Metabolite Concentrations Shed Light on Autistic Brain Structure

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IRVINE, CALIF. — Children with autism and pervasive developmental disorder show abnormalities in brain structure and chemistry early in their life, Seth Friedman, Ph.D., said at the annual conference of the EEG and Clinical Neuroscience Society.

Brain-volume increases in autism are likely not present at birth but begin to develop in infancy, grow most marked by 3-4 years of age, and level off somewhat by age 6-7 years, a theory championed by Eric Courchesne, Ph.D., of the University of California, San Diego. These changes may reflect deficits in cortical volume and organization relative to that seen in children who are developing more typically, said Dr. Friedman, of the University of Washington, Seattle.

With his colleagues, Dr. Friedman compared magnetic resonance images from 45 children with autism or pervasive developmental disorder not otherwise specified (PDD-NOS) and from 14 children with other types of developmental delays (DD) with images from 26 typically developing (TD) children. All subjects were 3-4 years old.

The children in the autistic and PDD-NOS groups had significantly larger cerebral volumes than the other two groups. Their cerebellar, amygdala, and hippocampal volumes were also larger but were proportionate to the overall increase in cerebral size. However, the amygdala was disproportionately large in a subgroup of children with strictly defined autism. The findings were generally similar for boys and girls.

Consistent with the findings of other studies, larger-than-average brains in the University of Washington autism sample leveled off in size over time, Dr. Friedman said. Some researchers have suggested that this early increase might be caused by a large number of neurons densely packed into the cortex.

To test this hypothesis, he and his associates evaluated regional brain chemistry in the same 45 children with autism and PDD-NOS, as well as 15 children with DD (the original 14 plus 1 more), and 13 of the original children in the TD group.

They used dual-proton echoplanar spectroscopic imaging to measure brain metabolite concentrations. They also measured each metabolite’s relaxation time—the approximate time it takes a chemical system to return to its original state after being perturbed by an outside force, such as a change in temperature, pressure, or—in the case of magnetic resonance—radio waves. In this study, the relative measures of transverse relaxation (T2r) were calculated from the paired echoes to provide a picture of the metabolic activity within the subjects’ gray matter.

Compared with the TD children, those with autism and PDD-NOS had T2r values of myoinositol, N-acetylaspartate, and creatine that were 13%, 10%, and 8% lower, respectively. These significant differences suggest there is a lower concentration of these metabolites in the gray matter. However, with those of the DD subjects, their T2r values for myoinositol, N-acetylaspartate, and creatine were 10% and 9% higher, respectively (Neurology 2003;60:100-7).

These data contradict the idea that people with autism experience dense neuronal packing early in the life and may support other theories.

CAM Use High Among Autism Patients

Chicago — The use of complementary and alternative medicine is very common among parents with autistic spectrum disorders, according to two poster presentations at the annual meeting of the Society for Developmental and Behavioral Pediatrics.

Seventy-four percent of the 112 families of children with autistic spectrum disorders (ASDs) from Children’s Hospital in Boston reported having used some type of complementary and alternative medicine (CAM). A Canadian study showed 91% of 18 families surveyed had used a CAM of any type.

“People are doing a lot of things that they aren’t telling their doctor about, unless they ask,” Leonard Rappaport, M.D., director of the developmental medicine center at Children’s Hospital, Boston, said. “This is something that needs to be reinforced continue.”

The most common CAM therapies were modified diet (38%), vitamins/minerals (30%), and mind-body therapies (23%).

CAM use was associated with having a more severe form of ASD. There was some suggestion that CAM use was associated with longer time since diagnosis, and with higher education level in mothers.

Very few families reported that any of the interventions were harmful. Most families reported that their chief motivations for choosing CAM were unacceptable side effects, concern about the side effects, and safety of conventional medicine.

In a separate presentation, a cross-sectional survey of a study population of children aged 3-18 years (mean 8.9 years) diagnosed with any ASD in southern Alberta showed that the most common types of CAM used were vitamins and minerals (63%), mind-body therapies (31%), dietary-nutritional therapies (48%), and natural therapies such as St. John’s wort, kava, and homeopathy (39%), and anti-yeast therapies (31%).

The most common reasons for CAM use were: to improve symptoms of autism (43%), to improve mental and emotional well being (39%), to improve health (36%), a belief it could not hurt (28%), a belief that conventional medicine did not have any answers (22%), and a belief in holistic health (20%).

“Only 10% of families used CAM because they wanted to heal their child of ASD, so this is a pretty aware population,” said lead investigator W. Ben Gibbard, M.D., of the University of Calgary (Alt.). “If you go online you’ll find 20-30 sites that say there is a potential cure,” Dr. Rappaport said.

The mean number of therapies used was 10, but “some patients are up to 80 therapies that they’ve tried,” Dr. Gibbard said.

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