

Supplementary Information

	T2 (ms) in PFC	T2 (ms) in Hip
W/CTRL	55 ± 2	56 ± 2
WKY/CMS	55 ± 3	55 ± 1

Supplementary Table 1. T2 values in the PFC and Hip, expressed as mean ± SD. No significant differences were observed between WKY/CMS and W/CTRL rats in either region.

	PFC				Hip			
	W/CTRL		WKY/CMS		W/CTRL		WKY/CMS	
	Mean ± SD (mM)	CV%	Mean ± SD (mM)	CV%	Mean ± SD (mM)	CV%	Mean ± SD (mM)	CV%
Cr	2.6 ± 0.5	17.3	2.0 ± 0.3	15.2	3.7 ± 0.2	5.9	4.0 ± 0.3	7.9
PCr	4.1 ± 0.3	7.3	3.8 ± 0.6	15.0	4.8 ± 0.2	4.5	4.7 ± 0.3	6.1
Gln	5.2 ± 0.7	14.0	3.2 ± 0.6	19.1	4.8 ± 0.3	6.1	3.9 ± 0.4	10.4
Glu	13.9 ± 1.5	11.1	10.9 ± 1.5	14.2	13.1 ± 0.5	3.9	13.1 ± 0.5	3.8
GSH	1.2 ± 0.7	62.7	0.9 ± 0.2	22.8	1.5 ± 0.4	25.6	1.4 ± 0.2	12.4
Ins	4.1 ± 0.2	5.1	4.8 ± 0.3	7.0	7.3 ± 0.6	8.8	7.8 ± 0.2	2.4
Tau	6.5 ± 0.6	10.3	4.6 ± 0.7	16.0	8.2 ± 0.5	5.6	7.8 ± 0.5	6.9
tCho	1.3 ± 0.3	25.0	1.0 ± 0.2	20.2	1.5 ± 0.1	8.8	1.1 ± 0.1	7.4
tNAA	8.9 ± 1.3	15.0	7.0 ± 1.1	16.2	10.2 ± 0.7	6.8	10.3 ± 0.3	3.2
MM09	7.5 ± 1.0	13.7	7.8 ± 0.9	12.1	7.8 ± 1.1	13.7	6.5 ± 0.6	9.7
MM14+Lip13	12.3 ± 0.7	6.0	11.9 ± 1.1	8.9	11.7 ± 0.9	7.9	10.1 ± 1.3	12.6

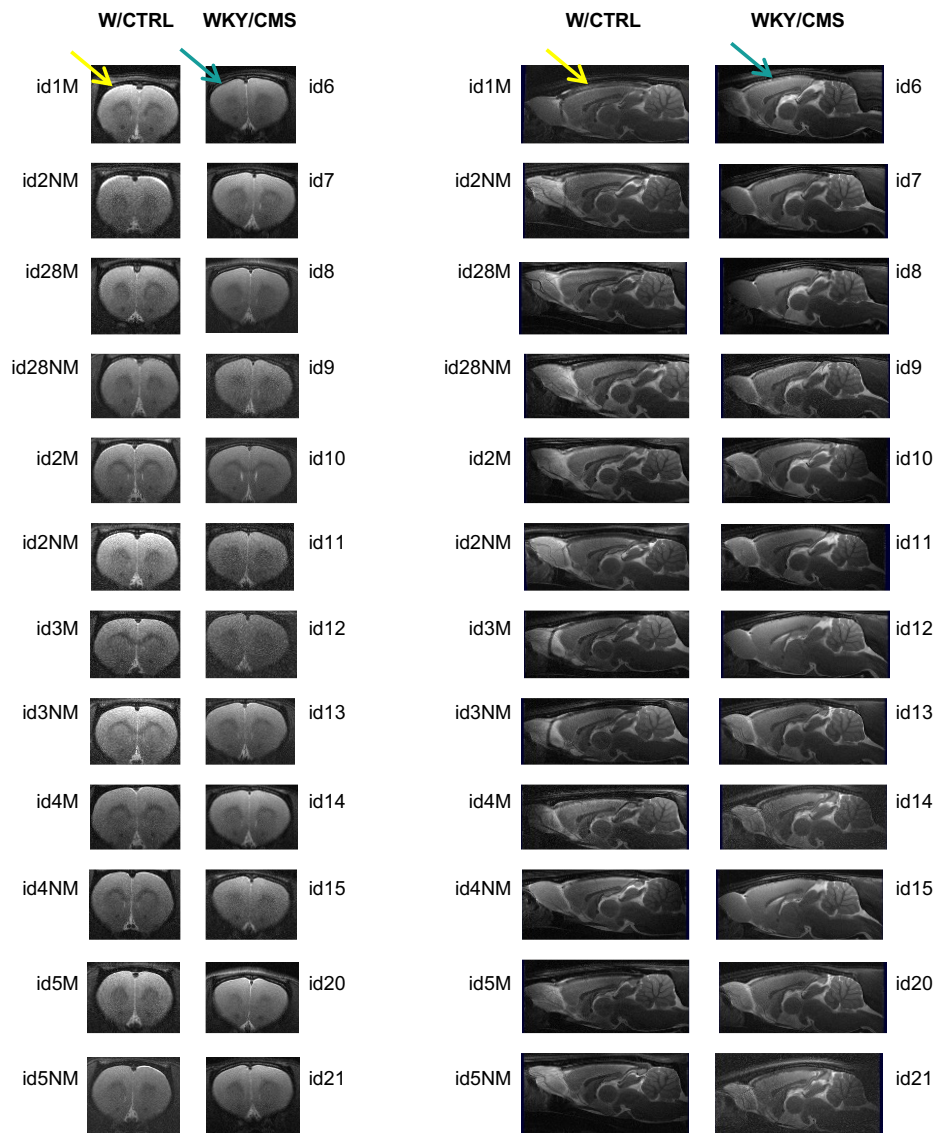
Supplementary Table 2. Mean ± SD and CV% of metabolite levels in the PFC and Hip. Only metabolites, macromolecular, and lipid signals meeting the inclusion criterion (see Methods – Statistical analysis) are reported.

Spectral quality metrics				
	PFC		Hip	
	FWHM (Hz)	SNR	FWHM (Hz)	SNR
W/CTRL	13 ± 2	22 ± 6	11 ± 2	17 ± 6
WKY/CMS	18 ± 1	17 ± 3	10 ± 2	15 ± 3
	CRLB in PFC		CRLB in Hip	
	W/CTRL	WKY/CMS	W/CTRL	WKY/CMS
Cr	11 ± 1	20 ± 4	11 ± 3	10 ± 2
PCr	8 ± 1	12 ± 1	9 ± 2	10 ± 1
Gln	9 ± 1	15 ± 2	15 ± 4	17 ± 4
Glu	2.9 ± 0.6	3.7 ± 0.5	5 ± 1	4.9 ± 0.8
GSH	17 ± 4	20 ± 4	16 ± 3	18 ± 3
Ins	5 ± 1	5.3 ± 0.8	5 ± 1	5.0 ± 0.8
Tau	4 ± 2	6.1 ± 0.9	5 ± 2	5 ± 1
tCho	4.1 ± 0.8	5.9 ± 0.7	6 ± 2	7 ± 1
tNAA	3.0 ± 0.5	4.0 ± 0.6	3.9 ± 0.9	3.6 ± 0.5
MM09	11 ± 2	12 ± 1	13 ± 2	14 ± 1
MM14+Lip13	13 ± 2	15 ± 1	17 ± 3	18 ± 2

Supplementary Table 3. Mean ± SD of spectral quality metrics FWHM (Hz) and SNR, and of the individual metabolites and macromolecular signals (CRLBs) included in the analysis in the PFC and Hip. FWHM values (Hz) correspond to the water linewidth measured after shimming.

Measure	1 comps	2 comps	3 comps	4 comps	5 comps
	PFC				
Accuracy	0.88333	1.0	1.0	1.0	1.0
R2	0.65498	0.89633	0.92811	0.96596	0.97992
Q2	0.54375	0.79608	0.76658	0.82018	0.83638
	Hip				
Accuracy	0.93333	1.0	0.95	0.95	0.88333
R2	0.7522	0.91342	0.9469	0.96672	0.96961
Q2	0.5846	0.6877	0.62608	0.58761	0.63752

Supplementary Table 4. PLS-DA cross-validation details for PFC and Hip.



Supplementary Figure 1. Sagittal and axial T2-weighted anatomical MRI images from all rats included in the study ($n = 12$ per group). The images illustrate the consistent morphological differences between groups, showing a shorter and more ellipsoid-shaped brain in WKY/CMS rats compared to W/CTRL controls. The panels on the left display axial views for W/CTRL and WKY/CMS rats, respectively; the panels on the right show the sagittal views for W/CTRL and WKY/CMS rats, respectively.