



**HEADS UP
REAL NEWS
ABOUT DRUGS
AND YOUR BODY**

How Inhalant Abuse Damages the Brain

Spray paint, paint thinner, and paint remover. What do they have in common? They are three very dangerous and commonly abused inhalants that contain a solvent called toluene. There is plenty of evidence that solvent abuse leads to brain damage. Many long-term solvent abusers have difficulties with coordination and walking. They also seem to suffer from lowered intelligence. Dr. Neil Rosenberg, a NIDA-sponsored scientist working at the University of Colorado Health Sciences Center, wanted to find out which parts of the brain solvents damage and how the damage correlates with loss of mental functioning. He also wanted to learn how the damage caused by solvents compares to that caused by cocaine.

The Experiment: Solvents, Cocaine, and the Brain

Key Questions: How does the brain damage caused by solvents compare with that caused by cocaine? How does the amount of brain damage observed in a solvent abuser correlate with the amount of cognitive functioning lost in a cocaine user?

Brief Description of Experiment: Fifty-five long-term solvent abusers took a series of cognitive tests and 50 of them underwent brain magnetic resonance imaging

(MRI), an imaging technique that can detect abnormalities in the brain. At the same time, 61 cocaine abusers took cognitive tests and 51 underwent brain MRIs.

Brain Areas Studied with MRI

Basal Ganglia, Cerebellum, Pons, and Thalamus:

These regions play a critical role in receiving sensory information from the peripheral nervous system and the spinal cord, and relaying messages throughout the brain that control thinking, learning, movement, and other behaviors.

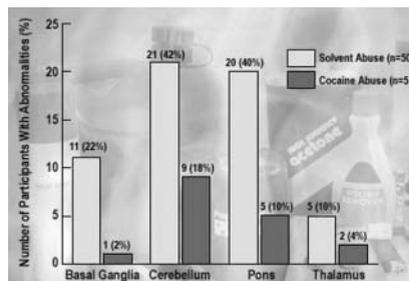
White Matter: White matter is an insulator for nerve fibers, allowing messages to be transmitted faster. It contains lots of neurons that are sheathed in a white fatty insulating protein called myelin.

The Results of the Study

Cognitive Test Results: Both groups performed below general population averages on tests that measured short-term memory, delayed recall, and the ability to learn and make associations. Inhalant abusers, however, did worse than cocaine abusers on tests involving the ability to focus attention, plan, solve problems, and control one's behavior.

Brain MRI Results: The chart below shows where more frequent brain abnormalities occurred in the brains of solvent abusers than in the brains of cocaine abusers.

Other Important Findings: Solvent abusers also had more severe abnormalities in brain white matter. The solvent abusers who had more white matter abnormalities tended to have the greatest cognitive impairment. For example, 12 percent of solvent abusers who had moderate to severe white matter abnormalities (the worst damage found) scored an average of 20 percent below the rest of the group in the study on a verbal IQ test.



Inhalant and Cocaine Abusers with Subcortical Abnormalities, by Brain Region Affected

Read about the experiment and think about how the results work together to answer the study's initial questions. When you're finished, answer these questions. Write your answers on the back of this page.

1. The study shows that damage in a particular brain area plays a role in cognitive damage among solvent abusers. What is the area? What is the evidence?
2. Dr. Rosenberg notes that his results show solvent abusers may be unable to "control their behavior and perceive problems associated with their substance abuse." How did he draw that conclusion?