Supplementary

Appendix 1 White matter volume analysis

To examine the white matter volume (WMV) in patients with SCA3, the Computational Anatomy Toolbox (CAT12, http://www.neuro.uni-jena.de/cat/) and the SPM12 (http://www.fil.ion.ucl.ac.uk/spm/software/spm12) were employed to process structural data. In each participant, high-spatial-resolution T1-weighted images underwent manual reorientation with the origin placed at the anterior commissure. Bias field inhomogeneity correction was then performed using an algorithm. Subsequently, the T1 images were segmented into gray matter, white matter, and CSF using CAT12. All segmented results underwent visual inspection. The images were then spatially normalized using the Diffeomorphic Anatomical Registration Through Exponentiated Lie algebra (DARTEL) algorithm. Total relative WMV were computed by dividing the total volume white matter (the sum of all voxels classified as white matter) by the total intracranial volume (TIV) (the sum of all voxels classified as gray or white matter or as CSF). Finally, the white matter relative volume was obtained for each white matter functional network (WMFN). Specifically, the masks of WMFNs were first normalized to the same template as the segmented white matter images using DARTEL algorithm, was used as a binary mask to select the regions of interest (ROIs) corresponding to each WMFN in the segmented white matter image. Then, the white matter relative volume was defined as the sum of all the voxels classified as white matter inside the respective ROI and divided by the TIV.

Table S1 Between-group differences of white matter volumes

Abbreviations	HCs	SCA3	P value	*t* values
WM1	17.20±1.08	16.87±0.98	0.05	−2.24
WM2	14.31±0.87	14.16±0.81	0.25	−1.34
WM3	14.04±0.71	13.80±0.71	0.05	−2.36
WM4	23.65±1.23	23.22±1.29	0.05	−2.48
WM5	9.17±0.61	9.27±0.61	0.53	0.75
WM6	15.54±1.17	15.71±1.16	0.55	0.66
WM7	17.38±0.94	17.22±0.88	0.25	−1.36
WM8	17.08±1.19	16.95±1.07	0.42	−0.98
WM9	6.08±0.28	5.61±0.29	<0.001*	−10.77
WM10	25.20±1.37	24.80±1.26	0.06	−2.14
WM11	21.82±1.31	21.95±1.23	0.65	0.46
WM12	7.22±0.35	5.75±0.42	<0.001*	−24.54
WM13	13.02±0.87	10.19±1.12	<0.001*	−18.14
WM14	8.72±0.44	7.52±0.48	<0.001*	−17.07

Data are presented as mean ± standard deviation. P values were corrected by False discovery rate. *, significant between-group differences. WM1, the default-mode white matter network; WM2, the executive control white matter network; WM3, the temporo-motor white matter network; WM4, the somatomotor white matter network; WM5, the limbic white matter network; WM6, the visual white matter network; WM7, the dorsal frontoparietal white matter network; WM8, the forceps minor network; WM9, the internal capsule network; WM10, the deep white matter network; WM11, the deep occipital white matter network; WM12, the midbrain network; WM13, the cerebellar white matter network; WM14, the pons network.

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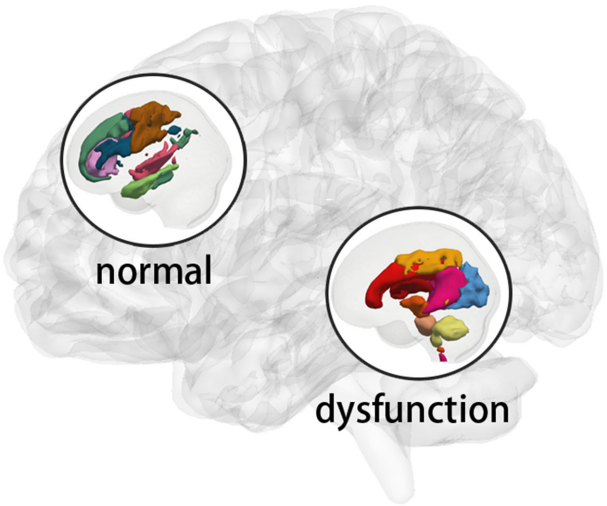

Figure S1 WMFNs without significant between-group differences (normal WMFNs) were mainly located in superficial-layer (WM1–5) and frontal region (WM8). WMFNs with significantly decreased amplitudes in SCA3 (dysfunctional WMFNs) were mainly located in middle-layer (WM7, WM9), deep-layer (WM10, WM11), infratentorial group (WM12–14), and occipital region (WM6). WMFNs, white matter functional networks.

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