The full spectrum of clinical disease is unknown. Balamuthiasis should be considered in patients with unexplained encephalitis, especially those with lymphocytic pleocytosis, elevated CSF protein (especially >100 mg/dL), and focal lesions on neuroimaging.

Although only seven balamuthiasis survivors have been reported worldwide, early recognition of the infection might offer an opportunity to slow or stop progression of the disease.[9,10] At present, the majority of cases are identified at autopsy. With improved diagnostic techniques, earlier therapeutic intervention might improve prognosis. Further studies are needed to estimate incidence, characterize risk factors, determine case-fatality rates, improve diagnostic methods, and evaluate the efficacy of therapeutic interventions. An important first step will be for public health personnel, clinicians, and pathologists to become knowledgeable about this disease.

REFERENCES

1. Schuster FL, Visvesvara GS. Balamuthia mandrillaris. In: *Emerging protozoan pathogens.* Khan NA, ed. London, England: Taylor and Francis Group; 2008: 71-118.
2. Visvesvara GS, Martinez AJ, Schuster FL, et al. Leptomyxid ameba, a new agent of amebic meningoencephalitis in humans and animals. *J Clin Microbiol*. 1990;28(12):2750-2756.
3. Visvesvara GS, Schuster FL, Martinez AJ. *Balamuthia mandrillaris*, N. G. N. Sp., agent of amebic meningoencephalitis in humans and other animals. *J Eukaryot Microbiol*. 1993;40(4):504-514.
4. Rowen JL, Doerr CA, Vogel H, Baker CJ. *Balamuthia mandrillaris*: a newly recognized agent for amebic encephalitis. *Pediatr Infect Dis J*. 1995;14(8): 705-710.
5. Glaser CA, Honarmand S, Anderson LJ, et al. Beyond viruses: clinical profiles and etiologies associated with encephalitis. *Clin Infect Dis*. 2006;43 (12):1565-1577.
6. Schuster FL, Glaser C, Honarmand S, Maguire JH, Visvesvara GS. *Balamuthia* amebic encephalitis risk, Hispanic Americans. *Emerg Infect Dis*. 2004;10 (8):1510-1512.
7. Visvesvara GS, Moura H, Schuster FL. Pathogenic and free-living amoebae: *Acanthamoeba* spp., *Balamuthia mandrillaris, Naegleria fowleri*, and *Sappinia diploidea. FEMS Immunol Med Microbiol*. 2007; 50(1):1-26.
8. Yagi S, Booton GC, Visvesvara GS, Schuster FL. Detection of Balamuthia 16S rRNA gene DNA in clinical specimens by PCR. *J Clin Microbiol*. 2005;43: 3192-3197.
9. Deetz TR, Sawyer MH, Schuster FL, Visvesvara GS. Successful treatment of *Balamuthia* amoebic encephalitis: presentation of 2 cases. *Clin Infect Dis*. 2003; 37(10):1304-1312.
10. Jung S, Schelper RL, Visvesvara GS, Chang HT. *Balamuthia mandrillaris* meningoencephalitis in an immunocompetent patient. *Arch Pathol Lab Med*. 2004; 128(4):466-468.

Work-Related Injury Deaths Among Hispanics—United States, 1992-2006

MMWR. 2008;57:597-600

2 figures, 1 table omitted

HISPANICS ARE AMONG THE FASTEST-growing segments of the U.S. workforce.[1] In 2006, an estimated 19.6 million workers in the United States were Hispanic, 56% of whom were foreign born.*[2] To characterize work-related injury deaths among Hispanic workers in the United States, CDC, the Bureau of Labor Statistics (BLS), and certain state agencies analyzed data from 1992-2006. This report summarizes the results of that analysis, which indicated that, during 1992-2006, a total of 11,303 Hispanic workers died from work-related injuries.† The death rate for Hispanic workers decreased during this period; however, the rate was consistently higher than the rate for all U.S. workers, and the proportion of deaths among foreign-born Hispanic workers increased over time. During 2003-2006, 34% of Hispanic worker deaths occurred in the construction industry. Additional efforts are needed to reduce the risk for death among Hispanic workers because of projected increases in their employment, involvement in work with high risk for injury, susceptibility to miscommunication caused by language differences, and other potential risks associated with culture and economic status.

The BLS Census of Fatal Occupational Injuries (CFOI) collects data on fatal occupational injuries from multiple federal, state, and local sources, including death certificates, workers' compensation reports, medical examiner reports, and police reports. Approximately 95% of cases are verified by at least two independent sources.[3] To be included in CFOI, the decedent must have been employed at the time of the event, engaged in a legal work activity, or present at a site as a job requirement. CFOI excludes deaths that occurred during a worker's normal commute to and from work and deaths related to occupational illnesses. A decedent is classified as Hispanic if documentation is available indicating that the decedent was of Mexican, Puerto Rican, Cuban, or Central or South American descent, or of other Spanish culture or origin, regardless of race. Deaths of undocumented workers are included. In this report, certain data are presented only for the period 2003-2006 because, in 2003, industry coding changed to the 2002 North American Industry Classification System. Death rates were calculated for workers aged ≥16 years, using estimates of employed civilian workers from the BLS Current Population Survey (CPS).[2] CPS is a monthly survey of approximately 60,000 households that uses a combination of in-person and telephone interviews with a single person reporting for all household members. Undocumented persons are included in CPS.

Work-related injury deaths among Hispanic workers during 1992-2006 totaled 11,303, approximately 13% of all U.S. work-related injury deaths during that period. Median age of Hispanic decedents was 35 years, compared with a median age of 42 years for all workers. Approximately 95% of Hispanic decedents were male. The annual work-related injury death rate for Hispanic workers exceeded the rate for all U.S. workers every year during 1992-2006, with the exception of 1995. In 2006, the work-related injury death rate for Hispanic workers was 5.0 per 100,000 Hispanic workers, compared with rates of 4.0 for all workers, 4.0 for non-Hispanic white workers, and 3.7 for non-Hispanic black workers. During 2003-2006, the work-related injury death rate for foreign-born Hispanic workers was 5.9, compared with a rate of 3.5 for U.S.-born Hispanic workers.

During 1992-1996, homicide was the most common fatal event among Hispanic workers. However, during 1997-2006, highway incidents‡ were the most common fatal event, with the excep-

tion of 2000 and 2006, when falls to a lower level were most common. Work-related homicides among Hispanics decreased 37% from 1992 to 2006, while the number of falls to a lower level increased approximately 370% during the same period.

During 2003-2006, 67% of Hispanic decedents were foreign born, an increase from 52% in 1992. Approximately 70% of these decedents were born in Mexico. During 2003-2006, the most common industries employing Hispanics who died from work-related injuries were construction (34%), administrative and waste services (11%), agriculture/forestry/fishing/hunting (10%), and transportation/warehousing (10%). Of those states with 30 or more work-related injury deaths among Hispanics during 2003-2006, the highest numbers of fatalities were in California (773 deaths), Texas (687), and Florida (417); however, the highest fatality rates were in South Carolina (22.8 per 100,000 Hispanic workers), Oklahoma (10.3), Georgia (9.6), and Tennessee (8.9).

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CDC Editorial Note: Although work-related injury death rates declined generally and among Hispanics in the United States from 1992 to 2006, disparities between Hispanics and all workers persisted, with Hispanics consistently experiencing higher rates. In 2006, rates for Hispanics and all workers were above the *Healthy People 2010* target for work-related injury deaths of 3.2 deaths per 100,000 workers (objective 20-1).[4] Foreign-born Hispanic workers were at especially high risk, and a large proportion of deaths occurred in the construction industry. Much of the increased risk for Hispanic workers likely can be attributed to holding high-risk jobs.[5] However, an analysis of Hispanic work-related injury deaths in the construction industry found that Hispanic workers also had elevated rates when compared with non-Hispanic workers in the same occupations (e.g., laborers or roofers).[6]

In-depth investigations of approximately 200 deaths of Hispanic workers by CDC's National Institute for Occupational Safety and Health and state public health and labor agencies during 1992-2006 suggested characteristics that contributed to higher numbers of work-related injury deaths among Hispanic workers, including inadequate knowledge and control of recognized safety hazards and inadequate training and supervision of workers, often exacerbated by different languages and literacy levels of workers (CDC, unpublished data, 2008).§ Preventing work-related injury deaths among Hispanics will require (1) employers to take additional responsibility for providing a safe work environment, (2) safety and health agencies to provide employers of Hispanic workers with safety information and ensure compliance with existing regulations, and (3) researchers and health communication professionals to develop additional materials that are culturally appropriate and effective for workers who speak different languages and have varying levels of literacy. In addition, labor unions, community groups, and workers themselves can contribute to research and prevention measures.

The findings in this report are subject to at least five limitations. First, the number of deaths of Hispanic workers might be undercounted in the CFOI database,[6] resulting in an underestimate of the death rate among Hispanics. Second, Hispanic ethnicity might have been misclassified in CFOI, which relies on secondary data sources, and also in CPS, which uses a single reporter for all household members. Third, the number of Hispanic workers might be undercounted in the CPS, which relies on stable residences for sequential interviews and largely collects data via telephone. An undercount of the total population of Hispanic workers would result in overestimate of Hispanic work-related injury death rates.[6] Fourth, Hispanic workers are a heterogeneous population, and analyses that aggregate deaths for all Hispanics might mask differences among subpopulations. Finally, the data do not address potential contributors to Hispanic worker risk associated with cultural and social norms or economic status. For example, Hispanic workers, especially those who are foreign born, might be more willing to perform tasks with higher risk and more hesitant to decline such tasks for fear of losing their jobs.

CDC, the Occupational Safety and Health Administration (OSHA), and other agencies have provided additional Spanish-language occupational health and safety materials and training opportunities for employers, supervisors, and workers.[7,8] OSHA has worked with employers to publicize best practices for Hispanic worker education and training programs.[8] In addition, federally supported research projects are exploring grassroots approaches to improving occupational health and safety among Hispanic and other immigrant workers.‖ Others agencies can build upon these projects to develop culturally competent programs that engage Hispanic workers in identifying and addressing their occupational health and safety concerns.

Acknowledgments

The findings in this report are based, in part, on contributions by B Materna, PhD, California Dept of Public Health; J Zhu, N Pavelchak, AM Gibson, New York State Dept of Health; P Spielholz, PhD, Washington State Dept of Labor and Industries; and S Pegula, MS, Bur of Labor Statistics, US Dept of Labor.

REFERENCES

8 Available.

*Does not reflect any immigration status.
†Data from 2001 exclude fatalities resulting from the September 11 terrorist attacks.
‡Defined as incidents on public roadways that involved vehicles or equipment.
§Individual case reports of Hispanic worker deaths are available at http://www2a.cdc.gov/NIOSH-FACE/state.asp?Category=0009&Category2= ALL&Submit=Submit.
‖Additional information available at http://www.dph.sf.ca.us/phes/work_unidos.htm.