Escitalopram Increased Gray Matter and White Matter in a First-Episode Drug-Naïve Panic Disorder Patient Within 6 Weeks

Escitalopram's modulating effects in brain structures of panic disorder (PD) are seldom mentioned in the study update. Here I share a case of PD with gray matter (GM), white matter (WM) and brain volume (BV) increase after escitalopram treatment for 6 weeks.

Case Report

Miss A. is a 24 y/o female patient with first-episode drug-naïve PD for 1-2 months. No significant other psychiatric diagnosis or physical illness history was noted. She received clinical ratings [Panic Disorder Severity Scale (PDSS): 21; Clinician Global Impression Severity (CGI-S): 6] and escitalopram 10 mg with alprazolam 0.5mg prn if panic attacks. Mild nausea and dizziness side effects were mentioned. She had improvement of panic symptoms within first 3 weeks (PDSS: 14; CGI-S: 4). Progressive remission of panic symptoms was noted at 6th week (PDSS: 4; CGI-S: 2).

Structural brain magnetic resonance imaging (MRI) scans were obtained with 3T Siemens version scanner housed at National Yang Ming University. Scans with three-dimensional fast spoiled gradient-echo recovery (3D-FSPGR) T1W1 (TR 2530ms; TE 3.03ms;slice thickness=1mm(no gap);192slices; matrix = 224×256;field of view: 256mm;number of excitation=1) were performed at first visit and 6th week visit. Structural MRI was preprocessing with Structural Image Evaluation, using Normalization, of Atrophy (SIENAX) function of FSL (FMRIB Software Library) to calculate single time point GM, WM and BV after registering and normalizing to template. The brain morphology change was estimated by SIENA function to calculate percentage of BV change (PBVC). The PBVC after escitalopram treatment is 0.7111355%, which represented BV increase. The GM and WM both increased after remission of panic symptoms. (Table 1)

Discussion

PD is associated with WM connectivity enhancement in cingulate region, which probably compensate the WM structural abnormalities derived from PD symptoms.[1] In this case, white matter increased after escitalopram treatment, which might suggest that WM volume could be lower through PD illness course and the increase probably represent WM restore phenomenon. PD is also associated with GM deficits in rostral anterior cingulate, dorsal anterior cingulate, left superior temporal gyrus and middle temporal gyrus,[2] which represent possible consequences of panic attacks or pathophysiology. The GM increase in this PD patient is different from our previous finding in PD with depression,[3] which showed that residual GM deficits were still obvious and widespread without global increase of GM volume. The results of this case probably suggested pure PD patients should not be severe as comorbid patients with significant residual GM deficits. PD patients can recover with faster and significant "re-growth" of GM volume. Escitalopram can increase the cytogenesis of ventral hippocampal formation through its modulation of brain-derived neurotrophic factor (BDNF) release in the chronic stress rat model.[4] Escitalopram contributes to synaptic plasticity through enhancing BDNF calcium-dependent intracellular signal transduction in prefrontal, frontal and hippocampal regions,[5] which probably produce neurogenesis phenomenon in this case.

TABLE 1: GM, WM and BV Increase After Escitalopram Treatment Within 6 Weeks

	GM	WM	BV
Baseline	778460.17	784669.36	1563129.53
6th week	786371.96	813828.01	1600199.97

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Chien-Han Lai, M.D.
Department of Psychiatry, Buddhist Tzu-Chi General Hospital, Taipei Branch, Taipei, Taiwan

References

1. Han DH, Renshaw PF, Dager SR, et al: Altered cingulate white matter connectivity

in panic disorder patients. J Psychiatr Res 2008; 42:399–407
2. van Tol MJ, van der Wee NJ, van den Heuvel OA, et al: Regional brain volume in depression and anxiety disorders. Arch Gen Psychiatry 2010; 67:1002–1011
3. Lai CH, Hsu YY: A subtle grey-matter increase in first-episode, drug-naive major depressive disorder with panic disorder after 6 weeks' duloxetine therapy. Int J Neuropsychopharmacol 2011; 14:225–235
4. Jayatissa MN, Bisgaard C, Tingström A, et al: Hippocampal cytogenesis correlates to escitalopram-mediated recovery in a chronic mild stress rat model of depression. Neuropsychopharmacology 2006; 31:2395–2404
5. Alboni S, Benatti C, Capone G, et al: Time-dependent effects of escitalopram on brain derived neurotrophic factor (BDNF) and neuroplasticity related targets in the central nervous system of rats. Eur J Pharmacol 2010; 643:180–187