



December 1, 2009

Lead exposure, brain damage linked

By Peggy O'Farrell
pofarrell@enquirer.com

Childhood lead exposure causes permanent brain damage with lifelong consequences, according to new research from Cincinnati Children's Hospital Medical Center.

Researchers led by Kim Cecil used functional MRI technology to show that activity decreases in regions of the brain that control decision-making and emotional response in people who suffered lead exposure as children.

Other regions of the brain took over those tasks, but didn't perform as efficiently, Cecil said.

"Your brain has some adaptability and it tries to recruit other areas to take over for parts that are damaged," she said. "But it doesn't work as well. It's like when you need a hammer to do a job and you're tapping away at it with a screwdriver. You may still complete the task, but you're not using the right tool, and you're not going to get as good a result."

The scans give scientists the first hard evidence that lead exposure causes physical damage to the brain, said Kim) Dietrich, co-author of the study and an environmental health researcher at the University of Cincinnati.

For the study, researchers took scans of subjects' brains while they performed two tasks. The scans showed less activity in areas of the brain that should have controlled their responses.

The results, coupled with previous research, show lead exposure damages all areas of the brain, Cecil said, including gray matter (the cells in which neural impulses originate) and white matter (makes up the wiring that carries those impulses throughout the brain). The scans showed that gray matter tends to "shrink" or lose volume in lead-exposed individuals, while white matter decays.

Since different areas of the brain mature at different ages, the damage affects development throughout life, she said. "The brain's white matter, which organizes and matures at an early age, adapts to lead exposure, while the frontal lobe, which is the last part of the brain to develop, incurs multiple insults from lead exposure as it matures."

Lead exposure often results in lower IQs, but people exposed to lead during childhood also have problems with judgment, emotional control and attention.

"One of the arguments we've always heard is, 'You see lower IQ. You see more behavioral problems. You see motor coordination problems in these lead-exposed kids. But you've never really proven there's any brain damage in these kids,'" Dietrich said. "Well, now we have. This is the first direct, neurological evidence of brain damage to children exposed to low to moderate levels of lead."

Cecil and her colleagues looked at brain images from 33 individuals who were enrolled as infants in the Cincinnati Lead Study, the world's longest-running study of people exposed to lead during childhood. The mean age of the study participants was 21, and their blood lead levels ranged from 5 to 37 micrograms per deciliter, with a mean of 14. The study, which continues today, was established in 1979.

The Centers for Disease Control and Prevention and the World Health Organization consider a blood lead level of 10 micrograms per deciliter or higher cause for concern.

Cecil will present her results today in Chicago at the annual meeting of the Radiological Society of North America in Chicago.