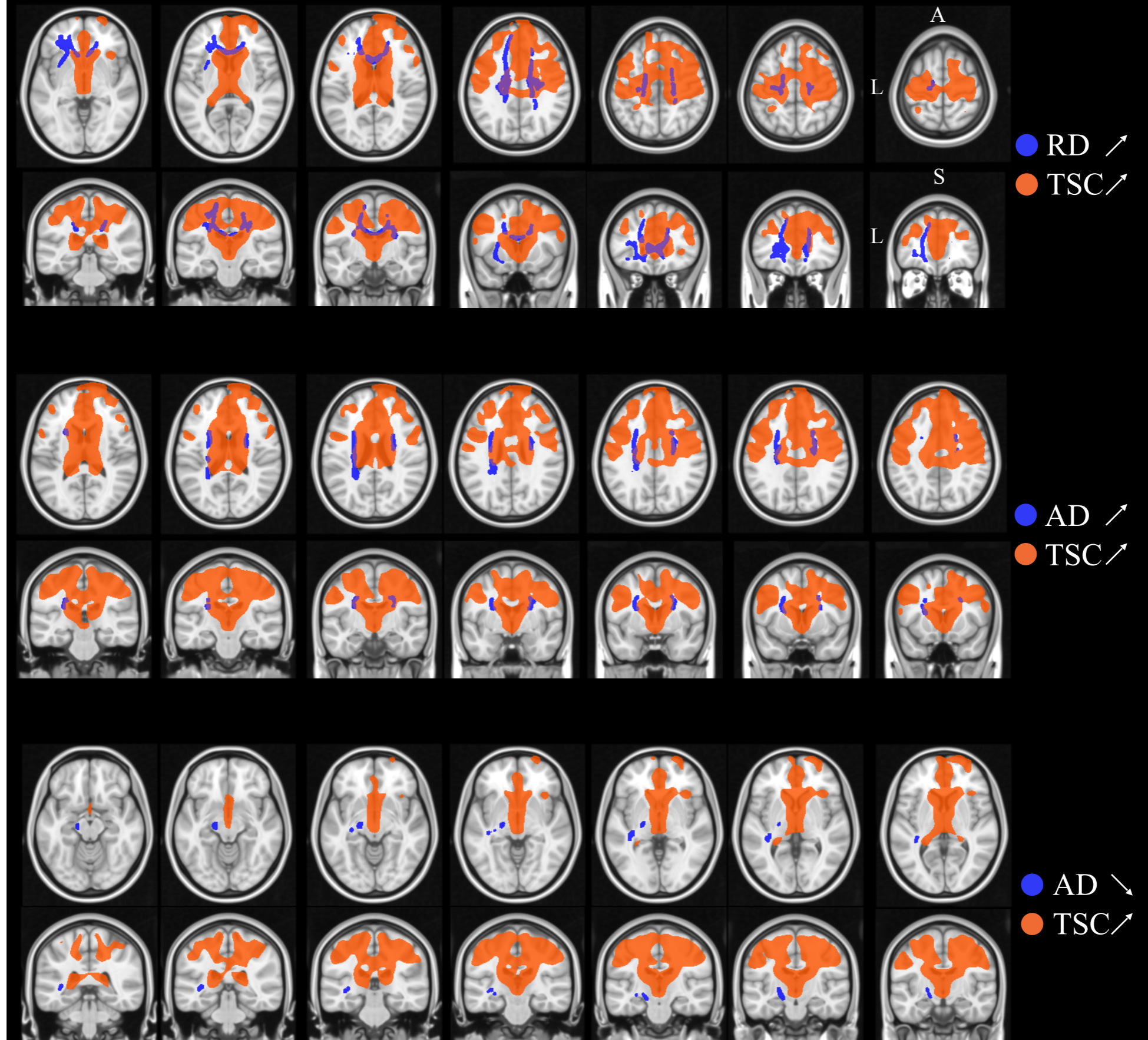


Anterior corona radiata left.	1	0.017	0.013	-25	14	13
Genu of corpus callosum.	1	0.007	0.013	-12	22	-7
<b>TSC <math>\cap</math> AD</b>						
Superior corona radiata right.	201	0.033	0.049	25	-5	23
Superior corona radiata left, posterior corona radiata left.	162	0.045	0.049	-27	-9	27
Anterior corona radiata left, anterior limb of internal capsule left, anterior thalamic radiation left, superior corona radiata left, external capsule left.	70	0.039	0.049	-23	0	19
Superior corona radiata right, superior fronto-occipital fasciculus (could be a part of anterior internal capsule) right.	23	0.033	0.022	24	0	20
Posterior corona radiata left.	22	0.016	0.024	-21	-30	28
Superior corona radiata right.	1	0.012	0.013	25	4	28
Superior corona radiata right.	1	0.013	0.013	25	8	21
Superior corona radiata right.	1	0.013	0.014	25	9	19
<b>Slow versus HC</b>						
<b>FA</b>						
Superior corona radiata left, corticospinal tract left.	199	0.039	-	-21	-21	38
Superior corona radiata right, body of corpus callosum, corticospinal tract right.	120	0.036	-	20	-18	38



**Supplementary Figure 1.** Significant clusters resulting from the comparison between ALS patients and HC using voxel-wise analysis for TSC (increased in ALS) and tract-based spatial statistics for RD (increased in ALS). A, anterior; ALS, amyotrophic lateral sclerosis; HC, healthy controls; L, left; RD, radial diffusivity; S, superior.

# Fast versus HC



**Supplementary Figure 2.** Significant clusters resulting from the comparison between Fast progressors and HC using voxel-wise analysis for TSC (increased in ALS) and tract-based spatial for RD (increased in ALS) and AD (increased and decreased in ALS). A, anterior; ALS, amyotrophic lateral sclerosis; FA, fractional anisotropy; HC, healthy controls; L, left; MD, mean diffusivity; S, superior.