Supporting Information

Evaluating Sample Normalization Methods for MS-based Multi-omics and the Application to a Neurodegenerative Mouse Model

Gwang Bin Lee[1], Cha Yang[2], Fenghua Hu[2], and Ling Hao[1]*

[1]Department of Chemistry & Biochemistry, University of Maryland, College Park, MD, 20742.

[2]Department of Molecular Biology and Genetics, Weill Institute for Cell and Molecular Biology, Cornell University, Ithaca, NY 14853, USA

*Corresponding author

Ling Hao

Associate Professor

Department of Chemistry and Biochemistry

University of Maryland

E-mail: linghao1@umd.edu

TABLE OF CONTENTS

Table S1. The spiked internal standards for lipidomics and metabolomics and their concentration.

| Category	Compound name	Adduct	*m/z*	Spiked conc. (nmol/mL)
Lipidomics	SM (d18:1/18:1-d9)	[M+H]$^+$	738.6475	18.1
Lipidomics	Cer (d18:1-d7/15:0)	[M+H]$^+$	531.5465	25.1
Lipidomics	MG (18:1-d7)	[M+NH$_4$]$^+$	381.3704	36.7
Lipidomics	DG (15:0/18:1-d7)	[M+NH$_4$]$^+$	605.5849	22.7
Lipidomics	LPC (18:1-d7)	[M+H]$^+$	529.3998	25.2
Lipidomics	LPE (18:1-d7)	[M+H]$^+$	487.3529	27.4
Lipidomics	TG (15:0/18:1-d7/15:0)	[M+NH$_4$]$^+$	829.7989	16.4
Lipidomics	CE (18:1-d7)	[M+NH$_4$]$^+$	675.6780	20.3
Lipidomics	PC (15:0/18:1-d7)	[M+H]$^+$	753.6138	17.7
Lipidomics	PE (15:0/18:1-d7)	[M+H]$^+$	711.5669	18.8
Lipidomics	PG (15:0/18:1-d7)	[M-H]$^-$	740.5469	17.5
Lipidomics	PS (15:0/18:1-d7)	[M-H]$^-$	753.5422	17.2
Lipidomics	PI (15:0/18:1-d7)	[M-H]$^-$	828.5630	15.7
Metabolomics	^{13}C$_5$, ^{15}N folic acid	[M+H]$^+$ [M-H]$^-$	448.1613 446.1462	51.4
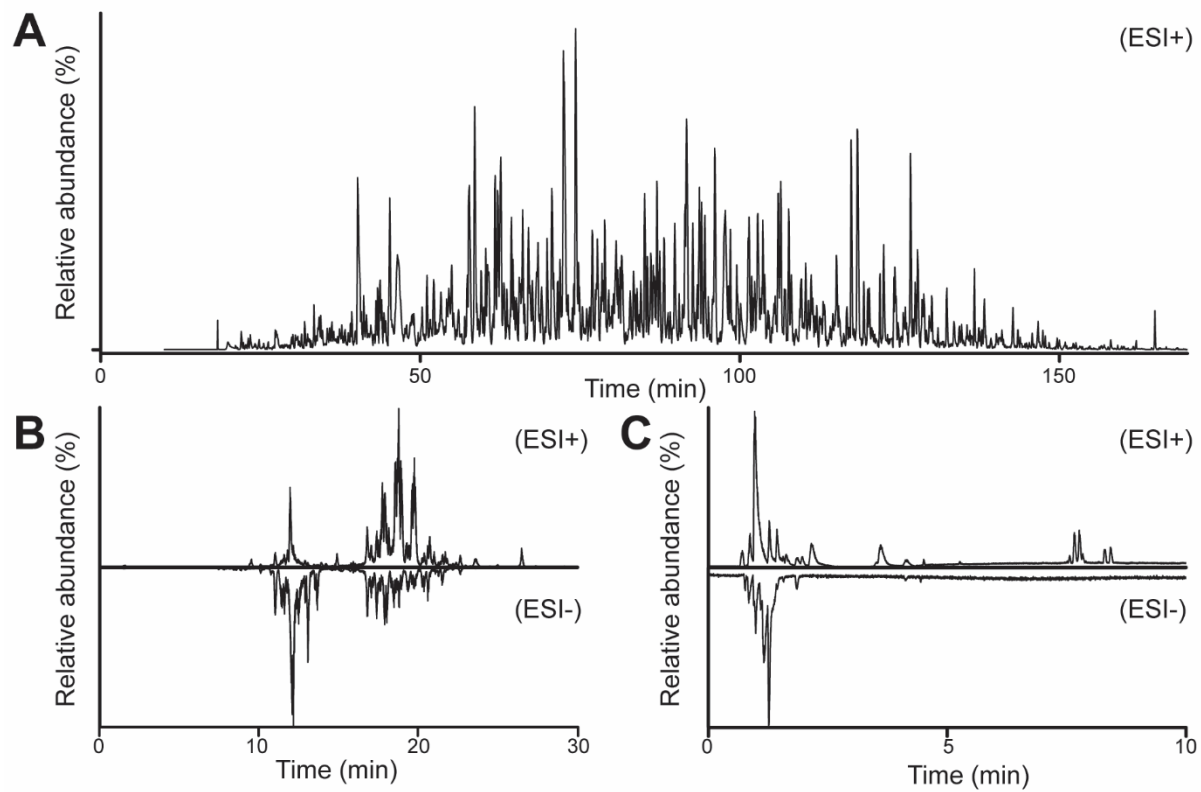
Fig. S1. Example LC-MS chromatograms from (A) proteomics, (B) lipidomics, and (C) metabolomics from mouse brain tissue.
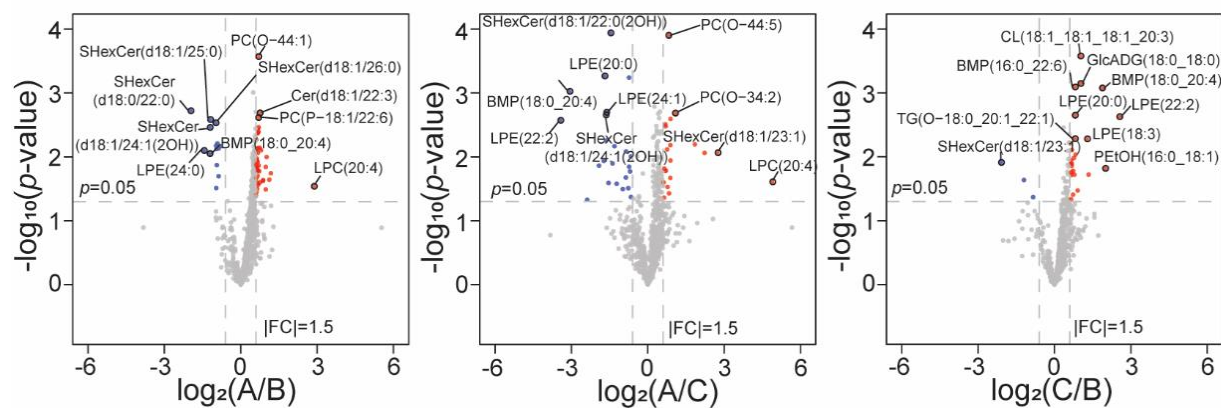
Fig. S2. Volcano plots showing the influence of normalization methods on lipidomics. A, B, C represents three different normalization methods.
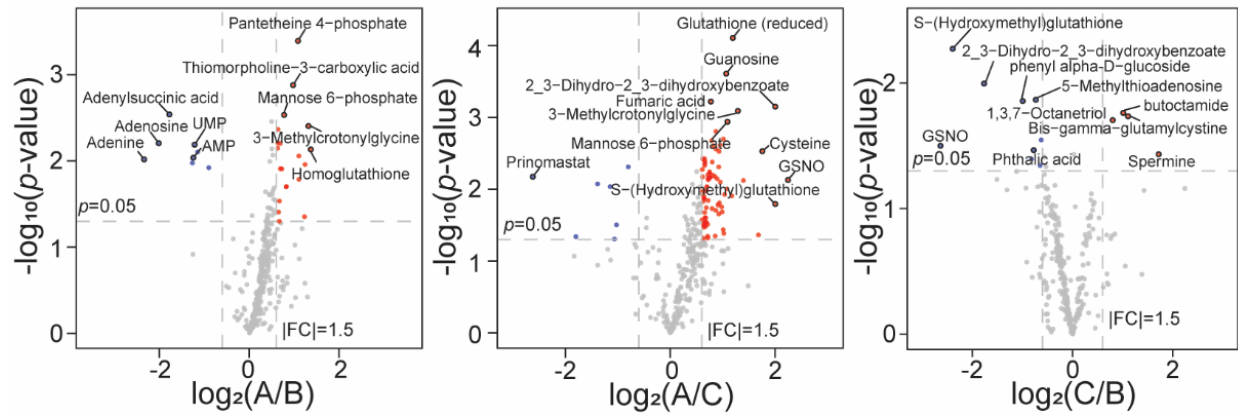
Fig. S3. Volcano plots showing the influence of normalization methods on metabolomics.
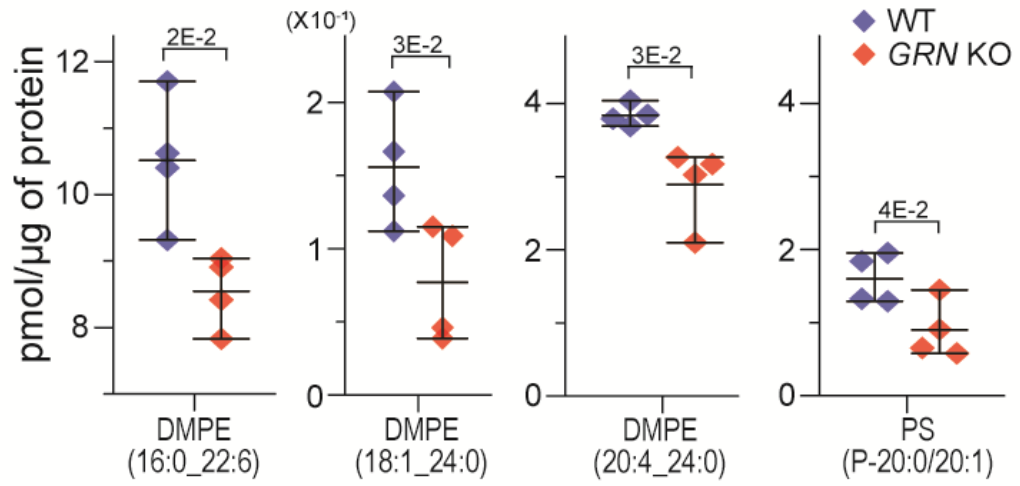
Fig. S4. Example lipid concentrations measured from *GRN* KO vs. WT mouse brains.