



CASE STUDIES IN AGRICULTURAL MEDICINE

Skin Disease in Agriculture (A Self-Instructional Case Study)

ALERT . . .

- *Skin disease accounts for approximately 70 percent of all occupational illness cases in agriculture in California. Skin disease usually accounts for 30 percent of all occupational illness in the United States.*
- *Farmers and agricultural workers consistently show an elevated risk of developing occupational skin diseases.*
- *Allergic contact dermatitis constitutes 25 to 30 percent of all occupational skin disease cases.*

The case studies in agricultural medicine monographs have been designed to increase primary care providers' knowledge of diseases common among farmers and agricultural workers and to aid in the evaluation of farmers and agricultural workers. See pages 33-34 for information about continuing medical education credits and continuing education units. The Office of Continuing Medical Education of the University of California, Davis, School of Medicine and Medical Center designates this continuing medical education activity for one credit hour in Category I of the Physician's Recognition Award of the American Medical Association. The University of California, Davis, School of Medicine and Medical Center is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians. This CME activity was planned and produced in accordance with the ACCME Essentials. The California State Board of Registered Nursing accepts AMA Category 1 hours toward relicensure.

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Case Studies in Agricultural Medicine: Skin Disease in Agriculture (A Self-Instructional Case Study)

Sponsored by

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HOW TO USE THIS MONOGRAPH. . .

This monograph contains three case studies that describe realistic encounters with patients who have skin diseases associated with agriculture. Cases are followed by challenge questions that measure the reader's existing knowledge about skin diseases in agriculture. (To benefit fully from this monograph, readers are urged to answer the challenge questions when they are presented. Your answers may then be compared with answers found on pages 29-30). The challenge questions are followed by didactic material that will reinforce or extend the reader's knowledge. The monograph ends with a posttest, which may be submitted to the Office of Continuing Medical Education, UC Davis Medical Center, for continuing medical education (CME) credit or continuing education units (CEU). See pages 32-33 for further instructions on how to receive these credits.

The objectives of this monograph on skin disease in agriculture are to help you:

- ☐ Explain the skin disease risk involved in agricultural work.
- ☐ Understand the known factors contributing to agricultural skin disease.
- ☐ Assess a patient's environmental and occupational exposure to these factors.
- ☐ Effectively evaluate and manage agricultural dermatitis patients.
- ☐ Efficiently report worker or pesticide illness cases.
- ☐ Utilize a variety of sources to locate further information on agricultural work and skin disease.

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1. INTRODUCTION

The Agricultural Industry. Agriculture is a major industrial sector in the United States. It is also one of the most hazardous industries. Farm work-related health problems include accidents, pesticide-related illnesses, musculoskeletal disorders, dermatitis, respiratory conditions, reproductive health problems, health problems of children of farm workers, climate-caused illnesses, communicable diseases, bladder and kidney disorders, and eye and ear problems.

California Agriculture. Approximately 20 percent of the total U.S. agricultural work force live or work in California, one of the leading agricultural states. In 1987 the three highest all-cause work-related death rates per 100,000 workers were 49 for agricultural workers, 38 for miners, and 35 for construction workers, compared with a rate of approximately 11 deaths per 100,000 workers for all occupations.

Case Studies in Agricultural Medicine. This series has been designed to inform physicians and other health care providers through discussions of clinical cases associated with agriculture. The recent focus on occupational health issues in California agriculture presents an important opportunity, not only because of the magnitude and importance of this industry to the state but also because the industry in California does not follow the same patterns of agriculture prevalent elsewhere in the nation. The entire series addresses health issues associated with California agriculture. The primary goal of these self-instructional case studies is to provide current information about occupational and environmental health hazards. It will be useful to the clinician in the diagnosis, management, and prevention of work and environmental-related diseases.

Skin Disease. Skin disease is the most common form of occupational illness, accounting for approximately one-third of all occupational diseases reported. Besides contact dermatitis, which accounts for 90 percent of all cases, skin disease includes skin infections, and a variety of less common conditions e.g., hives, occupational acne, skin cancer, and chemical leukoderma (vitiligo provoked by exposure to an exogenous chemical agent). Recognition of the work-relatedness of the condition may be difficult since the differential diagnosis includes non-occupational dermatitis as well as the long list of skin conditions that mimic contact dermatitis

Pretest

(a) What are likely agricultural etiologies of four common skin conditions: irritant contact dermatitis, allergic contact dermatitis, contact urticaria, and skin cancer?

(b) What are the most effective treatments and preventive measures for each of these skin conditions?

Answers begin on page 29

Skin Disease in Agriculture. The rate of occupational skin disease in agriculture is twice as high as the rate of occupational skin disease in the manufacturing sector. Occupational skin disease accounts for 30 percent of all occupational illnesses nationwide, but skin disease accounted for approximately 70 percent of all occupational illnesses in agriculture in California. The risk and type of occupational skin disease varies with the crops, livestock, farming practices, and climate of an area. In California, pesticides were second to poison oak as reported causes of occupational skin disease in agriculture. Pesticide caused dermatitis is more frequently irritant contact dermatitis than allergic contact dermatitis.

Exposures. Farmers and agricultural workers are exposed to a wide variety of chemical, biological, and physical hazards at work (see table 1). Plants and plant products can produce skin diseases through several mechanisms. It is also estimated that farmers apply 60 percent of all domestic agricultural chemicals. Contact dermatitis may be the main adverse health effect of certain pesticides in humans. The chief cutaneous irritants among the pesticides are inorganic compounds such as copper sulfate. Fungicides, such as carbamates and benomyl, have been the most frequently reported causes of allergic contact dermatitis from pesticides. Furthermore, the extremes of heat and cold, wet and dryness common to agricultural work predisposes workers to contact dermatitis. Contact urticaria is a demonstrated cause of skin disease in agriculture, though its frequency is unknown. Skin cancer, while virtually unstudied in western agriculture, is known to result from sun exposure that is common in agricultural work.

Table 1

Agents Causing or Exacerbating Skin Disease in Agriculture	
Environmental	
	UV radiation
	Soil
	Climate -heat, cold, wind, moisture
	Zoonoses
	Other physical agents, such as materials for protective devices
Chemical	
	Pesticides, including residues on foliage
	Fertilizers
	Other chemicals, such as machinery lubricants
Crop-Related (especially among farm workers)	
	Specific crop type
	Specific job activities, such as hoeing
	Plant materials
	Abrasive tasks & materials
Personal	
	Hygiene
	Personal allergy history
	Use of protective devices

Adapted from Ketty Mobed, Occupational Health Problems Among Migrant and Seasonal Farm Workers. Div. of Occup./Env. Medicine & Epid., UC Davis, 1992.

2. CASE STUDY ONE:

Contact Dermatitis in a 22-year-old agricultural worker

A 22-year-old man is seen at your office complaining of a rash. He'd been well until yesterday when he noted a red area on his left thigh. Through the day, the red area had grown and also appeared on his right thigh. By evening he was noting some itching in the left thigh rash, along with further extension of the rash. He washed and lotioned (he's unsure which brand) the area last evening. However, when he awoke, he noted broken blisters where the rash started on his thighs. They were mildly painful. His rash has continued to progress in those areas without other symptoms.

His past history includes good health without medication or allergy. He's unmarried. He occasionally drinks beer. He doesn't smoke. He's been an agricultural worker for the last six years. He's been pulling weeds in a field of winter sugar beets with 40 co-workers for the last week. He wears shorts while working. He has no exposures other than the fieldwork. He has not walked in woods or been exposed to poison oak.

On physical examination you find a fit young man with blood pressure of 115/77. Pulse is 64 and regular. He's afebrile. He appears well, with the exception of erythema with anterior weeping on this thighs, anterior more so than posterior. The largest weeping area on his right thigh is 3 x 7 cm. All have surrounding erythema, partly concealed by tanned skin. The remainder of his skin is uninvolved.

Challenge Questions Case Study One

1. What should be included in this patient's differential diagnosis?
2. What further information would assist in making a diagnosis?
3. What laboratory tests would you order for this patient?
4. What treatment would you offer this patient?
5. What is this patient's prognosis?



An example of contact dermatitis reprinted with permission from Michael A. O'Malley

3. CONTACT DERMATITIS: Background

☐ Contact Dermatitis

Contact Dermatitis is a common condition, found in about 2 percent of the population surveyed by the National Health Assessment Nutrition and Examination Survey (NHANES). The hallmark of this condition is the correspondence between the pattern of dermal exposure to the agent in question and the distribution of subsequent blistering and erythema, followed by cracking, fissuring, and lichenification. Depending on injury to melanocytes in the basal layer of the epidermis, acute episodes may have sequelae of either hyper- or hypopigmentation.

Table 2

HALLMARKS OF CONTACT DERMATITIS	
Irritant Dermatitis	vs. Allergic
<u>Irritant Contact Dermatitis</u>	<u>Allergic Contact Dermatitis</u>
Distribution of lesions correspond to the area of the skin contacting the offending agents.	Same
Lesions noticeable within 24 hours of exposure.	Lesions develop 48–96 hours following exposure.
High prevalence when exposure is widespread	Prevalence is unpredictable, most often low.
Photo toxic reactions form a subset of irritant dermatitis.	Photo allergic reactions form a subset of allergic dermatitis
Lesion in Epidermis	Sensitization takes place in Dermis

Adapted from Michael A. O'Malley, Lecture Series on Occupational Skin Disease. Div. of Occup./Env. Medicine & Epidemiology, UC Davis, 1993.

☐ Allergic Contact Dermatitis

Allergic Contact Dermatitis (see photo on page 5) is usually a delayed hypersensitivity (type 4 immune response) reaction that develops after repeated exposures to an antigenic substance. Once the sensitivity develops, an acute response (identical to that produced by irritant contact dermatitis) may recur following exposure to very small doses of the antigen. This exquisite sensitivity is identified clinically by use of the diagnostic patch test—a provocation test that uses a concentration of the suspected allergen too low to produce an irritant response when occluded against the skin for at least 24 hours. For better results 48 hours is recommended as in the case of a recent study with California nursery workers conducted by UC Agricultural Health & Safety Center at Davis.

The appropriate concentration for testing must be worked out by a tedious trial and error procedure, but fortunately this has already been done for common allergens such as nickel, neomycin, rubber additives, preservatives found in the household environment, and most recently for plant allergens and pesticides used in agriculture. Important subtypes of allergic contact dermatitis include photo allergic contact dermatitis and contact urticaria. In the former condition, the initial chemical exposure produces no response until an antigen is produced by interaction with UV or visible sunlight. Many reactions to sunscreens containing para-amino-benzoic-acid (PABA) are of this type. Contact urticaria is a unique syndrome characterized by a type 1 rather than a type 4 allergic response to dermal exposure, so the skin findings are the evanescent wheal and flare reaction rather than persistent vesiculation and erythema produced by the type 4 reaction. (see pages 12-14)

Following massive exposure to an antigen, individuals with a high degree of sensitivity may show immediate reactions, such as urticaria or erythema multiforme, in addition to eczematous dermatitis. Ultimately the entire integument may become involved with an oozing, crusting, exfoliating dermatitis.



Allergic Contact Dermatitis from the herbicide barban. Reprinted with permission from Robert M. Adams, Occupational skin disease, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

Irritant Contact ☐ Dermatitis

Contact Dermatitis is most commonly produced by direct irritation, arbitrarily differentiated from skin burn (e.g., acid on the skin) only by the difference in intensity and acuteness of the irritant response.

At the other end of the spectrum are weak irritants (or low concentrations of potent irritants) that produce a response only after

repeated exposure. This type of cumulative irritation to the skin thus produces contact dermatitis just as cumulative repetitive trauma to the skeletal system produces stress fractures and tendonitis. The classic example of this is hand dermatitis produced by wet work characterized by drying, cracking and fissuring of the hands following a period of weeks or months of repeated contact with water, detergents, or solvents. An important variation of direct irritation is photo toxicity—skin irritation produced by UV or visible light activated chemical (e.g., 8-methoxy psoralen).

❑ Chronic stages

Chronic stages are characterized by thickened, fissured skin, which occasionally erupts into more acute dermatitis on re-exposure to the antigen or following contact with irritant substances. Theoretically, the entire skin can react once sensitization is fully developed. Different regions of the body vary somewhat in degree of reaction, however, and the site of greatest exposure is not always the site of greatest involvement. For example, one study showed that on the soles of six glutaraldehyde-sensitive persons, the application of 25 percent glutaraldehyde produced no reaction, whereas on the arms a concentration of only 2.5 percent as a “use test” showed definite reactions.

Chronic Irritant Contact Dermatitis*



**Reprinted with permission from ATSDR Case Studies in Environmental Medicine: Skin Lesions and Environmental Exposures, Rash Decisions. U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1993.*

Table 3

Some Common Irritants in the Home

Bleaches	Pesticides
Copper and metal brighteners	Pet shampoos
Detergents	Rug shampoos
Drain cleaners	Soaps
Scouring pads and powders	Fertilizers
Furniture polishes and waxes	Toilet bowl cleaners
Oven cleaners	Window cleaners

Adapted from Robert M. Adams, Occupational skin disease, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

Other ☐ exposures

The mucous membranes often escape contact sensitivity reactions entirely. Dermatitis from lozenges and toothpaste appears at the corners of the mouth and on the adjacent skin, completely sparing the mucous membranes. In hair dye reactions, the scalp is usually less involved than the skin adjacent to the hairline.

The palms and soles are frequently spared from sensitivity reactions, with dermatitis appearing chiefly along the sides of the fingers and toes and on the dorsal surfaces. However, potent allergens can sensitize the palm. Strong allergens such as ethylbutyl thiourea may also markedly affect the soles of the feet (see photo below). Diminished sensitivity of certain body regions is not absolute, and many exceptions occur. Widespread, eczematous, contact type dermatitis may also result from parenteral administration of an allergen. Cross reactions are also commonly seen with chemically related compounds.



**Reprinted with permission from Robert M. Adams, Occupational skin disease, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.*

SENSITIZING PLANTS ASSOCIATED WITH THE AGRICULTURAL INDUSTRY

Most Common Sensitizing Plants Associated with the Agricultural Industry

The Most Common Sensitizing Plants:

<u>Family</u>	<u>Genus</u>	<u>Common Name</u>
Amaryllidaceae	<i>Narcissus</i>	Daffodil narcissus
Anacardiaceae	<i>Toxicodendron</i>	Poison Ivy, oak, sumac and others
Araliaceae	<i>Hedera</i>	Algerian and English ivy
Compositae	<i>Ambrosia</i>	Ragweed
	<i>Chrysanthemum</i>	Various species
	<i>Helenium</i>	Sneezeweed
	<i>Iva</i>	Marsh elder
	<i>Parthenium</i>	Feverfew
	<i>Tanacetum</i>	Tancy
	<i>Xanthium</i>	Various weeds, including cocklebur
Liliaceae	<i>Tulipa</i>	Tulip
Primulaceae	<i>Primula</i>	Primrose

Some Vegetables and Fruits Known to Cause Allergic Sensitization:

<u>Family</u>	<u>Genus</u>	<u>Common Name</u>
Alliaceae	<i>Allium</i>	Chive, leek, onion, garlic
Bromeliaceae	<i>Ananas</i>	Pineapple
Compositae	<i>Cichorium</i>	Chicory, endive
	<i>Cynara</i>	Artichoke
	<i>Lactuca</i>	Lettuce
	<i>Armoracia</i>	Horseradish
Cruciferae	<i>Brassica</i>	Brussels sprouts, Cabbage
Liliaceae	<i>Asparagus</i>	
Rutaceae	<i>Citrus</i>	Orange, lemon, lime
Umbelliferae	<i>Apium</i>	Celery
	<i>Daucus</i>	Carrot
	<i>Pastinaca</i>	Parnish
	<i>Petroselinum</i>	Parsley

Adapted from Robert M. Adams, Occupational skin disease, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

History ☐ Taking

It is extremely helpful to have a special form for recording the history and physical examination. Vital questions are easily omitted if a checklist is not adhered to. A suggested form for recording the history and physical examination is available (see Appendix C).

The history also may be helpful. Contact allergic reactions are often explosive in onset, whereas irritant reactions to mild irritants develop slowly over several day or weeks. It is helpful to question patients about the type of work they do and the materials that come into direct contact with the skin. If you can ascertain the pattern of dermal exposure that occurs on the job, you can move the diagnosis of occupational skin disease higher or lower on your list, depending upon the degree of correspondence you see with the lesions you observe.

Remember that some agents readily penetrate the work clothing, so one may see reactions in apparently non-exposed areas of skin. Dust, for example, collects in the flexural areas and around the cuffs of long sleeve shirts and around the collar line, producing a typical pattern of flexural eczema very difficult to differentiate from atopic dermatitis.

Differential ☐ Diagnosis

Contact dermatitis has been confused (both under and over diagnosed) with nearly every type of skin condition. Allergic contact dermatitis tends to be more vesicular than irritant dermatitis and the vesicles tend to be smaller; itching is often greater, whereas pain and burning are more prominent in irritant type dermatitis. However, the most common conditions to consider in the differential diagnosis include: seborrhea, pityriasis rosea, polymorphous light eruption, heat rash (milliaria rubra), irritant dermatitis, pustular eruptions of the palms and soles—superficial fungus infection, atopic dermatitis, psoriasis, herpes simplex and herpes zoster, insect bites, vesicular idiopathic reactions to primary *Trichophyton* infections of the feet, nummular eczema, and drug eruptions. There are no distinctive clinical features that differentiate allergic contact dermatitis from irritant dermatitis at the time the patient is first seen.

Physical ☐ Examination

It is important that the patient undress completely. Otherwise, patches of clearly endogenous eczema (flexural, lichenified, or discoid); plaques of psoriasis on elbows, knees, scalp, and feet; psoriatic nail pits; tinea pedis, or tinea cruris may be missed.

While these conditions can coexist with an occupational dermatosis, their presence can influence the diagnosis in doubtful cases. Most occupational contact dermatitis affects the hands. If the worker's hands are normal and no gloves are worn, a contact dermatitis is very unlikely. If gloves are worn, the arms above the gloves may be affected. Airborne contact factors (dust, fumes, vapors) affect the face and neck.

☐ Illness or Injury Report

In California, where physicians are required by law to report (see appendices A and B) all cases of illness or injury that have resulted from exposure to agricultural chemicals, there have been recent reports of epidemics of contact dermatitis from pesticides. These reports have led to important follow-up studies (see suggested readings on page 29).

CONTACT DERMATITIS: Treatment

☐ Treatment

The most important step in treatment is to remove the patient, at least temporarily, from further exposure to the offending agent. Substituting less irritating chemicals for the offending substance and correctly using protective materials, such as gloves and barrier creams, may help reduce exposure. During healing, the skin should be protected from other insults such as frequent washing, trauma, wind, and rapid changes in temperature.

Treatment for acute vesicular **irritant contact dermatitis** includes topical application of wet dressings for 15 to 20 minutes, three to six times daily. Domeboro's solution (diluted 1:40) or Burrow's solution may be used to soak dressings. Dressings should be discontinued after two to three days to avoid drying the skin.

Topical application of corticosteroid preparations may be efficacious. A low-potency corticosteroid should be used for mild to moderate skin conditions, with progression to more potent corticosteroids as required. Avoid most other over-the-counter and prescription topical medications or their excipients as they can further irritate the skin or provoke allergic contact dermatitis. Administering mild sedatives and antihistamines to relieve itching may be beneficial. Clinical signs of secondary bacterial infection include increased erythema and tenderness; development of a yellow, crusting, or purulent exudate; and occasionally, formation of small pustules around the edges of the dermatitis.

Infection with monilia has an appearance similar to bacterial infection, except that the exudate is usually white. Infection may be difficult to recognize initially because the serious exudate and erythema of the dermatitis can obscure the signs. Obtaining samples of the exudate for culture and sensitivity before initiating topical or systemic antibiotic therapy is generally advisable.

Systemic corticosteroids may be indicated for some patients who have **allergic contact dermatitis**, especially when large areas of the skin (20 percent total body surface area or greater) are involved. Short courses of oral corticosteroids, particularly if used for a *Rhus*-induced contact dermatitis, may be given for two to three weeks (up to 21 days). Corticosteroids administered even for a short period of time should always be delivered in decreasing doses over the course of therapy to prevent adrenal suppression.

Table 5

Measures for the Prevention and Control of Dermatitis in the Agricultural Industry

Prevention of Dermatitis

Worker Education

Meetings, posters, individual discussion

Personal Protective Equipment

Gloves, aprons, shoes, safety glasses, protective creams, respirators

Housekeeping

Workbench, storage of materials, general work place

Labeling

Material Safety Data Sheets (MSDSs), chemical information on ingredients

Engineering Controls

Mechanical enclosure of the agricultural chemical or process (closed vs. open pesticide mixers), automation of the work procedure, prevention of fire (from open flames, smoking, heat, electric sparks, static electricity)

Measures for Controlling Dermatitis

Removal of the chemical hazard from the work place

Substitution of less hazardous agricultural chemical

Changes in the specific work methods

Preplacement selection of workers

Limitation of exposure to brief periods

Protective clothing

Skin cleaners

Barrier creams

Convenient washing facilities

Supervision, education, and good housekeeping

Adapted from Robert M. Adams, Occupational skin disease, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

4. CASE STUDY TWO

Contact Urticaria in a 48-year-old nursery worker

A 48-year-old female nursery worker visits you with the chief complaint of two hours of a rash with acute swelling of the eyelids, accompanied by nasal congestion, watery eyes, itching of throat and cough at work, her current symptoms started within 15 minutes of beginning to handle seedlings.

The problem was first mildly present about two weeks ago. It occurred intermittently thereafter when she was at work, but usually cleared in the evenings. It was also better during weekends when she did not work.

She has worked in a plant nursery for 12 years. She has worked as lead person (full-time worker) and nursery helper (seasonal). The two principal products in her conifer seedling nursery are coast redwood (*Sequoia sempervirens*) and Douglas Fir (*Pseudotsuga menziessi*). Other products include Western White Pine (*Pinus monticola*) and Eucalyptus seedlings.

She has no past history of atopy except a history of “whelps” which she has developed after taking penicillin. Your examination reveals that she has normal vital signs, the rash shown below, marked facial edema and also rales and wheezing in the left lower lung fields.

Contact Urticaria*



**Reprinted with permission from ATSDR Case Studies in Environmental Medicine: Skin Lesions and Environmental Exposures, Rash Decisions. U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1993.*

Challenge Questions Case-Study Two

1. What is the most likely cause of the patient's complaints?

2. What evaluation and testing might be helpful?

3. What treatment will most likely be effective?

5. CONTACT URTICARIA: Background

Description ☐

Contact urticaria* is usually a localized wheal-and-flare response (hives) that develops almost immediately (a few minutes to about one hour) after direct contact with the eliciting agent. Many afflicted patients complain of skin sensations such as itching, burning, or tingling. Symptoms typically disappear within 24 hours.

Pathophysiology ☐

Contact urticaria may be mediated by mechanisms classified as immunologic (allergic), nonimmunologic (nonallergic), or uncertain. Nonimmunologic urticaria, the most common type of urticaria, is caused by a direct action of the offending substance on the skin vasculature and a nonimmunologic release of vasoactive substances such as bradykinin, histamines, or other inflammatory mediators. The reaction remains localized.

Immunologic contact urticaria is an immediate allergic reaction in persons who have previously become sensitized to the offending agent. Parts of the skin that are remote from the contact site may be affected. The vasoactive effects in the immunologic form of contact urticaria are caused by an IgE-mediated reaction. The resulting erythema and edema are elicited mainly by histamines released from mast cells. Activation of the complement cascade and generation of anaphylatoxins can result in systemic effects (contact urticaria syndrome) in which the typical rash is accompanied by symptoms of asthma, rhinitis, conjunctivitis, orolaryngeal effects (itching and tingling sensations or edema of the lips, tongue, and mouth; or throat irritation), or gastrointestinal signs and symptoms. In rare cases, patients who have contact urticaria syndrome have experienced otherwise unexplained attacks of vascular collapse (anaphylactoid reactions). The cause of the third type of contact urticaria is uncertain but includes both allergic and nonallergic mechanisms. Formaldehyde is an example of an urticant that has features of both types.

Common ☐
Etiologies

Immunologic contact urticaria is usually caused by proteins or protein complexes. It may also be caused by a wide variety of common chemicals, medications, cosmetics, and other agents. Food stuffs are also a common cause of contact urticaria.

*Portions of this section on contact urticaria have been adapted from: ATSDR Case Studies in Environmental Medicine: Skin Lesions and Environmental Exposures, Rash Decisions. U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1993.

☐ Clinical Evaluation

Nonimmunologic contact urticaria has been provoked by contact with substances as diverse as acids, alcohols, balsam of Peru, benzocaine, cinnamic aldehyde, cobalt chloride, dimethylsulfoxide, formaldehyde, witch hazel, sodium benzoate, and esters of nicotinic acid. Cold temperatures can also cause nonimmunologic contact urticaria.

Sunlight, which can produce rapid development of a wheal-and-flare reaction in exposed areas, and aquagenic agents (water, saline, or the patient's own perspiration), also are associated with uncertain mechanism-mediated contact urticaria.

☐ Diagnosis

Nonimmunologic contact urticaria must be differentiated from allergic contact urticaria and other forms of urticaria. The most important factor in making the correct diagnosis is taking a careful history of the relationship between possible exposures and development of symptoms. In cases of chronic urticaria, a clear cause is seldom identified.

Patch or scratch/prick tests may be used with suspected etiologic agents. These tests should be used initially on normal areas of skin.

☐ Treatment

Chlorpheniramine-like antihistamines are of value in treating urticaria. The newer agents that have less sedative effects, such as terfenadine (Seldane) and astemizole (Hismanal), are not efficacious. (Note: Seldane and Hismanal are contraindicated in patients who are taking ketoconazole, itraconazole, erythromycin, or other medications known to impair the metabolism of Seldane and Hismanal, and in patients who have significant hepatic dysfunction). Nonsteroidal anti-inflammatory medications have proven useful in certain cases of nonimmune urticaria; however they may cause anaphylaxis in patients who have immune urticaria, especially patients who exhibit the triad of asthma, nasal polyps, and rhinitis. These patients should be cautioned about the use of nonsteroidal anti-inflammatory agents. All patients suffering from urticaria should be advised to avoid further contact with the eliciting substance.

6. CASE STUDY THREE

Skin cancer and sun damage in a farmer

A farmer consults you because of the insidious development of a lesion on his left jaw line. It has gradually enlarged over the last one to two years. It has been mildly sore when bumped in the last month. It has bled when bumped.

- 1) *He has a four-by-six centimeter fungating lesion near his left lower mandibular angle.*
- 2) *The surrounding skin is dry with increased wrinkling.*
- 3) *He has scattered hyperkeratoses on his ears and hands.*

Skin Neoplasms*



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Challenge Questions: Case Study Three

1. What are your patient's lesions?

2. What is the leading risk factor for your patient's condition?

3. What treatment would you recommend?

7. SKIN CANCER: Background

☐ Skin Cancer

Cancer of the skin* is the most common neoplasm among adults in the United States, most often occurs among people who work or spend a great deal of time in the sun—farmers and agricultural workers—especially if they have been severely sunburned in their teens or twenties. The risk is higher in places where there is intense year-round sunshine in conjunction with other agents. The incidence of melanoma has increased more than 700 percent in the past 60 years. It was once believed that dark brown or black skin was guarantee against melanoma. We now know that black people can develop this skin cancer, especially on the palms of the hand, the soles of the feet and under the nails. Actually, no one can be considered entirely free from the risk of melanoma.

Phenolic compounds, aliphatic hydrocarbons, and inorganic arsenic compounds are among the chemicals found to be associated with skin tumors. Inorganic arsenic compounds are known to cause a variety of skin lesions, including malignant neoplasms. Initial dermal manifestations of arsenic exposure may be mild erythema and hyperhidrosis of the palms and soles, followed by development of slightly raised, firm, generally symmetrical punctuate keratoses. White-colored, nonraised hyper-keratoses may also develop on the ankles, shins, and dorsum of the hands. A diffuse hyper pigmentation of the skin interspersed with white, somewhat atrophic macules ("raindrops on a dusty road" appearance) may also be seen. Basal cell and squamous cell carcinomas may then develop. Bowen's disease, a squamous cell carcinoma, may arise spontaneously in situ or may develop after chronic exposure to inorganic arsenic or other chemicals. Bowen's disease consists of randomly distributed, sharply demarcated, erythematous, scaling lesions that range in size from a few millimeters up to one to two centimeters in diameter. These lesions grow slowly and rarely metastasize.

*The skin cancer section in this monograph has been adapted from: ATSDR Case Studies in Environmental Medicine: Skin Lesions and Environmental Exposures, Rash Decisions. U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1993.

Diagnosis ☐

All potentially cancerous skin lesions must be differentiated from benign lesions. Suspected malignant skin lesions are diagnosed most accurately by histologic examination of excisional biopsies. A punch biopsy of suspect lesions may be also performed.

Treatment ☐

Prevention is the first line of defense for skin cancer. Avoiding overexposure to sunlight is most important. Protection from UV radiation can be accomplished by wearing tightly woven clothing and wide-brimmed hats and by applying sunscreens as absorbers. Sunscreens, which contain p-aminobenzoic acid (PABA) derivatives to absorb UV rays, can provide sun-protective factors (SPFs) ranging from two to 50 or more. A SPF of 15 allows most persons to remain out of doors for five hours before developing minimal erythema.

Light-complexioned persons, and those with certain conditions (e.g., albinism, xeroderma pigmentosum, and erythropoietic protoporphyria) appear to be at increased risk for developing skin cancer. These sensitive populations may require more protective sunscreens. Surgical excision and radiation are the most common treatment modalities for localized malignant skin lesions. All excised tissue should be sent for histologic examination to confirm the diagnosis and to be certain that an adequate margin of normal skin was removed. Surveillance for the development of further skin cancers or lesions with extensive local infiltration is beyond the scope of this review. Patients who have malignant tumors should be referred to, or treated in consultation with, a physician knowledgeable in skin therapy.

8. DIAGNOSTIC PROCEDURES

☐ Techniques

Obtaining and recording a detailed history of exposures is essential in diagnosing skin disease. Besides physical examination, several special techniques may aid in the diagnosis of skin disease. These include: Patch Tests (to detect contact allergy), Skin Biopsy, Cultures, and Microscopic Scrapings of Skin (to detect yeasts, fungi, parasites, and fibrous glass). Referring patients to, or consulting with, a dermatologist who can perform or interpret dermatologic diagnostic testing, may be advisable.

☐ Patch Testing

Farmers and agricultural workers suspected of having occupational allergic contact dermatitis should be referred for **patch testing** with all plants they are in contact with as well as the pesticides they use or are exposed to. Pesticides may be generally patch tested at a 1 percent dilution. A dilution of 0.1 percent is also suggested to avoid false-positive patch test reactions.

A minority of pesticides are commercially available in proper vehicles and concentrations for patch testing. (See Appendices D and E). False-negative reactions occur when patch testing with insecticides. Fear of systemic toxicity may deter one from patch testing with adequate concentrations of organophosphorous insecticides such as parathion. Some pesticides are dissolved in primary irritants, necessitating extreme dilutions for patch testing. Pesticides manufacturers have information on file regarding cutaneous irritation and allergenicity of their products.*

A number of authors have suggested appropriate patch test concentrations for pesticides. See attached Appendices D and E with suggested patch testing concentrations for pesticides, agricultural chemicals, and plants.

**Information found in the Farm Chemical Handbook*

Patch ☐ Testing Technique

Patch testing is frequently used to differentiate between allergic contact dermatitis and other forms of dermatitis. The presence of a delayed hypersensitivity reaction to an offending substance can be determined by placing a suitably prepared, nonirritating amount of sample on the skin (usually on the back) under a chamber or impervious bandage (patch). If an eczematous dermatitis lesion develops under the patch during the 48 hours after application, allergy to the test substance or to an antigenically similar cross-reacting substance can be inferred. If no reaction is evident, the patches are removed, and the sites are reexamined for delayed reaction at 72 and 96 hours after application.

Interpretation of patch testing is often difficult, and it is usually recommended that the testing be carried out in specialized centers or by consultants who routinely do patch testing. If no response is provoked, it does not mean unequivocally that the patient is not allergic. For example, if an offending or cross-reacting substance was not included, or was not applied in proper concentration, a false-negative result will occur. Complications of patch testing include the “angry back syndrome,” in which patient’s entire back becomes edematous and erythematous. Flare-up of previously existing eczema also can occur, especially when testing materials that are not obtained from standard commercial sources. Even local response to the test substance may be extensive, causing patient discomfort. Patch testing itself can result in allergic sensitization to a substance to which the patient was not allergic previously, although this is a rare occurrence. Infections, scarring, and pigment alterations may also be complications of patch testing.

Skin Biopsy ☐

The appropriate skin biopsy (punch biopsy or excision of the lesion) usually can be performed under local anesthesia by experienced practitioners in an outpatient setting. Microscopic examination of the specimens obtained can allow differentiation between benign and malignant skin conditions. Irritant and allergic contact dermatitis cannot be readily differentiated on routine skin biopsy.

Other ☐ Diagnostic Procedures

Skin scrapings, UV-light examinations, cultures, and serologic testing are diagnostic tools used for various skin diseases.

9. APPENDICES

APPENDIX A

Doctor's First Report of Occupational Injury or Illness.

APPENDIX B

Pesticide Illness Report.

APPENDIX C

History and Physical Examination Form.

APPENDIX D

Adams: Patch Testing Concentrations for Pesticides and Agricultural Chemicals (1990).

APPENDIX E

- Patch Testing Concentrations from Pharmascience,
- OEME/UC Agricultural Health & Safety at Davis:
Patch Testing Concentrations for Pesticides,
Agricultural Chemicals, and Plants (1992).

APPENDIX A: Doctor's First Report of Occupational Injury or Illness

STATE OF
CALIFORNIA

Within 5 days of your initial examination, for every occupational injury or illness, send two copies of this report to the employer's workers' compensation insurance carrier or the self-insured employer. Failure to file a timely doctor's report may result in assessment of a civil penalty. In the case of diagnosed or suspected pesticide poisoning, send a copy of this report to Division of Labor Statistics and Research, P.O. Box 420603, San Francisco, CA 94142-0603, and notify your local health officer by telephone within 24 hours.

1. INSURER NAME AND ADDRESS			PLEASE DO NOT USE THIS COLUMN
2. EMPLOYER NAME			
3. Address	No. and Street	City	Zip
4. Nature of business (e.g., food manufacturing, building construction, retailer of women's clothes)			Case No.
5. PATIENT NAME (first name, middle initial, last name)			Industry
6. Sex <input type="checkbox"/> Male <input type="checkbox"/> Female		7. Date of Birth Mo. Day Yr.	County
8. Address	No. and Street	City	Age
9. Telephone number ()		10. Occupation (Specific job title)	Hazard
11. Social Security Number		12. Injured at: No. and Street	Disease
13. Date and hour of injury or onset of illness Mo. Day Yr. _____ a.m. _____ p.m.		14. Date last worked Mo. Day Yr.	Hospitalization
15. Date and hour of first examination or treatment Mo. Day Yr. _____ a.m. _____ p.m.		16. Have you (or your office) previously treated patient? <input type="checkbox"/> Yes <input type="checkbox"/> No	Occupation
Return Date/Code			

Patient please complete this portion, if able to do so. Otherwise, doctor please complete immediately. Inability or failure of a patient to complete this portion shall not affect his/her rights to workers' compensation under the California Labor Code.

17. DESCRIBE HOW THE ACCIDENT OR EXPOSURE HAPPENED (Give specific object, machinery or chemical. Use reverse side if more space is required.)

18. SUBJECTIVE COMPLAINTS (Describe fully. Use reverse side if more space is required.)

19. OBJECTIVE FINDINGS (Use reverse side if more space is required.)

A. Physical examination

B. X-ray and laboratory results (State if none or pending)

20. DIAGNOSIS (if occupational illness specify etiologic agent and duration of exposure.) Chemical or toxic compounds involved? ☐ Yes ☐ No

ICD-9 Code _____

21. Are your findings and diagnosis consistent with patient's account of injury or onset of illness? ☐ Yes ☐ No
If "no", please explain.

22. Is there any other current condition that will impede or delay patient's recovery? ☐ Yes ☐ No
If "yes", please explain.

23. TREATMENT RENDERED (Use reverse side if more space is required.)

If further treatment required, specify treatment.

24. If hospitalized as inpatient, give hospital name and location. Date admitted Mo. Day Yr. Estimated duration Estimated stay

25. WORK STATUS Is patient able to perform usual work? ☐ Yes ☐ No

If "no", patient can return to: Mo. Day Yr.

Regular work _____

Modified work _____ Specify restrictions _____

Doctor's Signature _____

Doctor's Name and Degree (please type) _____

Address _____

CA License Number _____

IRS Number _____

Telephone () _____

PESTICIDE ILLNESS REPORT

PATIENT:

Name: Age: Sex: ☐ ¹ M ☐ ² F
Address: City: County:
Phone No.: () Social Security Number:
Occupation: Language ☐ ¹ English ☐ ² Spanish ☐ ³ Other

PHYSICIAN FILING REPORT:

Physician's name:
Physician's address:

INJURY:

At Address: City: County:
Was injury: ☐ ¹ At Home ☐ ² At Work--agriculture ☐ ³ At Work--nonagriculture ☐ ⁴ Other exposure
If at work: a) Employer's name:
Employer's address:
b) Manager or Supervisor:

Date of exposure: / / Time of exposure: [:] a.m. [:] p.m.
Date of illness: / / Date of death: / /
Is there reason to believe others were exposed? ☐ ¹ No ☐ ² Yes

PATIENT'S DESCRIPTION OF EXPOSURE:

Activity at time of exposure:
☐ ¹ Applying pesticides ☐ ² Manufacturing pesticides ☐ ³ Mixing pesticides ☐ ⁴ Entering pesticide areas
☐ ⁵ Disposing of pesticides or their containers ☐ ⁶ Eating contaminated food
☐ ⁷ Other exposure (explain):
Name of pesticide(s): Ingredient(s) of pesticide(s):

Primary route of exposure: ☐ ¹ Oral ☐ ² Dermal ☐ ³ Eye ☐ ⁴ Inhalation ☐ ⁵ Unknown

PHYSICIAN'S DESCRIPTION OF EXPOSURE:

Date first seen / / Time first seen:
Major signs, symptoms, adverse reactions:
Hospitalized? ☐ ¹ No ☐ ² Yes If Yes, hospital name: City:
Emergency room only? ☐ ¹ No ☐ ² Yes
Physician's office only? ☐ ¹ No ☐ ² Yes
Diagnostic studies ordered? ☐ ¹ No ☐ ² Yes If Yes, which studies?
Diagnosis:
Treatment:

Brief description of incident (if female, indicate if pregnant):

AGENCY COMPLETING FORM:

Agency/County: By whom:
Address:
Phone no.:

AUTHORITY

Part 1. Physician Responsibility

The Health and Safety Code (Section 2950) requires that a physician who knows, or has reasonable cause to believe, that a patient has a pesticide-related illness must report that case to the local health officer by telephone within 24 hours. The reporting requirement includes all types of pesticide cases: skin and eye injuries, systemic poisonings, suicides, homicides, home cases, and occupational cases. **Failure to comply with the foregoing reporting requirement renders the physician liable for a civil penalty of \$250.00.**

A case seen as a pesticide poisoning, or suspected as a pesticide poisoning, may not be categorized as "first-aid" and must be reported (Health and Safety Code, Section 2950).

For occupational cases, there is the additional requirement to send a copy of the "Doctor's First Report of Occupational Injury or Illness" (DFR) to the local health officer within seven days and also to send the DFR to the State Department of Industrial Relations.

Part 2. Responsibility of the Local Health Department Regarding Pesticide Illness Reporting

Each local health officer shall immediately notify the county agricultural commissioner and shall report to the Director, Department of Pesticide Regulation, the Director, Office of Environmental Health Hazard Assessment, and, for occupational cases, the Director, Department of Industrial Relations, on a form prescribed by the Director, Office of Environmental Health Hazard Assessment, each case reported to him or her pursuant to this section within seven days after receipt of any such report (Health and Safety Code, Section 2950).

ADDRESSES AND PHONE NUMBERS

Department of Pesticide Regulation,
Worker Health and Safety Branch,
1220 N Street, Suite 620
P.O. Box 942871
Sacramento, CA 94271-0001
(916) 654-0455

Department of Industrial Relations,
Division of Labor Statistics and Research
P.O. Box 420603
San Francisco, CA 94142-0603
(415) 703-3451

Office of Environmental Health Hazard Assessment
Pesticide and Environmental Toxicology Section (PETS)
2151 Berkeley Way
Berkeley, CA 94704-1011
(510) 540-3063

AVAILABILITY OF THIS FORM

Additional copies of this form are available from the Office of Environmental Health Hazard Assessment, PETS, 2151 Berkeley Way, Berkeley, CA 94704-1011. Telephone (510) 540-3063.

APPENDIX C: History and Physical Examination Form

*Reprinted with permission from Robert M. Adams, *Occupational skin disease*, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

Table 12-1. SUGGESTED FORM FOR RECORDING MEDICAL HISTORY AND PHYSICAL EXAMINATION OF PATIENTS WITH SKIN DISEASE SUSPECTED TO BE OF OCCUPATIONAL ORIGIN

Name _____	Date _____
Address _____	Age _____ Sex _____
Home phone _____ Soc.sec.no. _____	Referred by _____
Current employer (name and address) _____	
Job title at present _____	
Employer at onset of injury (name and address) _____	
Date employed _____	Date terminated _____
Job title at onset of injury _____	Date _____
Insurance carrier (name and address) _____	

Present Illness

Date of onset _____ Dates of disability _____

Location at onset _____

Patient's description _____

Time off work (incl. vacations)? _____

Effect of return to work? _____

Workers' Compensation claim? _____

Previous job(s)? _____ How long? _____

Previous Treatment

1. Plant dispensary _____

2. Other physician _____

3. Self-treatment _____

Description of Work

Materials contacted _____

Other workers affected? Yes _____ No _____ No. affected _____

How many workers on this job? _____

Methods of cleaning skin at work (and frequency) _____

Protective creams (names) _____

Protective clothing (incl. gloves) _____

Past History

Previous compensation claims? Yes _____ No _____ Explain _____

Previous skin diseases _____

Relation to occupation? Yes _____ No _____ Place of birth _____

Past health _____

Allergic history: Hay fever _____ Asthma _____ Eczema _____ Allergic to cosmetics, medications, creams, ointments, jewelry, drugs, perfumes? (circle which)

Describe _____

Family history of atopy or psoriasis? Yes _____ No _____ Second job _____

Hobbies

Housework _____ Full-time _____ Part-time _____

Married _____ Single _____ Widow _____ Divorced _____

Children _____ Yes _____ Number _____ Ages _____

Emotional factors _____

APPENDIX D:

*Reprinted with permission from Robert M. Adams, *Occupational skin disease*, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

Patch Testing Concentrations for Pesticides and Agricultural Chemicals

Antisapstain, 1%
Benomyl, 0.1%
Benzisothiazoline, 1%
o-Benzyl-p-chlorophenol, 1% (aq)
Calcium chloride, 1% (aq)
Captafol, 0.1%
Captan, 0.25%
Chloranil, 1%
Chloro-2-phenylphenol, 1%
Chlorothalonil (tetrachloro-
isophthalonitrile, 0.01% in acetone
Chloromethylphenoxyacetic acid, 1%
p-Chloro-o-cresol, 0.1% (alcohol)
Copper sulfate, 1%
Creosote, 10% (oo)
Cuprobam, 1%
Dazomet, 0.025% (aq)
Dichlone, 1%
Dichlorophen, 0.5%
Difolatan, 0.1%
Dinitrochlorobenzene (DNCB) 0.1 (acetone)
4,6-Dinitro-o-cresol, 0.5% (aq)
Dinobuton, 1%
Dinocap, 0.5%
Ditalimfos, 0.01% (manufacture discontinued
in the United States)
Dithianon, 1%
DNCB, 0.1% (aq)
Dowicide B, 1%
Dowicide E, 1%
Dowicide F, 1%
Dowicide 1, 1%
Dowicide 3, 1%
Dowicide 6, 1% (manufacture discontinued
in the United States)
Dowicide 7, 1%
Fentichlor, 1%
Ferbam, 1%
Folpet, 0.05%
Mancozeb, 1%
Maneb, 0.5%
Manzeb, 0.5%
Mercaptobenzothiazole, 1%
Metiram, 1%
Nitrofen, 0.5%
Otho-phenylphenol, 1% (aq)
p-Chloro-o-cresol, 0.1%
pentachloronitrobenzene, 0.5%
Pentachlorophenol, 1% (aq)
Phaltan, 0.01%
Phenylmercuric acetate nitrates, 0.01%
Propineb, 1%
Streptomycin (bactericide), 1%
Tetrachlorodihydroxydiphenyl, 1% (aq)
Thiram (thiuram), 1%
Tributyltinhydroxide, 0.01% in water
Zineb, 1%
Ziram, 1%

Herbicides

Alachlor, 1%
Allidochlor, 0.1%
Amitrole, 1%
Aminoguanidine, 5% (manufacture discontinued
in the United States)
Atrazine, 0.1% (aq)
Barban, 0.1% (acetone)
Chloridazone, 0.1% (manufacture discontinued
in the United States)
Cyanamide, 1% (aq)
2,4 D, 1% (aq)
Dazomet, 0.25%
Desmetryn, 1%
Dichlorobenzene, 5% chloroform (manufacture
discontinued in the United States)
Diquat, 0.1%
DNCB, 0.1% acetone
Methoprotrotryne, 1% (manufacture discontinued
in the United States)
Molinate, 1%
Nitrallen, 1% (manufacture discontinued
in the United States)
Nitrofen, 0.5%
Paraquat, 0.1%
Pentachlorophenol, 1%
Phenmedipham, 2% (aq)
Prometryn, 1%
Propachlor, 1% (manufacture discontinued
in the United States)
Propanil, 1%
Simazine, 1%
Trichlorobenzyl chloride, 1% (manufacture
discontinued in the United States)

Plant Growth Regulators

Choline chloride, 1%
Chlorphenesin, 1%

Insecticides

Aldrin, 1%
Arsenic, 1%
Arsenic trioxide, 5% (starch powder)
Azinphos-methyl, 1%
Benzyl benzoate, 5%
Carbamates (methyl), 1%
Carbaryl, 1%
Chlordane, 5% acetone
Chlorobenzene, 5% (oo)
Chlorothion, 1% alcohol
Dazomet, 0.25% (aq)
DD, 1% alcohol
DDD, 1% acetone

APPENDIX D: (continued)

*Reprinted with permission from Robert M. Adams, *Occupational skin disease*, 2nd edition. Philadelphia: W.B. Saunders Co., 1990.

Insecticides (continued)

DDT, 1% pet (manufacture discontinued in the United States)
Diazinon, 1%
Diazonium, 1% (alcohol-open)
Dichlorophen, 1%
Dichlorodiphenyl, 5% acetone
Dichlorvos (DDVP), 0.05% (aq)
Dieldrin, 1%
Difluorodiphenyltrichloroethane, 5% acetone
Dilan, 5% acetone (manufacture discontinued in the United States)
Dimethoate, 1%
Dinobuton, 1%
Endosulfan, 1%
Fenticlor, 1%
Flit, 25% (oo)
Flusides, 1%
I50 Flurophate, 1% (alcohol-open)
Kerosene, 50% (oo)
Lead arsenate, 20%
Lindane, 1%
Malathion, 0.5%
Metacide, 1% (alcohol-open)
Metaldehyde, 1%
Naled, 1%
Nicotine, 5% (aq)
Ovex, 5% acetone
Paraoxon, 1% alcohol-opne (manufacture discontinued in the United States)
Parathion ethyl, 1% (open)
Parathion methyl, 1% (alcohol-open)
Paris green, 1% acetone (manufacture discontinued in the United States)
Petroleum, 10% (oo)
Phenothiazine, 1% (aq sol)
Potasane, 1% (manufacture discontinued in the United States)
Propargite, 1%
Pyrethrum, 2%
Rodannitrobenzene, 1%
Rotenone powder, 5% in talcum
Sodium sulfide, 2% (aq)
Streptomycin, 1% (bactericide)
Sulfur, 5%
TDE, 5% acetone (manufacturer discontinued in the U.S.)
Tetmosol, 1%
Topocide, (as is)
Xylene, 50% (oo)

Insect Repellents

Deet, 5% (alcohol-open)
Ethohexadiol, 5% (oo)

Fumigants

Carbon tetrachloride, 10% (oo)
Chloropicren (?), 0.25% in water
1,4-Dichlorobenzene, 1% (manufacturer discontinued in U.S.)
Ethylene oxide, 0.01% (aq)

Fumarontile, do not test
Metam-solium, 0.03%
Naphthalene, 2% (alcohol)
Propylene dichloride, 1% (acetone) mfg. discon. in U.S.

Veterinary Medications and Feed Additives

Benzalkonium chloride, 0.1% (aq)
Chlorpromazine, 1% (photopatch)
Cinnamon oil, 0.5%
Cobalt, 1%
3,5-Dinitro-o-toluamide, 1%
Ethoxyquin, 0.5%
Furadantin, 5%
Furazolidone, 3%
Furfuraldehyde, 3%
Lauryl gallate, 2%
Neomycin, 20%
Nitrofurazone, 3%
Olaquinox, 0.5% (photopatch)
Olaquinox, 10%
Penethamate, 25% (olive oil) Mfg. discon. in U.S.
Penicillin, 1%
Piperazine, 5% (aq)
Phenothiazine, 2.5%
Quindoxin, 0.1%
Rosin, 20%
Spiramycin, 10%
Tylosin, 1%

Animal Repellents

Citronella oil, 1%
Diethyl phthalate, 2%
Eucalyptus oil, 1%
Nicotine sulfate, 5% (aq)
Oil of lemon grass, 1%
Paradichlorobenzene, 1% (alcohol)
Pine tar, 1%
Synthetic oil of mustard, 0.1%
Thiram, 1%

Chemicals Used to Protect Seeds From Birds

Anthraquinone, as is (Mfg. Discon. in U.S.)

Rodenticides

ANTU, 1%
Thallium, 1% (aq sol)
Warfarin, 0.05%

Miscellaneous

Bronopol, 0.25%
Kathon CG, 100 ppm (aq)

APPENDIX E: Patch Testing Concentrations for Pesticides, Agricultural Chemicals, and Plants

Source: list of materials from Michael O'Malley, M.D., Worker Health & Safety, California E.P.A. Department of Pesticide Regulations, 1020 N Street, Rm. 200, Sacramento, CA 95814

TEST	MATERIAL	CONC. %
1	Geraniol	1%
2	Eucalyptus Oil	2%
3	Captan	0.1%
4	Zineb	1%
5	Captan (Difolatan)	0.1%
6	Maneb	1%
7	Folpet (Phaltan)	0.1%
8	Pyrethrum	2%
9	Benomyl (Benlate)	0.1%10
10	Ziram	1%
11	White Petrolatum	100%

TEST	MATERIAL	CONC. %
1	Carnation	10%
2	Primin	0.01%
3	Chrysanth indicum	3%
4	Common ivy	1%
5	Sunflower	2.5%
6	Tuliposide	0.1%
7	Daffodil	1%

TEST	MATERIAL	CONC. %
1	DCNA	1%
2	ACEPHATE	1%
3	FENBUTATIN-OXIDE	0.1%
4	DIAZINON	1%
5	CHLOROTHALONIL	0.001%
6	DIENOCHLOR	1%
7	MALATHION	0.5%
8	PERMETHRIN	1%
9	FLUVALINATE	1%
10	VINCLOZOLIN	1%
11	PCNB	1%
12	CHLORPYRIFOS	1%
13	SULFUR	1%

Source: list of materials from Pharmascience

TEST	MATERIAL	CONC. %
1	Potassium Dichromate	0.5%
2	Neomycin Sulphate	20%
3	Thiuram Mix	1%
4	Paraphenylenediamine free base	1%
5	Cobalt Chloride	1%
6	Benzocaine	5%
7	Formaldehyde (in water)	1%
8	Colony	20%
9	Quinoline Mix	6%
10	Balsam of Peru	25%
11	PPD-Black Rubber Mix	0.6%
12	Wool Alcohols	30%
13	Mercapto Mix	2%
14	Epoxy Resin	1%
15	Paraben Mix	15%
16	Paratertiarybutyl Phenol F. Resin	1%
17	Fragrance Mix	8%
18	Ethylenediamine Dihydrochloride	1%
19	Quaternium 15	1%
20	Nickel Sulphate	5%
21	(C1)Me-isothiazolinone	0.67%
22	Mercaptobenzothiazole	2%
23	Primin	0.01%

10. CONTACTS/SUGGESTED READING/REFERENCES

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2. National Institute of Occupational Safety & Health (NIOSH) queries: call (800) 35-NIOSH, FAX (513) 533-8573, Publications Office, e-mail pubstaft@niosdtl.em.cdc.gov, or write NIOSH Publications Office, 4676 Columbia Parkway, Cincinnati, OH 45226
3. *ATSDR Case Studies in Environmental Medicine: Skin Lesions and Environmental Exposures, Rash Decisions*. U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry 1993. Division of Health Education (404) 639-6204
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11. ANSWERS to Pretest and Challenge Questions

Pretest Pretest questions from page 1.

(a) Agriculture's exposures: plant, chemical (pesticides, etc.), physical (sun, heat, abrasion), etc. (see page 2) cause common skin diseases.

(b) Skin disease treatment and prevention are discussed below and on page 11.

Case Study One: Challenge questions from page 3.

1. The patient's problem list includes dermatitis (irritant, allergic, or infectious) and possible pesticide exposure.
2. He had been pulling *A. cotula* (mayweed) and *Lactuca scariola* (prickly lettuce) in the field. The field had not been treated with pesticides applied for six months. In the next week, six of his co-workers developed the same rash.
3. Culture revealed no growth. Gram stain was negative. Additional testing for the patient would include skin patch testing to weeds or plant allergens the patient had been exposed to.
4. The patient should be treated with steroids topically or if sufficiently affected, by mouth, if not contraindicated. His wounds may be bandaged. Further exposure should be avoided by wearing protective clothing (gloves and shirt), or removal from exposure. Antihistamines may reduce any itching.
5. The prognosis is generally good for resolution of the dermatitis over several days following cessation of exposure.

Case Study Two Challenge questions from page 12.

1. The constellation of complaints of the patient in Case Study Two is consistent with urticaria. Her history suggests that a workplace exposure is the most likely cause. Balsam of Peru and various alcohols (especially propyl alcohol and ethyl alcohol) in numerous consumer cosmetic products and benzocaine in many over-the-counter topical analgesic preparations could also be causative agents.
2. Evaluation might include correlating the history of the illness with probable exposures, serologic studies of circulating IgE, and patch or scratch testing (performed by, or in consultation with, a dermatologist in a setting with resuscitation equipment in case of anaphylactoid reaction).
3. Usual treatment for contact urticaria includes advice to avoid suspected or known causative substances and administration of antihistamines and provision of epinephrine for emergency, self administration as necessary. In certain patients, (with non-immune urticaria only) nonsteroidal anti-inflammatory medications have shown some efficacy.

Case Study Three Challenge questions from page 15.

1. He has a basal cell carcinoma on his jawline, actinic keratoses on his ears and hands, and solar elastosis of the adjacent skin.
2. Sun exposure, common in agriculture, is the leading risk factor for these lesions.
3. Treatment of the man's basal cell carcinoma may involve radiation therapy or excisional biopsy, including a suitable margin of normal-appearing skin. All tissue removed should be submitted for histologic confirmation of diagnosis and to be certain the tissue borders are free of cancerous cells. The patient should be counseled to avoid prolonged exposure to sunlight and to use sunscreens or protective clothing whenever exposure to sunlight is anticipated.

12. POST TEST

To obtain CME credits answer the following questions, circle **all** correct answers and record your answers on page 33.

1. Skin disease risk in agricultural work is:
 - a) Equal to many other industries
 - b) Twice as common as in general industry
 - c) Similar in most types of crops
 - d) Rarely attributable to poison oak/ivy exposures
 - e) Mostly from sun exposure
2. Allergic contact dermatitis is decreased in weather that is:
 - a) cold
 - b) wet
 - c) hot
 - d) very dry
 - e) none of the above
3. An appropriate biologic measure of contact allergy is:
 - a) skin prick testing
 - b) RAST testing
 - c) CD4 lymphocyte counts
 - d) patch testing
 - e) quantitative IgE measurement
4. The most common cause of occupational skin disease in California agricultural workers is:
 - a) *Xanthium pennsylvanicum* (cocklebur)
 - b) *Toxicodendron diversilobum* (poison oak)
 - c) *A. cotula* (mayweed)
 - d) malathion
 - e) *Lactuca scariola* (prickly lettuce)
5. Which of the following may help to differentiate irritant from allergic contact dermatitis?
 - a) Onset of allergic contact dermatitis is more explosive than onset of irritant contact dermatitis
 - b) Spreading to areas not directly exposed is more common with irritant contact dermatitis
 - c) Itching, stinging, or burning sensations are more pronounced with allergic contact dermatitis
 - d) Vesiculation is more pronounced than erythema in irritant contact dermatitis
 - e) Routine skin biopsy
6. Which procedure(s) may be helpful in differentiating allergic from irritant contact dermatitis?
 - a) Wood's light examination
 - b) Microscopic examination of skin scrapings in potassium hydroxide (KOH)
 - c) Patch testing
 - d) Skin biopsy and histologic examination
 - e) IgE level
7. Which of the following are potential complications of patch testing?
 - a) Sensitization to a substance to which the patient was not previously allergic
 - b) The "angry back" syndrome
 - c) Hemolytic anemia
 - d) aggravation of preexisting dermatitis
 - e) Pigmentation changes
8. Which of the following statements are true regarding contact urticaria?
 - a) The onset of hives is typically delayed for hours
 - b) The only known triggering mechanism in contact urticaria is inhalation of airborne allergens
 - c) Hives develop only at the site of actual contact with the offending substance
 - d) Its mechanism may be mediated only by a nonimmunologic reaction
 - e) Patch tests are of no use in determining the causative agent

EVALUATION/SUGGESTION/CONTINUING EDUCATION CREDIT FORM

Please suggest agricultural health topics, patient education materials or audiences that we might address.

If you wish CME credits or CEU, please indicate your answers to the Post Test questions on page 32 by circling the letters below for the correct answers. Complete the evaluation questionnaire and fill in the information requested on the reverse side. Tear off this page, fold, stamp, staple, and mail to the Division of Occupational/Environmental Medicine & Epidemiology, UC Agricultural Health and Safety Center at Davis, University of California, Davis, California 95616-8575.

- | | | | | | |
|----|---|---|---|---|---|
| 1. | a | b | c | d | e |
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| 5. | a | b | c | d | |
| 6. | a | b | c | d | |

Evaluation Questionnaire

Please complete the following evaluation by putting a check mark in the appropriate box.

As a result of completing this unit, I will be able to:

		Y	N	Unsure
1.	Explain how much dermatitis risk agricultural work presents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Understand the known factors contributing to agricultural dermatitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Assess a patient's environmental and occupational exposure to these factors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Effectively evaluate and manage agricultural dermatitis patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Efficiently comply with reporting of pesticide illness cases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Utilize a variety of sources to locate further information on agricultural work and dermatitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	I am more likely to ask patients questions regarding possible occupational or environmental exposures as a result of reading this issue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	I would recommend this issue to my colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	I will keep this issue as a reference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To obtain credit, please send \$5 and provide the information requested below.

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