Cerebellar Hypoplasia and Frontal Lobe Cognitive Deficits in Disorders of Early Childhood (Abstract)

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The authors believe that areas of the brain, which must undergo protracted periods of development, are more vulnerable to insult than earlier maturing areas and therefore may be common sites of abnormality across many disorders which originate in childhood. They designed this study to examine those areas of the brain via MRI and also neuropsychological assessment. In this paper they report findings regarding the cerebellum and the frontal lobes as measured in children with autism (11), or acute lymphoblastic leukemia (ALL) (10), and in typically developing controls (10). The group of children with ALL had undergone procedures of radiation and chemotherapy, which had left them with neurological sequelae.

The group of children with either autism or ALL had reduced MRI measures for the cerebellar vermis lobules 1-5 and 6-8 although hypoplasia was more prominent in lobules 6-8. Neuropsychological assessments demonstrated reduced function in the frontal lobes in both groups as compared to controls, but dysfunction was more severe in those with autism. Social emotional behaviors were significantly different between the two groups (more severe in autism) and may reflect the timing of the insult to the brain tissue (prenatal vs. postnatal). While the neurological deficits studied here are not specific to either clinical group, and may be present in other children with disorders of development, the authors believe further study is warranted. Therefore, they are continuing their examinations and will be targeting the limbic system and other brain structures, which form earlier than the cerebellum. They believe these structures may be involved in the "anatomy of autism."

In conclusion, the authors feel that the hypoplasia reported to be observed in brains of those with autism is not specific to that disorder, and is seen in another clinical population that does not exhibit similar social emotional behaviors as those with autism. They therefore feel that cerebellar abnormality is not the cause of autistic symptomatology. They also stress the relationship between cerebellar and frontal lobe dysfunction and believe that the cerebellum may influence the development of higher frontal lobe cognitive function.