

Biomedical Update:

Eye-poking: link to calcium levels?

Autistic children who hit or poke their eyes may respond to calcium supplementation, according to a preliminary report by Mary Coleman.

"Although ocular self-abuse is rare," Coleman says, "the four patients with autism seen in [our] clinic who experienced this symptom were all found to have hypocalcemia [low urinary calcium levels]." Three of these patients reduced or stopped their self-injury when given calcium supplements. The fourth moved, and researchers were unable to follow his case.

Coleman describes one adult patient with hypocalcemia who actually removed one of his own eyes, and attempted to injure the other eye. Thirty-six hours after being placed on calcium supplements and anticonvulsants he stopped touching his good eye, and he has exhibited no ocular self-injury since then.

Coleman and colleagues reported two decades ago that 22% of autistic children they studied had urinary calcium levels more than two standard deviations below the mean. Similar results were seen in a 1985 study by D. Rosenthal. The findings are difficult to understand, Coleman says, since blood levels of calcium are normal in autistic children, as are parathyroid hormones (which mobilize calcium from bone when calcium levels are depressed).

Coleman notes that "there is a large literature on low levels of calcium in the central nervous system associated with seizures," and points out that calcium plays an important role in the biosynthesis of the neurotransmitters dopamine and serotonin.

"Clinical presentations of patients with autism and hypocalcemia," Mary Coleman, *Developmental Brain Dysfunction*, 7, 1994, pp. 63-70. Address not listed.

Does violence occur in cycles?

Preliminary research suggests that aggression and self-injurious behavior (SIB) in mentally retarded individuals occur in cycles, and that the two behavior problems "rhythmically co-occur in the same subject"—a finding which may eventually help caretakers plan better treatment programs.

Mark Lewis et al. analyzed behavioral records of 12 patients (nine males and three females) in a treatment facility. The facility had kept careful records documenting aggression and self-injury, and was able to provide the researchers with 12 years of data on the number of times each patient had exhibited aggression or SIB serious enough to result in the use of restraints or "time-out."

The researchers say that "cycles of approximately 3- and 5-month periods were consistently observed," and that "although

interindividual differences were apparent, a similarity in dominant frequencies was observed across the subjects studied." They cite studies showing that stereotyped behaviors in retarded individuals, as well as homicides and suicides in the general population, follow similar cyclical patterns.

Some investigators, Lewis et al. say, have suggested that these cycles may be related to temperature or seasonal changes in sun exposure. Others suggest that they are linked to cyclic variation in cerebrospinal fluid levels of 5-HIAA, the primary metabolite of the brain substance serotonin. Lewis et al. note that "this measure has been related to aggressive behavior in both animals and humans." (High serotonin levels occur in about a third of autistic individuals, while low serotonin levels have been linked to aggression and suicide.)

The researchers say that if rhythmic cycles of aggression and self-injury are indeed common, "monitoring the outcomes of treatment programs over time could be improved by appreciating...the cyclic fluctuations in various target behaviors." In addition, they say, it might be possible to detect the environmental or biological processes causing such cycles.

"Cyclicity of aggression and self-injurious behavior in individuals with mental retardation," Mark H. Lewis, James R. Silva, and Susan G. Silva, *American Journal on Mental Retardation*, Vol. 99, No. 4, 1994, pp. 436-444. Address: Mark H. Lewis, Dept. Psychiatry, P.O. Box 100256, Univ. of Florida, Gainesville, FL 32610-0256.

Nutrient reduces CP

New research indicates that the nutrient magnesium, in the form of magnesium sulfate, may sharply reduce the incidence of cerebral palsy in low birth-weight infants if given to mothers shortly before labor.

Magnesium sulfate is routinely given to women in premature labor, to prevent convulsions resulting from pre-eclampsia (a potentially serious complication of pregnancy). In one study, Karin Nelson et al. found that only seven percent of mothers of very-low birthweight children with CP had received magnesium during labor, while 38 percent of mothers of very-low birthweight but CP-free children received the substance. A second study found that CP occurred in 7.6 percent of low-birthweight infants whose mother received the nutrient, but in 18 percent of those whose mothers did not.

Nelson notes that a third study conducted by the Centers for Disease Control and Prevention also found that magnesium helped prevent cerebral palsy.

Editor's note: USDA studies show that 75% of Americans are magnesium-deficient. I personally take 500 mg daily.

Nelson, Karin, et al., *Pediatrics*, February 9, 1995. Cited in "Drug may help curb some cases of cerebral palsy, 2 studies find," Lawrence Altman, *New York Times*, February 9, 1995.

"Theory of mind" test implicates frontal lobe defect

Simon Baron-Cohen and colleagues have spent years studying "theory of mind"—that is, the mind's ability to think about mental states such as beliefs, pretense, and intentions. Their research indicates that autistic individuals, unlike nondisabled or mentally retarded individuals, are severely handicapped in their ability to impute mental states to themselves or others.

In a new study, Baron-Cohen et al. first compared the responses of autistic and age- and mental-age matched retarded children on a "theory of mind" task. After ensuring that words used in the test were understood by children in both groups, researchers pointed to various words and asked, "can the mind do this?" Words included eight mental-state (such as "dream" and "think") and eight non-mental-state words. They then pointed to words and asked, "can the body do this?"—but in this test, mental-state words were replaced by body-related words.

The researchers found that only 27% of the autistic subjects succeeded at the mental-states task (by answering correctly at least six out of eight times for each group of words), while 93% of them passed the task using body-related words. In contrast, the retarded children succeeded at both tasks. "This deficit is further evidence," they say, "for an autism-specific impairment in the child's concept of mind."

SPECT study offers clues

Phase two of the researchers' study used non-disabled adult subjects in an effort to locate the area of the brain where "theory of mind" functions occur in non-autistic subjects. During SPECT (single photon emission computerized tomography) scans, 12 subjects performed tasks similar to those used in phase one of the study. (The researchers note that only the frontal lobes of the brain were examined in the study.)

The researchers found that the right orbito-frontal region of the brain was significantly more active during the mental state word-recognition task than during a control task. The evidence suggests, they say, that this area of the brain is impaired in autistic subjects. Baron-Cohen et al. note that patients with orbito-frontal lesions show loss of interest in social contact, impaired social judgment, and defects in language processes related to theory of mind.

"Recognition of mental state terms: clinical findings in children with autism and a functional neuroimaging study of normal adults," Simon Baron-Cohen, Howard Ring, John Moriarty, Bettina Schmitz, Durval Costa, and Peter EI; *British Journal of Psychiatry*, 165, 1994, pp. 640-649. Address: Simon Baron-Cohen, Departments of Experimental Psychology and Psychiatry, University of Cambridge, Downing Street, Cambridge CB2 3EB.