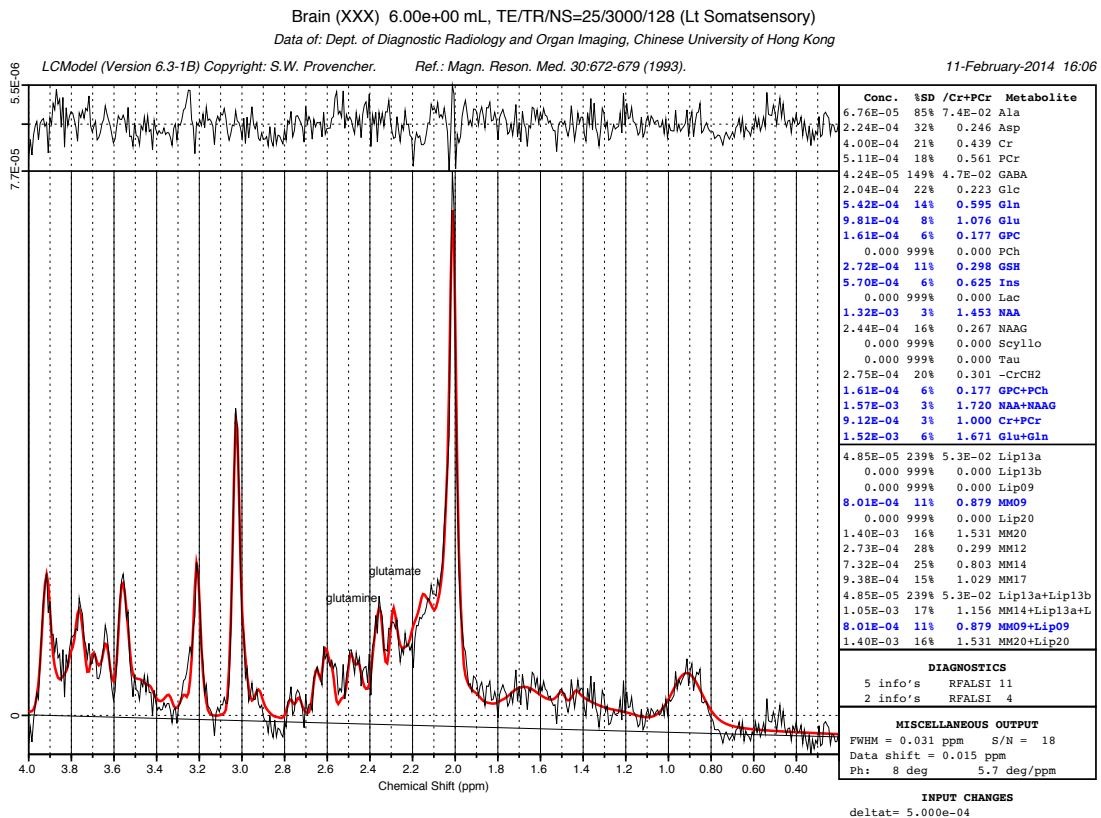# Supplementary Information

Title: Increased Glutamate in Somatosensory Cortex in Functional Dyspepsia

Lead author: Arthur DP Mak
Co-authors: Georg Northoff, David KW Yeung, Winnie CW Chu, Steve CN Hui, Cynthia Cheung, Jessica Ching, Linda Lam, Sing Lee, Justin Wu

Brain (XXX) 6.00e+00 mL, TE/TR/NS=25/3000/128 (Lt Somatsensory)

Data of: Dept. of Diagnostic Radiology and Organ Imaging, Chinese University of Hong Kong

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Conc.	%SD	/Cr+PCr	Metabolite
6.76E-05	85%	7.4E-02	Ala
2.24E-04	32%	0.246	Asp
4.00E-04	21%	0.439	Cr
5.11E-04	18%	0.561	PCr
4.24E-05	149%	4.7E-02	GABA
2.04E-04	22%	0.223	Glc
5.42E-04	14%	0.595	Gln
9.81E-04	8%	1.076	Glu
1.61E-04	6%	0.177	GPC
0.000	999%	0.000	PCh
2.72E-04	11%	0.298	GSH
5.70E-04	6%	0.625	Ins
0.000	999%	0.000	Lac
1.32E-03	3%	1.453	NAA
2.44E-04	16%	0.267	NAAG
0.000	999%	0.000	Scyllo
0.000	999%	0.000	Tau
2.75E-04	20%	0.301	-CrCH2
1.61E-04	6%	0.177	GPC+PCh
1.57E-03	3%	1.720	NAA+NAAG
9.12E-04	3%	1.000	Cr+PCr
1.52E-03	6%	1.671	Glu+Gln
4.85E-05	239%	5.3E-02	Lip13a
0.000	999%	0.000	Lip13b
0.000	999%	0.000	Lip09
8.01E-04	11%	0.879	MM09
0.000	999%	0.000	Lip20
1.40E-03	16%	1.531	MM20
2.73E-04	28%	0.299	MM12
7.32E-04	25%	0.803	MM14
9.38E-04	15%	1.029	MM17
4.85E-05	239%	5.3E-02	Lip13a+Lip13b
1.05E-03	17%	1.156	MM14+Lip13a+L
8.01E-04	11%	0.879	MM09+Lip09
1.40E-03	16%	1.531	MM20+Lip20

DIAGNOSTICS
5 info's   RFALSI 11
2 info's   RFALSI 4

MISCELLANEOUS OUTPUT
FWHM = 0.031 ppm   S/N = 18
Data shift = 0.015 ppm
Ph: 8 deg   5.7 deg/ppm

INPUT CHANGES
deltat= 5.000e-04

glutamate

glutamine

Chemical Shift (ppm)

Suppl S1
Typical MRS spectra of a patient with FD-PDS

Suppl S2. Comparison of Regional GM/WM Ratio and Menstrual Phase between Patients with FD-PDS and Healthy Controls

	FD-PDS	Control	*P*
GM/WM ratio			
Left SSC	1.19(0.48)	1.13(0.22)	0.62
Bilateral pgACC	6.12(1.75)	5.27(1.46)	0.14
Left insula	2.13(0.47)	2.11(0.51)	0.91
FWMH			
Left SSC	0.04(0.01)	0.04(0.01)	0.72
Bilateral pgACC	0.04(0.01)	0.04(0.01)	0.49
Left insula	0.05(0.01)	0.05(0.01)	0.07
Menstrual phase			
Menstrual phase, no. of subjects(%)			0.78
follicular phase	6(35.3)	5(29.4)	
luteal phase	5(29.4)	4(23.5)	
menopausal	6(35.3)	8(47.1)	

- p<0.05

Suppl S3. DSM-IV TR anxiety and depressive diagnoses of FD-PDS subjects

9 subjects met criteria for an anxiety disorder
>   1 subject met criteria for Generalized anxiety disorder, social phobia and panic disorder with agoraphobia
>   1 subject met criteria for social phobia only
>   1 subject met criteria for agoraphobia without panic disorder
>   6 subjects met criteria for Generalized Anxiety Disorder

3 subjects met criteria for depressive and related disorders
>   2 subjects met criteria for a current Major Depressive Disorder
>   1 subject met criteria for Dysthymia.

Suppl S4 Partial Correlation of SSC Glutamate with FD variables controlled separately for Depression (MADRS) and Anxiety (HAMA)

		Control variables	
		MADRS	HAMA
postprandial distress duration	r	0.64 *	0.32
	BCa95% CI	0.19-0.78$^+$	-0.02-0.68
Frequency of postprandial fullness	r	0.48 *	0.24
	BCa95% CI	0.11-0.75$^+$	-0.14-0.64
Frequency of early satiety	r	0.26	0.02
	BCa95% CI	-0.21-0.65	-0.44-0.63
Frequency of epigastric pain	r	0.38	-0.11
	BCa95% CI	-0.004-0.62	-0.67-0.57
Global symptom distress	r	0.29	0.29
	BCa95% CI	-0.19-0.67	-0.15-0.64

*$p< 0.05$
$^+$BCa 95%CI not including zero

Legend: BCa 95% CI: Bias corrected accelerated 95% confidence interval