

Resource ID# 4890

Farm Worker Illness Following Exposure to Carbofuran and Other Pesticides--Fresno County, California, 1998

JAMA, The Journal of the American Medical Association, March 17, 1999 v281 i11 p981(1)

Farm Worker illness Following Exposure to Carbofuran and Other Pesticides-- Fresno County, California, 1998. (From the Centers for Disease Control and Prevention)

Abstract: Farm owners should post the proper notices and warn farm workers when toxic pesticides are used. On July 31, 1998, 34 farm workers began working in a cotton field in Fresno County, California, just two hours after it had been sprayed with the pesticide carbofuran. When this pesticide is used on cotton, workers must wait 48 hours before entering the field. The workers were not told this and no warning signs were posted. Several hours later, all the workers became ill. Carbofuran was detected in urine samples from many of the workers up to 11 days later.

Full Text: COPYRIGHT 1999 American Medical Association. All Rights Reserved.

IN CALIFORNIA, SUSPECTED PESTICIDE-related illnesses and suspected work-related illnesses and injuries are reportable conditions. On July 31, 1998, the Occupational Health Branch of the California Department of Health Services (CDHS) [*] received a report from the California Department of Pesticide Regulation (CDPR) of a pesticide exposure incident in Fresno County involving 34 farm workers. CDHS investigated this incident by reviewing medical records of the 34 workers and interviewing 29. The findings indicated that the workers became ill after early reentry into a cotton field that had been sprayed with a cholinesterase-inhibiting carbamate pesticide.

On July 31 at 4 AM, a cotton field was sprayed aerially with a solution containing as active ingredients 0.26% carbofuran (n-methyl carbamate), 0.05% abamectin (macrolytic lactone), and 0.05% mepiquat chloride (growth regulator). Although carbofuran, when used on cotton, has a restricted entry interval (REI) [+] of 48 hours and requires both posting of treated fields and oral notification of workers, neither warning was provided. At 6 AM, the 34 workers (age range: 13-64 years; median: 31 years) entered the field to complete weeding begun the previous day. After weeding for approximately 4 hours, the workers were transported to a second field 2 1/2 miles away that had been sprayed 2 days earlier with a solution containing cyfluthrin (synthetic pyrethroid), diclofol (organochlorine), and mepiquat chloride. The RET for these pesticides is 12 hours. Within approximately 1/2 hour of entering the second field, the workers began feeling ill and stopped working.

Symptoms most commonly reported by the 34 farm workers were nausea (97%), headache (94%), eye irritation (85%), muscle weakness (82%), tearing (68%), vomiting (79%), and salivation (56%); the most commonly observed signs were bradycardia (21%), diaphoresis (15%), and miosis (pupillary constriction) (12%).

Thirty (88%) workers were transported immediately to a medical clinic the other four went home, showered, and sought medical care 3-17 days later. All workers evaluated at the clinic were decontaminated by clothing removal and showering and were sent to six area hospitals. Twenty-nine were evaluated and released the same day. One worker was hospitalized overnight for new-onset atrial fibrillation. All workers received hospital treatment for symptoms, and most (28 [82%]) lost at least 1 day of work.

Plasma and red blood cell (RBC) cholinesterase samples obtained from 29 workers on the day of the incident were within laboratory normal values (no workers had baseline levels

available). However, these specimens were not placed on ice when obtained and were tested by an outside laboratory after several hours' delay. In comparison, RBC (but not plasma) cholinesterase levels were lower than laboratory normal values in 10 workers who had second cholinesterase tests drawn at two local hospitals (3 hours after the original specimens were obtained); these samples were placed on ice and analyzed in hospital laboratories within 1 hour of collection. Urinary metabolites of carbofuran were detected by CDPR in 18(58%) of 31 samples obtained up to 11 days following the exposure.

Foliage samples obtained in the first field by CDPR on July 31 showed carbofuran levels up to 0.77 [micro]g/[cm.sup.2] these levels were consistent with application of pesticide early that morning. Information about pesticide levels to be expected on leaf samples at 48 hours was not available. Other pesticide residues found on leaves in the first field were abamectin (up to 0.009 [micro]g/[cm.sup.2]) and dicofol (up to 0.58 [micro]g/[cm.sup.2]). Workers' clothing contained carbofuran residue (up to 91 mg per clothing item) and abamectin residue (up to 6000 [micro]g per clothing item). CDHS is continuing follow-up on these workers to assess the subacute and chronic effects associated with carbofuran overexposure.

Reported by: R Das, MD, R Harrison, MD, Occupational Health Br, California Dept of Health Svcs; P Sutton, MPH, A Souter, J Beckman, B Santamaria, MPH, Public Health Institute, Berkeley; c Steinmaus, MD, Univ of California, San Francisco; O Sablan, MD, Sablan Medical clinic, Fresno; S Edmiston, t Mehler, MD, B Hernandez, F Schneider, Worker Health and Safety Br, California Dept of Pesticide Regulation. Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, CDC.

CDC Editorial Note: Pesticide exposure can cause serious acute illness among farm workers. In the incident described in this report, workers entered a field well before the end of a label-specified REI and incurred pesticide exposure that resulted in moderately severe illness (as defined by the American Association of Poison Control Centers[1]). The incident demonstrates that (1) posted and oral warnings based on the REI are necessary to prevent illness among workers performing hand labor in fields recently treated with pesticides and (2) failure to adhere to an REI can result in substantial morbidity among exposed workers. Because this incident demonstrates that sole reliance on these control measures may be inadequate, the substitution of safer, less toxic alternative pesticides should be adopted when feasible.

Prompt, appropriate medical attention, including decontamination by clothing removal and showering, probably prevented more acute illness in this incident. However, some exposed workers went home before decontamination, increasing the potential for secondary contamination of children and other family members. Secondary contamination can be reduced by developing in advance appropriate procedures for decontaminating clothing, homes, and vehicles[2]. Illnesses among family members exposed to the workers were not reported.

Although the incident involved exposure to several pesticides, the agent with the greatest acute systemic toxicity is the broad-spectrum insecticide/nematocide carbofuran. Carbofuran exposure was the probable cause of illness based on biologic evidence (foliage and clothing samples and urine metabolites), signs and symptoms of cholinergic excess (voluntary and involuntary muscle movement, exocrine gland overactivity, and central nervous system effects), and laboratory evidence of cholinesterase depression. Although atrial fibrillation has been reported with other cholinesterase-inhibiting pesticides[3], this is the first report following carbofuran exposure. In 1995, 248,000 lbs of cholinesterase-inhibiting carbamate pesticide were used in California, primarily on alfalfa, rice, table and wine grapes, and cotton[4]. During 1995, carbamate pesticides composed 1.8%, by weight, of all pesticides used and alone caused 30(1.9%) of pesticide-related illnesses reported to CDPR.

Clinical diagnosis of carbamate toxicity is based primarily on known or suspected history of carbamate use and presence of cholinergic symptoms and signs[5]. Isolated cases may be less recognizable, resulting in delays in diagnosis and treatment. Because cholinesterase inhibition by carbamates is rapidly reversible, cholinesterase testing may be unreliable in diagnosing carbamate poisoning. The incident described in this report also illustrates the importance of limiting the time between cholinesterase collection and analysis, placing specimens on ice, and using the most appropriate analytic techniques to conduct cholinesterase assays[6]. Measurement of urinary metabolites maybe useful to confirm suspected carbamate-related illness, but because this assay is highly chemical-specific and is performed only by certain reference laboratories, it is not a practical tool for most clinicians. Treatment of carbamate poisoning includes decontamination, supportive care, and the use of atropine in severe expo sures.

Some of the symptoms reported by these workers are consistent with effects reported for other pesticides involved in this incident. However, the residues for these pesticides were either not assayed or found to be low, and unlike the cholinesterase-inhibiting pesticides, methods to assess the biologic effects of other pesticides are not readily available to clinicians. Several of these pesticides have been associated with adverse effects in animals, but reliable data for humans are lacking. The toxicity related to combined exposures to pesticides remains unresolved and requires further research.

REFERENCES

6 available

(*)CDHS participates in two CDC-funded pesticide illness prevention projects that use case reports generated by these mandatory reporting requirements: the Sentinel Event Notification System for Occupational Risks and community Partners for Health Farming.
(+) REI are established by the U.S. Environmental Protection Agency for pesticides used on agricultural crops to which workers have substantial contact with treated surfaces during hand labor. No worker without prescribed protective clothing should enter a treated area to perform a hand labor task until the REI expires. The length of the REI depends on the specific pesticide but generally can be no less than 12 hours.

Mag.Coll.: 98B4169

Article A54249684

Copyright © 2000, Gale Group. All rights reserved.
Gale Group is a Thomson Corporation Company.