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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Case Studies in Environmental Medicine

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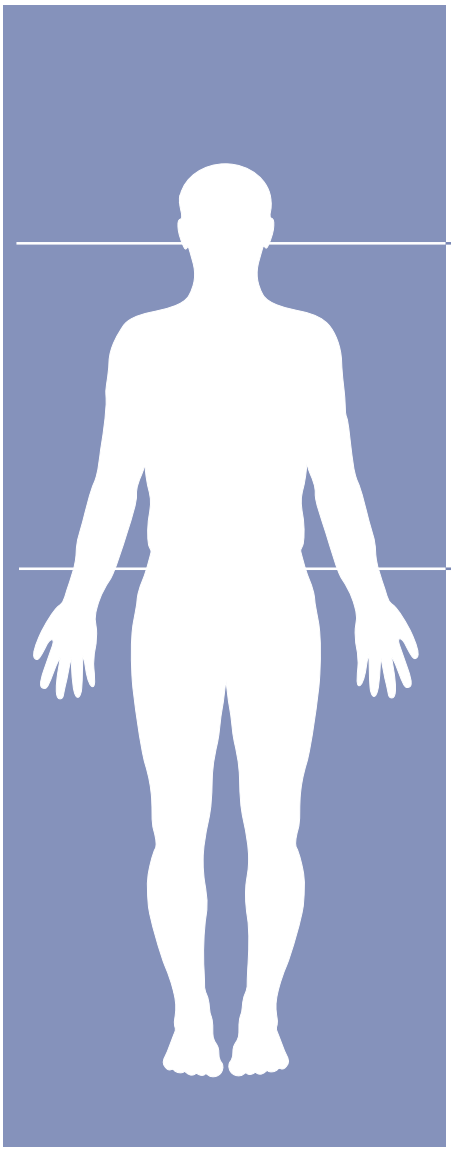

TAKING AN EXPOSURE HISTORY

Environmental Alert

- Because many environmental diseases either manifest as common medical problems or have nonspecific symptoms, an exposure history is vital for correct diagnosis. By taking a thorough exposure history, the primary care clinician can play an important role in detecting, treating, and preventing disease due to toxic exposure.

This monograph is one in a series of self-instructional publications designed to increase the primary care provider's knowledge of hazardous substances in the environment and to aid in the evaluation of potentially exposed patients. This course is also available on the ATSDR Web site, www.atsdr.cdc.gov/HEC/CSEM/. See page 3 for more information about continuing medical education credits, continuing nursing education units, and continuing education units.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
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Disclaimer

The state of knowledge regarding the treatment of patients potentially exposed to hazardous substances in the environment is constantly evolving and is often uncertain. In this monograph, ATSDR has made diligent effort to ensure the accuracy and currency of the information presented, but makes no claim that the document comprehensively addresses all possible situations related to exposure. This monograph is intended as an additional resource for physicians and other health professionals in assessing the condition and managing the treatment of patients potentially exposed to hazardous substances. It is not, however, a substitute for the professional judgment of a health care provider. The document must be interpreted in light of specific information regarding the patient and in conjunction with other sources of authority.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry or the U.S. Department of Health and Human Services.

Table of Contents

Tables

Appendices

Each content expert for this case study indicated no conflict of interest to disclose with the case study subject matter.

ATSDR Publication No.: ATSDR-HE-CS-2001-0002

Case Studies in Environmental Medicine (CSEM): Taking an Exposure History

Goals and Objectives

The goal of the CSEM is to increase the primary care provider's knowledge of hazardous substances in the environment and to aid in the evaluation of potentially exposed patients.

After completion of this educational activity, the reader should be able to discuss three important reasons for taking an exposure history, explain the process of taking an exposure history, and list two sources of information on exposure history.

Accreditation

Continuing Medical Education (CME)

The Centers for Disease Control and Prevention (CDC) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. CDC designates this educational activity for a maximum of 1.0 hour in category 1 credit toward the American Medical Association (AMA) Physician's Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

Continuing Nursing Education (CNE)

This activity for 1.4 contact hours is provided by CDC, which is accredited as a provider of continuing education in nursing by the American Nurses Credentialing Center's Commission on Accreditation.

Continuing Education Units (CEU)

CDC has been approved as an Authorized Provider of continuing education and training programs by the International Association for Continuing Education and Training and awards 0.1 continuing education units (CEUs).

Instructions

See page 4

The response form must be completed and returned electronically, by fax, or by mail for eligibility to receive continuing education credit.

Instructions for Completing CSEM Online

1. Read this CSEM, *Taking an Exposure History*; all answers are in the text.
2. Link to the MMWR/ATSDR Continuing Education General Information page (www.cdc.gov/atsdr/index.html).
3. Once you access this page, select the Continuing Education Opportunities link.
4. Once you access the MMWR/ATSDR site online system, select the electronic file and/or register and test for a particular ATSDR course.
   a. Under the heading "Register and Take Exam," click on the test type desired.
   b. If you have registered in this system before, please use the same login and password. This will ensure an accurate transcript.
   c. If you have not previously registered in this system, please provide the registration information requested. This allows accurate tracking for credit purposes. Please review the CDC Privacy Notice (www.cdc.gov/privacy.htm).
   d. Once you have logged in/registered, select the test and take the posttest.
5. Answer the questions presented. To receive continuing education credit, you must answer all of the questions. Some questions have more than one answer. Questions with more than one answer will instruct you to "indicate all that are true."
6. Complete the course evaluation and posttest no later than **June 29, 2006**.
7. You will be able to immediately print your continuing education certificate from your personal transcript.

Instructions for Completing CSEM on Paper

1. Read this CSEM, *Taking an Exposure History*; all answers are in the text.
2. Complete the evaluation questionnaire and posttest, including your name, mailing address, phone number, and e-mail address, if available.
3. Circle your answers to the questions. To receive your continuing education credit, you must answer all of the questions.
4. Sign and date the posttest.
5. Return the evaluation questionnaire and posttest, no later than **June 1, 2006**, to CDC by mail or fax:

Mail
Continuing Education Coordinator
Division of Health Education and Promotion, ATSDR
1600 Clifton Road, NE (MS E-33)
Atlanta, GA 30333

or

Fax
404-498-0061
ATTN: Continuing Education Coordinator

6. You will receive an award certificate within 90 days of submitting your credit forms. No fees are charged for participating in this continuing education activity.

Case Study

On Tuesday afternoon, a 52-year-old man with previously diagnosed coronary artery disease controlled by nitroglycerin describes episodes of recurring headache for the past 3 weeks. Mild nausea often accompanies the headache; there is no vomiting. He describes a dull frontal ache that is not relieved by aspirin. The patient states that the headaches are sometimes severe; at other times they are a nagging annoyance. The durations range from half an hour to a full day. His visit was also prompted by a mild angina attack that he suffered this past weekend shortly after he awoke on Sunday morning. He has experienced no further cardiac symptoms since that episode. History of previous illness indicates that the patient was diagnosed with angina pectoris 3 years ago and has been taking 0.4 milligrams (mg) nitroglycerin sublingually prophylactically before vigorous exercise. He also takes one aspirin every other day. He has been symptom-free for the past 2½ years. Sublingual nitroglycerin relieved the pain of the Sunday morning angina attack within several minutes. The patient does not smoke and rarely drinks alcohol. He is a trim man with a slightly ruddy complexion. At present, he is afebrile, and his vital signs are as follows: blood pressure 120/85, pulse 80, and respirations 20. Physical examination including head, eyes, ears, nose, throat (HEENT); heart; lungs; and neurologic exam is normal. The results of an electrocardiogram (ECG) with a rhythm strip performed in your office are unremarkable. Subsequent laboratory testing reveals normal blood lipids, cardiac enzymes, complete blood cell count (CBC), sedimentation rate, glucose, creatinine, and thyroid function.

Pretest

(a) What would you include in the patient's problem list?

(b) What would you include in the differential diagnosis?

(c) What additional information would you seek to assist in the diagnosis?

Introduction

The preceding case study describes a patient with angina. He has new, nonspecific symptoms of headache and nausea. Suppose this patient lived near a hazardous waste site. Would your differential diagnosis change? If the patient refinished furniture as a hobby, would you consider this important? Is there a connection between his headaches and cardiac symptoms? How would you investigate the possible correlation? Could he be exposed to chemicals in his workplace? Each of these factors could play a role in the etiology of this patient's illness; each exposure could cause disease.

The patient described in the case study—a 52-year-old male with angina—is portrayed in three scenarios throughout this document. An exposure history provides clues that prompt the clinician to investigate the possibility of toxic exposure.

- Scenario 1: This patient is an accountant who has had the same job and residence for many years.
- Scenario 2: This patient owns a commercial cleaning service and uses cleaning products at various industrial and commercial sites.

- Scenario 3: This patient is a retired advertising copywriter who lives in the vicinity of an abandoned industrial complex.

Most environmental and occupational diseases either manifest as common medical problems or have nonspecific symptoms. Etiology distinguishes a disorder as an environmental illness. Unless an exposure history is pursued by the clinician, the etiologic diagnosis might be missed, treatment may be inappropriate, and exposure can continue.

Most people with illness caused or exacerbated by exposure to hazardous substances obtain their medical care from clinicians who are not specialists in either environmental or occupational medicine. Few clinicians, however, routinely elicit information about the home, workplace, or community environment as part of the demographic and social history. In a study of a primary care practice in an academic setting, only 24% of 625 charts had any mention of the patient's occupation. Only 2% of the charts had information on exposures, duration of present employment, and past occupations. In addition, during routine health care visits or evaluation of symptoms, clinicians caring for adolescents seldom ask about their work exposure and history.

Although many clinicians recognize the importance of taking a work and exposure history to evaluate certain problems, most have had little training or practice in doing so. Extensive knowledge of toxicology is not needed to diagnose environmental and occupational disease. The same criteria are employed as those used in diagnosing other medical problems—history, including onset and temporal pattern of symptoms and palliative and provocative factors; physical examination; and laboratory results. If necessary, consultation with industrial hygienists or completion of environmental testing can be used in diagnosing environmental and occupational disease. In addition to current exposures, the clinician must consider the long-term or latent effects of past exposures to agents such as asbestos, radiation, and chemical carcinogens.

This monograph illustrates the investigation of environmental and occupational illness. The aim is not to demonstrate all exposure possibilities but rather to illustrate the principles and process of investigating this etiology. The exposure history form (pages 26–29), which can be completed by the clinician or by the patient (to save staff time), will guide the clinician through various aspects of this process. The form elicits many important points of an exposure history, including job descriptions and categories associated with hazardous substances, physical, and biologic agents; and temporal and activity patterns related to environmental and occupational disease. The form explores past and current exposures.

Taking an exposure history requires only a few minutes of the clinician's time and can be abbreviated, expanded, or focused according to the patient's signs and symptoms. The exposure history form is designed for quick scanning of important details and can be copied and used for a permanent database as well as for the investigation of current problems.

The diagnosis of environmental or occupational disease cannot always be made with certainty. More commonly, likelihood or unlikelihood is the goal. Sound clinical judgment must be used, and common etiologies should be considered. The multifactorial nature of many conditions, particularly chronic diseases, must not be overlooked.

An exposure history should be taken on every patient. It is of particular importance if the patient's illness occurs at an atypical age or is unresponsive to treatment. The clinician must also keep in mind that many organ systems are affected by toxic exposure (Table 1). Exposure and effects can be acute or chronic. The latency period from exposure to manifestation of disease can vary, ranging from immediate to delayed (hours or days) to prolonged (decades).

With practice using the exposure history form and a network of referrals, the primary care clinician can play an important role in detecting, treating, and preventing disease resulting from toxic exposures.

Organ Systems Affected by Toxic Exposure

All organ systems can be targets of toxic exposures: different toxins affect various and differing organ systems. The respiratory system is both a target organ and a portal of entry for toxicants. Adult-onset asthma and death from asthma are increasing. More than 100 toxicants cause asthma, and many more can exacerbate it. Irritant and allergic contact dermatitis account for 90% of occupational skin disorders. Other skin disorders with exposure etiologies include pigment alterations, chloracne, urticaria, and malignant neoplasms. Alcohol abuse is a potential confounding factor in the evaluation of patients with suspected toxic exposure. However, a history of alcohol use does not necessarily exclude an environmental or occupational etiology.

Symptoms of liver disease due to toxic exposure can mimic viral hepatitis. About 4,000 new cases of renal disease of unknown etiology are diagnosed annually. Organic solvents and heavy metals are two classes of toxicants known to adversely affect renal function. Neurotoxicants can cause peripheral neuropathy, ataxia, parkinsonism, seizures, coma, and death. Many chemicals cause mild central nervous system depression that may be

misdiagnosed as intoxication and, if undetected, can progress to psychoses or dementia. Sensory impairment can also be caused by exposure to toxicants (e.g., visual disturbances caused by methanol) and physical agents (e.g., hearing impairment caused by loud noise).

Table 1. Organ Systems Often Affected by Toxic Exposure

Organ/System	Exposure Risks
Respiratory	**Asbestos**, **radon**, cigarette smoke, glues
Dermatologic	**Dioxin**, nickel, **arsenic**, **mercury**, cement (**chromium**), **polychlorinated biphenyls (PCBs)**, glues, rubber cement
Liver	**Carbon tetrachloride**, **methylene chloride**, **vinyl chloride**
Kidney	**Cadmium, lead, mercury, chlorinated hydrocarbon solvents**
Cardiovascular	Carbon monoxide, noise, tobacco smoke, physical stress, carbon disulfide, **nitrates**, **methylene chloride**
Reproductive	**Methylmercury**, carbon monoxide, **lead**, ethylene oxide
Hematologic	**Arsenic**, **benzene**, **nitrates**, **radiation**
Neuropsychologic	**Tetrachloroethylene**, **mercury**, **arsenic**, **toluene**, **lead**, **methanol**, noise, **vinyl chloride**

Bold type indicates that the substance is covered in one of the *Case Studies in Environmental Medicine*. A list of the titles available can be found on page 46.

The cardiovascular and hematologic systems are frequent targets of toxicants. Cardiovascular changes, as well as exacerbation of preexisting cardiovascular conditions, can result from exposure to noise and to chemicals such as carbon monoxide and tobacco smoke. Benzene can cause bone marrow changes leading to aplastic anemia, acute leukemia, and chronic myelogenous leukemia.

Toxicants in the Home and Environment

The clinician should consider the following possible sources, which are discussed in the following sections, when eliciting information on exposures in the home and environment.

- Indoor air pollution
- Recreational hazards
- Soil contamination
- Common household products
- Lead products and waste
- Water supply
- Indoor air pollution
- Pesticides and lawn care products

Indoor Air Pollution

Tobacco Smoke

Environmental tobacco smoke is a mixture of more than 4,700 compounds. Mainstream smoke is exhaled by the smoker, and sidestream smoke comes off the smoldering end of the cigarette and is inhaled by adjacent persons (passive smokers). Sidestream smoke contains more carcinogenic hydrocarbons and respirable particles than mainstream smoke. All smokers should be encouraged to stop smoking, particularly if children in the home have asthma. If household members will not refrain from smoking, they should smoke only in well-ventilated or isolated areas.

Does anyone in the household smoke?

If so, how many packs per day?

Wood Stoves/Gas Ranges

Thirteen million wood stoves are in use in the United States, and 800,000 are sold annually. When not properly maintained and vented, wood stoves emit noxious gases including carbon monoxide, oxides of nitrogen, particulates, and hydrocarbons. Studies have shown that children living in homes heated with wood stoves have a significant increase in respiratory symptoms compared with children living in homes without wood stoves.

Does the patient have a wood stove?

Is there a smoke smell indoors?

When was the last time the chimney and stove were cleaned?

Gas ranges, which may produce nitrogen oxide, a respiratory irritant, are used for cooking in more than half of the homes in the United States. In low-income areas, gas stoves may be used not only for cooking, but as a supplemental source of heat. Proper ventilation and routine inspection and maintenance of the equipment is necessary in residences where wood or gas stoves are used.

If the patient uses a gas range, is it in proper working order?

Does the patient use the gas range for heat?

Building Materials

Building materials, home improvement products, and textiles used in the home can pose health risks. For example, formaldehyde volatilizes from particle board, insulation materials, carpet adhesives, and other household products. This is a particular problem in the confined spaces of mobile homes. Formaldehyde exposure can cause rhinitis, nausea, dry skin or dermatitis, and upper respiratory and eye irritation. It has also been reported to precipitate bronchospasm in persons who have asthma.

Does the patient live in a mobile home?

Was urea formaldehyde foam used for insulation?

Is cabinetry or furniture made of pressed wood?

Asbestos

Asbestos was widely used from 1950 to the early 1970s in areas requiring soundproofing, thermal proofing, or durability (e.g., floor and ceiling coverings, heating and water pipe insulation). It was often applied as a spray-on material. Asbestos that is in good condition and not respirable is generally not a risk. However, when it becomes frayed or friable (i.e., easily crumbled), asbestos fibers can be released into the air. Exposure to these fibers has been associated with lung cancer, asbestosis, and mesothelioma. The occurrence of disease is influenced by the type of asbestos mineral inhaled, the concentration and dimension of the fibers, and the duration of the exposure. In 1986, the U.S. Environmental Protection Agency (EPA)

Was the house built before 1970?

Was asbestos insulation used on pipes or hot water tank or for insulation in attic/walls?

Do walls and ceilings have sprayed-on or troweled-on material?

Is renovation work planned in any of the areas containing asbestos?

Are adults in the household exposed to asbestos on the job now or in the past (i.e., shipbuilders, miners)?

If so, were their work clothes laundered at home?

estimated that friable asbestos may be present in as many as 35,000 schools in the United States, potentially exposing 15 million schoolchildren and 1.4 million adults. Smoking cigarettes in addition to being exposed to asbestos increases the risk of cancer by an order of magnitude above smoking alone or asbestos exposure alone. Children may be at greater risk than adults because children have a longer life expectancy than adults, higher activity rates, higher breathing rates, increased amounts of time spent near the floor where fibers accumulate, and a greater likelihood of contact (through curiosity or mischief). (Further information on the health hazards of asbestos exposure is available in the *Case Studies in Environmental Medicine: Asbestos Toxicity*.)

Radon

Has the patient's home been tested for radon? If *yes*, what were the results?

Are there high levels of radon in homes in the area?

Do children spend a significant amount of time in the basement or on the first floor of the home, where radon might tend to be in higher concentrations?

Radon, a colorless, odorless gas, is a decay product of uranium and is found in significant concentrations in some areas. Radon itself does no harm, but its progeny attach to airborne particulates such as cigarette smoke and can be inhaled. During subsequent decay, the progeny emit high-energy alpha particles that may injure adjacent bronchial cells, thereby causing lung cancer. Five to ten percent of single-family homes in the United States have been estimated to exceed the EPA radon recommended guideline of 4 picocuries per liter of air. EPA estimates that approximately 14,000 lung cancer deaths per year are attributable to radon. (For further information about radon exposure and its health effects, see *Case Studies in Environmental Medicine: Radon Toxicity*.)

Common Household Products

Does the patient use any of the following on a regular basis: cleaners for glass, oven, floors, drains, and toilets; polishes; air fresheners and disinfectants; glues; solvents; paint strippers; or sealants?

Where are these chemicals stored and disposed of?

Indoor air pollution has been recognized as a significant public health problem especially where some modern building techniques may incorporate many synthetic materials and heating and air conditioning systems tend to increase indoor pollution concentrations. A 1987 EPA study found approximately 12 common organic pollutants in concentrations 2 to 5 times higher from air tested inside homes versus outdoor air. This increase was due to the use of common household products. Product warning labels are often inadequate and pertain only to acute exposures. Long-term or repeated use of some household chemicals, such as chlorinated hydrocarbons, can result in cancer. Commonly used compounds that can have serious adverse effects are methylene chloride (found in adhesive removers and paint strippers and thinners), tetrachloroethylene (used in dry cleaning of clothes), and paradichlorobenzene (found in room air fresheners, toilet bowl deodorizers, and moth crystals). (Further information is available in *Case Studies in Environmental Medicine: Methylene Chloride Toxicity* and in *Case Studies in Environmental Medicine: Tetrachloroethylene Toxicity*.)

Pesticides and Lawn Care Products

Does the patient use pesticides on the garden and lawn?

Pesticides and lawn care products are potentially hazardous, especially to children. Pesticide exposure can occur through dermal contact, inhalation, or

ingestion. At least 1,400 active ingredients can be found in more than 34,000 available preparations of insecticides, herbicides, fungicides, and other antibiologic preparations. These agents have different mechanisms of action and toxicity. There are approximately 600 active pesticide ingredients configured in more than 45,000 formulations in use today. Approximately 4 billion pounds of pesticides are used worldwide in agriculture and in most household gardens. Despite the ban on certain pesticides in the United States, exposure can still occur through improper use, storage, and disposal. Some banned pesticides are used in foreign countries and may return to this country on imported foods. Proper use and storage of household pesticides and proper cleaning of food, especially raw fruits and vegetables, can help protect consumers.

Does the patient employ a professional lawn-care company?

Are children allowed to play in areas recently sprayed with pesticides or lawn-care products?

Does the patient use bug repellants?

Does the patient know what to do in case of accidental poisoning?

Lead Products and Waste

Lead poisoning continues to be a significant health problem in the United States. Although lead was banned from paint for home use in 1972, millions of homes, particularly those built before 1950, still contain high amounts of lead in paint that is peeling and accessible for ingestion by children. Lead exposure also occurs through drinking water, especially in homes that have lead-soldered pipes. Significant exposures have occurred in children, particularly ages 1 to 6 years, who played in lead-contaminated soil. Acidic foods, such as juices, stored in imported pottery may leach lead from ceramic glazes. Some ceramic glazes used by hobbyists and those in imported pottery also may contain lead. Air can be contaminated with lead through the use of leaded gasoline.

What year was the patient's home built?

Is the indoor paint in poor repair?

Is the inside of the patient's home being renovated?

Has the patient's drinking water been tested for lead?

Does the patient use imported earthenware pottery?

People who work in jobs where they are exposed to lead dusts or lead-containing compounds may get lead on their clothing and shoes and bring it into their cars or homes, where children and other family members may be exposed. More than a million U.S. workers are potentially exposed to lead daily in hundreds of occupations such as construction work, radiator repair, metals recycling, battery manufacturing, smelting, and pigments formulating. Good workplace and personal hygiene practices can prevent the majority of these "take-home" exposures. The 1985 intervention level of 25 micrograms per deciliter (µg/dL) has been revised downward to 10 µg/dL. Childhood lead exposure has been associated with lower scores on vocabulary tests, poor eye–hand coordination, slow reaction time, higher absenteeism in school, and lower rankings in school classes. Consequences of childhood lead exposure have been shown to endure into adulthood. (For further information see *Case Studies in Environmental Medicine: Lead Toxicity*.)

Do any household members work with lead (e.g., in a lead refinery or smelter, battery factory, or power plant)? If *yes*, are work clothes brought home?

Do any household members work with arts-and-crafts products containing lead?

Does the patient live near a lead refinery or smelter, battery factory, or power plant?

Recreational Hazards

Recreational areas and products can pose a hazard to health. Fishing and swimming in contaminated lakes and streams can expose participants to toxins contained in polluted waters. Wooden playground structures that have not been treated with protective sealants may allow children to have dermal

Do the patient's children play on wooden playground equipment that has been treated and sealed?

Do the children play in a sandbox that may contain chatt or mine tailings that contain high levels of lead?

contact with potentially hazardous wood preservatives; these include arsenic-containing compounds, pentachlorophenol, and creosote. Some play sands and clays have been reported to contain asbestos-like fibers. Other materials used in arts and crafts involve potentially hazardous silica, talc, solvents, and heavy metals such as lead and cadmium. Toxic materials may be encountered in making stained glass and jewelry, woodworking, model building, and oil and airbrush painting. Persons do not need to be directly involved in these activities to become exposed; merely being in the vicinity of a work area may cause exposure. Federal legislation (the Labeling of Hazardous Materials Act) requires that all chronically hazardous materials be labeled as inappropriate for children's use. (See *Case Studies in Environmental Medicine: Arsenic Toxicity, Case Studies in Environmental Medicine: Asbestos Toxicity, Case Studies in Environmental Medicine: Cadmium Toxicity,* and *Case Studies in Environmental Medicine: Pentachlorophenol Toxicity*.)

Water Supply

What is the source of the patient's water supply?

If the patient uses a private well, when was the last time the water was tested?

Both public water supplies and private wells can be a source of toxic exposure, especially for industrial solvents, heavy metals, pesticides, and fertilizers. For example, an EPA groundwater survey detected trichloroethylene in approximately 10% of the wells tested. It is estimated to be in 34% of the nation's drinking water supplies. Up to 25% of the water supplies have detectable levels of tetrachloroethylene. Methylene chloride may remain in groundwater for years. Some solvents can volatilize from showers and during laundering of clothes, thereby creating a risk of toxicity via inhalation. Nitrates, a common contaminant of rural shallow wells, pose a risk of methemoglobinemia, especially to infants. (See *Case Studies in Environmental Medicine: Arsenic Toxicity*, *Case Studies in Environmental Medicine: Asbestos Toxicity*, *Case Studies in Environmental Medicine: Lead Toxicity*, *Case Studies in Environmental Medicine: Methylene Chloride Toxicity*, *Case Studies in Environmental Medicine: Nitrates/Nitrites Toxicity*, *Case Studies in Environmental Medicine: Tetrachloroethylene Toxicity*, and *Case Studies in Environmental Medicine: Trichloroethylene Toxicity*.)

Soil Contamination

Did the patient or previous owners use chlordane or other pesticides or termiticides in the home?

What is the history of the site on which the home was built?

Ingestion of contaminated soil poses a risk of toxicity, especially to children under the age of 6, because of natural mouthing behaviors. Lead is a common soil contaminant. Dioxin also adsorbs to soils. Certain pesticides such as chlordane can remain in the soil for years. (See *Case Studies in Environmental Medicine: Arsenic Toxicity*, *Case Studies in Environmental Medicine: Cadmium Toxicity*, *Case Studies in Environmental Medicine: Chlordane Toxicity*, *Case Studies in Environmental Medicine: Chromium Toxicity, Case Studies in Environmental Medicine: Dioxin Toxicity*, and *Case Studies in Environmental Medicine: Lead Toxicity.*)

Using the Exposure History Form

A work and exposure history has three components: Exposure Survey, Work History, and Environmental History. The main aspects of an exposure history (summarized in Table 2) will be elicited through the exposure history form (pages 26–29). Although a positive response to any question on the form indicates the need for further inquiry, a negative response to all questions does not necessarily rule out a toxic exposure etiology or significant previous exposure. All patients should complete exposure history forms, although the form does not need extensive evaluation in every clinical situation. As in all data-gathering activities, sound clinical judgment must be exercised.

See note on page 25 about the importance of cultural history in taking an exposure history.

Part 1. Exposure Survey

Past and current exposures are recorded on pages 1 and 2 of the exposure history form, which is designed for easy completion by the patient and a quick scan for pertinent details by the clinician. The questions investigate the following: known exposure to metals, dust, fibers, fumes, chemicals, physical agents, and biologic hazards; details about known toxicant exposure; other persons affected; temporal patterns and activities; changes in routines and work site characteristics; and protective equipment use.

If the patient answers *yes* to one or more questions on part 1, the clinician must follow up by asking the patient progressively more detailed questions about the possible exposure. Special attention should be directed to the route, dose, duration, and frequency of any identified exposure.

The chart of the patient described in scenario 1 of the case study (page 5) reveals that he has worked as an accountant in the same office for the past 12 years. On part 1 of the completed exposure history form, he indicates that no other workers are experiencing similar or unusual symptoms, and he denies recent changes in his job routine. The patient answered *yes* to these three questions: "Are family members experiencing the same or unusual symptoms?" "Do your symptoms get either worse or better at work?" and "Do your symptoms get either worse or better on weekends?" His explanations of these answers reveal a possible temporal relationship between his symptoms and his home. The clue and the clinician/patient dialogue follow.

Clinician: I see that you noted that your wife is having headaches.
Patient: Yes; frequently. In the last 3 or 4 weeks she has had more than usual. She usually has one every month or so; this past month she had three.

Table 2. Components of an Exposure History

Part 1. Exposure Survey
- A. Exposures
  - Current and past exposure to metals, dust, fibers, fumes, chemicals, biologic hazards, radiation, noise, and/or vibration
  - Typical workday (job tasks, location, materials, and agents used)
  - Changes in routines or processes
  - Other employees or household members similarly affected
- B. Health and Safety Practices at Work Site
  - Ventilation
  - Medical and industrial hygiene surveillance
  - Employment exams
  - Personal protective equipment (e.g., respirators, gloves, and coveralls)
  - Lockout devices, alarms, training, and drills
  - Personal habits (Smoke and/or eat in work area? Wash hands with solvents?)

Part 2. Work History
- Description of all previous jobs including short-term, seasonal, and part-time employment and military service
- Description of present jobs

Part 3. Environmental History
- Present and previous home locations
- Jobs of household members
- Home insulating and heating and cooling system
- Home cleaning agents
- Pesticide exposure
- Water supply
- Recent renovation/remodeling
- Air pollution, indoor and outdoor
- Hobbies (e.g., painting, photography, sculpting, welding, woodworking, piloting, restoring automobiles, shooting firearms, creating stained glass, creating ceramics, and gardening)
- Hazardous wastes/spill exposure

Scenario 1:
52-year-old male accountant with angina

Chief complaints: headache and nausea

Clinician: You also stated that your headaches are worse on weekends.
Patient: Yes, they seem to be. If I wake up on a Saturday or Sunday with a headache, it usually gets worse as the day progresses. In fact, that's usually when I feel nauseated too.

Clinician: Do your symptoms seem to be aggravated by certain activities around the home? A hobby or task?
Patient: No, I usually wake up with the headache. I don't think there's a connection with anything I do.

Clinician: Do your symptoms change at all at work?
Patient: Now that you mention it, if I wake up with a headache, by the time I get to work—it takes about 25 minutes—the headache is usually gone.

Clinician: Your angina attack occurred on a Sunday morning. Describe your weekend leading up to the attack.
Patient: It was a fairly quiet weekend. We had dinner at home Friday evening and just relaxed. On Saturday I spent the day packing old books and storing them in the attic and chopping and stacking firewood. I took one nitroglycerin tablet before doing the heavy work, at about 2:00 PM. Saturday night we had friends over for dinner. We had a fire in the fireplace and visited until about 11:00 PM. I had one glass of wine with dinner. I was beginning to feel a little stiff and sore from the work I did that afternoon. Sunday morning I woke up with a headache again. A few minutes after awakening, while I was still in bed, I had the attack. It was mild, not the crushing pain I've had in the past. I had the headache all day.

The preceding dialogue reveals that the patient's symptoms may be associated with the home environment, and his cardiac symptoms, headache, and nausea may be related. His symptoms seem to be exacerbated at home and lessen at work. Further questioning is needed to pursue this lead.

Clinician: What does your wife do for a living?
Patient: She's an attorney.

Clinician: Do either of you have a hobby?
Patient: My hobby is photography. My wife is an avid gardener.

Clinician: Do you have your own darkroom?
Patient: No, I occasionally use a friend's darkroom, but for the past year I've had my film and prints processed commercially.

Clinician: Does your wife use any pesticides or chemicals in the garden?
Patient: No, she does strictly organic gardening and uses only natural means of pest control.

Clinician: Do you work on your car?
Patient: No.

Clinician: Have you gotten any new furniture or remodeled your home in the past few years?
Patient: No.

Clinician: What is your source of heating and cooking in the home?
Patient: We have a natural gas, forced-air heating system. We cook with gas and use the fireplace a lot in winter.

Clinician: How long have you lived in this home and how old is your furnace?
Patient: We've lived there for 23 years. The furnace was replaced about 12 years ago.

Clinician: I see that you recently insulated your home. What exactly did you do?
Patient: Yes. Last month I added extra insulation to the attic, insulated the crawl space, replaced all the windows with double-paned windows, and weatherized all doorways.

Clinician: Have you noticed that the headaches coincide with days you have used the fireplace?
Patient: There could be a connection. I definitely use the fireplace more on weekends. This past Saturday I had a fire blazing all day.

A temporal relationship between the headaches and being in the home has been revealed. Some sources of toxicants have been eliminated (formaldehyde and other volatile organic chemicals from new furniture and rugs and toxic chemicals used in hobbies or gardening). There may be a correlation between symptoms and use of the fireplace. The fireplace could increase negative pressure in the house, causing back drafting of furnace gases. The furnace is old; it may be malfunctioning or producing excessive carbon monoxide. The patient's symptoms, including his angina attack, would be consistent with carbon monoxide poisoning.

Although the patient's symptoms could be associated with his preexisting disease, evidence is strong enough at this point to investigate the possibility of environmental exposure. It would be appropriate to contact the local gas company to request that it check the furnace and stove for malfunctions and leaks. The fireplace should be checked for proper drafting and for deposits of creosote in the chimney.

A carboxyhemoglobin (COHb) level on the patient may confirm carbon monoxide poisoning. The patient should be advised to ventilate the house until the furnace is checked or to stay out of the house until the gas company deems it safe. Symptoms of headaches usually do not occur below 15% COHb, but the half-life of COHb is only several hours.

A COHb level performed on this patient is 6%, which is high for a nonsmoker. The gas company discovers a cracked heating element in the 12-year-old furnace, which resulted in the circulation of carbon monoxide fumes throughout the house. The use of the fireplace most likely increased the back drafting of fumes. The furnace is replaced, the exposure ceases,

and the patient's symptoms abate. He experiences no further cardiac symptoms.

The exposure history form may also alert the clinician to past exposures. Most often, neither the job title nor the patient's initial description of job duties reveal clues of exposure. It is usually helpful to have a patient describe a routine work day, as well as unusual or overtime tasks. Patients tend to use jargon when describing their jobs. It is the clinician's challenge to persistently question the patient to elucidate possible exposures; it is not necessary to have foreknowledge of a particular trade. Start with general questions and work toward the more specific.

It is not necessary to understand the jargon of a particular trade; persistent questioning by the clinician can clarify the tasks involved and reveal possible exposures.

Page 1 of the form reveals another clue—this patient was exposed to asbestos about 30 years ago. The questioning that the clinician conducts, despite having neither knowledge of the patient's trade nor understanding of the jargon, follows.

Clinician: You state here that you were exposed to asbestos, fiberglass, and welding fumes way back in 1958.
Patient: Yes, during my days as a shipwright.

Clinician: Did you actually handle the asbestos?
Patient: No, the pipe laggers were the tradesmen that handled the asbestos. Oh, you might be setting a bracket or plate next to a pipe and accidentally hit the pipe and dislodge some asbestos, but otherwise, shipwrights didn't handle it. You only had asbestos where there were steam lines from the boiler carrying high-pressure steam to other units like a winch or an auxiliary motor.

Clinician: What does a shipwright do? What was a routine day for you?
Patient: There was no routine day. The shipwrights were the cream of the journeymen crop; we did everything from outfitting, to establishing the cribbing on the launching gang, to shoring. I worked on the outfitting docks. We did ship reconversion. I did a lot of work on the forepeak and hawse pipes when I wasn't working below deck.

Clinician: What exactly were your tasks below deck?
Patient: Most transporters were converted to passenger ships after the war; there was a lot of shifting of equipment and pipes. Basically, the ships were gutted. They would be completely revamped. The shipwrights would do all the woodworking, finish work, plates, and so on. Then, when everything was in place, it would be insulated, and the pipes would be lagged.

Clinician: So you worked throughout the ship? And when you finished your tasks, the laggers would come in?
Patient: No, no. There might be ten different tradesmen working in an afterpeak at one time. You'd be working next to welders, flangers, pipefitters, riveters, laggers; you name it. These conversions were done round-the-clock, 7 days a week; it could take a year and a half to complete a conversion. All the tasks were being done simultaneously.

Clinician: How long would the lagging take?
Patient: The lagging could take 6 to 10 months, sometimes longer. They were constantly cutting these sections of asbestos to fit the pipes. Then they would attach the sections with a paste and wrap it with asbestos wrapping.

Clinician: Could you see the asbestos in the air?
Patient: Oh yes. Sometimes it was so thick you couldn't see 5 feet in front of you. It was white and hung in the welding fumes like smog.

Clinician: Did you use any protective equipment? Masks? Respirators?
Patient: No. Nobody ever said it was dangerous. We were bothered more by the fiberglass and welding fumes than anything. We thought fiberglass was more dangerous because it was itchy and caused a rash. The air was blue from the welding fumes; if you worked in that for a year, you knew it was affecting you. It inspired me to go back to school and get my accounting degree. But we were blue-collar workers; we were more concerned with welders' flash, a boom breaking, or someone getting crushed between plates than we were with asbestos.

Clinician: You worked as a shipwright for 6 years?
Patient: Yes, about that. Five of those years as an outfitter on conversions.

The dialogue in which the clinician engaged the patient neither determines whether the patient's asbestos exposure was significant, nor does it confirm that he suffered adverse effects from the exposure. It is merely a starting point for investigation. The questioning establishes that approximately 30 years ago this patient received a possibly severe exposure to asbestos fibers for a duration of 5 or 6 years. Because quantitative data on this patient's exposure are impossible to obtain, a qualitative description ("Sometimes it was so thick you couldn't see 5 feet in front of you") can facilitate assessment of the exposure when consulting with an occupational medical specialist (see Appendices). In this scenario, the disclosure should prompt the clinician to monitor the patient closely for early detection of treatable health effects from asbestos exposure. A chest radiograph would be advised and pulmonary function tests should be considered. Vaccination for influenza may be warranted, depending on the results of the chest

radiograph. Consulting an occupational medical specialist could help determine the best way to evaluate and treat this patient.

In this scenario, the clinician successfully diagnosed an illness due to an environmental toxic exposure (carbon monoxide) and noted a significant past exposure (asbestos) that needs followup. Had the clinician failed to pursue an exposure history, the patient's current illness might have been misdiagnosed, treatment might have been inappropriate, or measures might not have been implemented to prevent further carbon monoxide exposure, leading to a risk of continued progression of the angina as well as the possibility of harmful health effects for patients and other residents of the household for carbon monoxide poisoning.

An exposure history may suggest the need for periodic monitoring by alerting the clinician to a past exposure.

Part 2: Work History

Part 2 of the exposure history is a comprehensive inventory of the patient's occupations, employers, and current and potential exposures in the workplace. No questions on allergies and principal symptoms have been included, on the presumption that the clinician will include these elsewhere as appropriate in the medical record.

In evaluating part 2 of the form, the clinician should note every job the patient had, regardless of duration. Information on part-time and temporary jobs could provide clues to toxic exposure. Details of jobs may reveal exposures that are not expected based on the job titles. Asking if any processes or routines have been changed recently can be helpful. Military service may have involved toxic exposure.

Scenario 2:
52-year-old male who owns a commercial cleaning service

Chief complaint: headache and nausea

Scenario 2 involves another instance of a 52-year-old male who is brought in, by his wife, to see his primary care physician for an evaluation. According to the wife, he has been in excellent health until approximately 1 week ago, when he began staying up later and later at night. She was initially not too concerned, until he began awakening her to talk about the "revolutionary" new ideas he had about creating an international commercial cleaning service. She notes he was "full of energy" and talked rapidly about many ideas that he had. She became quite concerned when at 3:00 AM (European time) her husband called the manager of the rayon mill, who was in Europe, to discuss his ideas. He then began telephoning European banks in an attempt to find partners for his business venture. When his wife confronted him about the inappropriateness of his phone calls, he became enraged and accused her of purposefully attempting to sabotage his venture. The patient complains of recurring headaches and nausea that started approximately 1 to 2 weeks ago and of recent angina attacks. This patient is the owner of a commercial cleaning service and is extremely proud to tell the clinician he performs some of the cleaning himself. Questioning the patient extensively about the cleaning products fails to yield any suspicious exposure

possibilities. Reviewing pages 1 and 2 of the Work and Exposure History forms, the clinician notes detergents, ammonia, and cleansers. Persual of Part 2: Work History, however, reveals a clue. The clinician's investigation follows.

Clinician: You own a commercial cleaning service?
Patient: Yes, I've been in business for 10 years and I'm going to be world wide. Would you like to purchase stock in my company?

Clinician: We can discuss that a little later. Do you do the cleaning yourself?
Patient: I don't do as much as I used to. I have a crew of about six full-time employees. I do more managing than cleaning, but have been known to roll up my sleeves and pitch in when needed.

Clinician: You clean residences and commercial businesses?
Patient: Yes, I currently have 20 residential accounts and 15 commercial accounts, but have I told you that I will be international?

Clinician: Yes, you did, but right now I'd like to know about the commercial accounts that are local.
Patient: The downtown administrative offices for the school district, several realty offices downtown, and the business offices of the viscose rayon mill. I have six accounts in the Shaw Building downtown (small medical offices) and five retail stores in the Hilltop Mall, but I don't know why you will not listen to how I will revolutionize the commercial cleaning industry. I'm in touch with people that control the world currency markets. I know this because God has spoken to me, telling me how to corner the cleaning market.

Clinician: So your headaches have been occurring for about 1 week now? Have there been any changes in your routine—work or otherwise—in the last week?
Patient: I've worked more hours than usual over the last week. I've been doing a special project for the rayon mill. They built new offices. We moved all the old offices into the new building. That has entailed cleaning and moving furniture, files, books, and exhibits. It's been tedious but I have plenty of energy. Fortunately, most of the staff members have been either out on vacation or at an international conference in Europe, so the building has been empty.

Clinician: Are any of your workers having similar symptoms?
Patient: No, nobody else has complained about feeling sick.

Clinician: What exactly do they produce at that plant?
Patient: They make viscose—transparent paper. I used to work there

during summers when I was in college. It was hot, hard work. And the whole place smelled like sulfur—rotten eggs. We used wood pulp cellulose, treated it with acids and other chemicals, and made cellulose filaments. I worked on the blending, ripening, and deaeration process. You know I called the plant manager to help his business grow to international status.

Clinician: Can you smell the chemicals in the office building you're working in?
Patient: Some days there's a faint odor. Nothing like when I worked on the xanthating process. The business office building is on the northeast end of the complex. It's pretty remote from the processing plant.

Clinician: So how many extra hours have you worked the past week?
Patient: Only about 4 to 6 hours more per day this past week. Also, this past weekend I put in an extra 10 hours. I had to finish setting up the exhibits. I didn't trust the crew to handle the fragile exhibits, so I did the job myself. My crew is good but not as good as me.

Patient's wife: Tell the doctor about the bottle you broke!
Patient: On Friday, about 2 weeks ago, I worked late setting up a huge model of the xanthating process. It was tedious work, and I was sort of stressed by the time constraints to get the job done. I had broken a bottle from the exhibit when I disassembled the thing. I'm really not certain that I broke the bottle; it most likely was stored improperly.

Clinician: What was in this bottle you broke?
Patient: I think it was carbon disulfide. I think I might have put the broken glass and the cleanup rags on the floor of my truck. This stuff had a sweet odor.

Clinician: How did you clean it up?
Patient: I changed into some protective clothing and a face mask because my eyes and nose burned. There wasn't a lot to clean up because it seemed to evaporate quickly.

Clinician: Did you get any of the chemical on you?
Patient: When the bottle fell I don't think any got on me, but I'm not certain.

Clinician: How much of the chemical was in the bottle? Did you report the accident to anyone at the plant?
Patient: The bottle was about liter size. It wasn't full. There was only a small amount of liquid in the bottle. No, I didn't report the accident. Frankly, I cleaned it up the way I was taught when I worked at the mill before. They know that I'm good. I helped them to become the organization they are today. I'll just talk with the manager when he returns from Europe later this week.

The preceding conversation reveals a possible connection with the spill and this patient's symptoms. It warrants further investigation. The results of the patient's physical examination are normal, and the mental status exam shows symptoms and behavior that are typical of a manic episode. The patient is grandiose, irritable, has a marked decreased need for sleep, and is possibly having auditory hallucinations.

The patient identifies the chemical spilled as carbon disulfide, which is consistent with the patient's symptoms. After obtaining permission from the patient, the clinician calls the poison control center to obtain information on carbon disulfide.

Clinician: My patient is a contract employee at a local textile company. In the process of his work, he broke a bottle that was labeled carbon disulfide. He didn't report the accident and just cleaned it up himself. I am concerned that he may be experiencing health effects from the exposure. He is complaining of nausea, headache, and difficulty sleeping and appears to be exhibiting signs of agitation, grandiose delusions, and hallucinations.
Poison Control Center: It would not surprise me. Carbon disulfide is dangerous stuff. Strict industrial controls are in effect to prevent exposure. This chemical can cause nausea, headache, insomnia, agitation, mania, and hallucinations, all the symptoms your patient is currently experiencing. The acute symptoms are mild to moderate irritation of skin, eyes, and mucous membranes from liquid or concentrated vapors. Percutaneous absorption causes headache, fatigue, unsteady gait, vertigo, hyperesthesia, central nervous system depression, garlicky breath, nausea, vomiting, diarrhea, abdominal pain, coma, convulsion, or death.

Clinician: Can you send me information on carbon disulfide?
Poison Control Center: Certainly. I'll fax you the information on carbon disulfide right away. I suggest that you report the accident to the safety manager at the textile plant.

Consultation with the Occupational and Environmental Physician from the Poison Control Center confirms that this patient's symptoms could indeed be caused by exposure to carbon disulfide. The clinician orders a CBC; ECG; urinalysis; liver, kidney and thyroid function tests; blood serology; and an electrolyte panel. The clinician received the faxed information and a Material Safety Data Sheet (MSDS) on carbon disulfide (pages 32–35) from the textile plant safety manager. The clinician reviews the Health Hazard Data section of the MSDS, and notes all pertinent information in the patient's medical record, along with the prior information faxed from the Poison Control Center.

Air sampling in the office in which the incident occurred reveals airborne concentrations of 0.8 parts of carbon disulfide per million parts of air (0.8 ppm). The permissible exposure limit for an 8-hour time-weighted average is 20 ppm. The concentrations were most likely higher at the time of the incident 2 weeks ago. Also, the acute exposure the patient incurred at the time of the accident has continued to occur for a limited number of hours each week, while he drives with the contaminated rags and bottle in his truck. Results of the laboratory tests on this patient are all within normal limits. Other employees at risk of exposure from this spill are also examined; none incurred acute exposure or suffered ill effects. Once the patient's exposure ceases, he improves and experiences no further symptoms.

Part 3. Environmental History

Part 3 of the exposure history form contains questions regarding the home and surrounding environment of the patient. Dialogue with the patient should include queries about the location of the house, the house water supply, and changes in air quality.

Proximity to industrial complexes and hazardous waste sites could result in residents being exposed to toxicants in the air, water, or soil. Contamination in communities is a growing public health concern; affected persons usually seek care from their primary care providers first. If a group of people with similar symptoms and exposures is identified, and an environmental exposure problem is suspected, the clinician should call the state health department or the Agency for Toxic Substances and Disease Registry toll-free at 1-888-42-ATSDR (1-888-422-8737). (For more information, see the Appendices, beginning on page 47.)

Hobbies are potential sources of toxicant exposure. For instance, model building, pottery-making, photography, silk screening, gardening, stained-glass making, and woodworking have all been associated with exposure to hazardous substances. Ask the patient what his or her hobbies are. All members in a household may be exposed to the hazardous substances from one person's hobby; small children may be especially susceptible.

Are the chemicals used in a well-ventilated place?

Is protective equipment used?

Scenario 3 involves another patient described in the case study on page 5. In this scenario, the patient has been retired for 2 years; he took early retirement from a stressful job in advertising shortly after being diagnosed with angina. The patient's answers to the questions on the Exposure Survey (part 1 of the form) were *no*: he denies exposure to metals, chemicals, fibers, dust, radiation, and physical and biologic agents; he is not aware of a connection between his symptoms and activity or time; and to his knowledge other persons are not experiencing similar symptoms.

A clue appears on part 3 of this patient's exposure history—the patient lives 2 miles from an abandoned industrial site, and prevailing winds blow toward

his house. In an effort to investigate this lead, the clinician initiates the following dialogue.

Scenario 3:
52-year-old male, retired advertising copywriter with angina

Chief complaints: headache and nausea

Clinician: You state that you live several miles downwind from an abandoned industrial site. Do you know what chemicals might have been used at the site or what type of industry it was?
Patient: There was a fire at the site several weeks ago. The newspaper said that they used methylene chloride to make some kind of plastic. The firefighters found drums of methylene chloride buried on the property.

Clinician: Do you ever smell chemicals in the air?
Patient: Yes, in the mornings when the wind blows from that direction, I smell a sweet odor. My neighbors have mentioned it too. In fact, they told me that the smell is really strong when they do laundry or dishes, and when they shower.

Clinician: Have you smelled it in your water?
Patient: No.

Clinician: What is the source of your water?
Patient: I have city water, but my neighbors have a private well.

Clinician: Do you know if any agency is testing your neighborhood for contamination?
Patient: Not as far as I know.

The preceding dialogue has uncovered a possibility that the patient was exposed to a toxicant. Furthermore, this patient may represent an index case; others may also be exposed. To follow up this lead, the clinician contacts the state health department. The health department confirms that the site contains buried drums of methylene chloride and that it is under investigation.

An industrial hygienist employed by the health department informs the clinician that the methylene chloride can indeed exacerbate signs and symptoms of angina. The odor threshold for the chemicals is 100–300 ppm. An 8-hour exposure to 250 ppm methylene chloride can cause a COHb level of about 8%.

The laboratory reports that the patient's COHb is 6%, indicating probable exposure to methylene chloride in this nonsmoker. The clinician calls the 24-hour emergency response number of the Agency for Toxic Substances and Disease Registry's Emergency Response and Scientific Assessment

Branch (404-498-0120) for more information. The clinician is advised that COHb, which forms when methylene chloride metabolizes to carbon monoxide, can be detected in blood at levels of 4% to 9% when ambient air concentrations of methylene chloride are about 220 ppm. Many factors can influence body burden, including exposure level and duration, route of exposure, physical activity, and amount of body fat.

A conference call is made, and the emergency response coordinator, a toxicologist, an industrial hygienist, and a physician discuss the patient's signs and symptoms. The clinician is given the name of the local contact person for the Association of Occupational and Environmental Clinics, who recommends a specialist to provide follow-up care for this patient. The health department's tests of ambient air reveal no immediate crisis in the vicinity, although the levels are above background levels; test results of water samples from private wells in the area are pending. ATSDR informs the EPA regional office of the situation. EPA provides immediate assistance to the affected area, cleanup is initiated, and threats to the surrounding population are mitigated.

Cultural History

Now more than ever, cultural diversity has emphasized the importance of assessing the use of alternative therapies and understanding different cultural practices and acceptable social behaviors. An exposure history is not complete if it lacks a cultural history. The cultural history provides relevant information about a patient's increased risk for certain problems associated with his or her practices or behaviors, which might contribute to the patient's condition.

Additional information on the cultural history component will be included in a future revision of this case study.

Exposure History Form

Part 1. Exposure Survey

Please circle the appropriate answer.

Name: _____ **Date:** _____

Birth date: _____ **Sex (circle one):** Male Female

1. Are you currently exposed to any of the following?

metals	no	yes
dust or fibers	no	yes
chemicals	no	yes
fumes	no	yes
radiation	no	yes
biologic agents	no	yes
loud noise, vibration, extreme heat or cold	no	yes

2. Have you been exposed to any of the above in the past? no yes

3. Do any household members have contact with metals, dust, fibers, chemicals, fumes, radiation, or biologic agents? no yes

If you answered *yes* to any of the items above, describe your exposure in detail—how you were exposed, to what you were exposed. If you need more space, please use a separate sheet of paper.

4. Do you know the names of the metals, dusts, fibers, chemicals, fumes, or radiation that you are/were exposed to? no yes

5. Do you get the material on your skin or clothing? no yes

6. Are your work clothes laundered at home? no yes

7. Do you shower at work? no yes

8. Can you smell the chemical or material you are working with? no yes

9. Do you use protective equipment such as gloves, masks, respirator, or hearing protectors? no yes

10. Have you been advised to use protective equipment? no yes

11. Have you been instructed in the use of protective equipment? no yes

If *yes*, list them below

If *yes*, list the protective equipment used

Developed by ATSDR in cooperation with NIOSH, 1992

12. Do you wash your hands with solvents?	no	yes			
13. Do you smoke at the workplace?	no	yes	At home?	no	yes
14. Are you exposed to secondhand tobacco smoke at the workplace?	no	yes	At home?	no	yes
15. Do you eat at the workplace?	no	yes			
16. Do you know of any co-workers experiencing similar or unusual symptoms?	no	yes			
17. Are family members experiencing similar or unusual symptoms?	no	yes			
18. Has there been a change in the health or behavior of family pets?	no	yes			
19. Do your symptoms seem to be aggravated by a specific activity?	no	yes			
20. Do your symptoms get either worse or better at work?	no	yes			
at home?	no	yes			
on weekends?	no	yes			
on vacation?	no	yes			
21. Has anything about your job changed in recent months (such as duties, procedures, overtime)?	no	yes			
22. Do you use any traditional or alternative medicines?	no	yes			

If you answered *yes* to any of the questions, please explain.

Part 2. Work History

Name: _____

A. Occupational Profile

Birth date: _____ **Sex:** Male Female

The following questions refer to your current or most recent job:

Job title: _____ Describe this job: _____

Type of industry: _____ _____

Name of employer: _____ _____

Date job began: _____ _____

Are you still working in this job? yes no _____

If *no*, when did this job end? _____ _____

Fill in the table below listing all jobs you have worked including short-term, seasonal, part-time employment, and military service. Begin with your most recent job. Use additional paper if necessary.

Dates of Employment	Job Title and Description of Work	Exposures*	Protective Equipment

*List the chemicals, dusts, fibers, fumes, radiation, biologic agents (i.e., molds or viruses) and physical agents (i.e., extreme heat, cold, vibration, or noise) that you were exposed to at this job.

Have you ever worked at a job or hobby in which you came in contact with any of the following by breathing, touching, or ingesting (swallowing)? If *yes*, please check the box beside the name.

- ○ Acids
- ○ Alcohols (industrial)
- ○ Alkalies
- ○ Ammonia
- ○ Arsenic
- ○ Asbestos
- ○ Benzene
- ○ Beryllium
- ○ Cadmium
- ○ Carbon tetrachloride
- ○ Chlorinated naphthalenes
- ○ Chloroform
- ○ Chloroprene
- ○ Chromates
- ○ Coal dust
- ○ Dichlorobenzene
- ○ Ethylene dibromide
- ○ Ethylene dichloride
- ○ Fiberglass
- ○ Halothane
- ○ Isocyanates
- ○ Ketones
- ○ Lead
- ○ Mercury
- ○ Methylene chloride
- ○ Nickel
- ○ PBBs
- ○ PCBs
- ○ Perchloroethylene
- ○ Pesticides
- ○ Phenol
- ○ Phosgene
- ○ Radiation
- ○ Rock dust
- ○ Silica powder
- ○ Solvents
- ○ Styrene
- ○ Talc
- ○ Toluene
- ○ TDI or MDI
- ○ Trichloroethylene
- ○ Trinitrotoluene
- ○ Vinyl chloride
- ○ Welding fumes
- ○ X-rays
- ○ Other (specify)

B. Occupational Exposure Inventory

Please circle the appropriate answer.

1. Have you ever been off work for more than 1 day because of an illness related to work? no yes
2. Have you ever been advised to change jobs or work assignments because of any health problems or injuries? no yes
3. Has your work routine changed recently? no yes
4. Is there poor ventilation in your workplace? no yes

Part 3. Environmental History

Please circle the appropriate answer.

1. Do you live next to or near an industrial plant, commercial business, dump site, or nonresidential property? no yes
2. Which of the following do you have in your home?
   Please circle those that apply.
   Air conditioner Air purifier Central heating (gas or oil?) Gas stove Electric stove
   Fireplace Wood stove Humidifier
3. Have you recently acquired new furniture or carpet, refinished furniture, or remodeled your home? no yes
4. Have you weatherized your home recently? no yes
5. Are pesticides or herbicides (bug or weed killers; flea and tick sprays, collars, powders, or shampoos) used in your home or garden, or on pets? no yes
6. Do you (or any household member) have a hobby or craft? no yes
7. Do you work on your car? no yes
8. Have you ever changed your residence because of a health problem? no yes
9. Does your drinking water come from a private well, city water supply, or grocery store?
10. Approximately what year was your home built?_____

If you answered *yes* to any of the questions, please explain.

Identifying Hazardous Agents

Identifying the toxicant, stopping the exposure, and arresting or reversing the progression of the patient's illness are the goals of the exposure history. Often, patients do not know the chemicals to which they have been exposed although they may know the trade names or slang terms for the chemicals. Likewise, household products used by patients may have labeling that is inadequate for proper identification. A variety of printed reference sources are available to the clinician, including books, journals, and MSDSs. Other sources of information are described in the Appendices.

Material Safety Data Sheet

The Occupational Safety and Health Administration (OSHA) has developed a right-to-know regulation covering three basic areas: the generation and distribution of information about chemical hazards, requirements for the labeling of chemicals used in the workplace, and programs for training employees in the safe use of these chemicals. Many state and local right-to-know laws, however, are more comprehensive than the federal regulation.

The MSDS is a component of the right-to-know law. Manufacturers and importers are required to provide an MSDS for each hazardous chemical in a shipment. Users of the chemicals must keep copies of MSDSs and make them available to workers, clinicians, and others. MSDSs contain information on the chemical properties of the substance, handling precautions, known health effects, and conditions that might worsen with exposure. The information on human health effects, however, can be vague and may have limited clinical value. The MSDS may not provide information on the synergistic effects of multiple chemical exposures. Clinical decisions should not be made solely from information obtained from MSDSs (sample MSDS, pages 32–35).

Additional Toxicologic Information

Books and journals provide the most accessible information on toxicologic issues. Some sources of information that the clinician can use to identify the chemicals, processes, and hazards of toxic substances are described in the following list.

Daugaard J. Symptoms and signs in occupational disease: a practical guide. Chicago: Year Book Medical Publishers, 1978. *A classification of occupational and environmental diseases according to associated clinical signs and symptoms.*

Fay BA, Billings CE, editors. Index of signs and symptoms of industrial diseases. Atlanta: US Department of Health and Human Services, 1981. *A guide to occupational and environmental diseases listed by associated clinical signs and symptoms.*

Gosselin RE, Smith RP, Hodge HC, editors. Clinical toxicology of commercial products. Baltimore: Williams & Wilkins, 1984. *A classification of products and the chemicals they contain, including the adverse health effects produced by exposure.*

Hathaway G, Proctor NH, Hughes JP, editors. Proctor and Hughes' chemical hazards of the workplace. 4th ed. New York: Van Nostrand Reinhold, 1996. *A short text summarizing the most important occupational chemical hazards.*

LaDou J. Occupational and environmental medicine. Stamford (CT): Appleton & Lange, 1997. *Aids in the diagnosis, treatment, and remedial measures of occupational injuries and illnesses.*

Maxcy KF, Rosenau MJ, Last J, Wallace RB, editors. Maxcy-Rosenau-Last public health and preventive medicine. 14th ed. Stamford (CT): Appleton & Lange, 1998. *Although communicable diseases continue to be the main focus of this book, increased emphasis has been placed on environmental and behavioral factors that can influence health.*

Rosenstock L, Cullen M, editors. Textbook of clinical occupational and environmental medicine. Philadelphia: WB Saunders, 1994. *Complete coverage of the clinical aspects of occupational medicine.*

Sullivan JB Jr, Krieger GR, editors. Hazardous materials toxicology: clinical principles of environmental health. Baltimore: Williams & Wilkins, 1992. *A complete reference including epidemiology, principles of management and evaluation of toxic exposures, toxic hazards of specific industries and sites, and economic implications of medical and legal issues.*

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CARBON DISULFIDE

MSDS Number: C0957 — *Effective Date: 11/17/99*

1. Product Identification

Synonyms: Carbon bisulfide **CAS No.:** 75-15-0 **Molecular Weight:** 76.1 **Chemical Formula:** CS2
Product Codes: J.T. Baker: 9172, E350
Mallinckrodt: 8831

2. Composition/Information on Ingredients

Ingredient CAS No Percent Hazardous
Carbon Disulfide 75-15-0 90 - 100% Yes

3. Hazards Identification

Emergency Overview: Danger! Extremely flammable liquid and vapor. Vapor may cause flash fire. May be fatal if swallowed or inhaled. Harmful if absorbed through skin. Affects the central and peripheral nervous systems. A developmental and reproductive hazard. Affects cardiovascular system, liver and kidneys.
J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)
Health Rating: 3 - Severe (Life)
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)
Potential Health Effects
Inhalation: Vapors cause irritation to the respiratory tract, followed by symptoms of headache, dizziness, fatigue, garlic breath, nausea, vomiting, and abdominal pains. Affects the central nervous system and peripheral nervous system. Overexposure may produce hallucinations, narcosis, unconsciousness, convulsions, and even death.
Ingestion: TOXIC! Symptoms parallel those of inhalation. May cause permanent disabilities described below in Chronic Exposure.
Skin Contact: May produce reddening and burning, cracking and peeling. Contact with liquid for several minutes may result in a second-degree burn. Skin absorption can occur even in the presence of vapors, with toxic effects paralleling inhalation.
Eye Contact: Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure: Kidney and liver damage, reproductive disorders, central and peripheral nervous system damage, vision problems, psychosis, and cardiovascular effects are associated with chronic exposure to Carbon Disulfide.
Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance. Affects the developing fetus.

4. First Aid Measures

FOLLOWING ANY ROUTE OF EXPOSURE GET MEDICAL ATTENTION IMMEDIATELY.
Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact: Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.
Note to Physician: Since effects may be delayed, keep victim under observation. The iodide-azide test is useful in detecting degree of exposure and hyposusceptiblility of exposed workers. I.V. urea 0.5 to 1.5 g/kg is recommended to inactivate free carbon disulfide in the blood. Vitamin B6 in large doses is recommended. Obtain CBC, EKG, urinalysis, and electrolyte balance.

5. Fire Fighting Measures

Fire: Flash point: -30C (-22F) CC Autoignition temperature: 90C (194F) Flammable limits in air % by volume: lel: 1.3; uel: 50 Extremely Flammable Liquid and Vapor. Contact with strong oxidizers may cause fire. May ignite on contact with hot surfaces such as light bulbs, steam pipes, or engine exhaust pipes.
Explosion: Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media: Dry chemical, foam or carbon dioxide. Fluoroprotein and protein foams are recommended over other types for carbon disulfide. Water spray may be used to keep fire exposed containers cool. Do not allow water runoff to enter sewers or waterways.
Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Flush area with water spray to cool containers and prevent reignition.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802. J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Prepare safe grounding routes for lightning strikes in storage area. Electrical installations and heating facilities must be prohibited in or near storage areas. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits: OSHA Z-2 TWA, 8 hour 20 ppm; 30 ppm Ceiling; 100 ppm Peak Concentration; Maximum Duration 30 minutes ACGIH Threshold Limit Value (TLV): 10 ppm (TWA) (skin)
Ventilation System: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved): If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance: Clear, colorless liquid.
Odor: Nearly odorless when pure, but most material has a strong garlic-type odor.
Solubility: 0.2 gm/100 ml water.
Density: 1.26
pH: No information found.
% Volatiles by volume @ 21C (70F): 100
Boiling Point: 46C (115F)
Melting Point: -100C (-148F)
Vapor Density (Air=1): 2.6
Vapor Pressure (mm Hg): 300 @ 20C (68F)
Evaporation Rate (BuAc=1): 22.6

10. Stability and Reactivity

Stability: Stable at room temperature in sealed containers. Heat and sunlight can contribute to instability. Containers may burst when heated.
Hazardous Decomposition Products: Burning may produce carbon monoxide, carbon dioxide, sulfur oxides.
Hazardous Polymerization: Will not occur.
Incompatibilities: Contact with strong oxidizers and chemically active metals (such as Potassium, Zinc), chlorine, nitrogen oxides, azides, and organic amines may cause fire and explosions.
Conditions to Avoid: Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data: Inhalation rat LC50: 25 gm/m3/2H. Investigated as a mutagen, reproductive effector.
Reproductive Toxicity: Carbon disulfide is a known human reproductive hazard. Menstrual disorders, spontaneous abortions and premature births are reported in cases of chronic exposure.

----------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Carbon Disulfide (75-15-0)	No	No	None

12. Ecological Information

Environmental Fate: When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life of less than 1 day. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity: No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)
Proper Shipping Name: CARBON DISULFIDE
Hazard Class: 3, 6.1
UN/NA: UN1131
Packing Group: I
Information reported for product/size: 2.5L

International (Water, I.M.O.)
Proper Shipping Name: CARBON DISULPHIDE
Hazard Class: 3.1, 6.1
UN/NA: UN1131
Packing Group: I
Information reported for product/size: 2.5L

International (Air, I.C.A.O.)
Proper Shipping Name: CARBON DISULPHIDE
Hazard Class: 3.1, 6.1
UN/NA: UN1131
Packing Group: I
Information reported for product/size: 2.5L

15. Regulatory Information

```
---------\Chemical Inventory Status - Part 1\-------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  --   -----  ---------
Carbon Disulfide (75-15-0)                     Yes  Yes   Yes      Yes
---------\Chemical Inventory Status - Part 2\-------------------------------
                                                    --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Carbon Disulfide (75-15-0)                     Yes   Yes   No     Yes
--------\Federal, State & International Regulations - Part 1\---------------
                                             -SARA 302-    ------SARA 313--
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  --    ---     ----  -------------
Carbon Disulfide (75-15-0)                100   10000   Yes        No
--------\Federal, State & International Regulations - Part 2\---------------
                                                    -RCRA-    -TSCA-
Ingredient                                CERCLA    261.33     8(d)
----------------------------------------  ------    ------     ----
Carbon Disulfide (75-15-0)                100       P022       Yes
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING: THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3WE

Poison Schedule: S6

WHMIS: This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **4** Reactivity: **0**

Label Hazard Warning: DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS. A DEVELOPMENTAL AND REPRODUCTIVE HAZARD. AFFECTS CARDIOVASCULAR SYSTEM, LIVER AND KIDNEYS.

Label Precautions: Keep away from heat, sparks and flame. Do not breathe vapor. Keep container closed. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid: If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use: Laboratory Reagent.

Revision Information: No changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose.

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Prepared by: Strategic Services Division Phone Number: (314) 539-1600 (U.S.A.)

Summary and Followup

In each scenario, the clinician's pursuit of the exposure history led to discovery of toxic exposure for each of the three patients. In each case, the diagnosis and treatment might have been inappropriate without an exposure history. The process required only a few minutes of the clinician's time; each history was focused as indicated by the patient's reported symptoms. Using the exposure history in managing the patients' problems, as well as guiding the patients in appropriate preventive behaviors, is the practice of preventive medicine at its best.

Consultation

Industrial hygienists, who are often employed by state health departments or industry, are a source of information to the clinician investigating a possible toxic exposure. Industrial hygiene is the discipline devoted to the recognition, evaluation, and control of workplace-related factors or stresses that may cause illness, impaired health or well-being, or significant discomfort and inefficiency among workers or community members. Other medical specialists, such as clinicians specializing in occupational/environmental and general preventive medicine, can be helpful in assessing whether a significant exposure has occurred. Occupational health nurses, who often work at patients' work sites, also have expertise and experience that may be valuable to the clinician.

Referral Resources

The clinician is encouraged to build a network of occupational and environmental medical specialists for information, consultation, and referral. The Association of Occupational and Environmental Clinics (AOEC) is a network of clinics that provide professional training, community education, exposure and risk assessment, clinical evaluations, and consultative services. Education and Resource Centers (ERCs) have been established in academic centers by the National Institute for Occupational Safety and Health (NIOSH) to educate professionals in occupational medicine topics. ERCs offer training courses in occupational and environmental medicine topics; continuing medical education credit is available. Other resources, including poison control centers and government agencies, are listed and described in the Appendices, which begin on page 47.

Suggested Reading List

Bresnitz EA, Rest KM, Miller N. Clinical industrial toxicology: an approach to information retrieval. Ann Intern Med 1985;103(6 pt 1):967–72.

Coye MJ, Rosenstock L. The occupational health history in a family practice setting. Am Fam Physician 1983;28(5):229–34.

Goldman RH, Peters JM. The occupational and environmental health history. JAMA 1981;246:2831–6.

Levy BS, Wegman DH, editors. Occupational health: recognizing and preventing work-related disease and injury. 6th ed. Philadelphia: Lippincott, Williams and Wilkins, Brown & Company, 2000.

Mayer JL, Balk SJ. A pediatrician's guide to environmental toxins. Contemp Pediatr 1988; pt 1:5(7):22– 40, part 2:5(8):63–76.

National Research Council. Environmental tobacco smoke: measuring exposure and assessing health effects. Washington: National Academy Press, 1986.

Rogan WJ. The sources and routes of childhood chemical exposures. J Pediatr 1980;97:861.

Rom WN, editor. Environmental and occupational medicine. 3rd ed. Boston: Lippincott- Raven Publishers, Philadelphia, 1998.

The Western Journal of Medicine. December 1982. *Entire issue devoted to occupational and environmental medicine.*

US Environmental Protection Agency and US Consumer Product Safety Commission. The inside story: a guide to indoor air quality. Washington: US Environmental Protection Agency, 1995. Report No.: EPA 402-K-93-007. Available from URL: http://www.epa.gov/iaq/pubs/insidest.html.

Zenz C, editor. Occupational medicine. 3rd ed. St. Louis: Mosby, 1994.

Zenz C, editor. Occupational medicine: principles and practical applications. 2nd ed. Chicago: Mosby Year Book Medical Publishers, 1988.

Answers to Pretest Questions

1. The patient's problem list includes recurrent headache and nausea, and unstable angina pectoris.

2. The patient's differential diagnosis of chest pain includes myocardial infarction. The differential diagnosis of headache and nausea includes viral syndrome, tension headaches, migraine, brain tumor, tooth or sinus problems, psychogenic headache, medication reaction (nitroglycerin can cause headaches), and exposure to toxicants.

3. The additional information sought to make a diagnosis would include all aspects of a work and exposure history.

Sources of Information

More information on taking an exposure history can be obtained from ATSDR, your state and local health departments, and university medical centers. *Taking an Exposure History* is one topic in the *Case Studies in Environmental Medicine* series. For other publications in this series, please use the order form on page 46. For clinical inquiries, contact ATSDR, Division of Health Education and Promotion, Office of the Director, at 404-498-0101.

Notes

Case Studies in Environmental Medicine:

Taking an Exposure History

Evaluation Questionnaire and Posttest, Course Number SS3046

Course Goal: To increase the primary care provider's knowledge of hazardous substances in the environment and to aid in the evaluation of potentially exposed patients.

Objectives

- Discuss three important reasons for taking an exposure history.
- Explain the process of taking an exposure history.
- List two sources of information on exposure history.

Tell Us About Yourself

Please carefully read the questions. Provide answers on the answer sheet (page 45). Your credit will be awarded based on the type of credit you select.

1. **What type of continuing education credit do you wish to receive?**
   ****Nurses should request CNE, not CEU. See note on page 44.**
   A. CME (for physicians)
   B. CME (for nonphysicians)
   C. CNE (continuing nursing education)
   D. CEU (continuing education units)
   E. [Not used]
   F. [Not used]
   G. [Not used]
   H. None of the above

2. **Are you a...**
   A. Nurse
   B. Pharmacist
   C. Physician
   D. Veterinarian
   E. None of the above

3. **What is your highest level of education?**
   A. High school or equivalent
   B. Associate, 2-year degree
   C. Bachelor's degree
   D. Master's degree
   E. Doctorate
   F. Other

4. Which of the following best describes your current occupation?

A. Environmental Health Professional
B. Epidemiologist
C. Health Educator
D. Laboratorian
E. Physician Assistant
F. Industrial Hygienist
G. Sanitarian
H. Toxicologist
I. Other patient care provider
J. Student
K. None of the above

5. Which of the following best describes your current work setting?

A. Academic (public and private)
B. Private health care organization
C. Public health organization
D. Environmental health organization
E. Nonprofit organization
F. Other work setting

6. Which of the following best describes the organization in which you work?

A. Federal government
B. State government
C. County government
D. Local government
E. Nongovernmental agency
F. Other type of organization

Tell Us About the Course

7. How did you obtain this course?

A. Downloaded or printed from Web site
B. Shared materials with colleague(s)
C. By mail from ATSDR
D. Not applicable

8. How did you first learn about this course?

A. State publication (or other state-sponsored communication)
B. *MMWR*
C. ATSDR Internet site or homepage
D. PHTN source (PHTN Web site, e-mail announcement)
E. Colleague
F. Other

9. What was the most important factor in your decision to obtain this course?

A. Content
B. Continuing education credit
C. Supervisor recommended
D. Previous participation in ATSDR, CDC/PHTN training
E. Ability to take the course at my convenience
F. Other

10. How much time did you spend completing the course, evaluation, and posttest?

A. 1 to 1.5 hours
B. More than 1.5 hours but less than 2 hours
C. 2 to 2.5 hours
D. More than 2.5 hours but less than 3 hours
E. 3 hours or more

11. Please rate your level of knowledge before completing this course.

A. Great deal of knowledge about the content
B. Fair amount of knowledge about the content
C. Limited knowledge about the content
D. No prior knowledge about the content
E. No opinion

12. Please estimate your knowledge gain after completing this course.

A. Gained a great deal of knowledge about the content
B. Gained a fair amount of knowledge about the content
C. Gained a limited amount of knowledge about the content
D. Did not gain any knowledge about the content
E. No opinion

Please use the scale below to rate your level of agreement with the following statements (questions 13–21) about this course.

A. Agree
B. No opinion
C. Disagree
D. Not applicable

13. The objectives are relevant to the goal.

14. The tables and figures are an effective learning resource.

15. The content in this course was appropriate for my training needs.

16. Participation in this course enhanced my professional effectiveness.

17. I will recommend this course to my colleagues.

18. Overall, this course enhanced my ability to understand the content.

19. I am confident I can discuss three important reasons for taking an exposure history.

20. I am confident I can explain the process of taking an exposure history.

21. I am confident I can list two sources of information on exposure history.

Posttest

If you wish to receive continuing education credit for this program, you must complete this posttest. Each question below contains four suggested answers, of which **one** or **more** is correct. Choose the answer:

A if **1, 2, and 3** are correct
B if **1 and 3** are correct
C if **2 and 4** are correct
D if **4** is correct
E if **1, 2, 3, and 4** are correct

22. Which of the following statements regarding diagnosis of environmental diseases are true?

(1) Extensive knowledge of toxicology is necessary.
(2) Signs and symptoms of environmental diseases are often specific and never similar to common maladies.
(3) Extensive laboratory and environmental testing is always necessary in making a diagnosis.
(4) Signs and symptoms, onset and temporal pattern, physical examination, and laboratory results are important in making a diagnosis.

23. Goals of an exposure history are

(1) identifying past and present toxic exposures.
(2) ending the patient's exposure to toxins.
(3) proper treatment of the patient's illness.
(4) identifying safety hazards to the patient.

24. Angina pectoris can be exacerbated by which of the following?

(1) Carbon tetrachloride
(2) Methylene chloride
(3) Asbestos
(4) Carbon monoxide

25. Which of the following statements are true?

(1) The completed form may alert the clinician to a significant past exposure.
(2) The completed form can be used to evaluate the patient's present complaint and also as a database for future use.
(3) The forms can be self-administered.
(4) Complete evaluation of the form is necessary in every clinical situation.

26. Which of the following statements are true?

(1) Hobbies can be sources of toxic exposure to all household members.
(2) Family pets' health and behavior can give clues to toxic exposure in the home.
(3) People often do not know the names of the toxicant to which they are routinely exposed.
(4) Labels required by law on household products are adequate in identifying product constituents.

27. Sources of information that may be helpful to the clinician in treating and managing an exposed patient include the following:

(1) MSDSs
(2) Poison control centers
(3) AOECs
(4) None of the above choices

28. Sources of consultation in evaluating a potentially exposed patient include the following:

(1) Industrial hygienists
(2) Toxicologists
(3) Public health departments
(4) Occupational specialists

29. Which of the following statements regarding the exposure history process are true?

(1) Exploring the temporal aspects of signs and symptoms can provide clues to the source of exposure.
(2) Knowing job titles is necessary when attempting to identify toxic exposures.
(3) The clinician must engage the patient in a dialogue that explores possibilities in detail.
(4) Employment handbooks are the best printed source to detail information on toxic exposures.

Note to Nurses

CDC is accredited by the American Nurses Credentialing Center's (ANCC) Commission on Accreditation. ANCC credit is accepted by most State Boards of Nursing.

California nurses should write in "ANCC - Self-Study" for this course when applying for relicensure. A provider number is **not** needed.

Iowa nurses must be granted special approval from the Iowa Board of Nursing. Call 515-281-4823 or e-mail marmago@bon.state.ia.us to obtain the necessary application.

Case Studies in Environmental Medicine:

Taking an Exposure History

Answer Sheet, Course Number SS3046

Instructions for submitting hard-copy answer sheet: Circle your answers. To receive your certificate, you must answer **all** questions. Mail or fax your completed answer sheet to

Fax: 404-498-0061, ATTN: Continuing Education Coordinator

Mail: Agency for Toxic Substances and Disease Registry
ATTN: Continuing Education Coordinator
Division of Health Education and Promotion
1600 Clifton Road, NE (MS E-33)
Atlanta, GA 30333

Be sure to fill in your name and address on the back of this form.

Remember, you can access the case studies online at www.atsdr.cdc.gov/HEC/CSEM/ and complete the evaluation questionnaire and posttest online at www2.cdc.gov/atsdrce/.

Online access allows you to receive your certificate as soon as you complete the posttest.

1. A B C D E F G H
2. A B C D E
3. A B C D E F
4. A B C D E F G H I J K
5. A B C D E F
6. A B C D E F
7. A B C D
8. A B C D E F
9. A B C D E F
10. A B C D E
11. A B C D E
12. A B C D E
13 A B C D
14. A B C D
15. A B C D
16. A B C D
17. A B C D
18. A B C D
19. A B C D
20. A B C D
21. A B C D
22. A B C D E
23. A B C D E
24. A B C D E
25. A B C D E
26. A B C D E
27. A B C D E
28. A B C D E
29. A B C D E

tape or staple here

Name: E-mail (not required):

Address:

Zip code:

○ Check here to be placed on the list to pilot test new case studies

fold here first

Place Stamp Here

Continuing Education Coordinator
Agency for Toxic Substances and Disease Registry
Division of Health Education and Promotion
1600 Clifton Road, NE (MS E-33)
Atlanta, GA 30333

fold here second

Access the case studies online at www.atsdr.cdc.gov/HEC/CSEM/ and complete the evaluation questionnaire and posttest online at www2.cdc.gov/atsdrce/.

Online access allows you to receive your certificate as soon as you complete the posttest.

tape or staple here

Appendices

Appendix 1. Association of Occupational and Environmental Clinics

The Association of Occupational and Environmental Clinics (AOEC) is a network of more than 60 clinics and more than 250 individuals committed to improving the practice of occupational and environmental medicine through information sharing and collaborative research.

The primary goal of AOEC is to facilitate the prevention and treatment of occupational and environmental illnesses and injuries through collaborative reporting and investigation of health problems. AOEC members develop curriculum materials in occupational and environmental health and provide Education Activities (EA) programs for primary care practitioners and others.

For more information and a listing of AOEC clinics in your area, please contact the AOEC office:

1010 Vermont Avenue, NW #513
Washington, DC 20005
Phone: 202-347-4976
Fax: 202-347-4950
Web site: www.aoec.org

Appendix 2. Regional Poison Control Centers Certified by the American Association of Poison Control Centers

Poison control centers were established in 1953 to help physicians deal with poisonings of adults and children in the United States. In 1983, the American Association of Poison Control Centers was established as the professional organization for poison control centers. The regional poison control centers can act as valuable resources in providing information about the toxicity and health effects of hazardous exposures involved in poisonings. The main emergency number across the country is 1-800-222-1222, although some states have other contact numbers as well as a number for the hearing impaired. For more information, contact the American Association of Poison Control Centers at www.aapcc.org.

	Emergency Phone	TDD/TTY
ALABAMA	1-800-222-1222	
ARIZONA	1-800-222-1222	
CALIFORNIA	1-800-876-4766	1-800-972-3323
COLORADO	1-800-222-1222	
CONNECTICUT	1-800-222-1222	1-866-218-5372 (toll-free)
DELAWARE	1-800-222-1222	215-590-8789
DISTRICT OF COLUMBIA	1-800-222-1222	202-362-8563 (TTY)
FLORIDA	1-800-222-1222	1-800-282-3171 (FL only)
GEORGIA	1-800-222-1222	404-616-9287 (TDD)
IDAHO	1-800-222-1222	
ILLINOIS	1-800-222-1222	312-906-6185
INDIANA	1-800-222-1222	317-929-2336 (TTY)
KENTUCKY	1-800-222-1222	
LOUISIANA	1-800-222-1222	
MARYLAND	1-800-222-1222	410-706-1858 (TDD)
MASSACHUSETTS	1-800-222-1222	1-888-244-5313
MICHIGAN	1-800-222-1222	1-800-356-3232 (TDD)

	Emergency Phone	TDD/TTY
MINNESOTA	1-800-222-1222	612-904-4691 (TTY)
MISSOURI	1-800-222-1222	314-577-5336
MONTANA	1-800-222-1222	
NEBRASKA	1-800-222-1222	
NEVADA	1-800-222-1222	
NEW JERSEY	1-800-222-1222	973-926-8008
NEW MEXICO	1-800-222-1222	
NEW YORK	1-800-222-1222	
	Finger Lakes Regional Poison and Drug Info Center, Rochester	716-273-3854 (TTY)
	Long Island Regional Poison and Drug Information Center, Mineola	516-924-8811 (TDD Suffolk) 516-747-3323 (TDD Nassau)
	New York City Poison Control Center, New York	212-689-9014 (TDD)
NORTH CAROLINA	1-800-222-1222	
OHIO	1-800-222-1222	614-228-2272 (TTY)
OREGON	1-800-222-1222	
PENNSYLVANIA	1-800-222-1222	
	Hershey	717-531-8335 (TTY)
	Philadelphia	215-590-8789
RHODE ISLAND	1-800-222-1222	1-888-244-5313
SOUTH DAKOTA	1-800-222-1222	612-904-4691 (TTY)
TENNESSEE	1-800-222-1222	615-936-2047 (TDD)

	Emergency Phone	TDD/TTY
TEXAS	All of Texas, unless noted otherwise 1-800-POISON-1; 254-724-7401	
	North Texas Poison Center, Dallas 1-800-764-7661	
	South Texas Poison Center, San Antonio 1-800-764-7661	1-800-764-7661
	Southeast Texas Poison Center, Galveston 1-800-764-7661	1-800-764-7661
	West Texas Regional Poison Center, El Paso 1-800-764-7661	
UTAH	1-800-222-1222	
VIRGINIA	1-800-222-1222	
WASHINGTON	1-800-222-1222	206-517-2394 (TDD) 1-800-572-0638 (TDD)
WEST VIRGINIA	1-800-222-1222	
WYOMING	1-800-222-1222	

Appendix 3. Computerized Information Services

The development of electronic databases has revolutionized the retrieval of up-to-date, accurate, and comprehensive information on hazardous exposures. Databases are commonly accessed through (a) the Internet, (b) floppy disk, or (c) CD-ROM (Compact Disk—Read-Only Memory). The advantage of Internet systems is that they provide the greatest versatility and are the most comprehensive in obtaining different kinds of information because several databases can be cross-searched. CD-ROMs may be easier to search and may be cost effective depending on use.

Toxicology Data Network (TOXNET)

TOXNET, developed by the National Library of Medicine (NLM), is a computerized system of files oriented to toxicology and related areas. The user may search them on the Internet at URL: http://toxnet.nlm.nih.gov/. The following files are currently included in TOXNET:

Chemical Carcinogenesis Research Information System (CCRIS)

This resource provides scientifically evaluated data from carcinogenicity, mutagenicity, tumor-promotion, and tumor-inhibition tests on 2,100 substances that have been evaluated according to criteria and protocols widely accepted by experts in carcinogenesis.

Developmental and Reproductive Toxicology (DART)

DART is a bibliographic database containing citations to literature published on birth defects and other aspects of reproductive and developmental toxicology since 1989. The file currently contains more than 1,500 records. Plans call for the addition of approximately 3,600 records each year. DART is a continuation of the ETICBACK file. DART is funded by the National Institute of Environmental Health Sciences (NIEHS) and EPA.

Environmental Mutagen Information Center (EMIC)

EMIC is a bibliographic database on chemical, biologic, and physical agents that have been tested for genotoxic activity. It contains citations from literature after 1988. The database is produced by the Oak Ridge National Laboratory in Oak Ridge, Tennessee, and is funded by the federal government.

Environmental Mutagen Information Center Backfile (EMICBACK)

This is the backfile for the Environmental Mutagen Information Center (EMIC) database. EMICBACK is a bibliographic database on chemical, biologic, and physical agents that have been tested for genotoxic activity. It contains approximately 71,000 citations from literature published from 1950 through 1988. The database is produced by the Oak Ridge National Laboratory in Oak Ridge, Tennessee, and is funded by the federal government. EMICBACK is continued in the EMIC database.

Environmental Teratology Information Center Backfile (ETICBACK)

ETICBACK is a bibliographic database containing more than 49,000 citations to publications concerning teratology and developmental toxicology. It contains publications dating from before 1950 through 1988. This database was produced by Oak Ridge National Laboratory in Oak Ridge, Tennessee. ETICBACK is continued in the Developmental and Reproductive Toxicology (DART) database.

Hazardous Substances Data Bank (HSDB)

This toxicology database was developed by NLM and ATSDR. It is a factual, peer-reviewed database of more than 4,200 chemicals. Records are in 12 information categories: substance identification, manufacturing/use, chemical/physical properties, safety and handling, toxicity, biomedical effects, pharmacology, environmental fate/exposure summary, exposure standards and regulations, monitoring and analysis methods, additional references, and express data. HSDB includes annotated medical treatment information derived from the Poisindex database. This database is partially funded by ATSDR.

Integrated Risk Information System (IRIS)

IRIS is an EPA database that contains chemical-specific information on more than 370 chemicals. It contains information on reference doses, carcinogenicity, drinking water health advisories, risk management, and supplementary data.

Toxic Chemical Release Inventory Facts (TRIFACTS)

TRIFACTS supplements the environmental release data on chemicals in TRI with information related to the health and ecologic effects and safety and handling of these chemicals. The data may be especially useful to workers, employers, community residents, and health professionals.

Toxics Release Inventory (TRI)

TRI was created by NLM and EPA. It is a record of estimated releases to the environment, reported by industries, of more than 300 toxic chemicals based on information collected by EPA.

Toxicology Information On-Line (TOXLINE/TOXLIT)

TOXLINE/TOXLIT is designed specifically to offer comprehensive bibliographic coverage of toxicology information. It includes the pharmacologic, biochemical, physiologic, environmental, and toxicologic effects of chemicals and drugs. Sixteen subfiles containing approximately 2.5 million references can be searched. Subfiles are from Chemical Abstracts, Biological Abstracts, International Pharmaceutical Abstracts, and others.

Other Databases

Hazardline provides emergency response, safety, regulatory, and health information on more than 4,000 chemicals. Produced by Occupational Health Services, Occupational Health Services, 400 Plaza Drive, Secaucus, NJ 07094. Hazardline contains an extensive companion file on MSDSs.

MEDLINE is the database used by most health care practitioners. It is the U.S. National Library of Medicine's (NLM) premier bibliographic database that contains over 11 million references to journal articles in life sciences with a concentration on biomedicine. MEDLINE indexes more than 4,300 journals published in the United States and abroad. It can be accessed easily through the NLM Gateway at URL: http://gateway.nlm.nih.gov/.

Online Library System (OLS) is the online library system for the library network of EPA. It consists of several related databases that can be used to

locate materials on a variety of topics. OLS is available through the Internet at URL: www.epa.gov/natlibra/ols.htm.

Reproductive Toxicology (REPROTOX) includes information on reproductive toxicology. It provides current assessments on the potentially harmful effects of environmental exposure to chemicals and physical agents on human pregnancy, reproduction, and development. REPROTOX is available through the Internet at URL: reprotox.org.

National Pesticide Information Retrieval System (NPIRS) is a collection of pesticide-related databases available on the Internet through subscription at URL: www.ceris.purdue.edu/npirs.

National Institute for Occupational Safety and Health (NIOSH) Technical Information Center (NIOSHTIC-2) is a compilation in abstract form of information about toxicology, epidemiology, industrial hygiene, and other areas of occupational safety and health. It is produced by NIOSH. NIOSHTIC is available on the Internet at URL: www.cdc.gov/niosh/nioshtic.html.

Registry of Toxic Effects of Chemical Substances (RTECS) is a database that provides information on more than 100,000 potentially toxic chemicals and includes toxicity data, chemical identifiers, National Toxicology Program test status, and exposure standards. RTECS is built and maintained by NIOSH, and is available on the Internet at URL: www.nisc.com/factsheets/rtecs.htm.

Compact Disk—Read-Only Memory Systems

The CD-ROM systems use a compact disk reader and a computer software package to read the information on a compact disk. Because the CD-ROM databases are generally updated on a quarterly basis, the information is not as current as that obtained from online searches. Two of the better known CD-ROM producers are Micromedex and SilverPlatter. Micromedex products include Poisindex and TOMES. SilverPlatter products include CHEM-BANK, OSH-ROM, and PEST-BANK. (For a complete listing of environmental health databases and vendors see *Environment On-line ... The Greening of Databases*, On-Line, Inc.; Wilton, CT; ISBN 0-910965-05-6.)

Micromedex developed the **Poisindex CD-ROM** system used in poison control centers. Poisindex contains toxicology information on drugs and consumer products.

The **TOMES-Plus system (Toxicology, Occupational Medicine and Environmental Series Information System)** provides toxicology information about acute and chronic exposure to occupational and environmental chemicals. The **TOMES-Plus** system includes

(1) MEDITEXT: detailed information on the evaluation and treatment of persons exposed to industrial chemicals. OSHA permissible exposure limits (PELs) information is also supplied.

(2) HAZARDTEXT: information on spills, leaks, and fires that may occur in hazardous materials incidents; protocols for first accident/injury/illness response.

(3) NAERG (North American Emergency Response Guidebooks, formerly the Department of Transportation Emergency Response Guides); HSDB; the U.S. Coast Guard's Chemical Hazard Response Information System (CHRIS); the Oil and Hazardous Materials/Technical Assistance Data System (OHM/TADS); RTECS; the New Jersey Department of Health's fact sheets; EPA's IRIS; and REPROTOX.

SilverPlatter has various CD-ROM disks of toxicology information, including the following: **CHEM-BANK**, which includes RTECS, OHM/TADS, CHRIS, and HSDB.

OSH-ROM includes the NIOSHTIC database, the HSELINE database of the Health and Safety Executive Information Services (United Kingdom), and CISDOC from the International Labour Organization. The Major Hazard Incident Data Service (MHIDAS) provides information on more than 3,000 major accidents involving chemicals.

PEST-BANK contains information on the U.S.-registered pesticides used in agriculture, industry, and general commerce. The information comes from NPIRS. It contains information on synonyms, registration dates and registering companies, composition and formulation, sites, and pests affected by the pesticide.

TOXLINE contains toxicologic information from NLM that includes references to published materials on topics such as drugs, food, chemicals, occupational hazards, pesticides, and toxicologic analysis.

MEDLINE contains bibliographic citations and abstracts of biomedical literature.

Appendix 4. National/Federal/State Resources

Chemical Emergencies

Chemical Spills Emergency Hotline - National Response Center
1-800-424-8802
http://www.nrc.uscg.mil/index.htm

Hazardous Waste

Emergency Planning and Community Right-To-Know Hotline (EPA)
(Developing chemical contingency plans, gathering site-specific information, list of more than 400 acutely toxic chemicals)
1-800-424-9346
http://www.epa.gov/epaoswer/hotline/epcra.htm

Superfund Records of Decision
(Hazardous waste, sites to be cleaned up, actions being taken)
703-412-9810 or 1-800-535-0202
http://www.epa.gov/superfund/sites/rodsites/

Integrated Risk Information System (IRIS)
(Hazardous chemicals information, including health effects)
301-345-2870
http://www.epa.gov/iris/

Lung Disease

Lung Line/National Jewish Medical and Research Center
(Information on asthma, allergies, and lung disease)
1-800-222-LUNG (1-800-222-5864)
http://nationaljewish.org/ll1.html

Lead

National Center for Environmental Health (CDC)
(Lead poisoning prevention)
404-498-1420
http://www.cdc.gov/nceh/lead/lead.htm

National Maternal and Child Health Clearinghouse
(Publications on lead poisoning)
1-888-434-4MCH (1-888-434-4624)
http://www.nmchc.org/

National Lead Information Center
1-800-424-LEAD (1-800-424-5323)
http://www.epa.gov/opptintr/lead/nlic.htm

Occupational Health

National Institute for Occupational Safety and Health (NIOSH) (CDC)
(Information and publications on health effects of occupational exposures)
1-800-35-NIOSH (1-800-356-4674)
http://www.cdc.gov/niosh/homepage.html

OSHA (Occupational Safety and Health Administration)
(Regulations for toxic and hazardous substances in the workplace)
To report a fatality or imminent life-threatening situation,
DO NOT SEND E-MAIL—Please contact the toll-free number:
1-800-321-OSHA (6742) immediately.
Office of Public Affairs: 202-693-1999
http://www.osha.gov/

Pesticides

EPA Office of Pesticide Programs Public Regulatory Docket
703-305-5805
http://www.epa.gov/pesticides/docket/

National Pesticide Telecommunications Network
1-800-858-7378
http://ace.orst.edu/info/nptn/

National Pesticide Information Retrieval System (NPIRS)
(Managed by Purdue University and available by subscription)
Help number for searching NPIRS database to get fact sheets on pesticides, insecticides, fungicides, state and federally registered chemicals:
765-494-5249
http://ceris.purdue.edu/npirs/index.html

Radon

National Radon Information Hotline
1-800-SOS-RADON (1-800-767-7236)
http://www.epa.gov/iedweb00/iaqinfo.html#Radon hotline

Toxic Substances

Toxicology Information Response Center (Oak Ridge)
(General toxicology information, searches on chemicals)
865-576-1746
http://www.ornl.gov/TechResources/tirc/hmepg.html

Agency for Toxic Substances and Disease Registry (ATSDR)
(Toxicological profiles in draft. [Final profiles available from National Technical Information Service.])
1-888-42-ATSDR (1-888-422-8737)
http://www.atsdr.cdc.gov/

Toxic Substances Control Act (TSCA)
Hotline/Public Information Office (EPA)
(Answers questions and gives general technical assistance on TSCA; guidance on TSCA regulations)
202-554-1404

Toxics Release Inventory System (EPA)
(Information about which chemicals are used, stored, and released by companies)
1-800-424-9346
http://www.epa.gov/tri/

Water

EPA Office of Water (Groundwater and Drinking Water)
1-800-426-4791 (Safe Drinking Water Hotline)
http://www.epa.gov/OGWDW/

State Health Departments

Alabama Department of Public Health
201 Monroe Street
Montgomery, AL 36130-3017
(334) 206-5300

Alaska Deparment of Health and Social Services
PO Box 110610
Juneau, AK 99811-0610
(907) 465-3090

Arizona Department of Health Services
1740 W. Adams Street, Room 407
Phoenix, AZ 85007
(602) 542-1025

Arkansas Department of Health
4815 W. Markham Street
Little Rock, AR 72205-3867
(501) 661-2417

California Department of Health Services
714 P Street, Room 1253
Sacramento, CA 95814
(916) 657-1493

Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530
(303) 692-2011

Connecticut Department of Public Health
PO Box 340308
Hartford, CT 06134
(860) 509-7101

Delaware
Department of Health and Social Services
PO Box 637
Dover, DE 19903
(302) 739-4700

District of Columbia Department of Health
800 N. Capitol Street, NE, Suite 4400
Washington, DC 20002
(202) 442-5999

Florida Department of Health
4052 Bald Cypress Way, Bin A00
Tallahassee, FL 32399-1701
(805) 245-4321

Georgia Department of Human Resources
2 Peachtree Street, NW, Suite 7-300
Atlanta, GA 30303
(404) 657-2700

Guam Department of Public Health and Social Services
PO Box 2816
Agana, GU 96910
(671) 735-7102

Hawaii Department of Health
PO Box 3378
Honolulu, HI 96801
(808) 586-4410

Idaho Department of Health and Welfare
PO Box 83720
Boise, ID 83720-0036
(208) 334-5945

Illinois Department of Public Health
535 W. Jefferson Street, Fifth Floor
Springfield, IL 62761
(217) 782-4977

Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204
(317) 233-7400

Iowa Department of Public Health
Lucas State Office Building
Des Moines, IA 50319-0075
(515) 281-5605

Kansas Department of Health and Environment
400 SW Jackson, Room 665
Topeka, KS 66612-1290
(785) 296-1343

Kentucky Department for Public Health
275 E. Main Street
Frankfort, KY 40621
(502) 564-3970

Louisiana Department of Health and Hospitals
PO Box 3214, Bin 4
Baton Rouge, LA 70821
(225) 342-8093

Maine Department of Human Services
151 Capitol Street, Station 11
Augusta, ME 04333
(207) 287-3201

Maryland Department of Health and Mental Hygiene
201 W. Preston Street
Baltimore, MD 21201
(410) 767-6505

Massachusetts Department of Public Health
250 Washington Street, 2nd Floor
Boston, MA 02108-4619
(617) 624-5200

Michigan Department of Community Health
PO Box 30195
Lansing, MI 48909
(517) 335-8024

Minnesota Department of Health
PO Box 64882
St. Paul, MN 55164-0882
(651) 296-8401

Mississippi State Department of Health
PO Box 1700
Jackson, MS 39215-1700
(601) 960-7634

Missouri Department of Health
PO Box 570
Jefferson City, MO 65102
(573) 751-6001

Montana Department of Public Health and Human Services
PO Box 4210
Helena, MT 59604-4210
(406) 444-5622

Nebraska Health and Human Services System
PO Box 95007
Lincoln, NE 68509
(402) 471-8566

Nevada State Department of Human Resources
505 East King Street, Room 201
Carson City, NV 89710-4797
(775) 684-4200

New Hampshire Department of Health and Human Services
6 Hazen Drive
Concord, NH 03301-6527
(603) 271-8560

New Jersey Department of Health and Senior Services
PO Box 360, Room 805
Trenton, NJ 08625
(609) 292-7837

New Mexico Department of Health
PO Box 26110
Santa Fe, NM 87502-6110
(505) 827-2613

New York State Department of Health
ESP-Corning Tower, 14th Floor
Albany, NY 12237
(518) 474-2011

North Carolina Department of Health and Human Services
PO Box 29526
Raleigh, NC 27626-0526
(919) 733-4392

North Dakota Department of Health
600 E. Boulevard Avenue
Bismarck, ND 58505-0200
(701) 328-2372

Ohio Department of Health
PO Box 118
Columbus, OH 43266-0118
(614) 466-2253

Oklahoma State Department of Health
1000 NE 10th Street, Room 305
Oklahoma City, OK 73117-1299
(405) 271-4200

Oregon Department of Human Services
PO Box 14450
Portland, OR 97293-0450
(503) 731-4000

Pennsylvania Department of Health
PO Box 90
Harrisburg, PA 17108
(717) 787-6436

Puerto Rico Department of Health
PO Box 70184
San Juan, PR 00936
(787) 274-7602

Rhode Island Department of Health
3 Capitol Hill, Room 401
Providence, RI 02908-5097
(401) 222-2231

South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
(803) 734-4880

South Dakota State Department of Health
600 East Capitol
c/o 500 East Capitol
Pierre, SD 57501-5070
(605) 773-3361

Tennessee Department of Health
Third Floor, Cordell Hull Building
426 Fifth Avenue, North
Nashville, TN 37247-0101
(615) 741-3111

Texas Department of Health
1100 W. 49th Street
Austin, TX 78756
(512) 458-7375

Utah Department of Health
PO Box 141000
Salt Lake City, UT 84116-1000
(801) 538-6111

Vermont Department of Health
PO Box 70
Burlington, VT 05402
(802) 863-7280

Virgin Islands Department of Health
48 Sugar Estate
Charlotte Amalie
St. Thomas, VI 00802
(340) 774-0117

Virginia Department of Health
PO Box 2448, Room 214
Richmond, VA 23218
(804) 786-3561

Washington State Department of Health
1300 SE Quince Street, MS 7890
Olympia, WA 98504-7890
(360) 236-4015

West Virginia Department of Health and Human Resources
Building 3, Room 518
1900 Kanawha Boulevard
Charleston, WV 25305
(304) 558-2971

Wisconsin Department of Health and Family Services
PO Box 309
Madison, WI 53701-0309
(608) 266-1511

Wyoming Department of Health
117 Hathaway Building
Cheyenne, WY 82002
(307) 777-7656

Notes

DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Agency for Toxic Substances
and Disease Registry
Division of Health Education
and Promotion (MS E-33)
Atlanta, GA 30333
