

Inhalant Abuse in the United States



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What materials are commonly abused?

- **Volatile nitrites**
 - Nitrous oxide
 - Solvents

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How Do Volatile Nitrites Work?

- Same as amyl nitrite and nitroglycerin used medically to relax smooth muscles in the veins leading to venous pooling in the periphery
 - Dizziness
 - Enhanced erections
- Also relax smooth muscle of anal sphincter
- No evidence yet for direct effects on the brain



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Current Status of Nitrites

- In 1988 and 1990 Congress prohibited sale of alkyl nitrites, such as isobutyl nitrite, under the Consumer Product Safety Act
- Manufacturers switched to cyclohexyl nitrite, which is not an “alkyl nitrite”
- Many online sites sell as aromas
 - <http://www.poppersonline.com/>
 - <http://www.realpoppers.com/>
- Ronald Wood estimates annual sales in the tens of million dollars

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Nitrous Oxide

- How is it obtained?
 - cylinders for anesthesia
 - racing fuels (after filtering)
 - dairy industry foaming agent
 - whipped creme chargers
- How is it used?
 - balloons



Pharmacological Actions of Nitrous Oxide

- Euphoria (“laughing gas”)
- Analgesia
- Inebriation and motor impairment

Different profile of acute intoxication than volatile solvents and anesthetics

Nitrous Oxide Abusers

- Concert attendees/more affluent
- Health Professionals
- Late Teens/College Students

What materials are commonly abused?

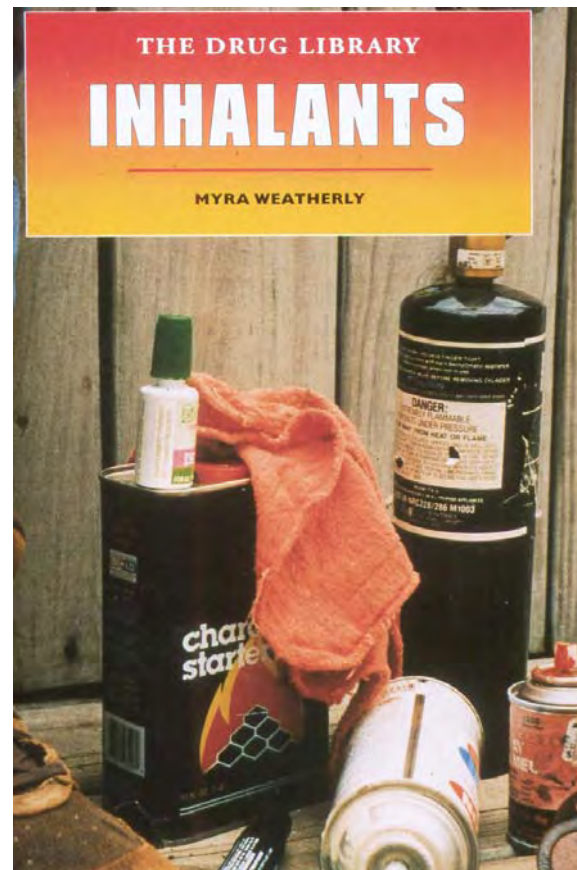
- Volatile nitrites
- Nitrous oxide
- **Solvents**
 - Most are complex mixtures of chemicals

Commonly Abused Solvents

- Toluene
- Xylene
- Trichloroethane
- Methylene chloride
- Butane
- Many others, many combinations

Commonly Abused Products

- Paint thinners and removers
- Stains and Varnishes
- Adhesives
- Nail polish and removers
- Inks
- Spot removers, cleaning agents
- Gasoline
- Lighter Fuels
- Dry Erase Markers
- Dusters



How are solvents used?

- Sniffed directly
- Aerosol sprays
- Bags or rags



Why are inhalants abused?

- Easy to obtain
- To produce intoxication

But what kind of intoxication?

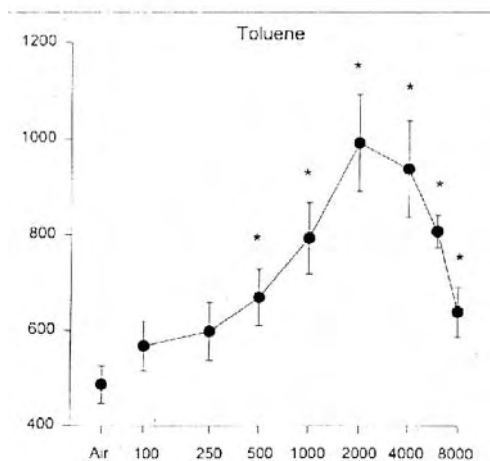
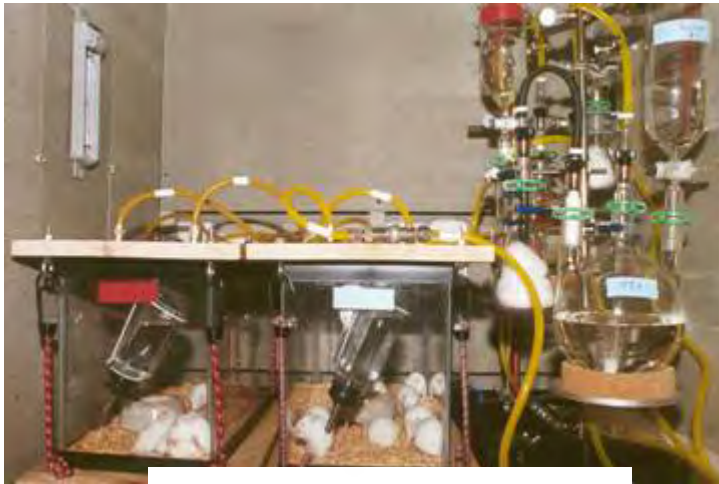
Questions Regarding Inhalant Intoxication

- How strong are the effects and how long do they last?
- What types of effects are produced?
- Is the intoxication similar to what is produced by better-known drugs of abuse?
- Do all inhalants produce the same effects?
- What happens when inhalants are taken in combination with alcohol and other drugs?

Basic Research in Solvent Intoxication

- Ethical concerns prevent studies in people, especially juveniles
- There are 100's of chemicals to study
- The strong odors of most solvents will make them easily distinguishable from other drugs and difficult to study

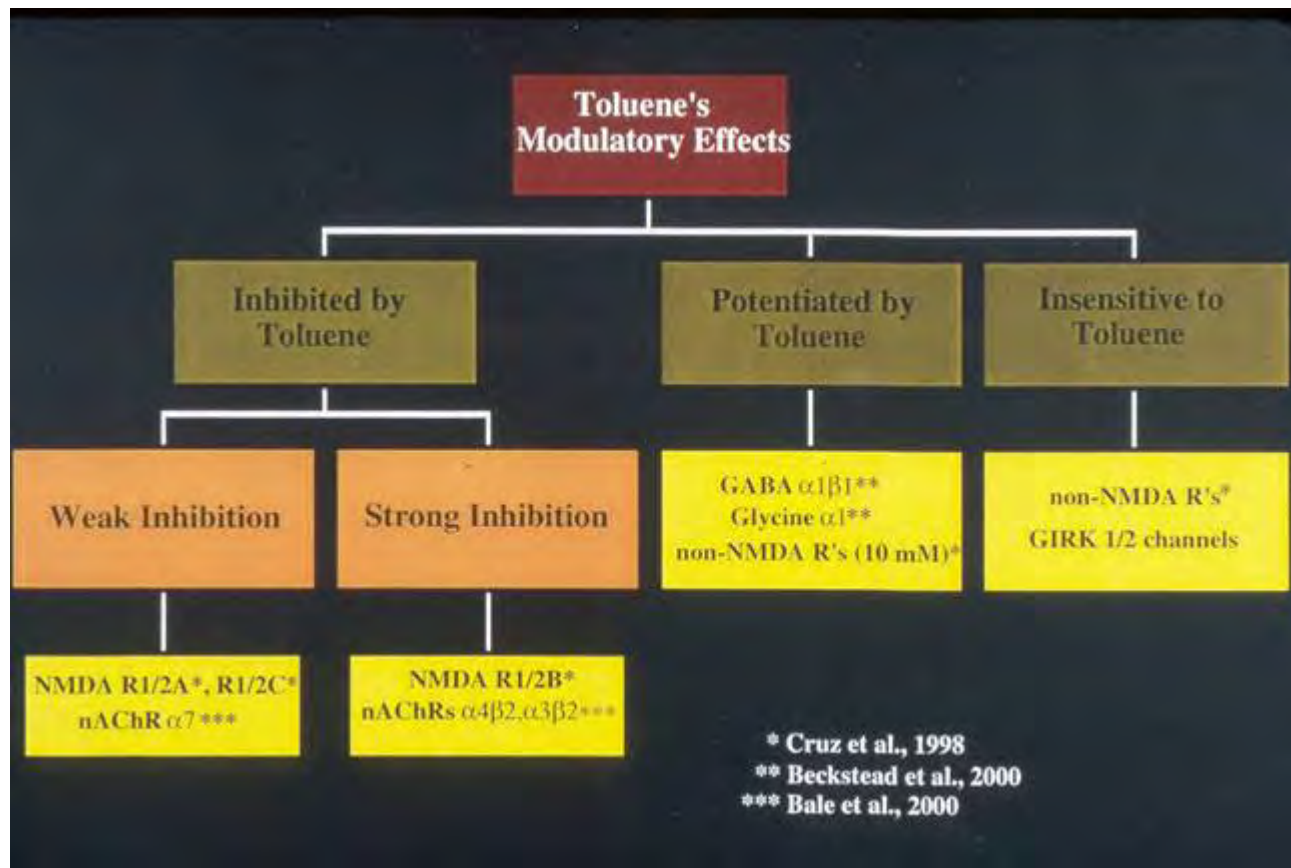
NIDA-Supported Studies in Mice



Inhalant Intoxication

- Inhalants produce very strong effects similar to those of subanesthetic doses of general anesthetics
- Effects occur very rapidly and dissipate rapidly as well
- Most probably produce an alcohol-like intoxication and drunkenness
- There are some differences among the effects of inhalants, suggesting that some will have greater abuse potential than others

How do solvents produce these abuse related effects in the brain?



What are the health consequences of inhalant abuse?

- Short-term effects
 - Accidents and injuries
 - Overdose producing anesthesia and respiratory depression
 - “Sudden sniffing death”
 - Heart stoppage

Virginia Study 1987-1996

Bowen, Daniel and Balster in Drug and Alcohol Dependence, 1999

- About 4 deaths per year
- Most were males aged 13-22
- All were a direct consequence of inhalant exposure
- Most (54%) were at home

What are the health consequences of inhalant abuse?

- Long-term Effects
 - Depends on specific solvent
 - Some more toxic than others (e.g. aerosols)
 - Nose and mouth lesions, runny nose
 - Brain damage
 - Liver and kidney damage
 - Fetal solvent syndrome
- No solid epidemiological evidence on actual prevalence of organic damage associated with inhalants, but widely encountered clinically

Some Additional Questions To Be Answered by Matthew Howard

- What do we know about the prevalence of inhalant abuse in the U.S.?
- What do we know about specific inhalant products?
- What are some special populations at risk for inhalant use?
- What are some of the broad public health implications if inhalant abuse?

ONDCP Recommendations

- Help bring attention to inhalant abuse problem
 - Add something to the 2010 National Strategy
 - There have been some prior work by ONDCP on inhalants
 - Ron Wood (University of Rochester) has most knowledge of this
 - Mention it from time to time in public settings
 - Consider press activity during National Inhalants & Poisons Awareness Week
 - Usually around March
 - <http://www.inhalants.org/nipaw.htm>

Treatment Issues

- There are no controlled trials supporting an evidence based treatment for inhalant abuse
- Treatment should probably be focused on adding skills to typical adolescent care
- Canada has some models for inhalant specific treatment programs
 - <http://www.members.shaw.ca/ysac/default.htm>

Possible ONDCP Efforts Regarding Treatment

- Encourage development of SAMHSA Treatment Improvement Protocol to provide basis for improved screening and treatment
 - Identify areas of needed research
- Encourage routine screening for inhalant use within the juvenile and criminal justice systems and the funding of innovative inhalant prevention initiatives within these and other settings serving populations at high risk for inhalant use and inhalant use disorders.

Research Initiatives

- The last NIDA RFA on inhalants expired in September, 2008
 - Encourage NIDA to issue a new one with adequate funding
- Inhalants rank last in NIDA funding when sorted by drug category

FY2009 NIDA Funding (in millions)

Estimate by Selected Drug Categories

(data provided by NIDA)

- Cocaine • \$264,429
- Heroin • \$101,671
- Marijuana • \$ 64, 045
- Methamphetamine • \$ 60, 709
- Hallucinogens • \$ 23, 607
- MDMA • \$ 17, 129
- Steroids • \$ 5,992
- Inhalants • \$ 4,409

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- Encourage more toxicology research on consequences of frequent, but short, high concentration exposures to solvents as modeling the exposures encountered by abusers
 - NIEHS
 - EPA
 - National Toxicology Program

Possible Initiatives for Epidemiological Research

- Discourage single omnibus inhalant abuse assessment items in national surveys
- Encourage when possible to obtain information on specific agents and popularly abused products
- Promote the inclusion of survey items that assess largely unexplored and/or controversial research and practice issues related to inhalants.
 - Medical and behavioral problems
 - Health and social service utilization

Supply Reduction Opportunities

- Encourage manufactures and retail outlets to take steps to reduce availability of highly abused products
 - Abuse-deterrent reformulation
 - Example is replacement of dry erase markers that contained TCE with water-based solvent not subject to abuse
 - American Chemical Society and other industry groups could be lobbied to work on this.
 - Place behind the counter
- Mandate the Consumer Product Safety Administration to reduce harm associated with abuse of products subject to abuse by inhalation and to monitor product-associated injuries arising from such abuse
- Look at export of abused inhalants to determine to what extent the U.S. is contributing to the international problem and what steps could be taken to reduce this.

Nitrite Situation

- Broaden regulation of nitrites to include compounds like cyclohexyl nitrites
 - Ron Wood (University of Rochester) is an expert on the regulatory aspects of nitrite abuse
- Apply pressure on companies manufacturing these products as aromas
- Investigate web sites selling nitrites to make sure they are compliant with current regulations

Some Sources For More Information

- National Inhalant Prevention Coalition
 - www.inhalants.org
- National Clearinghouse for Alcohol and Drug Information
 - www.health.org
- National Institute on Drug Abuse
 - www.nida.nih.gov
- SAMHSA (Inhalant Trends 2002-2007)
 - <http://oas.samhsa.gov/2k9/inhalantTrends/inhalantTrends.cfm>
- Partnership for a Drug Free America
 - www.drugfree.org
- Virginia Department of Education Inhalant Prevention Resource Guide
 - <http://www.doe.virginia.gov/VDOE/Instruction/Inhalantbook.pdf>