PROTEOMICS

Supporting Information for Proteomics

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Neuroproteomics and its applications in research on nicotine and other drugs of abuse

Supplementary Table 1: Recent publications of applying neuroproteomics to profile protein expression in response to different substances of abuse

Drug of abuse	Biological model	Brain region/tissue	Drug Delivery Route	Experiment design	Proteomic Technology	Reference
Nicotine	Male Sprague-Dawley rats	Striatum	Injection, 0.4mg/kg, s.c., 7 days	Saline control and nicotine-treated group; 10 animals per group	2-DE, MALDI-TOF	[1]
Nicotine	Male Holtzman rats	Amygdala, NA, PFC, striatum, VTA	Infusion, 3.15 mg/kg/day, s.c., 7 days	Saline control and nicotine-treated group; at least 6 animals per group	2-DE, MALDI-TOF	[2]
Alcohol	Human	White matter of prefrontal region	--	Control (n = 10), Uncomplicated alcoholics (n = 8), Alcoholic complicated with hepatic cirrhosis (n = 6), Reformed (n = 1)	2-DE, MALDI-TOF	[3]
Alcohol	Inbred alcohol-preferring female rats	Amygdala, NA	15% and 30% alcohol in drinking water	Alcohol-naïve, Alcohol continuous access and multiple scheduled access; 7-8 animals per group	2-DE, MALDI-TOF	[4]
Alcohol	Inbred alcohol-preferring and -nonpreferring male rats	Hippocampus, NA	--	Alcohol-preferring and alcohol-nonpreferring group; 5 animals per group	2-DE, MALDI-TOF	[5]
Alcohol	Zebrafish	Whole brain	0.5% (v/v) ethanol exposure, 4 weeks	Control and treatment group; 8 fishes per group	2-DE, MALDI-TOF	[6]
Alcohol	Human	Superior frontal cortex	--	Control and alcoholic group; 4 samples per group	2-DGE, MALDI-MS	[7]
Amphetamine	Male Sprague-Dawley rats	Hippocampus	IVSA, 0.1 mg/kg per	Four groups of Controls, Binge, Abstinent Relapse;	2-DIGE, MALDI-TOF	[8]

			injection, max. 12 injections per day for 3 days	3 animals per group		
Methamphetamine	Wistar rats	Striatum	ip injection, 1 mg/kg once	Control and cocaine-treated group; 8 animals per group	2-DIGE, MALDI-TOF	[9]
Butorphanol	Male Sprague-Dawley rats	Frontal cortex	Infusion, 26 nmol/µl/hr, i.c.v., 72 hrs	Control and cocaine-treated group; 3 animals per group	2-DE, MALDI-TOF	[10]
Cocaine	Male Sprague-Dawley rats	VTA	ip injection, 15 mg/kg twice a day for 7 days	Control and cocaine-treated group; 8 animals per group	2-DGE, MALDI-TOF	[11]
Cocaine	Human	NA	--	Post-mortem brains of 10 cocaine overdose victims and 10 controls	2-DIGE, MALDI-TOF	[12]
Morphine	Male Sprague-Dawley rats	Frontal cortex	Infusion, 26 nmol/µl/hr, i.c.v., 72 hrs		2-DE, MALDI-TOF	[13]
Morphine	Male C57BL/6JBom mice	Hippocampus	ip injection, 5, 8, 10, 15 mg/kg every 12 hr for 48 hr	Control and 4 treatment groups; 5 animals per group	ICAT, HPLC-MS/MS	[14]
Morphine	SH-SY5Y cells	--	Cells treated with 1µM morphine for 6, 24 or 48 hr	Control and 3 treatment groups; 4 replicates per group	2-DE, MALDI-TOF	[15]
Morphine	Wistar rats	NA	Injection, 10 mg/kg, s.c., single injection per day for 14 days	Saline control and treatment group; 5 animals per group	2-DE, MALDI-TOF	[16]
Morphine	Wistar rats	Whole brain	Implantation, s.c., 75 mg	Control and treatment group; 5 animals per grouo	2D PAGE, MALDI-TOF	[17]

			morphine base in 3 days			
Morphine	Male Sprague-Dawley rats	Spinal cord	Injection, 20 μg/10μl for 4 days	Control and treatment group; 6 animals per group	2-DE, MALDI-TOF	[18]
Morphine	Male Sprague-Dawley rats	Cortex	Implantation, s.c., 1.8 mg/kg/h morphine sulfate for 7 days	Control and treatment group; 3 animals per group	ICAT, HPLC-MS/MS	[19]

Notes: s.c.: subcutaneously; i.c.v., intracerebroventricular; IVSA, Intravenous Self-administration

References

[1] Yeom, M., Shim, I., Lee, H. J., Hahm, D. H., Proteomic analysis of nicotine-associated protein expression in the striatum of repeated nicotine-treated rats. *Biochem Biophys Res Commun*, 2005, 326, 321-328.

[2] Hwang, Y. Y., Li, M. D., Proteins differentially expressed in response to nicotine in five rat brain regions: identification using a 2-DE/MS-based proteomics approach. *Proteomics*, 2006, 6, 3138-3153.

[3] Alexander-Kaufman, K., James, G., Sheedy, D., Harper, C. *et al.*, Differential protein expression in the prefrontal white matter of human alcoholics: a proteomics study. *Mol Psychiatry*, 2006, 11, 56-65.

[4] Bell, R. L., Kimpel, M. W., Rodd, Z. A., Strother, W. N. *et al.*, Protein expression changes in the nucleus accumbens and amygdala of inbred alcohol-preferring rats given either continuous or scheduled access to ethanol. *Alcohol*, 2006, 40, 3-17.

[5] Witzmann, F. A., Li, J., Strother, W. N., McBride, W. J. *et al.*, Innate differences in protein expression in the nucleus accumbens and hippocampus of inbred alcohol-preferring and -nonpreferring rats. *Proteomics*, 2003, 3, 1335-1344.

[6] Damodaran, S., Dlugos, C. A., Wood, T. D., Rabin, R. A., Effects of chronic ethanol administration on brain protein levels: a proteomic investigation using 2-D DIGE system. *Eur J Pharmacol*, 2006, 547, 75-82.

[7] Lewohl, J. M., Van Dyk, D. D., Craft, G. E., Innes, D. J. *et al.*, The application of proteomics to the human alcoholic brain. *Ann N Y Acad Sci*, 2004, 1025, 14-26.

[8] Freeman, W. M., Brebner, K., Amara, S. G., Reed, M. S. *et al.*, Distinct proteomic profiles of amphetamine self-administration transitional states. *Pharmacogenomics J*, 2005, 5, 203-214.

[9] Iwazaki, T., McGregor, I. S., Matsumoto, I., Protein expression profile in the striatum of acute methamphetamine-treated rats. *Brain Res*, 2006, 1097, 19-25.

[10] Kim, S. I., Voshol, H., van Oostrum, J., Hastings, T. G. *et al.*, Neuroproteomics: expression profiling of the brain's proteomes in health and disease. *Neurochem Res*, 2004, 29, 1317-1331.
[11] Geng, T., Seitz, P. K., Thomas, M. L., Xu, B. *et al.*, Use of surface enhanced laser desorption/ionization-time of flight mass spectrometry (SELDI-TOF MS) to study protein expression in a rat model of cocaine withdrawal. *J Neurosci Methods*, 2006, 158, 1-12.
[12] Tannu, N., Mash, D. C., Hemby, S. E., Cytosolic proteomic alterations in the nucleus accumbens of cocaine overdose victims. *Mol Psychiatry*, 2007, 12, 55-73.
[13] Kim, S. Y., Chudapongse, N., Lee, S. M., Levin, M. C. *et al.*, Proteomic analysis of phosphotyrosyl proteins in morphine-dependent rat brains. *Brain Res Mol Brain Res*, 2005, 133, 58-70.
[14] Moron, J. A., Abul-Husn, N. S., Rozenfeld, R., Dolios, G. *et al.*, Morphine Administration Alters the Profile of Hippocampal Postsynaptic Density-associated Proteins: A Proteomics Study Focusing on Endocytic Proteins. *Mol Cell Proteomics*, 2007, 6, 29-42.
[15] Neasta, J., Uttenweiler-Joseph, S., Chaoui, K., Monsarrat, B. *et al.*, Effect of long-term exposure of SH-SY5Y cells to morphine: a whole cell proteomic analysis. *Proteome Sci*, 2006, 4, 23.
[16] Li, K. W., Jimenez, C. R., van der Schors, R. C., Hornshaw, M. P. *et al.*, Intermittent administration of morphine alters protein expression in rat nucleus accumbens. *Proteomics*, 2006, 6, 2003-2008.
[17] Bierczynska-Krzysik, A., Bonar, E., Drabik, A., Noga, M. *et al.*, Rat brain proteome in morphine dependence. *Neurochem Int*, 2006, 49, 401-406.
[18] Shui, H. A., Ho, S. T., Wang, J. J., Wu, C. C. *et al.*, Proteomic analysis of spinal protein expression in rats exposed to repeated intrathecal morphine injection. *Proteomics*, 2007, 7, 796-803.
[19] Prokai, L., Zharikova, A. D., Stevens, S. M., Jr., Effect of chronic morphine exposure on the synaptic plasma-membrane subproteome of rats: a quantitative protein profiling study based on isotope-coded affinity tags and liquid chromatography/mass spectrometry. *J Mass Spectrom*, 2005, 40, 169-175.