CRIME Times

Linking Brain Dysfunction to Disordered/Criminal/Psychopathic Behavior

Volume 11, Number 3, 2005

FEATURE ISSUE: BEHAVIOR AND NUTRITION
(see pages 1-4)

Zinc enhances teens' memory, attention

Teenagers taking zinc supplements show strong gains in memory and sustained attention, according to a recent study.

James Penland et al. divided 209 seventh-graders into three groups. Each day for 10 to 12 weeks, the students consumed juice containing 0, 10, or 20 mg of zinc gluconate. Students, their teachers, and their parents were not told which groups received zinc and which received the placebo.

Before and after the experiment, Penland et al. measured the students' blood zinc levels and administered tasks measuring hand-eye coordination, attention, memory, and problem-solving. In addition, students, parents, and teachers filled out questionnaires about the children's mental, physical, and social abilities and school performance.

The researchers report that students receiving 20 mg of zinc gluconate per day decreased their reaction time on a visual memory task by 12 percent, vs. 6 percent for the placebo group; increased correct answering on a word rec-

continued on page 3

Fatty acids dramatically improve academic performance, reduce ADHD symptoms in children with dyspraxia

Children with developmental coordination disorder (DCD) improve dramatically when treated with essential fatty acids, according to a new British study.

DCD (also known as dyspraxia) is a syndrome involving clumsiness and delays in walking and other motor milestones. Many children with DCD also exhibit speech, learning, and behavioral problems, and the syndrome often overlaps with dyslexia, attention deficit hyperactivity disorder (ADHD), and autism.

At the beginning of the study, about one-third of the children had symptoms suggestive of ADHD, but nearly half of the symptomatic children taking fatty acids improved so much that they no longer appeared to have ADHD.

Alexandra Richardson and Paul Montgomery enrolled 117 children between the ages of 5 and 12 in a double-blind, placebo-controlled study of the effects of essential fatty acid supplementation on DCD. All of the children in the study exhibited symptoms consistent with the disorder.

Half of the children received supplements of essential fatty acids for the entire six months of the study. The remaining children took a placebo (olive oil) for the first three months of the study, and then received the fatty acid supplements for the next three months. The fatty acid supplements used during active treatment contained 80 percent fish oil and 20 percent evening primrose oil, providing high levels of the omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) and the omega-6 fatty acid linoleic acid.

No significant improvements in motor coordination occurred in either the placebo or the active-treatment group. However, the researchers say, the group taking fatty acids made more than nine months' worth of progress in reading during the first three months of treatment, compared to only three months of progress for the untreated group. In spelling, the treated group made six months' worth of progress, while the untreated group made less than two months' worth, exacerbating their delay.

Moreover, ADHD-related symptoms dropped significantly in the group taking fatty acids, but remained virtually unchanged in the placebo group. At the beginning of the study, about one-third of the children had symptoms suggestive of ADHD, but half of the symptomatic children taking fatty acids improved so much that they no longer appeared to have ADHD. Richardson and Montgomery say the improvement seen in these subjects was comparable to that reported in studies of Ritalin.

When the children who initially received a placebo began taking the active capsules, they made equally strong academic and cognitive

continued on page 3

QUOTABLE

"The results in the classrooms and playground have been noticed by all staff teaching the 200 children aged four to 11. 'Before the children were quite lively, they were quite a trial,' [school official Eileen Miller] says diplomatically. 'Then suddenly they are getting on in the afternoon and incidents of fighting have gone down.... We're giving them the best chance, because if they are cross or agitated they are not ready to absorb new ideas.'"

—March 18, 2005 article on the BBC website "Food for Thought," describing the results of a program that has replaced junk food with nutritious food in 30 British primary schools

A simple explanation why diet affects behavior is found in the existence of the human brain, which like any other part of the body requires nourishment to function normally.... Yet we somehow manage to de-couple the brain from behavior by assuming that our behavior is purely a matter of free will. This clarity is important for the difficult task of sentencing [of criminals] but how exactly can we exercise free will without involving our brains?"

—Bernard Gesch, in "Food for court," Magistrate, *May 2005. Dr. Gesch's landmark study in 2002 (see* Crime Times *Volume 8, Number 3, 2002, page 1) showed that improving the diets of criminal offenders dramatically reduced the number of antisocial acts they committed*

Crime Times is interested in hearing from readers conducting research pertaining to biological influences on criminality and psychopathology. Reprints of research papers are appreciated.

Low cholesterol, school suspensions or expulsions linked

Many doctors recommend limiting the amount of fat and cholesterol consumed by young children, in order to protect their cardiovascular health. New research, however, suggests that children and teens with low cholesterol levels are at increased risk for significant behavior problems.

Jian Zhang and colleagues analyzed the serum cholesterol levels of 4,852 children between the ages of 6 and 16, all participants in the Third National Health and Nutrition Examination Survey (NHANES III), and evaluated their psychosocial development. After adjusting for family socioeconomic status, maternal marital status and education, the adequacy of the children's nutrition, and their academic performance, the researchers found that non-African-American children with serum total cholesterol concentrations below the 25th percentile were nearly three times as likely to have been suspended or expelled from school as those with total cholesterol levels at or above the 25th percentile. The researchers found no association between low cholesterol and school suspensions or expulsions in African-American children.

Zhang et al. note that the most common reason for school suspension or expulsion is physical aggression, and say their findings are consistent with other studies linking low serum cholesterol levels to aggressive behavior in adults and nonhuman primates. In addition, they say, "low total cholesterol has been associated with the onset of conduct disorder during childhood among male criminals." They note that cholesterol and fats influence brain function and behavior by modifying cell membranes and affecting the production and use of neurotransmitters. In particular, they note, research indicates that low cholesterol may lead to reduced serotonin levels, which in turn are linked to impulsive behavior and aggression.

The researchers conclude that among non-African-American children, "low total cholesterol may be a risk factor for aggression or a risk marker for other biologic variables that predispose to aggression."

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"Association of serum cholesterol and history of school suspension among school-age children and adolescents in the United States," Jian Zhang, Matthew F. Muldoon, Robert E. McKeown, and Steven P. Cuffee, *American Journal of Epidemiology*, Vol. 161, No. 7, 2005, 691-99. Address: Jian Zhang, 4770 Buford Highway, MS K-24, Atlanta, GA 30341, bvw2@cdc.gov.

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Adolescents' attention, memory skills enhanced by zinc

(continued from page 1)

ognition task by 9 percent, vs. 3 percent; and increased their scores on a sustained attention task by 6 percent, vs. 1 percent. The gains seen in children on the high dose of zinc were independent of their initial zinc status. No significant differences were seen between students taking the placebo and those on the lower dose of zinc.

Penland notes that zinc deficiency is not uncommon even in developed nations, and that the risk is especially high for teens because they are growing rapidly and often eat poor diets.

The findings follow earlier research revealing that zinc can benefit many children with attention deficit hyperactivity disorder (see *Crime Times* Vol. 10, No. 2, 2004, page 4). In that study, Mustafa Bilici et al. randomly assigned 400 children with ADHD to take either a placebo or 150 mg per day of zinc sulfate for 12 weeks, and reported that subjects taking zinc "showed significant improvement in hyperactivity, impulsivity and socialization scores," although the treatment had no effect on attention deficits.

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"Zinc supplementation improved mental performance of 7th-grade boys and girls," news release, Federation of American Societies for Experimental Biology, April 4, 2005.

Mothers' iron deficiency jeopardizes infant development

New mothers with even mild iron deficiency are more negative toward their babies and less sensitive to their cues during critical months of infant development and mother-infant bonding, according to new research. The study also identified delays in the infants of iron-deficient mothers.

E. M. Perez and colleagues studied 64 South African mothers identified as mildly iron deficient and 31 with good iron status. Ten weeks after delivering their babies, half of the iron-deficient women began taking iron supplements, while the other half did not. The researchers observed the women's interactions with their infants before administering the supplements, and again when the infants were 9 months old.

"At baseline," the researchers say, "anemic mothers tended to be less responsive to, and more controlling of, their infants." They also appeared more bored or distant, and tended to interfere inappropriately with their babies' play experiences.

"Earlier research had shown that anemic women may experience post-partum depression and that women with moderate iron deficiency have a slowdown in thinking and memory," study coauthor Laura Murray-Kolb says. "Our new results suggest that the effects of mild iron deficiency, which are easily correctable with supplements, can disrupt the solid foundation that is established by healthy mother/infant interactions."

The researchers also found that infants of the iron-deficient mothers exhibited delays in hand-eye movement and overall development that did not resolve when the mothers received supplements.

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"Maternal iron deficiency disrupts mother/child interaction," news release, Penn State, April 5, 2005, and "Mother-infant interactions and infant development are altered by maternal iron deficiency anemia," E. M. Perez, M. K. Hendricks, J. L. Beard, L. E. Murray-Kolb, A. Berg, M. Tomlinson, J. Irlam, W. Isaacs, T. Njengele, A. Sive, and L. Vernon-Feagans, *Journal of Nutrition*, Vol. 135, No. 4, April 2005, 850-55. Address: John L. Beard, jbeard@psu.edu.

RECOMMENDED LINKS:

For more information on nutrition and behavior (and, in particular, on the Durham study cited in our page 1 article), Crime Times recommends **www.fabresearch.org**, the website of Food and Behaviour Research (FAB Research). This British charitable organization is "dedicated both to advancing scientific research into the links between nutrition and human behaviour and to making the findings from such research available to the widest possible audience." Their website includes media articles, abstracts of research papers, and other information. Click on "Information about..." to find research and news reports on specific mental and learning disabilities.

Fatty acid supplements enhance learning, behavior in children with DCD

(continued from page 1)

gains, while the children kept on the supplements continued their improvement.

Essential fatty acids play an integral role in the development and health of the brain and eyes, and research links shortages or imbalances of these nutrients to increases in depression, learning disabilities, attention deficit disorder, and aggression (see *Crime Times* Volume 5, Number 1, 1999, page 1 and Volume 11, No. 2, 2005, page 1).

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"The Oxford-Durham Study: a randomized controlled trial of dietary supplementation with fatty acids in children with developmental coordination disorder," Alexandra J. Richardson and Paul Montgomery, *Pediatrics*, Vol. 115, No. 5, May 2005, 1360-66. Address: Alexandra J. Richardson, University Laboratory of Physiology, Parks Road, Oxford OX1 3PT, United Kingdom, alex.richardson@physiol.ox.ac.uk.

High soy exposure alters monkeys' early social behavior

Soy infant formula contains much more manganese than cow's milk or human breast milk—a finding that is raising concerns because of the potential of manganese to alter brain function. A new study adds to these concerns, showing that soy formulas may alter social behavior.

Mari Golub and colleagues fed cow's milk formula, soy formula with typical manganese levels, or soy formula with added manganese to rhesus monkeys, beginning at birth and continuing until the monkeys were four months old. The researchers report that both monkeys receiving the typical soy formula and those drinking the extra-manganese formula engaged in less play behavior and more "clinging" behavior when evaluated in pair interactions. The soy and extra-manganese groups also had shorter wake cycles and shorter periods of daytime inactivity than monkeys fed cow's milk formula. In addition, monkeys given the soy formula could be identified by their impulsivity, and monkeys in the extra-manganese group showed evidence of alterations in dopamine function. The researchers say their findings suggest that "components of soy formula, including manganese, may influence brain development as reflected in behavioral measures."

Previous research has suggested a link between manganese and attention deficit hyperactivity disorder (see *Crime Times* Volume 8, Number 4, 2002, page 7) or violent behavior (see *Crime Times* Volume 3, Number 4, 1997, page 1).

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"Neurobehavioral evaluation of rhesus monkey infants fed cow's milk formula, soy formula, or soy formula with added manganese," M. S. Golub, C. E. Hogrefe, S. L. Germann, T. T. Tran, J. L. Beard, F. M. Crinella, and B. Lonnerdal, *Neurotoxicology and Teratology,* June 11, 2005 (epub ahead of print publication). Address: Mari Golub, Department of Internal Medicine, CNPRN, Room 1925, University of California, One Shields Avenue, Davis, CA 95616.

Adding choline to diet could protect against effects of impoverished environment

Supplementing the diets of rats with choline, a vitamin-like nutrient needed for brain development and neurotransmitter synthesis, can prevent memory impairment stemming from impoverished environments, according to a recent study.

Lisa Teather and Richard J. Wurtman reared young rats for three months in either impoverished or enriched environments. In both groups, some rats received a regular diet, while others ate a diet supplemented with CDP-choline (a highly active form of choline). In a second phase of the experiment, some rats ate the choline-rich diet for the entire three months, while others received supplements for only one month at the beginning or end of the three-month period.

The researchers found that rats raised in the poor environment exhibited a selective deficit in spatial memory dependent on hippocampal function, while this deficit did not occur in those fed the high-choline diet. Choline did not enhance memory in rats raised in an enriched environment. The researchers say that in the impoverished-environment group, only rats fed choline for the entire three months were protected against memory impairment.

An earlier study by a different research group (see *Crime Times*

continued on page 7

Fatty acid effective for treating bipolar disorder

A new study indicates that the omega-3 fatty acid eicosapentaenoic acid (EPA) can markedly reduce symptoms of depression in bipolar patients without precipitating mania.

Yamima Osher and colleagues administered 1.5 to 2 grams of EPA per day for up to six months to patients with bipolar disorder, and report, "Eight of the ten patients who completed at least one month of follow-up achieved a 50 percent or greater reduction in Hamilton Rating Scale for Depression scores within one month." None of the patients developed mania, a problem that often occurs when lithium—the standard treatment for bipolar disorder—is used. One patient developed suicidal behavior, but the researchers note that this is not uncommon in patients recovering from depression.

Osher et al. note that their study was small and unblinded and did not include severely depressed patients, but the researchers conclude, "Although the ultimate utility of omega-3 fatty acids in bipolar depression is still an open question, we believe that these initial results are encouraging and justify the continuing exploration of its use. This study suggests that EPA omega oil may be a safe, efficacious, and well-tolerated compound especially useful in the treatment of mild to moderate bipolar depression."

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"Omega-3 eicosapentaenoic acid in bipolar depression: report of a small open-label study," Y. Osher, Y. Bersudsky, and R. H. Belmaker, *Journal of Clinical Psychiatry*, Vol. 66, No. 6, June 2005, 726-9. Address: Yamima Osher, Beer Sheva Mental Health Center, P.O. Box 4600, Beer Sheva, Israel, yamy@bgumail.bgu.ac.il.

Babies exposed to hundreds of dangerous chemicals in the womb, new study finds

Unborn babies are exposed to hundreds of hazardous chemicals, according to a new study commissioned by the Environmental Working Group (EWG).

Jane Houlihan and colleagues analyzed umbilical cord blood samples collected from 10 babies born in 2004 in the United States. The researchers report, "Tests revealed a total of 287 chemicals in the group. The umbilical cord blood of these 10 children, collected by Red Cross after the cord was cut, harbored pesticides, consumer product ingredients, and wastes from burning coal, gasoline, and garbage." Of the chemicals they detected, the researchers say, "we know that 180 cause cancer in humans or animals, 217 are toxic to the brain and nervous system, and 208 cause birth defects or abnormal development in animal tests."

Such chemicals pose a greater danger to a fetus or developing child than to an adult, the researchers say, because:

—Children's exposures are far greater on a pound-for-pound basis.

—The immature blood-brain barrier of infants allows greater exposure.

—Children have lower levels of proteins that can bind with toxins and remove them from the body.

—Babies' systems are rapidly developing, and thus more vulnerable to damage.

"Not long ago scientists thought that the placenta shielded cord blood—and the developing baby—from most chemicals and pollutants in the environment," Houlihan et al. say. "But now we know that at this critical time when organs, vessels, membranes and systems are knit together from single cells to finished form in a span of weeks, the umbilical cord carries not only the building blocks of life, but also a steady stream of industrial chemicals, pollutants and pesticides that cross the placenta as readily as residues from cigarettes and alcohol."

The researchers say the government should take stronger steps to protect unborn children and infants. Such action, they say, should include updating the Toxic Substances Control Act to require chemical manufacturers to "demonstrate affirmatively that the chemicals they sell are safe for the entire population exposed, including children in the womb."

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"Body burden—the pollution in newborns: A benchmark investigation of industrial chemicals, pollutants and pesticides in umbilical cord blood," Jane Houlihan, Timothy Kropp, Richard Wiles, Sean Gray, and Chris Campbell, Environmental Working Group, July 14, 2005. Full report available at http://www.ewg.org.

Compromised blood-brain barrier in many offenders?

A significant percentage of violent offenders show evidence of blood-brain barrier dysfunction, according to two studies.

In the most recent of these studies, Henrik Anckarsäter and colleagues evaluated 28 violent and sexual offenders, all but one of them male. All of the subjects were undergoing pretrial psychiatric evaluation at the time, and were later convicted. The researchers measured each subject's cerebrospinal fluid (CSF)/serum albumin ratio, which can be used to assess the integrity of the blood-brain barrier, and compared the measurements to those of non-criminal control subjects. They report that four of the criminals, but none of the controls, had abnormally high CSF/serum albumin ratios, and that as a group the offenders had significantly higher ratios than the controls.

In an earlier study of 19 non-psychotic violent male offenders, the researchers found an even higher percentage of abnormality, with 8 of the subjects having elevated CSF/serum albumin ratios. The researchers say that "current medication or substance abuse did not explain the increase in either study."

Increased CSF/serum albumin ratio has also been reported in suicide attempters, psychotic patients, and people with central nervous system trauma and tumors. The researchers say that "changes in blood brain barrier permeability [are] an unspecific sign that may be explained by various adverse life events and medical conditions. Increased albumin ratios on the group level and clearly pathological states in considerable subgroups (about one in four based on our two study groups) call for attention to the neurological functioning among violent offenders that today receive little medical attention."

—

"Increased CSF/serum albumin ratio: a recurrent finding in violent offenders," H. Anckarsäter, A. Forsman, and K. Blennow, *Acta Neurologica Scandinavica*, Vol. 112, No. 1, July 2005, 48-50.

—and—

"CSF studies in violent offenders. II. Blood-brain barrier dysfunction without concurrent inflammation or structure degeneration," H. Soderstrom, K. Blennow, A. Manhem, and A. Forsman, *Journal of Neural Transmission*, Vol. 108, No. 7, 2001, 879-86.

Address for either: Henrik Anckarsäter, the Forensic Psychiatric Clinic, Malmö University Hospital, Sege Park 8A, 205 02 Malmö, Sweden.

Asperger's disorder: a possible explanation for behavior of subgroup of serial killers?

A series of papers by J. Arturo Silva and colleagues suggests that some serial killers—including Jeffrey Dahmer and Theodore Kaczynski (the "Unabomber")—exhibit evidence of Asperger's disorder (AD), a variant of autism.

Autism is a neurological disorder that severely affects communication, social skills, behavior, and learning. Individuals with AD are far less impaired mentally and socially than other autistic individuals, and often are highly intelligent. Unlike people with autism, individuals with AD exhibit normal language development, although their speech tends to be somewhat eccentric. While very few people with AD are violent, studies do suggest that the prevalence of AD may be elevated in violent criminal populations.

Silva et al. say that Dahmer, convicted of serially killing and cannibalizing young boys, exhibited signs of AD from his earliest years. As a child, he exhibited poor eye contact, displayed facial expressions "devoid of emotional glow," had a rigid body posture and gait, and was isolated, socially inept, and "emotionally disconnected." He also strongly disliked change and was highly ritualistic and obsessive (with his obsessions including the collection of bones and dead animal bodies). All of these traits can be signs of AD.

Silver et al. argue that Dahmer's creation, collection, and utilization of cadavers can be viewed as "a sexualized form of the repetitive behavioral patterns typically encountered in AD." Dahmer's treatment of his victims, they say, is consistent with the fact that individuals with AD have trouble both in "theory of mind" (the understanding that other people have thoughts and feelings) and in distinguishing between people and objects.

Similar patterns, Silva and colleagues say, appear in the history of Kaczynski, who killed three people and wounded dozens by sending them mail bombs. Silva et al. note that Kaczynski was aloof and could not understand the feelings of others. He also exhibited an aversion to being touched and experienced extreme distress when exposed to noise, both common reactions in children with autism. A neighbor described the young Kaczynski as "a child who was an old man before his time," consistent with Hans Asperger's description of his young patients with AD as "little professors," and as an adult, Kaczynski was extremely impaired in social relationships. Kaczynski's preoccupations with bomb-making and the perceived evils of technology, the authors say, can be viewed as typical of the obsessive interests of a person with AD.

Silva et al. say their characterization of a subset of serial killers as having high-functioning autism could lead to a greater understanding of the etiology of both serial homicide and autism. "Psychological phenomena of central importance to understanding serial killers such as deficits in empathy have frequently been explained as originating from a psychopathic core," they say, "thereby missing the possibility that deficits in empathy may also be due to autistic psychopathology."

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"A neuropsychiatric developmental model of serial homicidal behavior," J. Arturo Silva, Gregory B. Leong, and Michelle M. Ferrari, *Behavioral Sciences and the Law*, Vol. 22, 2004, 787-99; and "The case of Jeffrey Dahmer: Sexual serial homicide from a neuropsychiatric developmental perspective," J. Arturo Silva, Michelle M. Ferrari, and Gregory B. Leong, *Journal of Forensic Sciences*, Vol. 47, No. 6, 2002, 1-13; and "Asperger's disorder and the origins of the Unabomber," J. Arturo Silva, Michelle M. Ferrari, and Gregory B. Leong, *American Journal of Forensic Psychiatry*, Vol. 24, No. 2, 2003, 5-43. Address for all: J. Arturo Silva, P.O. Box 20928, San Jose, CA 95160, silvapsychcorp@earthlink.net.

Pedophilia: "handedness" difference replicated

New research replicates an earlier finding that pedophiles have a substantially increased rate of non-right-handedness, which can be an indication of disrupted neurological development.

In the new study, James Cantor et al. evaluated 404 adult men undergoing assessment for illegal or aberrant sexual behaviors or interests. The researchers found that scores of right-handedness correlated negatively with physiological responses to stimuli depicting children and positively with reactions to stimuli depicting adults, consistent with an earlier study by the researchers (see *Crime Times* Volume 10, Number 3, 2004, page 2). When the researchers combined the subjects from both studies, they found that "the odds of non-right-handedness in men offending predominantly against prepubescent children were approximately two-fold higher than that in men offending predominantly against adults and three-fold higher after eliminating those men with intrafamilial (i.e., incest) offenses." The researchers say their findings suggest a "neurological component" to the development of pedophilia.

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"Handedness in pedophilia and hebephilia," J. M. Cantor, P. E. Klassen, R. Dickey, B. K. Christensen, M. E. Kuban, T. Blak, N. S. Williams, and R. Blanchard, *Archives of Sexual Behavior*, Vol. 34, No. 4, Aug. 2005, 447-59. Address: James Cantor, Law and Mental Health Program, Ctr. for Addiction and Mental Health, 250 College St., Toronto, Ontario M5T 1R8.

Natural chemical tells our brains when to trust others

The neuropeptide oxytocin fosters romantic attraction and maternal-infant bonding, and a new study indicates that the chemical also influences how much we trust other people.

Ernst Fehr et al. gave study subjects several dollars, and asked them to decide how much of the money to give to a "trustee." Participants were told that their investment would quadruple if they gave money to the trustee, but that the trustee could decide how much, if any, of the money to give back to them.

Thirteen of 29 participants given inhaled oxytocin gave all of their money to the trustee, while only six of 29 subjects given a placebo chose to do so. When the researchers replaced the human trustee with a computer making random payoffs, this difference disappeared, indicating that oxytocin enhanced trust in other people rather than merely making the participants less risk-averse.

The researchers say, "These results concur with animal research suggesting an essential role for oxytocin as a biological basis of prosocial approach behavior."

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"Oxytocin increases trust in humans," Michael Kosfeld, Markus Heinrichs, Paul J. Zak, Urs Fischbacher, and Ernst Fehr, *Nature*, Vol. 435, June 2, 2005, 673-6. Address: Ernst Fehr, efehr@iew.unizh.ch.

Why Crime Times?

The more we learn about the brain dysfunction that underlies much delinquency and criminal behavior, the more successful we will be in truly rehabilitating offenders, and preventing at-risk children from turning to lives of crime. The purpose of *Crime Times*, a free publication sponsored by the Wacker Foundation, is to foster this effort by reporting state-of-the-art worldwide research on biological causes and treatment of aberrant behavior. It is our hope that physicians, researchers, educators, law enforcement professionals, and parents can use the information in *Crime Times* to build a better, safer future for at-risk children, and for the communities in which they live.

Choline may ameliorate effects of poor environment

(continued from page 4)

Volume 7, Number 2, 2001, page 1) found evidence that choline supplementation also may ameliorate at least some of the long-term effects of prenatal alcohol exposure, even if the nutrient is administered after the alcohol exposure occurs. In addition, Teather's group has found that choline supplementation can protect against memory loss in aging rats.

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"Dietary CDP-choline supplementation prevents memory impairment caused by impoverished environmental conditions in rats," L. A. Teather and Richard J. Wurtman, *Learning and Memory*, January 2005 (epub ahead of print publication). Address: Lisa Teather, Department of Psychology, Wilfrid Lauer University, Waterloo, Ontario, Canada N2L 3CS.

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Callous, unemotional behavior in children is highly heritable

Callous, unemotional traits in very young children—which can be a warning sign for future psychopathy—are largely due to hereditary rather than environmental factors, according to recent research.

Essi Viding and colleagues studied same-sex twin pairs, using teachers' ratings to identify pairs in which at least one twin had high scores for callous, unemotional behavior and pairs in which at least one twin had high scores for antisocial behavior. The researchers investigated hereditary and environmental influences on each behavior, and analyzed the differences between antisocial children with and without callous, unemotional behavior. They determined the relative strength of hereditary and environmental factors by comparing identical twins to fraternal twins (who share only half as many genes).

Viding et al. say their data revealed a powerful hereditary influence on levels of callous, unemotional behavior. Moreover, they found that antisocial behavior in children with high levels of callous, unemotional behavior was "under extremely strong genetic influence and no influence of shared environment." In contrast, both environment and heredity played a role in antisocial behavior in children without callous or unemotional traits.

The researchers say that "the remarkably high heritability for callous, unemotional traits and for antisocial behavior in children with [these traits] suggests that molecular genetic research on antisocial behavior should focus on the callous-unemotional core of psychopathy."

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"Evidence for substantial genetic risk for psychopathy in 7-year-olds," Essi Viding, R. James R. Blair, Terrie E. Moffitt, and Robert Plomin, *Journal of Child Psychology and Psychiatry*, Vol. 46, No. 6, 2005, 592-7. Address: Essi Viding, Social Genetic and Developmental Psychiatry Centre, Box Number P080, Institute of Psychiatry, De Crespigny Park, London SE5 8AF, UK, spjgemc@iop.kcl.ac.uk.

PROFESSIONAL ADVISORY BOARD

QUOTABLE

"The federal government has proposed a national children's health study to sort out these issues [regarding the toxic effects of chemicals] over a period of 21 years.

That's too long to wait, Betty Mekdeci [executive director of Birth Defect Research for Children] said.

'Nationally, we're looking at off-the-chart stuff: a 1,700 percent increase in children being served for autism between 1992 and 2002; 450,000 children born every year with structural birth defects.' Schools are in a dither about students not being able to pass the FCAT, she said, 'but no one is looking at the fact that these kids are coming into the world with severe impairments that are making it tough for teachers to handle, tough for them to learn.

'For the U.S. Department of Education, these things are like a train coming down the track. One problem is, nobody wants to count it up and see what's coming.'"

—"Birth defects puzzle officials," Jan Hollingsworth,
Tampa Bay Online*, May 16, 2005*

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