Form 2-4-2

Japan-U.S. Brain Research Cooperation Program
Group Joint Study Project Report

Field: _Neurobiology of Disease__

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2. Project Title:
Investigation of how abuse during sensitive periods affects regional brain development in Japanese and American children.

3. Japanese Group
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4. U.S. Group
Names, Titles and Affiliations of Principal Researcher and Collaborating Research Members

5. Research Period: From 04/04/2009 to 03/31/2012 (3 years)

6. Abstract, Results, and Research Significance (300 words):

1) A history of exposure to Childhood maltreatment such as interparental violence has been reported to be associated with negative outcomes, such as short-term development of a host of psychological problems, and reductions in intelligence and receptive vocabulary ability. However, little is known about the effects of interparental witnessing domestic violence (WDV) in childhood on gray matter volume (GMV) has yet to be reported. We have investigated an objective overall assessment using voxel-based morphometry. The results in subjects who witnessed DV were similar to results in subjects with childhood sexual abuse (Tomoda, 2009), as the primary region affected was visual cortex. Furthermore, previous studies have demonstrated reduced fractional anisotropy in the visual limbic pathway of young adults witnessing domestic violence in childhood (Choi, 2011). Brain regions that process and convey the adverse sensory input of the abuse appear to be specifically modified by this experience. These findings fit with preclinical studies showing the visual cortex is a highly plastic structure.
2) Attention deficit/hyperactivity disorder (ADHD) is neurobehavioral disorder characterized by in attention, hyperactivity/impulsivity and impaired reward system function, such as delay aversion, and low reward sensitivity. The pharmacological treatment for ADHD i*nclud*es osmotic release oral system for methylphenidate (OROS-MPH), which increases extrasynaptic dopamine and noradrenaline levels by blocking their reuptake. Although previous fMRI studies revealed that acute treatment with MPH normalizes activation of the nucleus accumbens during delay aversion in ADHD

children and adolescents, the effects of OROS-MPH treatment for a relatively long period on delay aversion as well as reward sensitivity are still unclear. Thus, we evaluated brain activation with fMRI during a reward sensitivity paradigm. We found that decreased activations of the nucleus accumbens and thalamus of the ADHD patients during only the LMR condition before the treatment were improved to same level as those of the healthy children and adolescents after the treatment. These results suggest that OROS-MPH treatment for a relatively long period is effective in controlling reward sensitivity in ADHD children and adolescents.

7. Other (Research-related concerns, particular points of note): N/P