

Cognitive strengths, weaknesses seen in 'autism families'

Simon Baron-Cohen and colleagues recently reported evidence that fathers of autistic children are more likely than fathers of other children to work as engineers (see ARRI 11/4). This indicates, they said, that the genes that contribute to autism may also confer benefits in the form of superior engineering skills.

A recent report by E. Fombonne and colleagues indicates that relatives of autistic in-

Fombonne et al. report evidence of higher-than-average verbal skills in autistic children's parents, while other researchers are finding a pattern of social and cognitive deficits in the families of autistic individuals.

dividuals may also be slightly better at verbal skills than control subjects. Fombonne et al. studied the first-degree relatives of 99 individuals with autism, comparing them to relatives of individuals with Down syndrome. The researchers report that "higher mean verbal IQ scores, and discrepancies in favor of verbal scores, were characteristic of autism relatives." Fombonne et al. note that a number of genes considered to be deleterious can convey benefits to heterozygotic carriers, and say that "it is not impossible that this could apply in the case of autism."

Although both Baron-Cohen and Fombonne suggest that the genes that contribute to autism may confer advantages to non-autistic relatives, three other recent studies report deficits in relatives of autistic individuals. Their findings:

—Joseph Piven and colleagues took the family histories of 25 families with more than one autistic child, comparing them to families of children with Down syndrome. The researchers found higher rates of social deficits and stereotypical behavior in autistic children's parents than in controls, as well as elevated rates of communication deficits in mothers of autistic children. A similar pattern of deficits was seen in grandparents and aunts and uncles of autistic individuals. While few nondisabled siblings of autistic subjects were available for study, the researchers saw evidence of a higher rate of social deficits in these siblings than in the siblings of children with Down syndrome.

—In a separate study, Piven and Pat Palmer evaluated the cognitive skills and deficits of the same group of subjects. The researchers report that parents of autistic children scored significantly lower than parents of children with Down syndrome on perfor-

mance IQ measures and some reading measures. In addition, they had lower scores on a test of executive function. (Executive function skills, believed to be mediated by the frontal lobes of the brain, include planning, working memory, inhibition of non-goal-directed responses, and cognitive flexibility.)

—Claire Hughes and colleagues, also testing the executive function skills of parents of autistic children, found that their subjects were impaired in these skills compared to normal controls and to parents of retarded children. This deficit was particularly marked in fathers of autistic children, the researchers say, and was significantly correlated with interviewers' impressions of social impairment. Hughes et al. note, however, that pervasive deficits in executive function skills were seen in only 25% of the 40 parents of autistic children they studied, "suggesting that poor executive function is not universal, but rather characteristic of a subgroup of parents of autistic children."

— "A family study of autism: cognitive patterns

and levels in parents and siblings," E. Fombonne, P. Bolton, J. Prior, H. Jordan, and M. Rutter; *Journal of Child Psychology and Psychiatry*, Vol. 38, No. 6, 1997, pp. 667-683. Address: E. Fombonne, MRC Child Psychiatry Unit, 16 De Crespigny Park, Denmark Hill, London SE5 8AF, U.K.

—and—

"Broader autism phenotype: evidence from a family history study of multiple-incidence autism families," Joseph Piven, Pat Palmer, Dinah Jacobi, Debra Childress, and Stephan Arndt; *American Journal of Psychiatry*, Vol. 154, No. 2, February 1997, pp. 185-190. Address: Joseph Piven, 1875 John Pappajohn Pavilion, Department of Psychiatry, University of Iowa Hospitals and Clinics, Iowa City, IA 52242-1057.

—and—

"Cognitive deficits in parents from multiple-incidence autism families," Joseph Piven and Pat Palmer; *Journal of Child Psychology and Psychiatry*, Vol. 38, No. 8, 1997, pp. 1011-1021. See address above.

—and—

"Executive function in parents of children with autism," C. Hughes, M. Leboyer, and M. Bouvard; *Psychological Medicine*, Vol. 27, 1997, pp. 209-220. Address: Claire Hughes, Institute of Psychiatry, De Crespigny Park, Denmark Hill, London SE5 8AF, U.K.

Prenatal toxic exposure linked to autism

Exposure to toxins *in utero* can permanently alter the development of the brain. According to Stephen B. Edelson and David Cantor, such toxic exposure—combined with a genetic defect that prevents the body from eliminating the toxins—may be one cause of the abnormal brain structure seen in many autistic individuals.

Edelson and Cantor studied 20 autistic children between the ages of 3 and 12, using three measures of toxic exposure and abnormal liver detoxification processes. Their tests included:

- A glucuric acid analysis. Glucuric acid is a biomarker for contamination by toxins, although it also can be elevated in people with liver disease.

- Blood analyses for toxins.

- A liver detoxification profile, to evaluate the liver's efficiency in eliminating toxic substances. (If the first phase of the liver's detoxification function is overactive, "pathological detoxification" can lead to a back-up of chemicals in the body and formation of toxic free radicals. If the second phase is impaired, "imbalanced detoxification" can lead to an accumulation of toxic chemicals that are absorbed by fatty tissues.)

"It was hypothesized," the researchers say, "that these children would exhibit evidence of abnormally high blood levels of xenobiotic agents [toxins], and would also have evidence of abnormal liver detoxification." This hypothesis was confirmed, according to Edelson and Cantor: of the 18 subjects for whom blood analyses were avail-

able, 16 showed evidence of exposure to toxic chemicals exceeding adult maximum tolerance levels. In addition, all subjects showed evidence of either pathological or imbalanced liver detoxification processes, and all exhibited abnormal levels of glucuric acid.

The researchers note that even the two subjects whose blood tests did not reveal toxic levels of chemicals had abnormal glucuric acid levels, "suggesting abnormal xenobiotic influences on liver detoxification processes."

Edelson and Cantor say their data suggest that, in individuals with a genetically influenced inability to detoxify the body, exposure to toxins early in fetal development (when the protective blood-brain barrier is not yet established) can lead to disruptions in the formation of brain cells and their connections. In addition, they say, exposure of the fetus's brain to toxins may trigger autoimmune reactions that damage the brain.

"Exposure to ordinary environmental chemicals....usually doesn't present any difficulty unless there is a massive exposure," they say. "To the individual with a dysfunctional liver detoxification system, however, these ordinary chemical exposures can be devastating."

— "Autism: xenobiotic influences," Stephen B. Edelson and David S. Cantor, *Toxicology and Industrial Health*, Vol. 14, No. 4, 1998, p. 553-563. Address: Stephen B. Edelson, Environmental and Preventive Health Center of Atlanta, 3833 Roswell Rd., Suite 110, Atlanta, GA 30342. (See Editor's Note, page 6.)