

physical activity, higher levels of self-reported physical activity were reported (6). Second, BRFSS is a landline telephone survey and excludes persons in households without telephone access or persons who use only cellular telephones. Finally, the mean CASRO response rate was 50.6%, and low response rates can result in response bias; however, BRFSS estimates generally are comparable with estimates from surveys based on face-to-face interviews. In addition, weighting adjustments that account for sex, age group, and race/ethnicity attempt to minimize nonresponse, noncoverage, and undercoverage (7,8).

Approximately one third of U.S. adults did not report meeting minimum levels of aerobic physical activity as defined by the 2008 Guidelines. Minimum levels were analyzed for this report because they provided the most direct comparison with *Healthy People 2010* objectives. However, more extensive health benefits can be attained by engaging in physical activity beyond these levels (1). Increasing physical activity among U.S. adults can be accomplished through informational, behavioral, and environmental evidence-based approaches, such as those recommended in the *Guide to Community Preventive Services*.^{††} Strong evidence of increased physical activity has been documented for communitywide campaigns, targeted health-behavior change programs, school-based physical education, nonfamily social support, and increased access to locations for physical activity combined with information outreach activities. Evidence of increased physical activity also has been documented for use of point-of-decision prompts and for community-scale and street-scale urban design and land-use policies and practices (9,10).

^{††} Available at <http://www.thecommunityguide.org/pa>.

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Neurologic Illness Associated with Occupational Exposure to the Solvent 1-Bromopropane — New Jersey and Pennsylvania, 2007–2008

1-Bromopropane (1-BP) (n-propyl bromide) is a solvent increasingly used as a substitute for ozone-depleting chlorofluorocarbons and similar regulated compounds. 1-BP is used in vapor and immersion degreasing operations and other manufacturing processes, and as a solvent in industries using aerosol-applied adhesives. In some states, 1-BP is used as a solvent in dry cleaning because of restrictions on use of perchloroethylene (tetrachloroethylene), a possible human carcinogen (1). Published studies of workers exposed to 1-BP have raised concerns about occupational health risks associated with exposure (2–5). This report describes two cases involving workers exposed to 1-BP and diagnosed with clinical manifestations of neurotoxicity. The cases, when coupled with previously reported studies of workers exposed to 1-BP, illustrate potential health risks of 1-BP exposure. Clinicians and public health professionals should be alert to potential health effects among workers exposed to 1-BP, particularly in dry cleaning and other workplaces where 1-BP use might be increasing, and effective control methods to limit exposure to 1-BP should be implemented at worksites.

Both cases involved neurotoxic effects that likely resulted from occupational exposure to 1-BP in the electronics and dry cleaning industries. The cases were reported to regional poison control centers in Pennsylvania (2007) and New Jersey (2008) by attending physicians who treated the affected workers. The cases were investigated by federal and state health agencies, and more in-depth investigations of the New Jersey case currently are being conducted by the New Jersey Department of Health and Senior Services and CDC.

Case 1. In 2007, a male aged 50 years visited an emergency department in Pennsylvania with a history of confusion,

dysarthria, dizziness, paresthesias, and ataxia for 24–48 hours. The patient had worked for 8 years at an electronics plant in Pennsylvania, where for 3 years 1-BP had been used to clean circuit boards by vapor and immersion degreasing. His duties at the plant included mechanically submerging and spraying circuit boards with 1-BP, and maintenance (draining, cleaning, and charging) of the bath tank. The patient typically did not use personal protective equipment (PPE), and ventilation was reported by the patient to be poor within the process room. Neurologic examination revealed that the patient was alert but had slowed mental activity and mild confusion. His cranial nerve function and motor strength were intact, but his gait was wide based and ataxic, and a Romberg's test was positive. Serum laboratory results were notable for an anion gap of -31 mmol/L (normal range: 5–17 mmol/L) and a chloride concentration of 146 mmol/L (normal range: 101–111 mmol/L). The patient was hospitalized. Mild sensory peripheral neuropathy was detected by electromyogram in his upper and lower extremities.

One week after the patient went to the emergency department, the Occupational Safety and Health Administration (OSHA) evaluated his workplace and found a 1-BP concentration of 178 ppm by short-term area air sampling. Two weeks after his initial visit to the emergency department, the patient's serum bromide concentration was 48 mg/dL (normal range: 0–10 mg/dL). His peripheral neuropathy and ataxia persisted 1 year after the initial visit. The patient also reported having trouble maintaining mental focus and stopped working at the electronic plant because of continuing medical problems.

Case 2. A previously healthy male aged 43 years visited his primary-care physician in New Jersey in February 2008 with a history of headache, nausea, dizziness, and malaise, which began after he had begun using 1-BP in his dry cleaning facility. Six weeks earlier, the patient had switched from using perchloroethylene to DrySolv™ (Enviro Tech International, Melrose Park, Illinois) (>95% by weight 1-BP) as the solvent in his dry cleaning machine (7). The patient also used DrySolv as a cleaner to prepare the dry cleaning machine for use. In early February 2008, he manually charged the machine using 50–60 gallons of the solvent and did not use PPE. The patient then began using DrySolv in the daily operation of the dry cleaning machine. During the next 2 days, he reported unusual fatigue and headaches and developed arthralgias, visual disturbances (difficulty focusing), paresthesias, and muscular twitching.

The patient was referred by his personal physician to an emergency department, where physical examination and computed tomography of his head were normal, except for a slight tremor in his upper extremities. Tests of the patient's serum revealed an anion gap and chloride concentration within normal ranges. A site visit to the dry cleaning facility in April

2008 by the New Jersey Department of Health and Senior Services revealed background and high peak concentrations (75 to 250 times background levels) of 1-BP during the handling of clothes. The patient continued to use 1-BP in the dry cleaning machine but adjusted temperature settings on the machine to account for the physical properties of 1-BP, improved his use of ventilation, and began using PPE.

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Editorial Note: 1-BP has received increased global attention since the 1990s as a potential alternative for ozone-depleting chlorofluorocarbons and similar regulated compounds. Since its introduction within the United States, 1-BP has been applied as a solvent in many industrial processes, including vapor degreasing, foam cushion manufacturing, and dry cleaning. The incidence of 1-BP toxicity is unknown, and the signs and symptoms are not described fully. In this report, case 1 demonstrated severe neurologic illness in a worker in the electronics industry using 1-BP as a cleaning solvent. The elevated serum bromide concentration and negative anion gap in a worker with neurologic abnormalities exposed to 1-BP provides strong evidence of occupational 1-BP toxicity. Although bromide levels were not measured in case 2, the patient's clinical presentation and course, and his exposure to 1-BP, strongly favor the conclusion that his illness was caused by 1-BP. However, the exact etiology of the neurologic illnesses of the two workers remains unclear and nonwork-related factors potentially contributing to the illnesses are not fully characterized. Additionally, personal exposure information was not available for these workers to help establish their workplace exposures to 1-BP or to other potential workplace hazards.

CDC does not have a recommended exposure limit for 1-BP, nor does OSHA have a permissible exposure limit. Manufacturers of 1-BP and professional organizations, such as the American Conference of Governmental Industrial Hygienists, have recommended occupational exposure limits ranging from 10 ppm to 100 ppm as an 8-hour time-weighted average (6). On the basis of limited exposure and human health effects data, the National Toxicology Program concluded that exposure to 1-BP is toxic to the developmental and reproductive health of animals (8). Animal toxicity studies with 1-BP and human case reports of occupational exposures to 1-BP have raised concerns that exposure to 1-BP might cause reproductive and neurologic effects (2–6). Workers exposed to 1-BP vapors from spray adhesives at

two seat-cushion–manufacturing facilities were found to have severe neurologic illnesses (4,5). CDC evaluated workers at one of those facilities and found nonspecific acute effects (e.g., headache and feeling drunk) possibly associated with central nervous system responses to 1-BP exposure (2).

In accordance with its Significant New Alternatives Program, the Environmental Protection Agency (EPA) has reviewed available scientific literature on 1-BP and promulgated a final rule to accept 1-BP as an alternative for ozone-depleting solvents in the solvent cleaning sector.* EPA also published a proposed rule not to accept 1-BP for use as an aerosol solvent vehicle for adhesives because of higher exposures and the potential for adverse health effects to workers in these settings.† These new rules do not apply to dry cleaning.

Case 2 likely represents a sentinel case of neurologic toxicity in the dry cleaning industry, and additional cases could occur as dry cleaners switch from perchloroethylene use to 1-BP. The U.S. dry cleaning and laundry industry employs an estimated 110,000 persons at approximately 30,000 establishments and is one of the largest industry sectors characterized by small businesses with fewer than 10 employees. In recent years, an estimated 85%–90% of the dry cleaning industry has used perchloroethylene as a solvent. In response to environmental and health concerns, certain states, including California and New Jersey (9,10), have passed or proposed legislation to eliminate use of perchloroethylene as the primary solvent in the dry cleaning industry. To use 1-BP as an alternative solvent, dry cleaning businesses must modify existing equipment to adjust heating/drying cycles, upgrade solvent vapor control systems, replace natural rubber seals, and provide adequate exhaust ventilation. Manufacturer literature on the use of DrySolv recommends wearing a full-facepiece organic vapor respirator if ventilation is inadequate, and chemical-resistant gloves for skin protection (7). Previous CDC research and communication efforts have emphasized application of a hierarchy of controls (e.g., engineering controls and work practices) for reducing worker exposures to perchloroethylene.§ Similar controls should be used within the dry cleaning industry to limit worker exposure to 1-BP.

Clinicians and public health officials should be alert to potential adverse health effects from exposures to 1-BP in industries where such use might increase, such as the dry

cleaning industry, and in workplaces where 1-BP use might be more established. A thorough occupational history always should be part of the clinical evaluation of persons who have unexplained or onset of nonspecific neurologic symptoms. Exposure to electronics cleaning solvents or dry cleaning solvents should prompt a more thorough inquiry concerning exposure to 1-BP. In the evaluation of a worker with occupational exposure to 1-BP and neurologic abnormalities, diagnosis of 1-BP poisoning is suggested by an elevated urinary or serum bromide concentration and a negative serum anion gap. Findings of potential 1-BP poisoning in a potentially exposed worker should prompt removal of the worker from the exposure while an evaluation of workplace exposures is conducted by a qualified professional.

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Prevalence of Self-Reported Physically Active Adults – United States, 2007

The report, *2008 Physical Activity Guidelines for Americans* (2008 Guidelines), released in October by the U.S. Department of Health and Human Services, provides new guidelines for aerobic physical activity (i.e., activity that increases breathing and heart rate) and muscle strengthening physical activity (1). Under the 2008 Guidelines, the minimum recommended aerobic physical activity required to produce substantial health benefits in adults is 150 minutes of moderate-intensity activity per week, or 75 minutes of vigorous-intensity activity per week, or an equivalent combination of moderate- and vigorous-intensity physical activity. Recommendations for aerobic physical activity in the 2008 Guidelines differ from those used in *Healthy People 2010* (HP2010) objectives, which call for adults to engage in at least 30 minutes of moderate-intensity activity, 5 days per week, or 20 minutes of vigorous-intensity activity, 3 days per week (2). To establish baseline data for the 2008 Guidelines and compare the percentage of respondents who reported meeting these guidelines with the percentage who reported meeting HP2010 objectives, CDC analyzed data from the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. This report summarizes the results of that analysis, which indicated that, overall, 64.5% of respondents in 2007 reported meeting the 2008 Guidelines, and 48.8% of the same respondents reported meeting HP2010 objectives. Public health officials should be aware that, when applied to BRFSS data, the two sets of recommendations yield different results. Additional efforts are needed to further increase physical activity.

BRFSS is a state-based, random-digit-dialed telephone survey of the noninstitutionalized U.S. civilian population aged ≥ 18 years. Data for the 2007 BRFSS survey were collected from 430,912 respondents (median response rate: 50.6%; median cooperation rate: 72.1%*) and reported by the 50

states, District of Columbia, Puerto Rico, and U.S. Virgin Islands. Response rates were calculated using guidelines from the Council of American Survey and Research Organizations (CASRO). A total of 31,805 respondents with missing physical activity data were excluded, resulting in a final sample of 399,107.

Since 2001, in alternate years, BRFSS surveys have included the same questions regarding participation in moderate-intensity and vigorous-intensity physical activities. In 2007, to assess participation in moderate activities, respondents were asked, "When you are not working, in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate?" Respondents who answered "yes" were then asked, "How many days per week do you do these moderate activities for at least 10 minutes at a time?" Finally, they were asked, "On days when you do moderate activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities?" To assess participation in vigorous-intensity activities, respondents were asked, "When you are not working, in a usual week, do you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?" Respondents who answered "yes" were then asked, "How many days per week do you do these vigorous activities for at least 10 minutes at a time?" Finally, they were

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*The response rate is the percentage of persons who completed interviews among all eligible persons, including those who were not successfully contacted. The cooperation rate is the percentage of persons who completed interviews among all eligible persons who were contacted.

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