

## PCBs cause autism-like condition in newborn rats

Traces of a chemical banned 30 years ago cause brain abnormalities in newborn lab animals that are similar to defects in children with autism, according to a new study by University of California scientists.

Many scientists say that an array of chemicals in the environment are scrambling brain development and could play a role in children's learning disorders.

The new study adds to the evidence by showing that PCBs, polychlorinated biphenyls, disrupt the auditory cortex, a part of the brain that is impaired in autistic children.

In the research at UC San Francisco, rats exposed to low levels of PCBs in the womb and during nursing had disorganized, malfunctioning auditory centers. The auditory cortex controls the brain's processing of sounds, which is essential for language development.

"This is a red flag," said neuroscientist Michael M. Merzenich of UCSF's W.M. Keck Foundation Center for Integrative Neuroscience, the study's senior author. "The impact of this class of chemicals must be studied in human populations, and fast."

The new research shows brain development is skewed when animals are exposed to amounts of PCBs in the same range as some highly exposed people. It will be published in this week's online Proceedings of the National Academy of Sciences.

"This study indicates that there are chemicals out there, this being just one example, that could profoundly affect development," said Tal Kenet, who led the research team in Merzenich's lab while a postdoctoral fellow there. He is now a faculty member at Harvard Medical School.

Last year, two internationally known environmental scientists reported in a medical journal that industrial chemicals may be causing a "silent pandemic" of learning disorders. Dr. Philippe Grandjean of Harvard School of Public Health and Dr. Philip J. Landrigan of Mount Sinai School of Medicine identified 202 chemicals -- including PCBs and mercury -- that could be contributing to autism, attention deficit disorders and other neurological disorders, and they urged more human studies.

PCBs were one of the world's most widely used chemicals, their use peaking in the 1970s, mostly as insulating fluids in large electrical equipment.

Although banned in the United States in 1977, they are still among the most pervasive contaminants on the planet, and exposure is difficult to avoid because they have spread globally and built up in food chains.

Concentrations are highest in people who frequently eat fish from waters contaminated by industrial discharge, including the Hudson River, the Great Lakes and San Francisco Bay.

Many scientists say there is substantial human evidence that PCBs are among five industrial chemicals that harm children's brains.

Researchers in the 1990s reported that children in the Great Lakes region exposed to high levels of PCBs during their mothers' pregnancy had impaired cognitive development that led to reduced motor skills and short-term memory.

In the new study, "we linked PCBs to an area of the brain that impacts one aspect of autism, language delays or language loss," said co-author Isaac N. Pessah, an autism researcher at the UC Davis M.I.N.D. Institute and director of the university's Center for Children's Environmental Health and Disease Prevention.

"We don't see any reason why the PCBs in human tissues wouldn't be causing this miswiring of the auditory cortex too. Not necessarily in every child. We suggest that because of the mechanism involved, there may be populations of kids with predisposition to sensitivity," he said.

The scientists compared the auditory cortex and nerve signals of unexposed rat pups to pups exposed to one type of PCB during gestation and nursing. One of the most profound disruptions from the PCBs involved abnormalities in signals sent by the brain to inhibit or trigger reactions to sounds. The brain also had diminished capacity to learn and change how it responds to sounds.

Scientists believe that autistic children have such signalling imbalances.

They respond differently to sound and other sensations, and their communication and language skills are impaired.

"The animals could hear, but their brain's representations of what they heard was grossly disturbed," Merzenich said.

Kenet urged human studies to see if babies breast fed by highly exposed mothers experience similar effects, particularly those with a family history of developmental disorders.

They are unsure if damage to the rats occurred prenatally or during nursing. Researchers generally have found that benefits of breastfeeding outweigh risks.

The Centers for Disease Control and Prevention reported in February that one in every 150 8-year-old children in 14 states had autism or related syndromes.

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