Fetal Alcohol Syndrome and its Effects
FAS is defined by four main criteria: maternal drinking during pregnancy, a characteristic pattern of facial abnormalities, growth retardation, and brain damage. When only brain damage occurs (often manifested as intellectual difficulties or behavioral problems), the condition is termed "alcohol-related neurodevelopmental disorder."

Recent studies have shown that specific neurobehavioral functions are consistently impaired. One of these is verbal learning. Children that are prenatally exposed to alcohol show a variety of problems with language and memory. For example, children with FAS have problems encoding information into memory. Children with FAS also have difficulties with visual-spatial learning, which involves learning spatial relationships between objects.

Alcohol Exposure Associated with Reduced Efficiency in Corpus Callosum

Since Fetal Alcohol Syndrome (FAS) was described in 1973, scientists and health care providers have known that heavy use of alcohol in pregnancy can cause damage to the central nervous system. It is this damage to the brain that is believed to be responsible for the learning and behavior problems that are often seen in infants and children who have been exposed to alcohol. Research using animal models, which allows exposure to higher levels of alcohol than usually occur in humans, has confirmed that there are specific nervous system malformations and unusual growth patterns resulting from alcohol exposure. A few postmortem studies of infants and children who died from other causes suggested that alcohol caused brains to be smaller than normal and to have certain malformations. However, it has not been possible until recently to study the brains of living people and to understand the relationship between the activities of the nervous system and the behavior of individuals.

In the last decade there have been significant advances in neuroimaging using neuromagnetic resonance imaging (MRI) procedures. These procedures use a powerful magnet as well as sophisticated electronics and statistics to provide a picture of the structure and function of the living brain. Initially MRI was used clinically to identify lesions and other structural problems in the brain that led to medical problems. More recently, functional MRI has been used to study the process that goes on during memory, attention and other activities of the brain.

In the last few years, several centers have used this powerful technique to study the effects of prenatal alcohol exposure. Studies from San Diego (Sowell, et al. 2001) have found that patients with FAS have less white matter than do normal individuals. Since white matter helps to ensure the efficiency of the transmission of nerve impulses in the brain, having a reduced amount may explain some of the learning difficulties that result from alcohol exposure. Recently, the Maternal Substance Abuse and Child Development Laboratory, Department of Psychiatry and Behavioral Sciences has collaborated with the Biomedical Imaging Technology Center, both at Emory University, to study young adults who were exposed to alcohol prenatally. An initial study using a technique called Diffusion Tensor Imaging has found that alcohol exposure is associated with reduced...
FAS children may also have attention problems. Unfortunately, many children are misdiagnosed as having attention deficit hyperactivity disorder (ADHD). Prenatal alcohol exposure has also been related to a slower, less efficient way of processing information in school-age children. Lastly, there are important deficits in executive functioning. This involves activities that require abstract thinking, such as planning and organizing.

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- Evaluation of Corpus Callosum Anisotropy in Young Adults with Fetal Alcohol Syndrome Using Diffusion Tensor Imaging Poster presented at Research Society on Alcoholism Annual Meeting, June, 2003, Fort Lauderdale, Fl.


For further information regarding this article please contact Claire D. Coles at the Maternal Substance Abuse and Child Development Project, Emory University School of Medicine, Department of Psychiatry and Behavioral Sciences, 1256 Briarcliff Road, N.E., Suite 324W, Atlanta, Georgia, 30306. You can also phone us at 404-712-9800 or visit our website at http://www.emory.edu/MSACD

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