^{1}H MRSI Study of Effects of Cognitive-Behavioral Therapy on Obsessive-Compulsive Disorder

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Introduction: Obsessive-compulsive disorder (OCD) is a common, debilitating psychiatric condition that responds to cognitive-behavioral therapy (CBT). CBT reduces hyperintense FDG-PET signals in anterior cingulate, caudate, thalamus and other brain regions[1-4] but its effects are little explored with MRS[5]. We examined ^{1}H MRSI metabolites in multiple brain regions implicated in adult OCD before and after 4 weeks of daily CBT with no medication changes.

Methods: 8 DSM-IV OCD patients (5 ♀, 37.1 ± 9.8 yr) were treated with the Gorbis integrated method of intensive CBT; 7 completed therapy. Clinical response was evaluated by the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS). MRSI (1.5 T, Siemens PRESS, TR/TE = 1500/30 ms, 11 x 11 mm^2 in-plane, 9 mm thick) was acquired before and after CBT from three slabs: basal ganglia (Fig. 1), perigenual anterior cingulate, and anterior middle cingulate. MRS peaks were fit and normed to water by LCModel. Voxels were selected with MRSI Voxel Picker[6] which rejected spectra with linewidth > 0.1 Hz or SNR < 3 and rejected peaks with SD > 20%. Pretreatment-results were compared to those of 18 healthy controls (14 ♀, 37.6 ± 10.4 yr). Statistics were non-parametric Mann-Whitney U and Wilcoxon tests.

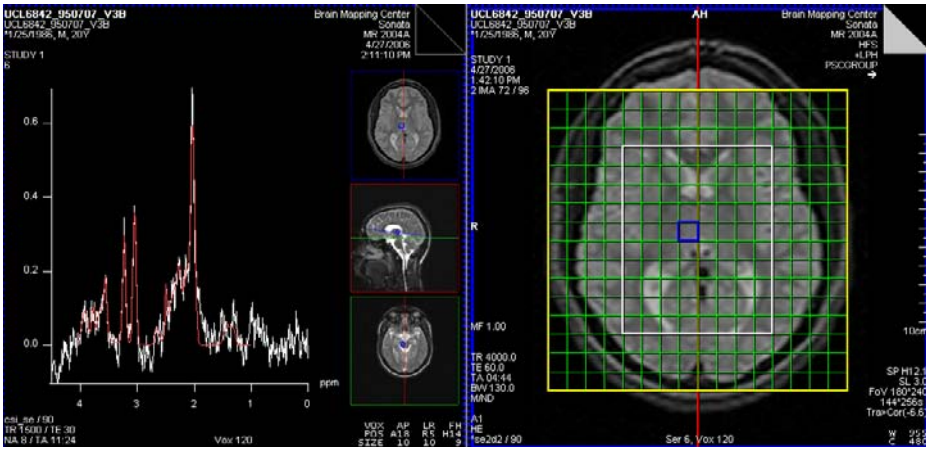

Fig. 1. (*Right*) Positioning of basal ganglia MRSI slab (*yellow*) and sample spectrum (*left*, from *blue box*). The PRESS volume (*white*) samples bilateral caudate, putamen, thalamus and other structures. Other slabs sampled bilateral perigenual anterior cingulate and anterior middle cingulate.

Results: Mean Y-BOCS in patients decreased from 26.2 ± 9.0 (severe OCD) to 10.3 ± 5.8 (subclinical). In bilateral thalamus, mean pretreatment Cr was 13-19 % below control ($p < 0.001$-0.05). Cr was below control mean for 7-8/8 patients. In 6-7/7 patients, Cr increased post-treatment (mean 10-15%, $p < 0.05$). Other post-treatment increases were: NAA +NAAG in right thalamus (10%), Cr in left putamen (15%), Cho (13%) and mI (16%) in right anterior middle cingulate (all $p < 0.05$).

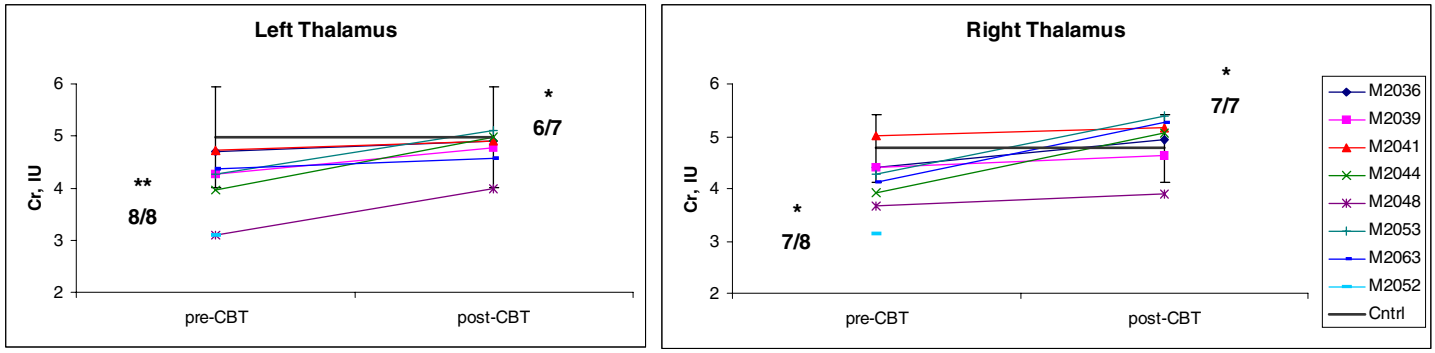

Fig. 2. Pre- and post-CBT Cr in thalamus in 8 OCD patients; mean ± SD of controls. $p <$ *0.05, **0.001. "IU" = Institutional Units

Discussion: Abnormal Cr has been measured in bilateral thalamus in pediatric OCD[7]. In our patients (16 weeks stable on medication), metabolic response to CBT was observed in bilateral thalamus and right anterior middle cingulate, the same regions where we saw FDG-PET response to intensive integrated CBT in OCD[3]. MRSI response was also seen in left putamen. Anterior middle cingulate, putamen, and thalamus together form the "action-compulsive behaviors circuit" proposed to be disturbed in OCD in a recent model[8]. CBT response may be mediated by this circuit.

[1]Baxter et al. **Arch Gen Psychiat** (1992), [2]Schwartz et al. **Arch Gen Psychiat** (1996), [3]Saxena, Gorbis, O'Neill et al. (submitted), [5]Benazon et al. **JAACAP** (2003), [6] O'Neill et al. ISMRM Workshop (2006), [7]Mirza, O'Neill, Rosenberg et al. **J Child Neurol** (2006), [8]Middleton in Vogt BA (ed.) Cingulate Neurobiology & Disease (in press). Supported by NIMH R01 MH069433; Center for Research Resources RR12169, RR13642, RR08655; and private donors