Study Links Free Radicals to the Spectrum of Autism

A metabolic flaw may account partly for the range in severity shown in children with the developmental disorder, scientists report.

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Many autistic children share a chronic flaw in the body's natural defenses against oxygen free radicals — corrosive molecules in the body that can severely damage developing brain cells, scientists said Saturday in San Diego.

The molecular havoc caused by free radicals — natural byproducts of metabolism — is believed to be a major factor in the cell damage that underlies aging.

Researchers at the University of Arkansas for Medical Sciences in Little Rock found that a single breakdown in the body's metabolism might underlie many of the puzzling symptoms of autism, a complex developmental disability with a spectrum of behaviors.

"This is a very promising thing to look at because it gets at the actual metabolic processes in the brain," said UCLA neurologist George Bartzokis, who did not participate in the research. "The brain is especially vulnerable to damage from free radicals."

Those with autism typically have difficulty communicating and interacting with other people. It strikes some in infancy. Other children may develop normally for several years before falling into a private world where normal social interaction and behavior becomes impossible.

The new findings also may help shed light on the condition's range in severity because maturing neurons and synapses are especially vulnerable to this biomolecular bombardment. Autism could therefore cause different symptoms and degrees of severity in children depending on when the disorder is triggered.

Normally, the body shields itself from such damage with a chemical produced by every cell called glutathione, which neutralizes oxygen free radicals. It binds to them, altering their electron balance and sees them safely expelled from the body.

By analyzing blood samples from 95 autistic children and 75 healthy ones, researchers led by biochemist S. Jill James at the University of Arkansas determined that levels of this protective antioxidant were abnormally low in many autistic children.

They presented their work at the Experimental Biology 2005 conference in San Diego.

The finding is suggestive, several experts said, because glutathione also is crucial for neutralizing toxic heavy metals such as mercury, which is found in food, the air and, at one time, a vaccine preservative called thimerosal.

"When glutathione is less available, then it is easier for things to get out of balance and the free radicals can cause more damage," James said. "One interpretation of this finding is that children with autism would be less able to detoxify and eliminate these heavy metals."

The researchers cautioned that they do not know whether this metabolic flaw precedes the disorder or is one of its symptoms. Indeed, no one knows what causes autism, which has increased in prevalence 10-fold during the last 15 years. So far, there is no medical test that can identify it reliably.

Most experts agree that autism most probably involves the interaction of many genes that together predispose a child to the condition, combined with some outside factor that triggers the disorder. No one has identified any genes for autism, nor is there any consensus on what environmental factor is involved.

"We have added now the fact that there may also be a metabolic component that reflects both the underlying genetics and the environment," James said.
