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AUTISTIC SPECTRUM DISORDERS

BRAIN ANATOMY OF ASPERGER'S SYNDROME

Brain anatomy and sensorimotor gating were compared in 21 adults with Asperger's syndrome and 24 controls, all of normal IQ, aged 18-49 years. Brain anatomy was studied using quantitative MRI, and sensorimotor 'gating,' or ability to inhibit repetitive thoughts, speech and actions, by measuring prepulse inhibition of startle (PPI). In PPI the startle response to a strong stimulus is muted or inhibited when momentarily preceded by a weak stimulus (the prepulse). The PPI was tested in a subset of 12 patients with Asperger's syndrome and 14 controls. Control but not Asperger subjects had significant age-related reductions in volume of cerebral hemispheres and caudate nuclei. Asperger subjects had significantly less grey matter in fronto-striatal and cerebellar regions, and widespread differences in white matter, compared to controls. Sensorimotor gating was significantly impaired in Asperger's syndrome. The difficulties inhibiting repetitive thoughts, speech and actions, characteristic of subjects with Asperger's syndrome, are associated with anatomical abnormalities in fronto-striatal pathways that result in defective sensorimotor gating. (McAlonan GM, Daly E, Kumari V et al. Brain anatomy and sensorimotor gating in Asperger's syndrome. Brain July 2002;127:1594-1606). (Respond: Dr Declan Murphy, Room M216, Division of Psychological Medicine, Institute of Psychiatry, London SE5 8AF, UK).

COMMENT. Prepulse inhibition of startle response (PPI) is dependent in part on intact fronto-parietal pathways (Bubser and Koch, 1994 and others). The above study demonstrates that subjects with Asperger's syndrome have a significant impairment in sensorimotor gating, or an inability to inhibit repetition of thoughts, speech and actions. This characteristic behavior of Asperger and other autistic patients is associated with reductions in volumes of frontostriatal and cerebellar grey matter and diffuse white matter changes.

EFFECTS OF AGE ON BRAIN DEVELOPMENT IN AUTISM

Total brain volumes were measured by MRI in 67 non-mentally retarded children with autism and 83 healthy controls, aged 8 to 46 years, in a study at

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University of Washington, Seattle; Johns Hopkins University Hospital, Baltimore; and University of Pittsburgh School of Medicine, PA. Head circumference was also measured. Children with autism 12 years of age and younger had significantly larger brain volumes (average 5% increase) compared to normal children. Autism and control groups older than age 12 years showed no differences in brain volume. The accelerated growth in brain volume and increased head circumference noted in younger children with autism was slowed to an average of 1 to 2% increase in older children. Brain volume in adolescents and adults with autism appears to show a slight decrease while that of normal controls continues to increase. (Aylward EH, Minshew NJ, Field K, Sparks BS, Singh N. Effects of age on brain volume and head circumference in autism. Neurology July (2 of 2) 2002;59:175-183). (Reprints: Dr Elizabeth H Aylward, Department of Radiology, Box 357115, University of Washington School of Medicine, Seattle, WA 98195).

COMMENT. Autism is a spectrum of developmental disorders, grouped under the term 'pervasive developmental disorder' (PDD), with impairments of social interaction, communication, and repetitive or restricted behaviors. While autistic disorder is characterized by all three behavior patterns, Asperger's syndrome is milder than autistic disorder and is distinguished by normal language development. Within these categories the clinical manifestations show wide heterogeneity. The cause of autism is unknown and the clinical variation in the degrees of autistic spectrum disorder complicate the evaluation of neuroimaging studies. As pointed out by Mink JW and McKinstry RC, in their editorial (Neurology 2002;59:158-159), despite some contradictory results, imaging studies may provide a noninvasive in vivo method of investigating the neurobiology of autism.

The above study by Aylward and associates and that of Sparks et al, in the same issue (Neurology 2002;59:184-192), found increases in brain volume of young children with autism. Sparks also found that cerebellar, amygdalar, and hippocampal volumes increased in proportion to growth of the cerebral volume of autistic children. The average cerebral volume is 5 to 10% larger in autistic compared to normal children. After the age of 12 years, brain growth shows a plateau, and brain size in adolescents and adults is similar in autistic and control patients. Future studies will require careful selection of subjects and measurement of the growth of specific brain regions. The neurobiological and functional significance of these structural changes in the brain remains to be determined.

PRACTICAL RELEVANCE OF MRI IN DIAGNOSIS OF AUTISM AND ADHD

Methods of quantitative MRI brain mapping and possible significance in diagnosis and response to therapy of childhood autism and attention deficit hyperactivity disorder are reviewed by investigators at the Child Psychiatry Branch, National Institute of Mental Health, Bethesda, MD. Recent advances in MRI allow automated analysis in measurement of regional gray and white matter volumes across time and between subject groups. Standard curves of healthy and disease-specific regional maturation and volumetric changes during development may be helpful in diagnosis. Except for the cerebellum, volume measurements are more highly correlated for monozygotic than dizygotic twins, and heritability indices for brain regions may be calculated. Brain volume and region-specific brain tissue changes may identify patients at high risk for autistic disorder and ADHD.