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:ase Studies in Agricultural Medicine: Respiratory Disease in
.griculture (A Self-Instructional Case Study)

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UC Agricultural Health & Safety Center at Davis

CASE STUDIES IN AGRICULTURAL MEDICINE
Respiratory Disease in Agriculture
(A Self-Instructional Case Study)

ALERT . . .

- *Farmers, farmworkers and farm families are at risk for diverse respiratory diseases, among them, acute infectious or toxic pneumonitis and chronic asthma, bronchitis, silicosis and hypersensitivity pneumonitis (farmer's lung).*
- *Agricultural processes and the farm environment generate dusts, microbes, pollens, toxins and gases that are respiratory health risks.*
- *The combination of smoking and agricultural exposures may result in especially serious health risks. Minimizing smoking and other exposures helps prevent respiratory diseases.*

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 page 27 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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HOW TO USE THIS MONOGRAPH. . .

This monograph contains case studies that describe realistic encounters with patients who have respiratory diseases associated with agriculture. Cases are followed by challenge questions that measure the reader's existing knowledge about respiratory 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 the answers found on page 24. The challenge questions are followed by didactic material that will reinforce or extend the reader's knowledge. The monograph ends with a post test, 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 page 27 for further instructions on how to receive these credits.

The objectives of this monograph are to help you:

- ❐ Explain the respiratory health risk associated with agricultural work.
- ❐ Name known exposures contributing to respiratory disease in agriculture.
- ❐ Assess a patient's environmental and occupational agricultural exposures.
- ❐ Effectively evaluate and manage patients with agricultural respiratory disease.
- ❐ Utilize a variety of sources of agricultural respiratory disease information.

CONTENTS

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1. INTRODUCTION

❐ Agricultural Worker Health

Agriculture is a leading United States industry in terms of employment, production, and occupational illnesses and injuries. Agriculture often leads the nation in occupational fatality rate. In 1987, agriculture, mining, construction, and U.S. average all-cause work-related death rates per 100,000 workers were 49, 38, 35, and 11, respectively.

❐ California Agriculture

Approximately 20 percent of the total United States agricultural work force live or work in California, the leading agricultural state. The diverse work force includes Hispanics, Asians, Caucasians, Native and African Americans, and others. California agricultural production is also exceptionally diverse, leading the United States in the production of dozens of commodities, from fruits and nuts, to dairy products.

The diverse exposures and people in agriculture are linked by the relatively few common respiratory diseases: pneumonitis; pulmonary edema; obstructive lung disease; and restrictive lung disease (see table I). Therefore, we will present a case, then discuss exposures, population at risk, diseases, diagnosis, treatment, and prevention of respiratory disease in agriculture.

TABLE I

Respiratory Diseases Associated with Agricultural Work

Syndrome	Work Processes/Locations	Suspect Agent
Obstructive Lung Disease		
Asthma and bronchitis	Grain storage	Storage mites (Europe), probably endotoxins, unknown
	Swine, cattle and poultry confinement	Animal danders, bacterial and fungal antigens, unknown
	Fertilizer application	Ammonia
	Pesticide application	Inhibition of acetylcholine esterase
	Animal waste storage	Hydrogen sulfide, ammonia, bacterial or fungal antigens
Restrictive Lung Disease		
Interstitial lung disease	Grain storage	Crystalline silica contamination
	Vineyard	Copper sulfate, probably silicates
Pulmonary Edema	Recently filled silos	Nitrogen oxides
Pneumonitis		
Hypersensitivity	Silage storing Bird breeding	Variety of proteins and fungal agents including Micropolyspora, Thermaoctinomyces, Pennicillium, Graphium and Aurobasidium
Infectious	Animal husbandry or slaughter, soil tillage	bacteria, chlamydia, fungi
Organic Dust Toxic Syndrome	Silo uncapping Handling wood chips	Unknown, probably endotoxin

2. CASE STUDY

❐ A 42-Year-Old Man

A 42-year-old farmer is seen complaining of "being winded easier." He reports that he's had trouble keeping up with his livestock farm co-workers for six months, but that he's noted much more progressive coughing and shortness of breath in the last month. He brings up a little phlegm. It is a "normal" color without green or blood. His breathing seems worse since exposure to dust yesterday when cleaning up a shed.

History of previous illness reveals that the patient had brief bronchitis twice in the last ten years. He's otherwise been healthy except for a few cuts. He takes no medicine, doesn't have smoke exposure at home or work, and rarely drinks alcohol. His sister had asthma as a child.

He appears fit. At present, his temperature, respirations, pulse, and blood pressure are 98, 20, 76, and 128/84, respectively. Physical exam including HEENT, heart, and lungs reveals only a few left lower lung field wheezes. A chest x-ray and ECG performed in your office are unremarkable.

3. PRETEST

Challenge Questions

1. What would you include in the patient's problem list?

2. What would you include in the differential diagnosis?

3. What additional information would you seek to assist in the diagnosis?

4. What treatment would you offer this patient?

5. What is this patient's prognosis?

4. EXPOSURES

❒ Farmers and Agricultural Workers

Farmers and other agricultural workers (agriculturalists) are exposed to a variety of natural and synthetic toxic materials including soil, plant and animal dusts, noxious gases, microbes, microbial products and toxins (endotoxins, fungal proteins), and a variety of chemicals such as pesticides and fertilizers. Farming activity may put more of the above pathogens into the air just when the agriculturalists' breathing is increased with exertion. In addition, farmers may be involved in processes during agricultural operations that generate potential respiratory toxins such as diesel exhaust, welding gases, hydrogen sulfide, and ammonia. Furthermore, the agriculturalist may be exposed in diverse settings and circumstances. These include: the home (often located on the farm); the confined spaces of underground manure pits, silos, barns, machine sheds, etc.; deep in the foliage of grapevines, trees, etc. during the heavy exertion of picking; during the heavy exertion of handling livestock (often in the workers' breathing zone, where inhalation is greatest) for caging, veterinary, or other tasks; while on tractors or harvesters stirring up dust in the fields; etc. Thus, exposures to potential respiratory toxins in a farm environment can be diverse and are not limited to sources associated with primary processes of cultivation or livestock confinement (see table 2).

TABLE 2

Typical Particulate Exposures in California Agriculture

Operation	Respiratory Exposures of Concern	Typical Levels	Ind. Hygiene Recommended Limits (ACGIH)**	(U.S. OSHA)***
Manual harvest:	Total dust	13–31 mg/m^3	10mg/m^3	15mg/m^{3*}
Tree fruit, grapes for raisins	Respirable quartz	.07–1.05 mg/m^3	0.1mg/m^3	0.1mg/m^3
Field preparation: plowing, harrowing	Total dust	2.2–14 mg/m^3	10mg/m^3	15mg/$m^{3*/**}$
Grain elevator operations	Grain dust	1.4–16 mg/m^3	4mg/m^3	10mg/m^3
Poultry production: Growout	Total dust	11.6 mg/m^3	10mg/m^3	15mg/$m^{3*/**}$
	Endotoxins	100 ng/m^3	n/a	n/a
Catching	Total dust	20.2 mg/m^3	10mg/m^3	15mg/$m^{3*/**}$
	Endotoxins	250 ng/m^3	n/a	n/a

* Limit is 10 mg/m^3 for Cal/OSHA the California state OSHA program.
**American Conference of Governmental Industrial Hygienists
***U.S. Occupational Safety and Health Administration.
n/a = non applicable

5. POPULATION AT RISK

❐ Farmers and Agricultural Workers

Changes in the structure of farming continue to dramatically affect the numbers, activities, and working conditions of the agricultural population. Farmers and farm workers are present in every state. They are very diverse. Ages range from pre-teenagers to 90-year-olds. Women are active in agriculture, even during pregnancy. Many ethnic groups may work in agriculture in the course of their immigration and acculturation. Increasingly, agriculturists are part-time or seasonal. They may be farm operators, unpaid workers, hired farmworkers, legal and illegal foreign workers, migrants, and family members including children. Literacy and education range from nil to professional levels. Agricultural experience ranges from decades to nil. The prevalence of smoking among agriculturists may approach population averages.

❐ Children and Respiratory Risks

Historically, farming has been a family endeavor with all members participating in agricultural activities, from field preparation to harvest or livestock feeding. Thus, members of farm families may assist in a wide range of agricultural activities from a very young age. Very young children may also be exposed to respiratory hazards from living and playing in the farm environment. In addition, many farm workers such as migrant and seasonal workers may not have access to day care facilities and may need to have all members of their family participate in work activities.

It is of particular concern that young children and adolescents may be exposed to these work environments, because occupational standards for exposures are based upon adult exposures. Children also may be at increased risk of injury because they are less likely to heed written advisories or react appropriately to noxious warning properties of certain toxins, and adult supervision may not be readily available. Finally, there are physiological differences between the respiratory system of children relative to adults (e.g., increased lung surface area to volume, increase minute ventilation) that may place these young workers at risk of injury from respiratory toxins. Few clinical or epidemiologic data exists on respiratory illnesses among children due to agricultural exposures.

6. HEALTH EFFECTS & CLINICAL TREATMENT

❒ Respiratory System Diseases

The individual's respiratory responses to inhaled agricultural substances (dusts and gases) will depend on many factors: composition, irritative and antigenic properties of inhaled substances, size and shape of dust particles, location of deposition in the respiratory tract, intensity and duration of exposure, and the individual's susceptibility including immunologic status. The great majority of agricultural dusts are organic particles. Unlike inorganic particles such as rock particles in soil, which may produce a nuisance effect, organic particles are often biologically active, capable of producing irritating, allergic, toxic, inflammatory, or infectious responses. Responses may be acute or chronic, resolving completely or resulting in permanent impairment and disability, and sometimes ending in death. In addition to the above factors the individual's smoking history and occupational or environmental exposure to non-farm respiratory hazards play an important role in respiratory system diseases.

This monograph focuses on
- Obstructive Airway Disease
- Restrictive Pulmonary Disease
- Hypersensitivity Pneumonitis
- Organic Dust Toxic Syndrome
- Infectious Agents
- Specific Pulmonary Toxins.

❒ Obstructive Airway Disease

Because agricultural workers are exposed to many dust-generating processes, it is not surprising that acute obstructive airway dysfunction has been documented in this industry. Examples of dusts that may be respiratory irritants in the agricultural environment include pollens, grain particles, animal danders, and bacterial and fungal cell-wall components.

HEALTH EFFECTS & CLINICAL TREATMENT

Documented decreases in peak expiratory flow rates (PEFR) have been demonstrated for grain elevator workers in the United States and Canada. Similarly, grain industry workers in Australia had decreases in forced vital capacity (FVC) and forced expiratory volume (FEV) in one second within one week of starting work. Grainhandlers with higher dust exposure or a previous history of bronchial responsiveness were more likely to exhibit respiratory symptoms. In a study of American grainworkers, researchers found an adverse dose-related acute respiratory effect from grain dust exposure across the work shift that was not related to smoking habit, atopic status, or age. In a "nested" case-control study of grainworkers, exposure to grain dust at concentrations greater than 5 mg/m^3 was associated with a more rapidly declining pulmonary function. investigators observed that when grain workers in Canada experienced temporary layoffs, there was a corresponding decrease in respiratory symptoms.

❒ Symptoms

While the precise etiology for the acute respiratory symptoms related to work in the grain handling industry has not been elucidated, there is evidence from studies of European grain-storing farmers to suggest that allergic reactions to insects may be one cause of acute symptomatology. Allergy to storage mites is a documented cause of allergic rhinitis and occupational asthma among certain European farmers. The predominant symptom among farmers was rhinoconjunctivitis, but a significant proportion also reported allergic symptoms There was nearly a 60 percent prevalence of storage mite-specific IgE demonstrated in grainstorage workers who complained of work-related cough, wheezing, or breathlessness versus 9 percent in symptomless farm workers.

HEALTH EFFECTS & CLINICAL TREATMENT

However, a study of Canadian grainworkers showed no increased reactivity to allergy testing with grain dust mite or grain, just extract, and it is unlikely that the reduction in FEV_1 observed in these Canadian workers is related to storage mite allergy. It is possible that differences in storage conditions, especially moisture content, may lead to conditions that favor growth of these mites, and this in turn may produce a greater antigenic exposure for European workers than for workers who handle grain stored under drier conditions. Thus, the etiology of grain dust-related respiratory symptoms and airflow obstruction is due to more than a single agent, and the condition may indeed be related to the many constituents found in this complex mixture.

While most studies of acute respiratory disease in agriculture are commodity specific, limited data from large population-based studies suggest that chronic respiratory disease morbidity and mortality may be increased in this industry. Analysis of Social Security records suggests that agricultural workers have increased rates of respiratory disease disability, and mortality studies have shown an increase in chronic obstructive disease mortality in agriculture. These observations are particularly notable in view of the lower prevalence of cigarette smoking among farmers and farm workers than in the general population.

❒ Bronchitis and Other Chronic Airway Obstruction

Several studies have reported an increased prevalence of chronic respiratory symptoms among farmers exposed to biologic and physical agents. Studies of chronic respiratory symptoms in agricultural workers exposed to biologic and physical agents have been limited by the lack of a uniform definition of chronic respiratory disease and the lack of a universal reporting system. Despite these limitations, several studies have documented chronic airway obstruction in agricultural populations.

HEALTH EFFECTS & CLINICAL TREATMENT

Hog confinement workers are exposed to dusts with especially high concentrations of animal dander, bacterial and fungal proteins, and endotoxins. In a study of hog farmers versus other farmers, there was increased frequency of respiratory symptoms, including cough, chest tightness, sputum production, and chronic bronchitis, but no significant corresponding differences in lung function. Such symptoms along with fever or nocturnal dyspnea following exposure may represent early disease without lung function changes. Others have reported a slight decrease in FVC for swine-producing farmers versus nonfarming controls. Researchers evaluated more than 1800 Canadian farmers and found an increased prevalence of chronic bronchitis as well as slight reductions in both FVC and FEV_1 relative to a nonfarming control group. Other studies have not confirmed these results. A study of male farmers and farm workers in England and Wales, for example, found no difference in the prevalence of chronic bronchitis symptoms compared with controls from industry. This group of farmers was less likely to smoke but showed a slight reduction in FEV_1 and forced expiratory flow from 25 to 75 percent (FEF_{25-75}), which was more common among silage and dairy workers.

Chronic respiratory symptoms were not more prevalent in Canadian farmers exposed to grain dust compared with community controls. While slight reductions in FVC and FEV_1 were recorded for former farmers relative to nonfarmers in this study group, this was felt to be secondary to greater involvement with livestock confinement. There was a strong relationship between respiratory symptoms and smoking.

In a survey of Yugoslavian farmers, researchers observed an increased prevalence of bronchitis among nonsmoking workers who reported their occupation as farmer or cattle breeder compared with those workers who reported their occupation as craftsmen. The prevalence of chronic bronchitis was also increased for smokers employed in cattle breeding or farming but not for tractor drivers. The results of this study were somewhat compromised by the high prevalence of smoking in the study group.

HEALTH EFFECTS & CLINICAL TREATMENT

Occupational asthma may result from many exposures occurring in the agricultural workplace. In general, causal agents consist of organic antigens contained in dusts from plant or animal sources, although chemical irritants may cause or exacerbate asthma.

The prevalence of asthma among farmers and farm workers in unknown, and most reports have focused on single commodities or exposures, such as coffee bean, mushroom, and wood dusts. Many of the reported etiologies occur in the production of agricultural products, such as among production workers for vegetable gums, teas, and spices, For some agents, such as grain dusts, it may be difficult to separate chronic bronchitis with reduced FEV_1 following cotton dust exposure.

❒ **Summary**

In summary, while most studies of farmers have not demonstrated consistent objective evidence of chronic lung injury, there is ample evidence that the prevalence of respiratory symptoms is increased for several groups of agriculture workers. This is apparent for both grain handling/storage workers as well as for livestock confinement workers. While agriculture workers generally have a lower prevalence of smoking than the general public, this observation appears to be independent of smoking status. However, the interaction between smoking and agriculture exposure may vary, with some agricultural dust exposures having an additive effect with smoking and pulmonary function but a greater than additive effect (synergism) on respiratory symptoms. It is hoped that future studies will elucidate more precisely the respiratory risks associated with these endeavors and their interaction with cigarette smoking, thus providing a sound basis for strategies to prevent acute and chronic respiratory symptoms among agricultural workers.

HEALTH EFFECTS & CLINICAL TREATMENT

❒ Restrictive Pulmonary Disease

Aside from the chronic effects of hypersensitivity pneumonitides, such as farmer's lung, restrictive lung disease has not been an outcome generally associated with agricultural work. The paucity of data concerning this subject is partially a result of the low incidence of reported disease, the difficulty of diagnosis, and the difficulties in recognizing a link between exposures and disease.

Restrictive lung disease in agricultural workers has been observed among workers chronically exposed to organic dusts. These hypersensitivity pneumonitides were originally classified according to the source of dust exposure (farmer's lung, maple bark disease, bagassosis, suberosis, "vegetable dust" pneumoconiosis, etc.) The offending substances were found to be complex mixtures of inhaled endotoxins, single-cell organisms, chemicals, inorganic particles, and insects. The discovery of common cellular pathophysiologic mechanisms for multiple disease states (including activation of pulmonary alveolar macrophages and T lymphocytes) has led recent investigators to rename these disorders "organic dust diseases." The acute clinical course is often fulminant in nature and the patient seeks medical care, thus enabling detection of disease by surveillance mechanisms.

The diagnosis can be verified by the exposure history, clinical course, and the demonstration of serum precipitins to offending substances such as actinomycetes.

While chronic inhalation of organic dust represents a known risk for restrictive lung disease, recent studies indicate that inorganic dust may be hazardous as well. Data from industrial hygiene measurements of fibrogenic dust in the breathing zones of agricultural employees have found levels that consistently exceed standards set for nonagricultural industries. Recent studies include California agricultural operations, European and Russian agricultural operations, sugar cane harvesting, bean processing in the United States, and grain elevator operations.

HEALTH EFFECTS & CLINICAL TREATMENT

Crystalline silica (including quartz) is virtually ubiquitous in the earth, constituting more than 12 percent of the earth's land mass, and it may represent up to 20 percent of soil dust in California agricultural operations. Quartz dust inhalation is a significant risk for restrictive lung disease, both acute and chronic, as demonstrated in cohort studies of exposed workers in nonagricultural settings. High ambient levels of respirable quartz(<5 micron diameter particles) have been detected for agricultural settings as varied as tillage in Europe and California grape workers. Inorganic agents including silica also may be used as diluents or carriers for pesticides, but the extent of exposure and hazards from this source is unknown.

❐ Diagnosis and Differential Diagnosis

Screening for restrictive lung disease usually relies on clinical history, results of radiologic studies, and the demonstration of a "restrictive defect" on pulmonary function testing. The clinician's history and physical examination provide only modest insight into early restrictive lung disease, because symptoms and examination findings are often nonspecific or absent. Thus, for screening purposes, the diagnosis of restrictive lung disease is heavily dependent on radiographic studies and pulmonary function determinations. Since radiographic studies are rarely employed in asymptomatic individuals, spirometry may be the best objective screening tool for detection of restrictive lung disease in an exposed population. While the term "restrictive defect" most accurately refers to a reduced total lung capacity, with the widespread use of spirometry the term has been operationally defined as reduced FVC with relatively preserved FEV/FVC (FEV_1), compared to expected values. As such, the use of this term is non-standardized and has less than optimal specificity. A "restrictive defect" has been measured in up to 10 percent of individuals with reversible obstructive disease and documented in an agricultural setting from a farmer with the "reactive airways syndrome" after massive exposure to silage by-products.

The diagnosis of "agricultural pneumoconiosis" and its differential diagnosis from idiopathic pulmonary fibrosis therefore requires at least a demonstration of restrictive lung function and a positive work exposure history.

HEALTH EFFECTS & CLINICAL TREATMENT

Confirmation of cases can be accomplished by the biopsy of lung tissue, followed by x-ray dispersion techniques or scanning electron microscopy to demonstrate mineral content. Given the labor-intensive and costly nature of this diagnostic regimen, the lack of specific clinical findings in diseased individuals, the lack of access to medical care, and the migrant nature of many individuals with high exposures to inorganic agricultural dusts, it is not surprising that agricultural pneumoconioses are infrequently diagnosed.

Recent studies of agricultural workers suggest that restrictive lung disease may be more common than previously suspected. Large cross-sectional spirometric studies of pulmonary function in Canadian farmers, Canadian swine producers, Canadian grain handlers, and California grape workers have found restrictive or mixed restrictive/obstructive pulmonary function compared to controls. Cross-shift or short-term longitudinal studies have found reduced FVC and/or restrictive lung disease in grain workers in Canada and in Wisconsin and Minnesota.

In addition to pulmonary function studies, some radiologic studies have found evidence of restrictive lung disease in agricultural populations. These include a Bulgarian farming community, tractor drivers in the Russian forestry service, and Danish fruit growers. Other reports, such as a cross-sectional study of Canadian grain handlers, have found no increase in radiologic evidence of restrictive lung disease.

Relatively few case-reports of agricultural pneumoconiosis exist. Pulmonary fibrosis and heavy deposits of silicates as determined by x-ray dispersion radiography have been found in several career farmers, and silicosis has been diagnosed in a railroad worker with a heavy 11-year exposure to silica-laden wheat dust. In Northern California, an autopsy series of seven individuals, including six agricultural workers, demonstrated heavy pulmonary deposition of silicates and interstitial fibrosis. In addition, the pulmonary silicate type matched regional soil type, suggesting that environmental silica dust was responsible for interstitial lung disease in these agricultural workers.

HEALTH EFFECTS & CLINICAL TREATMENT

❒ Summary

Restrictive lung disease is a recognized hazard in agriculture. While diseases due to organic agents and some chemicals in agriculture is at present unknown. The dearth of reported cases of "agricultural pneumoconiosis" suggest that this hazard may be slight, but diagnostic biases and the migrant nature of the exposed population may make the rarity of case reports misleading. Data from recent studies indicate that agricultural workers may be at greater risk from inorganic agents than previously thought. Clinicians should become more aware of possible toxic respiratory exposures in agricultural work and of the possible link between these exposures and resultant restrictive lung disease, which is often indistinguishable from idiopathic or infectious disease without a careful occupational history and/or mineralogic analysis. Employers should be advised to reduced employee exposure wherever practical.

HEALTH EFFECTS & CLINICAL TREATMENT

❒ Hypersensitivity Pneumonitis

"Farmer's lung" is probably the most well known respiratory disease of farmers. A variety of airborne organic dusts have been associated with development of this form of hypersensitivity pneumonitis, or allergic alveolitis in agricultural workers. Farmer's lung is most commonly associated with exposure to moldy hay. This dust contains a variety of antigenic substances, including spores and cell wall components from thermophilic actinomycetes. During enclosed feeding of livestock there may be high exposures to dusts from decomposing feedstuffs. Other agricultural workers with documented risk for hypersensitivity pneumonitis (and the associated exposures) include malt workers (sprouting barley), sugar cane workers (moldy cane fibers), mushroom workers (compost), and bird breeders (bird feces and dander).

❒ Symptoms

The acute symptoms of hypersensitivity pneumonitis typically occur within four to eight hours of heavy exposure. Symptoms may include fever, chills, cough, myalgias, and arthralgias. Similar symptoms may also be found in organic dust toxic syndrome (see table 3). These manifestations may entirely resolve if there are no further exposures. Commonly, the symptoms become progressively worse with increasing exposure, and the affected worker becomes increasingly symptomatic. Continued exposure may lead to a progressive syndrome characterized by cough, dyspnea, weakness, anorexia, and restricted lung function.

❒ Diagnosis

Minimal objective findings may be present in acute hypersensitivity pneumonitis. The chest x-ray is commonly normal in an initial episode, but a more severe case or progressive exposure may lead to alveolar filling and eventually a reticular nodular infiltrate. Repeated exposure may result in interstitial fibrosis, which can be severe with persistent exposure. Pulmonary function testing in chronic disease reveals a restrictive pattern with reductions in lung volume and diffusing capacity. The demonstration of IgG antibodies to one of the farmer's lung antigens (Micropolyspora faeni or Thermoactinomyces) is more a measure of exposure than an index of disease, and the test has very low specificity for the diagnosis of hypersensitivity pneumonitis.

HEALTH EFFECTS & CLINICAL TREATMENT

TABLE 3

Hypersensitivity Pneumonitis (HP) Versus Organic Dust Toxic Syndrome (ODTS)

Characteristics	Hypersensitivity Pneumonitis	Organic Dust Toxic Syndrome
Symptoms	Chills, dyspnea, myalgias, arthralgias, cough	Chills, headache, myalgias, cough
Time course	4–6 hours postexposure	4–6 hours post *high-level exposure*
Clinical findings	Fever, rales, abnormal CXR DLCO, +serum precipitins	Fever
Alveolitis	Lymphocytic	Neutrophilic
Course	Acute syndrome has variable course depending on severity, Chronic syndrome may be progressive, leading to restrictive interstitial lung disease	Resolves spontaneously without long-term sequelae
Prevalence estimates	5–8% of exposed	30–40% of exposed

CXR = chest X-ray; DLCO = single breath diffusing capacity

Once diagnosed, the worker should be removed from exposure and measures taken to prevent further injury. Treatment is largely supportive, because most workers have spontaneous regression of symptoms with removal from the offending exposure. Corticosteroids have been advocated, but efficacy has not been demonstrated. A randomized controlled study of Finnish farmers with the diagnosis of hypersensitivity pneumonitis found that while the steroid-treated group reported some subjective benefit initially, there was no significant change in lung function compared to control parties.

Unfortunately, exposure often continues after the diagnosis of hypersensitivity pneumonitis in the agricultural setting, because there is financial incentive or necessity for these individuals to continue working. In one study fully two-thirds of patients returned to farming and cattle feeding after the diagnosis of farmer's lung disease. One long-term evaluation of patients with the diagnosis of farmer's lung disease found that patients who continued to work in farm environments and had recurrences of symptoms were most likely to have abnormal pulmonary function and chest x-ray abnormalities.

Although hypersensitivity pneumonitis has been studied for more than 25 years, the precise pathologic mechanism of the illness is not known. Because more than 85 percent of patients with acute farmer's lung disease have precipitating antibodies to the fungi found in moldy hay, it was felt that the acute process was secondary to an allergic alveolitis induced by such an exposure. This is supported by the finding of an intense lymphocytic alveolitis in patients with acute farmer's lung disease who undergo bronchoalveolar lavage (BAL). However, the precise role of the lymphocytosis in the development of disease is not known, because many patients will have persistence of BAL lymphocytosis without evidence of clinical disease, and asymptomatic dairy farmers may have BAL lymphocytosis.

❐ Summary

In summary, hypersensitivity pneumonitis can be induced by a variety of organic dust exposures in the agricultural environment. The precise mechanism of disease is not known but appears to involve an immune-mediated response to respirable fungal or other antigens. Treatment is largely supportive, and there is no evidence to support steroid use. Since this syndrome can be progressive and lead to a severe restrictive pulmonary disease, farmers at risk should be encouraged to avoid exposure to contaminated materials.

HEALTH EFFECTS & CLINICAL TREATMENT

❒ Organic Dust Toxic Syndrome

The term "pulmonary mycotoxicosis" was previously used to describe this syndrome that resembled farmer's lung disease in symptoms but lacked positive antibody status. This syndrome has been described in relation to handling of moldy hay, grain handling, or cleaning up moldy wood chips, and has recently been renamed "organic dust toxic syndrome." It is distinct from farmer's lung antigen and BAL findings (see table 3). The results of biopsy and bronchoalveolar lavage suggest that this disease entity is secondary to an acute inflammatory response triggered by inhaled dusts. Often the only significant objective findings are fever and an elevated white blood cell count.

❒ Symptoms

A recent cross-sectional study of Swedish farmers found that 44 percent of the farmers interviewed had experienced at least one attack of this disorder and that it was most commonly associated with grain handling. The mechanism of injury is not known but appears to be in some way related to direct injury secondary to toxin inhalation. Since recent studies of silo unloading have demonstrated very high levels of organic dusts containing fungal and bacterial components, these components may play a role in the development of the acute syndrome. The syndrome is usually short lived and resolves spontaneously within a few days with only supportive measures.

❒ Infectious Agents

A variety of bacterial diseases including anthrax, brucellosis, mycobacterial infections, psittacosis, Q-fever, and tularemia have been spread by respiratory means among agricultural workers (see table 4). Psittacosis is probably the most common of these diseases but is typically associated with workers eviscerating poultry for market rather than farmers involved only in cultivation. Psittacosis typically occurs following direct inhalation of the bacteria from fecal material of infected birds, leading to an acute illness characterized by fever, headache, and a hacking nonproductive cough. Chest x-rays may reveal an interstitial pneumonitis, but this is nonspecific and the disease can only be confirmed by serologic testing.

HEALTH EFFECTS & CLINICAL TREATMENT

❒ Fungal Infections

Fungal agents may also cause respiratory disease in agricultural workers, and coccidioidomycosis is probably the most well-documented fungal cause of disease in this population. Coccidioides immitis is a dimorphic fungus that is endemic to the semi-arid regions of the southwestern United States and may be transmitted by inhalation of fungal spores from infected soils. In a survey of 100 patients who developed coccidiomycosis in Fresno, California, it was found that 50 percent had been employed in farm labor just prior to the onset of illness. Since farmers are often involved in activities that disrupt the integrity of the topsoil and thus disperse the fungal spores, one might expect that this occupational group should be at risk for acquiring pulmonary coccidiomycosis. Histoplasmosis has not been as carefully studied with regard to occupation, but there appears to be an increased risk for agricultural workers. Those farmers and others who are exposed to poultry fungal respiratory infection in immunocompetent hosts are often self-limited and resolve spontaneously without long-term sequelae. In rare cases dissemination may occur, leading to fungemia, meningitis, and occasionally death.

TABLE 4

Respiratory Infectious Diseases Associated with Agricultural Work

Bacterial Disease	**Source**	**Agent**
Q fever	Livestock—sheep, cattle	*Coxiella burnetii*
Anthrax	Livestock	Bacillus anthracis
Brucellosis	Cattle, pigs	*Brucella*
Psittacosis	Turkeys	*Chamydia psittaci*
Tularemia	Sheep	*Francisella tularensis*
Mycobacterial disease	Poultry, cattle	*Mycobacterium avium-intracellulare* complex
Leptospirosis	Cattle, sheep	*Leptospira interrogans*
Fungal Disease		
Coccidioidomycosis	Farming contaminated soil Southwest U.S., Mexico	Coccidioides immitis
Histoplasmosis	Ranching, poultry waste	*Histoplasma capsulatum*

❒ Specific Pulmonary Toxins

Agricultural workers may be exposed to a multitude of potential acute respiratory toxins and to a variety of hazardous conditions. Some potential toxins to the respiratory system include hydrogen sulfide, fumigants such as phosphide and phosgene, ammonia, oxides of nitrogen from decomposing silage, herbicides, and pesticides.

The confined spaces used for storage of animal excrement provide an anaerobic environment that favors the production of hydrogen sulfide. Agricultural workers who have inadvertently entered these environments have developed acute toxicity, including respiratory failure and death. These environments may also contain toxic levels of ammonia, which can act as an acute repertory irritant at low concentrations and cause pulmonary edema with very high exposures. Another common exposure to ammonia occurs when agricultural workers are inadvertently exposed to anhydrous ammonia concentrates used for fertilizer. Anhydrous ammonia inhaled under these conditions can expose the upper airway to concentrations that overwhelm the normal host defense mechanisms and lead to severe scarring and occasionally bronchiectasis.

Oxides of nitrogen are formed during natural fermentation of silage in an enclosed space, and a syndrome of pulmonary edema with progressive bronchiolitis obliterans has been described among silo unloaders. The low solubility of nitrogen dioxide facilitates the entry of this gas deep into the lung, thus resulting in alveolar injury. Prevention of disease depends upon recognition of the hazard and avoidance of entry into confined spaces containing silage until adequate ventilation has been achieved.

HEALTH EFFECTS & CLINICAL TREATMENT

Agricultural workers may also be at increased risk for cancer, including lung cancer, from exposure to pesticides and herbicides or to other agents in the agricultural environment. While most studies of cancer in farmers have observed lower lung cancer rates and an increase in several non-respiratory malignancies, there is some concern that specific exposures could predispose this group to respiratory cancer. Etiologic studies of this population are difficult, because the lower smoking prevalence is associated with a lower rate of lung cancer than for the general population. One retrospective cohort study found a two-fold increased risk for lung cancer among pesticide workers that could not be attributed to differences in smoking habits, but a study of pesticide applicators in Sweden was unable to demonstrate increased lung cancer risk. A case-control study of orchardists exposed to arsenic-containing pesticides in Washington state found no excess mortality from lung cancer. Finally, a case-control study of lung cancer patients in Canada found that farmers who developed lung cancer reported a more extensive exposure to herbicides, grains, and diesel exhaust than sibling who did not develop lung cancer.

One rather unique occupational exposure is that of biogenic silica to agricultural workers during harvesting and field preparation. Biogenic silica is generated when sugar cane and rice fields are burned, and industrial hygiene surveys confirm that amorphous silica particulate is present during harvesting. These fibers are of respirable size, and air concentrations may exceed 300,000 fibers/cubic meter. It remains to be seen whether these fibers are potentially toxic, but there are two reports of mesothelioma among sugar cane workers. One study showed an increased relative risk for the development of lung cancer among sugar cane workers.

7. PREVENTION, STANDARDS, AND REGULATIONS

Prevention Measures

Prevention of respiratory disease in agriculture may be primary, secondary, or tertiary prevention. Primary prevention depends on avoiding disease by recognizing and minimizing pathogenic dust, gas, microbe, and tobacco smoke exposure. Secondary and tertiary prevention lie in promptly detecting disease and protecting workers with sensitivity to exposure.

Agricultural respiratory disease primary prevention measures include: education about pathogens, exposure sources, and hygienic measures (see tables 1 & 2); hygienic measures such as increasing ventilation, air filtration (eg. in tractor cabs) and/or misting to reduce pollutant and dust levels; and/or using personal protective equipment such as certified respirators that are fitted and maintained. (See the attached pamphlets on using disposable dust/mist masks in agriculture.)

Secondary and tertiary prevention programs might include periodic spirometry or questionnaires. A Doctor's First Report of Occupational Injury or Illness (see Appendix A) should be completed and submitted to avoid penalties. Sensitive workers might then have intensive primary prevention measures or other removal from exposure measures implemented. Whenever a work-related illness or injury requiring more than first aid care is recognized and not reported, civil penalties may apply to physicians.

Standards and regulations on respiratory exposures exist (see table 2 and the ACGIH and OSHA standards documentation. Also see suggested reading on page 23). These standards are often not applied or enforced in agriculture. This makes educating agriculturalists about respiratory pathogens and diseases (table 1), avoiding smoking (see pamphlet), and respiratory protection (see pamphlet) very important. Please also note the suggested readings.

8. SUGGESTED READING & ADDITIONAL SOURCES OF INFORMATION

1) UC Agricultural Health and Safety Center at Davis, ITEH, UCD, Davis, CA 95616-8757, (916) 752 -4050, e-mail: agcenter@ucdavis.edu
   World Wide Web:
   http://www-oem.ucdavis.edu/

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, Cincinnatti, OH 45226

3) *Agricultural Respiratory Hazards Education Series*, American Lung Association of Iowa, 1321 Walnut, Des Moines, IA. 50309

4) Schenker M, Ferguson T, Gamsky T. Respiratory risks associated with agriculture. *Occupational Medicine*, 1991; 6:415-428

5) Federal OSHA Peak Performance Exposure Limits (FedOSHA PELs): Title 29, Code of Federal Regulations, section 1910.1000

6) Cal/OSHA PELs: Title 8, Code of California Regulations, section 5155

7) American Conference of Governmental Industrial Hygienists, 1993–94 Threshold Limit Values and Biological Exposure Indices, ACGIH, Cincinatti, OH.

9. ANSWERS TO PRETEST QUESTIONS

1) The patient's problem list includes cough, dyspnea, phlegm, and dust exposure.

2) The differential diagnosis includes asthma, chronic pulmonary disease (obstructive or restrictive), hypersensitivity pneumonitis, toxic organic dust syndrome (TODS), and congestive heart failure (CHF).

3) Additional information: His symptoms were initially solely with his dustiest work (eg. catching chickens). He felt fine by the end of his last vacation five months ago. His spirometry shows a mild obstructive defect that is reversed by beta-agonist (Alupent) inhalation. Allergy skin testing shows reactions to tree pollens, but no poultry antigens were included.

4) The patient is treated with: avoidance of dust exposure, preferably by removal from dusty poultry work; or, if exposure must continue, mini peak flow meter testing pre-, mid-, and post-shift; inhaled steroids; beta agonist inhalation (not to exceed eight puffs per day for two weeks) and, as necessary, follow-up.

5) The prognosis of this patient's asthma is uncertain. Prognosis may be improved by follow-up to ensure that he avoids further exposure which should exacerbate and make his asthma chronic.

10. POST TEST

To obtain CME credits answer the following questions:

1. Respiratory health risks known to be associated with agricultural work include:
   a. Storage mite asthma
   b. coccidioidomycosis
   c. progressive bronchiolitis obliterans .
   d. pulmonary hypertension
   e. chronic obstructive pulmonary disease

2. Specific exposures and tasks associated with agricultural respiratory disease include:
   a. inhaling soil dust in the Southwestern U.S.
   b. working in animal confinement buildings
   c. handling moldy hay
   d. entering manure pits
   e. handling grain

3. Additional major sources of agricultural respiratory disease information include:
   a. American Lung Association
   b. American Heart Association
   c. 1-800-35 NIOSH
   d. U.S. regional Centers for Agricultural Disease and Injury Research, Education and Prevention (CADIREP).

4. Early indications of agricultural respiratory disease may be:
   a. transient cough
   b. sputum production
   c. chest tightness
   d. nocturnal dyspnea
   e. fevers after dust exposure

5. Behaviors that are likely to *reduce* agricultural respiratory disease risk include:
   a. high fiber diet
   b. not smoking
   c. wearing a moist cloth over the mouth and nose during dusty work
   d. use of a fitted, clean NIOSH-approved respirator during toxic dust exposure
   e. avoiding passive smoke exposures

6. An evaluation for agricultural respiratory disease might include:
   a. a methacholine challenge test
   b. sputum cytology
   c. spirometry
   d. chest x-ray
   e. a therapeutic trial of bronchodilator

7. Agricultural respiratory pathogens include:
   a. spores
   b. endotoxin
   c. gasoline
   d. silica
   e. gases

11. 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
2	a	b	c	d	e
3.	a	b	c	d	e
4.	a	b	c	d	e
5.	a	b	c	d	e
6.	a	b	c	d	e

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 respiratory diseases are associated with agricultural work	❑	❑	❑
2.	Understand the known factors contributing to agricultural respiratory diseases	❑	❑	❑
3.	Assess a patient's environmental and occupational exposure to these factors	❑	❑	❑
4.	Effectively evaluate and manage patients who suffer from agricultural respiratory diseases	❑	❑	❑
5.	Efficiently comply with reporting of pesticide illness cases	❑	❑	❑
6.	Utilize a variety of sources to locate further information on agricultural work and respiratory diseases	❑	❑	❑
7.	I am more likely to ask patients questions regarding possible occupational or environmental exposures as a result of reading this issue	❑	❑	❑
8.	I would recommend this issue to my colleagues	❑	❑	❑
9.	I will keep this issue as a reference	❑	❑	❑

Appendix A

STATE OF CALIFORNIA

DOCTOR'S FIRST REPORT OF OCCUPATIONAL INJURY OR ILLNESS

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.

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

24. If further treatment required, specify treatment plan/estimated duration.

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

26. **WORK STATUS**—Is patient able to perform usual work? ☐ Yes ☐ No
    If "no", date when patient can return to: Regular work ____/____/____
    Modified work ____/____/____ Specify restrictions ____________

Doctor's Signature ____________ CA License Number ____________

Doctor Name and Degree (please type) ____________ IRS Number ____________

Address ____________ Telephone Number ( )

FORM 5021 (REV. 4) 1992

Any person who makes or causes to be made any knowingly false or fraudulent material statement or material representation for the purpose of obtaining or denying workers' compensation benefits or payments is guilty of a felony.

A1578 (4/93)

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

Name ____________________

Address ____________________

City/State/Zip ____________________

Daytime telephone ____________________

- ☐ Degree and specialty ____________________
- ☐ Institutional affiliation ____________________
- ☐ Social Security Number (for transcript purposes only) ____________________
- ☐ Check enclosed payable to:
  The Regents of the University of California
- ☐ Charge Visa/Mastercard
  Phone Registration (916) 734-5390
  Fax Registration (916) 736-0188

Account number/expiration date ____________________

Authorized signature ____________________

- ☐ Check here to be placed on the UC Agricultural Health & Safety Center at Davis mailing list.

____

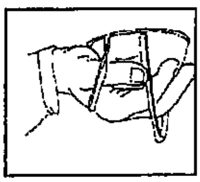
____

____

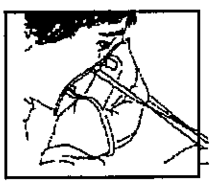
Office of Continuing Medical Education
Room 1019 Camellia Cottage
2315 Stockton Blvd.
Sacramento, CA 95817-2282

UC Agricultural Health & Safety Center at Davis

How to fit your dust/mist mask



1. Hold mask in hand with molded nose contour (narrow end) at fingertips, allowing headstraps to fall below hand.



2. Place mask under chin with molded nose contour (narrow end up).

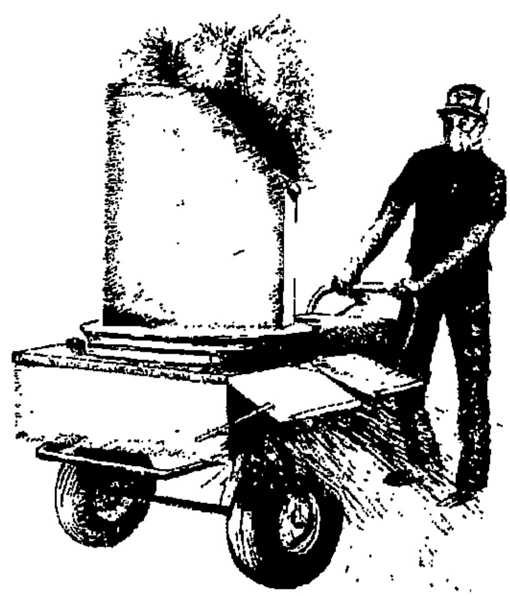
3. Pull shorter bottom strap over head, below ears, to around neck. Raise longer top strap to top back of head. Adjust mask to comfortable fit.

4. To check fit, cup both hands over mask and exhale deeply. If air leaks at mask edges, adjust straps back along the sides of the head.

NYCAMH

Supported by the UC Agricultural Health & Safety Center at Davis, NIOSH Cooperative Agreement Nos. U07/ CCU906162-4/94 & #PHS/0H07205-12/94, and the New York Center for Agricultural Medicine and Health (NYCAMH).

WHAT YOU SHOULD KNOW



... About Using Disposable Dust/Mist Masks On The Farm

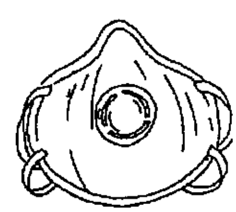
For more information, please contact the UC Agricultural Health & Safety Center at Davis, University of California, Davis, California 95616, Phone (916) 752-4050.

Disposable dust/mist masks may not provide the best protection for all agricultural situations, but properly used they can be adequate for most agricultural jobs. Not everyone can wear a disposable dust/mist mask. It you currently have respiratory problems, circulatory problems, psychological problems or minor facial abnormalities you may not be able to wear a disposable dust/mist mask. If you have questions, you should consult a professional before you start to wear respiratory protection.

Follow these four recommendations for the best possible respiratory protection while wearing disposable dust/mist masks

■ Purchase only approved masks

The mask must have a test certified number (TC-000-000) stamped on the mask or on the straps. The mask must have two straps. Only a mask with two straps will provide adequate protection. Look for the National Institute for Occupational Safety and Health Seal on the package NIOSH. **Remember! Always use a mask with two straps!**



■ Use the right mask for the job

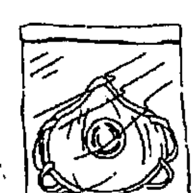
A mask approved for protection against dust/mist must only be used in a job involving dust/mist exposure. Avoid life-threatening situations where there may not be enough oxygen (air). **A dust/mist mask offers no protection if worn while entering freshly filled silos and manure storage pits or while spraying pesticides.** discard and replace mask if breathing becomes difficult and/or if the mask becomes saturated with dust particles or mist droplets. Also discard and replace the mask if you can taste or smell the contaminant you are working with.

■ Make sure the mask fits your face properly

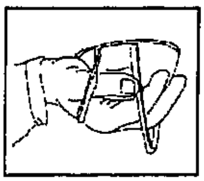
A tight seal against your skin is necessary to keep dust/mist from being inhaled. Keep in mind that facial hair (beards, long sideburns and mustaches) can interfere with this seal. Some facial features and scars may also prevent an adequate seal. **Refer to the back cover for a detailed explanation of how to properly fit a disposable mask.**

■ Store the mask in an airtight, sealed container

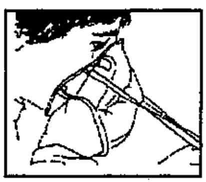
Proper storage prevents contamination of the mask when it is not being worn. A sealable plastic bag or a clean plastic sealed can are good storage containers. A disposable mask must not be hung on a nail in the barn where it can be contaminated with dust before it is worn.



■ Cómo ajustarse bien la máscara



1. Sostenga el respirador en la mano con el contorno moldeado de la nariz (el extremo angosto) en la punta de los dedos. Las correas deben caer a los lados de la mano.



2. Coloque el respirador debajo del mentón (barbilla) con el contorno moldeado de la nariz (extremo angosto) hacia arriba.

3. Hale la correa de abajo, la más corta por sobre la cabeza, debajo de las orejas y alrededor del cuello. Levante la correa de arriba, la más larga, hacia la parte superior trasera de la cabeza. Ajuste el respirador para que descanse cómodamente sobre la cara.

4. Para comprobar si hay buen ajuste, ahueque las manos sobre el respirador y suelte todo el aire. Si el aire sale por los lados del respirador, ajuste las correas hacia atrás en los costados de la cabeza.

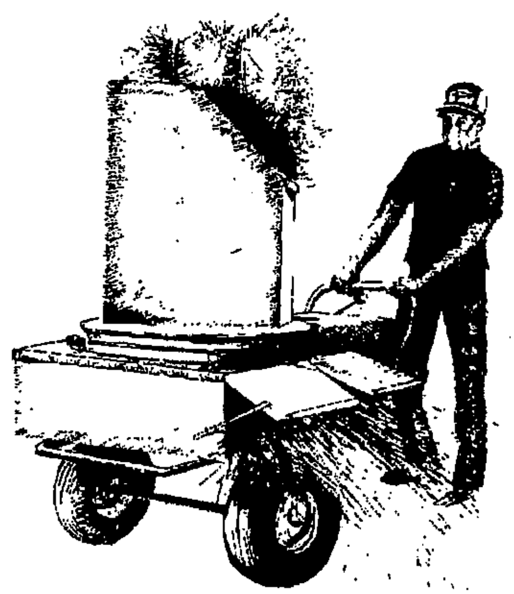
NYCAMH

Apoyado por el Centro de Salud y Seguridad Agricola de la Universidad de California, Davis; el acuerdo cooperativo de NIOSH #U07/CCU906162-04/95 y #PHS/0H07205-12/94, y el Centro de Agomedicina y Salud de Nueva York (NYCAMH)

Traducción de Irene Tenney, UC ANR Publications

UC Agricultural Health & Safety Center at Davis

LO QUE USTED DEBE SABER SOBRE



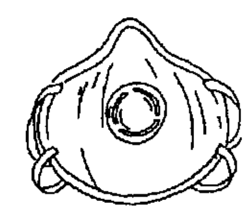
EL USO DE MáSCARAS DESCARTABLES CONTRA POLVO O NEBLINA PARA TAREAS AGRíCOLAS

Para información adicional, comuníquese con esta organización: The UC Agricultural Health & Safety Center, University of California, Davis, California 95616. Teléfono (916) 752-4050.

Las máscaras para polvo o neblina no siempre brindan la mejor protección en todas las actividades agrícolas. Pero, si se usan bien, pueden ser útiles para la mayoría de las tareas agrícolas. No todos pueden usar una máscara descartable contra el polvo o la neblina. Si usted actualmente padece de trastornos circulatorios, respiratorios, psicológicos o anormalidades faciales leves, el uso de una máscara descartable puede resultarle difícil o imposible. Si tiene preguntas o dudas, consulte a un profesional antes de comenzar a usar el equipo protector para la respiración.

SIGA ESTAS CUATRO RECOMENDACIONES PARA UNA MáXIMA PROTECCIóN RESPIRATORIA AL USAR MáSCARAS DESCARTABLES CONTRA POLVO O NEBLINA

■ Compre sólo las máscaras aprobadas



La máscara debe tener un número de la prueba de certificación (TC-000-000) impreso en la máscara o en las correas de ajuste. La máscara debe tener dos correas. Solo las máscaras con dos correas pueden brindarle protección adecuada. Busque el sello de NIOSH (National Institute for Occupational Safety and Health) en el envase. **¡Recuerde! Use siempre una máscara con dos correas de ajuste.**

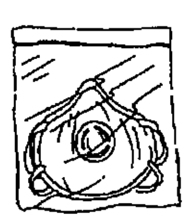
■ Use la máscara adecuada para cada trabajo

Las máscaras aprobadas para proteger contra el polvo o la neblina sólo deben usarse para una tarea en la que usted se exponga al polvo o la neblina. Evite situaciones que pongan en peligro su vida por falta de oxígeno (aire). **Una máscara para polvo o neblina no ofrece protección si se usa para entrar a un silo recién llenado o pozos de almacenamiento de estiércol, o para rociar pesticidas.** Quítese la máscara y póngase una nueva si respira con dificultad o si la máscara se tapona con partículas de polvo o gotitas de rocío, o en ambos casos. Elimine su máscara y use una nueva si comienza a oler o sentir el sabor del contaminante con el que trabaja.

■ Asegúrese de que la máscara se ajusta bien a su cara

Para que usted no respire el polvo ni la neblina, la máscara debe estar bien ajustada contra la piel de la cara. Recuerde que el vello facial (barba, patillas largas y bigotes) pueden impedir un buen ajuste. Algunos rasgos faciales y ciertas cicatrices también pueden tener el mismo efecto. **Consulte las instrucciones del reverso del folleto para una explicación detallada sobre la correcta colocación de la máscara descartable.**

■ Guarde la máscara en un recipiente cerrado donde no entre el aire



Las máscaras que se guardan correctamente no se contaminan. Una bolsa tipo ziplok o un recipiente limpio de plástico con tapa ajustada sirven para conservar limpia la máscara. Las máscaras descartables no deben colgarse de un clavo en la pared del establo porque pueden contaminarse con polvo antes de que puedan usarse.

No vale la pena (English translation)

Photo-Talk About Tobacco: It's not worth it!

PHOTO 1—Rafael has just arrived to the United States from Mexico.

PHOTO 2—Good afternoon, Sir.
Good afternoon, young man. What brings you here?

PHOTO 3—My name is Rafael . . . I am looking for a job. I just arrived from Mexico.
What luck! You got here just in time for the harvest. But right now it's lunch time and the person in charge of the hiring is not here.
Come on, have a seat. Let's have lunch together.

PHOTO 4—Don Ricardo and Rafael sit together to share the lunch Don Ricardo has brought.
Thank you very much, Don Ricardo. These bean burritos taste just like the ones my wife makes for me.
Now, let's have a cup of coffee.

PHOTO 5—While having lunch, Don Ricardo and Rafael became acquainted. . .
I'm not going to offer you any cigarettes. It's a bad habit that I wouldn't wish on anyone, not even on my worst enemy.
Excuse me for asking, Don Ricardo, but if it's such a bad habit, why do you smoke?

PHOTO 6—Let me tell you. I began smoking when I was very young, like you. I came to this country on my own. I used to feel very lonely and nervous. I thought cigarettes would calm me down.
Sometimes when I see my friends smoking I want to smoke, too.

PHOTO 7—No Rafael! I'm speaking from experience. Smoking isn't worth it. Before you know it, you are hooked.
Are you telling me that smoking is like any other addiction?

PHOTO 8—Well, look at me. I feel very weak. My body is tired and I have difficulty breathing. I don't have the same strength I used to.
Don Ricardo, why don't you try to quit smoking?

PHOTO 9—Do you think I can quit smoking after all these years?
I'm sure you can quit smoking. You already know about the health hazards of smoking. This could be the first step.

PHOTO 10—Believe me, I am very tired of smoking. I can't stand this coughing anymore (cough! cough!).

PHOTO 11—Let's make a deal! You help me get a job and I'll help you quit smoking.
OK. Let's start right now.
fft!

PHOTO 12—Look. I think the foreman is back. Come on. I'll introduce you to him. It looks like a day full of positive beginnings . . .

PHOTO 13—Including our friendship.

Smoking is not worth it!

These are some of the advantages of not smoking:

- Men who don't smoke are healthier and stronger than those who do.
- Men who don't smoke feel stronger and enjoy better health than those who do.
- Men who don't smoke are good role models for their children and provide healthier lifestyles.

For your own health and your family's health, DON'T smoke!

If you smoke, there are services in your community that can help you to quit smoking.

(Translated by Pedro Rodriguez-H. with permission)

This pamphlet was made possible by funds received from the Tobacco Tax Health Protection Act of 1988, through the California Department of Health Services and the Tobacco Education Clearinghouse of California, P.O. Box 1830, Santa Cruz, CA 95061-1830
Phone: (800) 258-9090, (408) 438-4822
FAX: (408) 438-3618

For smoking cessation assistance, call the Smokers' Helpline: English 1(800) 7NO-BUTTS; Spanish 1 (800) 45 NO FUME (in California); the American Lung Association 1(800) LUNG USA; or the American Cancer Society 1(800) ACS-2345.

Development of this material is supported by National Institute for Occupational Safety and Health (NIOSH) grants: PHS 0H07205-12/94, PHS CCU 906162-04/95 and T42/CCT910427, through the UC Agricultural Health & Safety Center at Davis, (916) 752-4050. Mention of the name of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health or the UC Agricultural Health & Safety Center at Davis.

CALIFORNIA SMOKERS' HELPLINE

1-800-7-NO BUTTS
English

1-800-45-NO FUME
Español

1-800-400-0866
國語和粵語

1-800-778-8440
Tiếng Việt Nam

1-800-556-5564
한국어

1-800-933-4-TDD
Hearing Impaired

UC Agricultural Health & Safety Center at Davis

University of California
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