

Data Related to Typical Household Cleaners

Compiled by Shaklee Corporation, May 2008

Exposure to Household Chemicals

- **There are over 80,000 chemicals registered with the EPA and less than 20% of them have been tested for toxicity.** Today there are more than 80,000 synthetic chemicals. Dr. Philip Landrigan, Professor of Community and Preventative Medicine at Mount Sinai School of Medicine, said less than 20% of the estimated chemicals manufactured in the past 50 years have been assessed for their neurotoxicity. Children, because of their size and more future years of life, have a higher risk of early and prolonged exposure to chemicals than adults. The National Research Council (NRC), which is part of the National Academy of Sciences, conducted a study of 100 random chemicals. The study found that nearly 78 percent of these chemicals lacked even minimum toxicity standards. Sources: U.S. EPA, New Chemicals Program; Landrigan, P.J., et al, (2006). The national children's study: a 21-year prospective study of 100,000 American children. *Pediatrics*, 118(5), 2173-2186.
- **A person who spends 15 minutes cleaning scale off shower walls could inhale three times the "acute one-hour exposure limit" for glycol-ether containing products set by the California Office of Environmental Health Hazard Assessment.**
Sources: News-Medical.Net; University of California at Berkeley.
- **It has been estimated that a person who cleans four houses a day, five days per week, 50 weeks per year, could inhale about 80 micrograms per day of formaldehyde, double the guideline value set by California's Proposition 65.** In addition, the person's intake of fine particulate matter during the hours spent cleaning would exceed the average federal guideline level for an entire year. These quantities are in addition to the formaldehyde and particulate matter that the person would be exposed to from all other sources and activities during the year. Sources: News-Medical.Net; University of California at Berkeley, Household Chemicals.
- **Several chlorinated chemicals can cause cancer and other serious health problems.** Chlorinated chemicals can come from consumer products, dry-cleaned clothes, and treated municipal water. Air levels of these chemicals, therefore, are generally higher in the home than outdoors. Many commonly used consumer products contain chlorinated chemical solvents, such as trichloroethylene, methyl chloroform, perchloroethylene, and methylene chloride. These products include glues, spot removers, spray cleaners, water repellents, spray paints, paint strippers, and automotive products. Sources: California Environmental Protection Agency, Air Resources Board, Chlorinated Chemicals in Your Home, May 2001.
- **Studies conducted in the United States indicate that people spend an average of 87% of their time in enclosed buildings.** Source: Klepeis, N.E., Tsang, A.M., and Behar, J.V. Analysis of the National Human Activity Pattern Survey (NHAPS) Respondents from a Standpoint of Exposure Assessment. Final EPA Report, EPA/600/R-96/074: Washington, D.C., 1996.
- **Organic pollutants are 2 to 5 times higher inside homes than outside.** According to the EPA, sources of organic pollutants from household cleaners include: solvents; wood preservatives; aerosol sprays; cleansers and disinfectants; and air fresheners. Health effects from organic pollutants include: Eye, nose, and throat irritation; headaches, loss of coordination, nausea; damage to liver, kidney, and central nervous system. Many organic compounds are known to cause cancer in animals; some are suspected of causing, or are known to cause, cancer in humans. Source: U.S. EPA.

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Vulnerability of Children

- **"We are conducting a vast toxicologic experiment in our society, in which our children and our children's children are the experimental subjects,"** stated pediatrician Herbert L. Needleman. Little information on possible toxic potential is available for the 80,000 chemicals registered today with the U.S. Environmental Protection Agency (EPA). Of the 3,000 chemicals produced or imported at over 1 million pounds a year, only 43% have received even minimal toxicologic assessment, and a mere 23% have been tested to determine whether they have the potential to cause developmental damage. Source: Landrigan, P.J. & Weiss, B. (2000). Environmental Health Perspectives Supplements, v107 supplement 3, June.
- **Children are highly vulnerable to chemical toxicants. Pound for pound of body weight children drink more water, eat more food and breathe more air than adults.** The implication of this is that children will have substantially heavier exposures than adults to any toxicants that are present in water, food or air. Source: Landrigan, P.J. & Garg, A. (2002). Chronic effects of toxic environmental exposures on children's health. *Journal of Toxicology: Clinical Toxicology*, 40(4), 449-456.
- **Why are children a sensitive subpopulation?** Children's metabolic pathways, especially in the first months after birth, are immature. Their ability to metabolize, detoxify and excrete many chemicals differs from adults. Source: Landrigan, P.J., et al, (1998). Children's Health and the Environment: A New Agenda for Prevention Research, Environmental Health Perspectives 106, Supplement 3, June.
- **The National Academy of Sciences has recommended that infants and children be considered more vulnerable to chemicals than adults in the absences of evidence to the contrary.** Source: National Research Council (1993). Pesticides in the Diets of Infants and Children; National Academy Press: Washington, DC.
- **Carcinogenic and toxic exposures sustained early in life including prenatal exposures appear more likely to lead to disease than similar exposures encountered later.** Source: Landrigan, P.J. & Garg, A. (2002). Chronic effects of toxic environmental exposures on children's health. *Journal of Toxicology: Clinical Toxicology*, 40(4), 449-456.
- **Faster metabolisms in children speed up their absorption of contaminants.** "Children absorb a greater proportion of many substances from the intestinal tract or lung," says pediatrician Dr. Philip Landrigan. "For example, children take up approximately half of the lead that they swallow while adults absorb only about one-tenth." Source: PBS.org, Trade Secrets: A Moyers Report (2001).
- **Children spend a considerable amount of time putting things in their mouths.** In 1998, scientists at Rutgers University discovered that pesticides sprayed in a home evaporate from floors and carpets, and then re-condense on plastic and foam objects such as pillows and plush toys. By observing how frequently a group of pre-schoolers put clean toys in their mouths, the researchers calculated that contaminated toys are likely to give young children much higher doses of poison than adults would get in the same environment. Source: PBS.org, Trade Secrets: A Moyers Report (2001).

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Vulnerability of Children (continued)

- **Children have more time to develop chronic diseases triggered by early exposures.** Many diseases that are caused by toxicants in the environment require decades to develop. Source: Landrigan, P.J. & Garg, A. (2002). Chronic effects of toxic environmental exposures on children's health. *Journal of Toxicology: Clinical Toxicology*, 40(4), 449-456.
- **Babies don't excrete contaminants or store them away in fat in the same ways that adults do, making the poisons more available to affect rapidly growing bodies.** Furthermore, because a baby's immune system is not fully functional, a baby's body cannot counteract toxic effects as well as an adult can. In an adult, a blood-brain barrier insulates the brain from many of the potentially harmful chemicals circulating through the body. But in a human child, that barrier isn't fully developed until six months after birth. Source: PBS.org, Trade Secrets: A Moyers Report (2001).
- **Many contaminants such as dioxins and PCBs have an affinity for fatty tissue.** During pregnancy, women mobilize their amassed stores of body fat to provide nourishment for their growing babies; the contaminants in the fat are then passed to their children. Nursing mothers also transfer a good portion of their lifetime accumulation of chemicals to their babies. Source: PBS.org, Trade Secrets: A Moyers Report (2001).
- **Children exposed in the womb are at greatest risk of all.** Because cellular structures change so rapidly during embryonic and fetal growth, a toxic exposure at the wrong moment can permanently alter further development. According to Dr. Landrigan, the central nervous system is especially vulnerable. To function properly, the developing brain must lay down an intricate web of interconnecting neurons. Small doses of neurotoxins during critical periods of brain development can alter those crucial neural pathways – one mistake early on, and the brain may be forever changed in subtle or serious ways. Government and university scientists are currently investigating the possibility of a connection between fetal exposures to toxics and developmental disabilities such as attention deficit hyperactivity disorder (ADHD). Source: PBS.org, Trade Secrets: A Moyers Report (2001).
- **Children's metabolic pathways, especially in the first months after birth, are immature.** Their ability to metabolize, detoxify and excrete many chemicals differs from adults. Source: Landrigan, P.J. & Garg, A. (2002). Chronic effects of toxic environmental exposures on children's health. *Journal of Toxicology: Clinical Toxicology*, 40(4), 449-456.

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Health Issues

Asthma Population Statistics

Overall Asthma Statistics

- **Approximately 20 million Americans have asthma.**
Source: American Lung Association, (2005). Epidemiology & Statistics Unit, Research and Program Services. Trends in Asthma Morbidity and Mortality
- **The prevalence of asthma increased 75% from 1980-1994.** Source: Centers for Disease Control. Surveillance for Asthma, United States, 1960-1995, MMWR. 1998; 47 (SS-1).

Children

- **Nine million U.S. children under 18 have been diagnosed with asthma.** Source: Summary Health Statistics for U.S. Children: National Health Interview Survey, 2002. Series 10, Number 221.2004-1549
- **Asthma is the most common serious chronic disease of childhood.** Source: Asthma and Allergy Foundation of America. Asthma Facts and Figures.
- **Asthma rates in children under the age of five have increased more than 160% from 1980-1994.** Source: Centers for Disease Control. Surveillance for Asthma, United States, 1960-1995, MMWR. 1998; 47 (SS-1).
- **An average of one out of every 13 school-aged children has asthma.** Source: EPA Asthma Facts.
- **Asthma is the third-ranking cause of hospitalization among children under 15.** Source: EPA Asthma Facts.

African Americans

- **Asthma prevalence is 39% higher in African Americans than in Caucasians.**
Source: American Lung Association, (2005). Epidemiology & Statistics Unit, Research and Program Services. Trends in Asthma Morbidity and Mortality.
- **African Americans have highest asthma rates of any racial/ethnic group. Compared to Caucasians:**
 - The rate of emergency department visits is 380% higher
 - The hospitalization rate is 225% higher
 - The asthma death rate is 200% higher
 - In 2004, an estimated 3.5 million African Americans currently had asthma

Source: EPA asthma facts.

Women

- **The prevalence of asthma in adult females was 42% greater than the rate in adult males according to a 2004 survey by the Center for Disease Control.** Source: National Health Interview Survey, (2006). National Center for Health Statistics, CDC

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Household Cleaners and Asthma

- **Common household cleaners and appliances give off fumes, which can potentially increase the risk of developing asthma in children.** Asthma is the most common chronic childhood disease in the developed world and has become more common in the last 30 years. In a 2004 study published in the journal *Thorax*, it was found that many common household cleaners and appliances give off fumes, which can potentially increase the risk of developing asthma in children. It was concluded that, "Domestic exposure to Volatile Organic Compounds (VOCs) at levels [even] below currently accepted recommendations may increase the risk of childhood asthma." VOCs are found in many household products and may also be embedded in the house itself as part of the paint, flooring, or furniture. Source: Rumchev, K. et al. (2004). *Thorax*, 59(9), 746-751.
- **Environmental exposures early in life, including the womb, may influence the development of wheezing and asthma.** In the UK and other developed countries the prevalence of asthma symptoms has increased in recent years. This is likely to be the result of increased exposure to environmental factors. A study was undertaken to investigate the association between maternal use of chemical based products in the prenatal period and patterns of wheeze in early childhood. A dose-dependent relationship was observed between frequency of use of common household chemical products in the prenatal period and persistent wheeze in the resulting offspring. These findings suggest that frequent use of chemical based products in the prenatal period is associated with persistent wheezing in young children. Source: *Thorax*, Jan 2005 60(1), 45-49.
- **Strong links have been found between the use of domestic and industrial cleaning products and the risk of asthma.** It is well-documented that women who are employed in domestic cleaning are at increased risk for symptoms of obstructive lung disease. There are now at least 6 well-designed epidemiologic studies that have documented a strong link between use of domestic and industrial cleaning products and risk of asthma. For example, in a study of over 4,500 women employed in domestic cleaning it was found that 25% of the asthma cases in the study population could be attributed to domestic cleaning. This led the study authors to conclude that, "Employment in domestic cleaning may induce or aggravate asthma. This study suggests that domestic cleaning work has an important public health impact, probably involving not only professional cleaners but also people undertaking cleaning tasks at home." Source: *Thorax*, Nov 2003 58(11), 950-954.
- **Using household cleaning sprays and air fresheners as little as once a week can raise the risk of developing asthma in adults.** The epidemiological study, the first to investigate the effects of cleaning products in occasional users rather than occupational users, found that cleaning sprays, especially air fresheners, furniture cleaners and glass-cleaners, had a particularly strong relation to increased asthma risk in adults. "The relative risk rates of developing adult asthma in relation to exposure to cleaning products could account for as much as 15 percent, or one in seven adult asthma cases," according to Dr. Zock. Source: *American Journal of Respiratory and Critical Care Medicine* Vol 176. pp. 735-741, (2007)

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- **Toxicity of Household Cleaners**
- **Some cleaning products and air fresheners have unhealthy emissions.** While effective cleaning can improve the healthfulness of indoor environments, this work shows that use of some consumer cleaning agents can yield high levels of volatile organic compounds, including glycol ethers—which are regulated toxic air contaminants—and terpenes that can react with ozone to form a variety of secondary pollutants including formaldehyde and ultrafine particles. Persons involved in cleaning, especially those who clean occupationally or often, might encounter excessive exposures to these pollutants owing to cleaning product emissions. Source: Singer, B.C., et al (2006). Cleaning products and air fresheners: emissions and resulting concentrations of glycol ethers and terpenoids. *Indoor Air*, 16(3), 179-191.
- **All purpose cleaners.** Many all-purpose cleaners contain neurotoxins and nasal irritants that can be absorbed through the skin or inhaled. Synthetic solvents may cause hormone disruption. Maternal exposure to toxic chemicals during pregnancy can disrupt development or even cause the death of the fetus. Effects can include birth defects, low birth weight, biological dysfunctions, or psychological or behavioral deficits that become manifest as the child grows. Sources: Agency for Toxic Substances and Disease Registry (1998); Agency for Toxic Substances and Disease Registry (1999); Scorecard (2007).

Butyl Cellosolve (2-butoxyethanol, 2-butoxyethanol acetate or Ethylene glycol monobutyl ether)

- Butyl cellosolve is a high volume chemical with production exceeding 1 million pounds annually.
- The general population is exposed to 2-butoxyethanol and 2-butoxyethanol acetate mainly by breathing air or having skin contact with liquids, particularly household cleaners, which contain these compounds.
- Butyl cellosolve is a toxic glycol ether chemical used in cleaning solutions. Material Safety Data Sheet reports potential irritation and tissue damage from inhalation, ingestion, cutaneous, and/or ocular exposure.
- People who swallowed large amounts of cleaning agents containing Butyl cellosolve experienced breathing problems, low blood pressure, low levels of hemoglobin, acidic blood, and blood in the urine.

Formaldehyde

- Formaldehyde is a preservative found in many household products.
 - Formaldehyde is an anticipated carcinogen.
 - Low levels of formaldehyde cause irritation of the eyes, nose, throat, and skin.
 - People with asthma may be more sensitive to the effects of inhaled formaldehyde.
 - Drinking large amounts of formaldehyde can cause severe pain, vomiting, coma, and possible death.
 - In animal studies, rats developed nose cancer from formaldehyde.
- **Automatic Dishwasher Detergents.** Some products contain dry chlorine that is activated when it encounters water in the dishwasher. Chlorine fumes are released in the steam that leaks out of the dishwasher, and can cause eye irritation.

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Toxicity of Household Cleaners (continued)

- **Carpet Cleaners.** Carpet cleaners can be extremely toxic to children; who tend to play and crawl around on carpets. The fumes given off by carpet cleaners can cause cancer and liver damage. Carpet and upholstery cleaners accounted for 5397 poison exposures in 2005. The majority of these, exposures, over 3500, involved children under 6. Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).

Naphthalene

- Possible human carcinogen found in moth balls and metal polishes.
- Exposure to large amounts of naphthalene may lead to hemolytic anemia.
- Naphthalene may cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to skin.
- Mice that breathed naphthalene vapors daily for a lifetime developed lung tumors and some developed nose tumors.

Sources: Agency for Toxic Substances and Disease Registry (2005).

- **Bleach.** The chemical known as hypochlorite in bleach causes more poisoning exposures than any other household cleaning substance. May cause reproductive, endocrine, and immune system disorders. Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).
- **Degreasers.** Many degreasers contain petroleum distillates and butyl cellosolve; which can damage lung tissues and dissolve fatty tissue surrounding nerve cells.
- **Drain Cleaners.** One of the most hazardous products in the home, drain cleaners often contain lye or sodium hydroxide; strong caustic substances that cause severe corrosive damage to eyes, skin, mouth and stomach, and can be fatal if swallowed.
- **Glass Cleaners.** Ammonia is found in many glass cleaners and the ammonia fumes can irritate skin, eyes and the respiratory system. Ammonia based glass cleaners accounted for 6,356 poison exposures in 2005. Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).

Ammonia

- Exposure to high levels of ammonia in air may be irritating to your skin, eyes, throat, and lungs and cause coughing and burns.
- Asthma sufferers may be more sensitive to breathing ammonia than others.
- Swallowing concentrated solutions of ammonia can cause burns in your mouth, throat, and stomach. Getting ammonia into the eyes can cause burns and even blindness.

Sources: Agency for Toxic Substances and Disease Registry (2004); U.S. Department of Health and Human Services, Public Health Service.

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Toxicity of Household Cleaners (continued)

- **Oven Cleaners.** One of the most dangerous cleaning products, oven cleaners can cause severe damage to eyes, skin, mouth and throat. Source: U.S. Department of Health and Human Services, Agency for Toxic Substances & Disease Registry.

Sodium hydroxide

- Sodium hydroxide is very corrosive and can cause severe burns in all tissues that come in contact with it.
 - Sodium hydroxide is odorless; thus, odor provides no warning of hazardous concentrations.
 - Inhalation of sodium hydroxide is immediately irritating to the respiratory tract. Swelling or spasms of the larynx leading to upper-airway obstruction and asphyxia can occur after high-dose inhalation. Inflammation of the lungs and an accumulation of fluid in the lungs may also occur.
 - Cancer of the esophagus has been reported 15 to 40 years after the formation of corrosion-induced strictures.
 - Ingestion of solid or liquid forms of sodium hydroxide can cause spontaneous vomiting, chest and abdominal pain, and difficulty swallowing. Corrosive injury to the mouth, throat, esophagus, and stomach is very rapid and may result in perforation, hemorrhage, and narrowing of the gastrointestinal tract.
 - Skin contact with sodium hydroxide can cause severe burns with deep ulcerations.
 - Sodium hydroxide contact with the eye may produce pain and irritation, and in severe cases, clouding of the eye and blindness.
 - Long-term exposure to sodium hydroxide in the air may lead to ulceration of the nasal passages and chronic skin irritation.
- **Scouring Cleansers.** Some cleaners may contain sodium hydroxide or bleach that can irritate mucous membranes and cause liver and kidney damage.
 - **Scale or Lime Removers.** These are products designed to remove mineral buildup like lime, scale and soap scum. Source: ScienceLab.com.

Sulfamic Acid

- Sulfamic acid is toxic to lungs and mucous membranes.
- Direct skin contact with sulfamic acid is corrosive and causes irritation, dryness or burning. Eye contact can result in corneal damage or blindness.
- Inhalation of sulfamic acid will produce irritation to gastro-intestinal or respiratory tract with burning, sneezing or coughing.
- Severe over exposure of sulfamic acid can produce lung damage, choking, unconsciousness or death.

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Toxicity of Household Cleaners (continued)

- **Toilet Bowl Cleaners.** One of the most dangerous cleaning products, toilet bowl cleaners can contain chlorine and hydrochloric acid. Harmful to health simply by breathing during use. Toilet Bowl Cleaners accounted for 10,461 poison exposures in 2005. Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).

Hydrochloride/ Hydrochloric Acid (HCl)

- HCl can cause severe damage to skin and eyes.
- Brief exposure to low levels of HCl vapor causes throat irritation.
- Exposure to higher levels of HCl can result in rapid breathing, narrowing of the bronchioles, blue coloring of the skin, accumulation of fluid in the lungs, and even death.
- Exposure to even higher levels of HCl can cause swelling, spasm of the throat and suffocation.
- Some people exposed to HCl may develop an inflammatory reaction called reactive airways dysfunction syndrome (RADS), a type of asthma caused by some irritating or corrosive substances.
- Swallowing HCl causes severe corrosive injury to the lips, mouth, throat, esophagus, and stomach.

Sources: Agency for Toxic Substances and Disease Registry (2007). Managing Hazardous Materials Incidents. Volume III, Medical Management Guidelines for Acute Chemical Exposures; U.S. Department of Health and Human Services, Public Health Service.

Environmental Impact

Harmful Environmental Impact of Chemicals in Household Products

- **Phosphates are extremely damaging to aquatic life.** Phosphates cause rivers and lakes to become clogged with masses of algae and weeds, robbing less aggressive plants and aquatic animal life of oxygen, ultimately resulting in lifeless streams and rivers. Many automatic dishwashing detergents contain phosphates. Source: Revenga, C. & Mock, G. (2000). Dirty Water: Pollution Problems Persist. World Resources Institute.

Hazardous Waste Statistics

- **Americans generate 1.6 million tons (3.2 billion pounds) of household hazardous waste per year.** Source: U.S. EPA.
- **The average U.S. household generates more than 20 pounds of household hazardous waste per year, and the average home can accumulate as much as 100 pounds of household hazardous waste in the basement, garage, and in storage closets.** Source: U.S. EPA.
- **176,000 tons of household waste from cleaning products generated annually.** Cleaning products make up about 11.5% of the 1.6 million tons of household waste annually. Source: U.S. EPA.

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- **The following household cleaning products are designated as household hazardous waste by the EPA, and “improper disposal of these wastes can pollute the environment and pose a threat to human health.”** Source: U.S. EPA.
 - Oven cleaners
 - Drain cleaners
 - Wood and metal cleaners and polishes
 - Toilet cleaners
 - Tub, tile, shower cleaners
 - Bleach (laundry)

- **The U.S. EPA provides tips on how you can safely dispose of household hazardous waste:**
 - **Permanent collection or exchange.** See if your community has a facility that collects household hazardous waste year-round. Some of these facilities have exchange areas for unused or leftover paints, solvents, pesticides, cleaning and automotive products, and other materials. By taking advantage of these facilities, materials can be used by someone else, rather than being thrown away.
 - **Special collection days.** If your community doesn't have a year-round collection system for household hazardous waste, see if there are any designated days in your area for collecting solid waste at a central location to ensure safe management and disposal.
 - **Local business collection sites.** You might be able to drop off certain products at local businesses for recycling or proper disposal. Some local garages, for example, may accept used motor oil for recycling.

Poisoning Statistics (based on United States' data)

- **More than 90% of poison exposures occur in the home.** Source: National Center for Injury Prevention and Control.
- **218,316 reported poison exposures in 2005 were from household cleaning products.** Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).
- **121,498 children under the age of 6 were poisoned by household cleaners last year.** More than one out of every 6 poison exposures in 2005 from non-pharmaceutical substances was attributed to household cleaning substances; with 56% attributed to children under the age of 6. Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).
- **Bleach is the number one household chemical involved in poisoning.** Hypochlorite (bleach) was the source of 54,433 poisonings in 2005; 25% of the total exposures from household cleaning substances and the cause of 8 deaths. Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).
- **Animal poisoning exposure cases totaled 131,336 in 2005 with dogs accounting for 89% of the cases.** Source: Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database (2005).

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