

CEREBELLAR VERMIS BLOOD FLOW: ASSOCIATIONS WITH PSYCHIATRIC SYMPTOMS IN CHILD ABUSE AND ADHD

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In two fMRI studies a striking association between psychiatric symptoms and elevated blood flow in the vermis was observed. Subjects: STUDY 1, 32 young adults (9M/32F; 18-22 yr), including 15 (3M/12F) with a history of sexual or verbal childhood trauma exclusive of physical trauma, were scanned under resting conditions; STUDY 2, perfusion was observed in ADHD children (all subtypes; 6 male, aged 9.93 ± 0.45 yr) assigned to a 4 week double-blind schedule of methylphenidate one week each of 0.25, 0.4, 0.75mg/kg bid MPH or placebo). Methods: A series of 32 TE stepped echo-planar images (EPI) were collected in 4 axial slices of the cerebellum to calculate T2-relaxation times indicative of blood flow in the vermis. Results: In STUDY 1, higher ratings on the Limbic System Checklist-33 (LSCL-33; $F_{1,23} = 13.34$, $p < 0.001$), the Dissociative Experiences Scale (DES; $F_{1,23} = 8.42$, $p < 0.008$), Hamilton Depression (HAM-D; $F_{1,23} = 9.58$, $p < 0.005$) and Anxiety scales (HAM-A; $F_{1,23} = 9.68$, $p < 0.005$) were positively associated with increased vermial blood flow. In STUDY 2, a dose-dependent decrease in resting blood flow in the vermis was observed ($F_{5} = 5.261$, $p < 0.01$) which was associated with reductions in behavioral hyperactivity in ADHD children. Summary: The vermis has a protracted period of postnatal development, which may engender susceptibility to environmental insults or effects of early child abuse. Interestingly, the fastigial nucleus, the output nucleus of the vermis, has projections to brainstem regions such as the LC, PAG, VTA, SN and parabrachial nucleus, implicating it in bihemispheric emotional and attentional modulation. Therefore, the vermis of the cerebellum may form an important locus of the developmental psychopathology and neuropharmacology of childhood abuse and hyperactivity. Supported by NIMH R01-53636-01A1