

# Autism Research Review

I N T E R N A T I O N A L

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Reviewing biomedical and educational research in the field of autism and related disorders

## Study outlines evidence linking autism to cell damage caused by toxic exposure

A new report outlines strong evidence supporting the theory that autism can stem from neuronal cell death or brain damage occurring after birth as a result of exposure to toxins or other insults.

Janet Kern and Anne Jones note that the loss of Purkinje cells in the cerebellum is one of the most consistent findings in autism. Several studies, they say, reveal evidence of gliosis (a sign of neural damage) and/or high levels of glial fibrillary acidic protein (GFAP, elevated in acute and chronic nerve cell damage) associated with Purkinje cell loss—an indication that in some autistic children, Purkinje cell abnormalities stem from damage rather than simply from abnormal development.

Because of Purkinje cells' physiology, the researchers say, these cells are exquisitely vulnerable to a wide range of toxins and other environmental insults. Among the toxins known to damage Purkinje cells are mercury, lead, cadmium, arsenic, and bismuth.

Kern and Jones say that increased brain volume—another consistent finding in young autistic children—also can result from environmental insults, and in particular from exposure to heavy metals. A recent rodent study, they say, showed that lead causes the brain to swell. "It was also found that the cerebellum is preferentially susceptible to lead," they say, possibly because of its delayed maturation compared to the cerebrum. Another study by Mady Hornig et al. (see ARRI 18/2) found that mice genetically susceptible to autoimmune disease develop enlarged brains and autistic-like symptoms when exposed to mercury after birth.

"Studies suggest that toxic metals in the brain alter permeability, fluid balance, growth factors, and biochemical processes," they say, all of which could lead to an enlarged brain.

Kern and Jones note that exposure to toxic metals can inhibit formation of the antioxidant glutathione (GSH), while greatly increasing the body's need for this crucial substance. GSH protects against unstable "reactive oxygen species" (ROS) that can attack the lipids in cell membranes, forming peroxides that impair cell function (a process called "lipid peroxidation") and causing cell damage (oxidative stress). Purkinje cells, the

researchers note, are particularly vulnerable to this damage. Five recent studies reported increased lipid peroxidation and/or oxidative stress in autism, and one of these studies reported a correlation between decreased antioxidant proteins and regressive autism. Research by Jill James (see ARRI 18/4) also indicates that autistic children have reduced levels of active glutathione and higher concentrations of oxidized (inactive) glutathione than controls.

In addition to its role as an antioxidant and detoxifier, glutathione is needed for normal immune function and gastrointestinal integrity. Both immune dysfunction and gastrointestinal problems are common in autism.

Kern and Jones cite multiple studies revealing that autistic children are vulnerable to heavy metal toxicity because they are "poor detoxifiers" compared to non-disabled children. They speculate that autism may involve a vicious cycle in which heavy metals accumulate in a child with a limited ability to handle toxins, eventually reaching "critical mass" and resulting in oxidative stress and neurological damage. "This would result in cell loss and loss of previously acquired skills," they say. Some children may be more vulnerable than others, they say, due to their age at the time of exposure, genetic predisposition, use of antibiotics (which rodent studies suggest can reduce

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## Autism Research Institute and Autism Society of America announce partnership to address epidemic

The Autism Research Institute (ARI) and the Autism Society of America (ASA) have announced a strategic partnership to collaborate on conferences, publications and services that will improve the lives of all those affected by autism in the United States. By joining forces, ARI and ASA aim to continue the important stewardship of their founder, Dr. Bernard Rimland. A pioneer in the area of autism diagnosis and treatment, Dr. Rimland transformed the prevailing pessimistic view of autism in the medical and scientific community and built the largest parent support organization in the United States.

"Bernie Rimland was among the first to realize the importance of combining a focus on medical interventions with treatments, supports and services," stated Dr. Cathy Pratt, ASA Board Chairperson. "There is not one parent or professional who has not been impacted by the knowledge, dreams and thinking of Bernie Rimland. The ASA/ARI partnership is our way of ensuring that Bernie's vision will continue to guide the autism community for the long-term."

A major purpose of the ASA/ARI partnership is to promote awareness that autism must be treated as a whole body condition. Projects in 2007 will include biomarker conferences and many other collaborative efforts to serve over 100,000 members and supporters of these two organizations.

"I founded ASA in 1965 as a parent advocacy organization to work on behalf of autistic children and their families at local, state, and national levels," Dr. Rimland said shortly before his death. "I founded the Autism Research Institute in 1967 to conduct and sponsor scientific research on the cause and treatment of autism. ARI, through its Defeat Autism Now! (DAN!) project, has made enormous progress in the past few years—hundreds of the DAN! doctors and thousands of parents worldwide have reported bringing dramatic improvement, and sometimes recovery, to formerly autistic children. It is clearly time for ASA and ARI to capitalize on the progress that has been made. My colleague, Dr. Steve Edelson, with whom I have worked for 25 years, will play a major role in these efforts."

Lee Grossman, President and CEO of ASA, and Edelson, Director of ARI, will oversee this strategic partnership.

ASA is the largest parent-based, autism organization in the U.S., with over 100,000 members and supporters and 200 local chapters. ARI, with more than 70,000 supporters nationwide, has pioneered the study of medical problems associated with autism and effective treatments.