Magnetic Resonance Spectroscopy in Obsessive-Compulsive Disorder: Comparing Brain Metabolism in Selective Serotonin Responders and Non-Responders

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Introduction: Obsessive-compulsive disorder (OCD) is ranked by the World Health Organization as one of the top 20 disabling illnesses in terms of lost income and diminished quality of life. Approximately 2.2 million American adults age 18 and older, or about 1.0 percent of people in this age group in a given year, have OCD (1). Twenty to 40 % of OCD patients are resistant to SRIs (2). Dysfunction of orbitofrontal cortex circuit areas are suggested to relate to abnormal response inhibition in obsessive -compulsive disorder (OCD) (3). We sought to determine the differences in brain metabolism between obsessive-compulsive disorder (OCD) patients who respond to selective serotonin reuptake inhibitors (SSRIs) and those who do not respond to SSRIs using magnetic response spectroscopy (MRS).

Methods: Clinical evaluation using the Yale Brown Obsessive Compulsive Scale (YBOCS) was done on OCD patients. Eighteen OCD patients (10 were responders to SSRIs and 8 were non responders to SSRIs) and 14 age and gender matched controls were included in the study. Subjects underwent single voxel MRS (TR/TE=2000/35 ms) which was acquired from 2 regions of interest [the anterior cingulate cortex (ACC) and in the basal ganglia/ thalamus (BG/TH) region combined] with and without water suppression. All studies were performed on a Philips Intera 3T system using a 32 channel SENSE head coil. The voxel measured 4 x 3.0x 2.5 cm. Metabolites concentrations were determined using the LCM.

Results: The mean myoinositol (mI) concentrations in ACC in non-responders, responders and healthy controls are 5.8 ± 0.47, 4.4 ± 0.36, and 4.5 ± 0.27 millimole (mM) respectively (Figure 1). Student t tests showed significant difference in ACC mI between responders and non-responders ($P<0.03$) and in ACC mI between non responders and healthy controls ($P<0.01$). In the BG/TH region, creatine (Cr) concentrations were 7.2 ± 0.3, 7.1 ±2.6 and 5.9 ±0.4 respectively. Student t tests showed significant differences in BG/TH Cr between controls and non-responders and between responders and non-responders ($P=0.03$ and $P= 0.02$ respectively).

Conclusion: Abnormal mI and Cr metabolites (markers of osmoregulation and energy metabolism) in the ACC and BG/TH regions may be related to lack of response to treatment with selective serotonin reuptake inhibitor. Improved understanding of the brain metabolism will lead to the development of new therapeutic strategies for OCD.

References: (1) Kessler, R.C., et al. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry, 2005. 62(6): p. 617-27. (2) Pigott, T.A. and S.M. Seay, A review of the efficacy of selective serotonin reuptake inhibitors in obsessive-compulsive disorder. J Clin Psychiatry, 1999. 60(2): p. 101-6. (3) Page LA, et al. A functional magnetic resonance imaging study of inhibitory control in obsessive-compulsive disorder. Psychiatry Res. 2009 Dec 30; 174 (3):202-9.

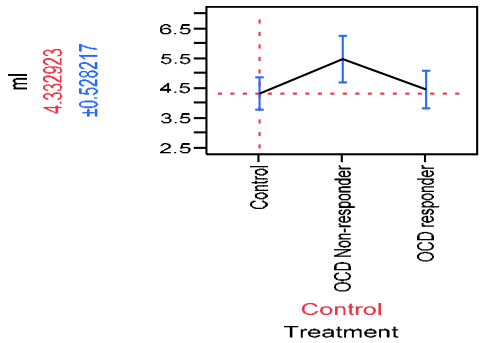

Figure 1 showing the mean mI concentrations (in mM) in the ACC region in the controls, the OCD patients who respond to SSRIs and those who do not respond to SSRIs.

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