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University of California, Davis

UC Davis Awarded \$8 Million by the EPA to Study Health Effects of Particulate Matter in California's Central Valley

By Kent E. Pinkerton, Ph.D.

The University of California, Davis, was selected by the U.S. Environmental Protection Agency (EPA) to serve as one of five national research centers to study the health effects of airborne particles. In November, the EPA awarded UC Davis \$8 million to establish the center for studying airborne particles over the next five years. The newly named San Joaquin Valley Aerosol Health Effects Research Center will focus much of its research on the Central Valley of California.

The San Joaquin Valley routinely experiences some of the highest fine airborne particulate matter concentrations in the United States, with fine and ultrafine particle concentrations that rival those found in Los Angeles. The American Lung Association reported that three of the four most polluted American cities are located in the San Joaquin Valley of California. Many of the air pollution source categories in the San Joaquin Valley are the same as in the rest of the country: transportation, wood smoke, refineries, and agriculture. The Central Valley also encompasses sharp gradients—concentrations are higher in the south-central portion of the valley and significantly lower in the foothills and further

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Sylvia Wright / UC Davis

A San Joaquin Valley farmer collects harvested almonds using an older type of machine that is being phased out in favor of less dusty designs.

Policy Recommendations Made for Improved Health of Hired Farm Workers

In November, WCAHS Center Director Marc Schenker, M.D., M.P.H., and Don Villarejo, Ph.D., consultant to WCAHS and principal author, released a 26-page report at a legislative briefing in the State Capitol outlining recommendations that could help improve the health and well-being of California's hired farm laborers. The report was commissioned by the California Program on Access to Care, California Policy Research Center, University of California.

The report reviews current research findings regarding hired farm workers and proposes seven policy initiatives to improve the health and well-being of California's hired farm laborers. They are:

- Enhance participation of eligible farm laborers and their families in Medi-Cal, Healthy Families and other health insurance programs.
- Enhance safety and labor law enforcement by adding a substantial number of new field inspectors to the staff of Cal/OSHA,

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north. Seasonal variations occur in the concentrations as well. The San Joaquin Valley's large extent, rapidly expanding population, and severe air pollution make it one of the United States' greatest emerging public health threats and an ideal location to study the acute and



Kent Pinkerton examines a cast of rat lungs. Sylvia Wright / UC Davis photo.

agriculture. An estimated 40 to 50 percent of all airborne particles in the Central Valley of California arise from agricultural sources to intermix with urban and industrial sources of pollution. Recent studies of air-quality health indicators reflect a growing concern for environmental factors that could be driving higher rates for childhood asthma and cardiovascular disease in the Valley.

The benefits of this center at UC Davis will be far-reaching with heightened interactions between experts from widely differing disciplines. The results of these studies will benefit both urban and agricultural communities. With the establishment of this

center, research efforts of the past two decades to understand how the Central Valley air quality affects health have come full circle. The environmental conditions in the Central Valley are unique, and UC Davis has the collaborative expertise of toxicologists, physiologists, engineers, chemists, atmospheric scientists and physicians to identify and solve some of the potential public health threats.

Kent Pinkerton, associate director for WCAHS, and co-director of the new research center, is a UC Davis professor of anatomy, physiology and cell biology in the School of Veterinary Medicine. Pinkerton investigates the interaction of gases and airborne particles in the lungs, and the effects of air pollution on lung structure and function. Pinkerton also is director of the UC Davis Center for Health and the Environment. He can be reached at kepinkerton@ucdavis.edu.

chronic health effects of airborne particles.

The center includes faculty from the UC Davis schools of Medicine and Veterinary Medicine, the College of Agricultural and Environmental Sciences, the College of Engineering and the College of Math and Physical Sciences. Professor Tony Wexler from the School of Engineering will serve as the center's director.

The mission of the center is driven by the need to study air pollutants and their health effects in a region where residents are exposed to some of the worst particulate air pollution in the country. The San Joaquin Valley represents one of the fastest growing areas of the country with a significant interface between large metropolitan areas surrounded by

Key Features of Research Program

The aerosol center's research will include:

- Collecting air samples from the San Joaquin Valley and making them available to researchers at UC Davis and nationwide for further study.
- Producing air pollutants in the laboratory that are representative of those found in the environment.
- Exposing cell cultures, tissue cultures and animals to San Joaquin Valley air pollutants or similar, laboratory-produced air pollutants and measuring their health effects.
- Understanding how particles affect lung development during childhood.
- Discovering how the genes of cells in the lungs and heart respond when they come in contact with particles, and whether those responses are caused by the particles' size, shape or chemical makeup.
- Mapping how particles move from the lungs to other organs.

Permanent Standards Must Be Adopted for Farm Workers at Risk of Heat-Related Illnesses

By Stephen McCurdy, M.D., M.P.H.

Our Summer 2005 edition of *AgHealth News* featured an article on heat stress among California farm workers. With daytime temperatures frequently in excess of 100°F, California farm workers are at risk for heat-related illnesses ranging from minor skin rash to potentially fatal heat stroke. The news feature described three deaths in the Central Valley during July 2005.

Heat illness is well understood in its broad mechanism, if not in all its detail. The human body works most efficiently at about 98.6°F. Heat is added to the body from normal metabolism (and increases markedly when muscles are working) from the air and surroundings, and from the sun's direct rays. Heat is taken away from the body primarily through evaporation of sweat. If the addition of heat to the body outpaces its removal, body temperature rises. Depending on how great a heat imbalance exists, the effects can be minor (heat rash) or major (heat exhaustion, heat stroke, and death). While hot days increase risk for heat illness, they are not required for it. Because the major sources of heat are the body's metabolism and work by muscles, heat imbalance and heat illness can occur even when ambient temperatures are in the 60- and 70-degree range.

Measures to reduce the uptake of heat include avoiding prolonged, uninterrupted work on hot days and use of shade and sun-protective clothing such as broad-brimmed hats. Because loss of excess heat occurs mostly through sweating, it is imperative to drink plenty of fluids (a quart an hour under severe

conditions) to avoid dehydration. Regulatory measures are generally focused on promoting these conditions and resources to prevent heat illness.

The recent heat-related illnesses and fatalities have drawn attention to California's regulatory process. Cal-OSHA established an advisory committee in late 1999 to make recommendations for a permanent heat standard. Unfortunately, the committee had been inactive since Spring 2002. It again took up its charge in July 2005, but it was clear that this would not lead to a permanent standard in time to prevent further illnesses, and potential deaths, related to heat exposure during the 2005 harvest season. Accordingly, the state Occupational Safety and Health Standards Board voted unanimously to adopt a temporary emergency

standard, which went into effect on August 22, 2005, for a period of 120 days.

The temporary standard requires employers to provide at least one quart of drinking water per employee per hour, access to shade for employees needing to prevent or recover from heat illness symptoms, and training in prevention and response to heat illness. In mid-December 2005, the Board readopted the standard for an additional 120 days to allow the advisory committee to continue its work in developing a permanent standard.

Cal-OSHA's rule-making efforts are in addition to several other relevant requirements or developments. Existing standards, including the Field Sanitation standard (8 CCR Section 3457), require provision of cool drinking water in adequate amounts. In addition, the California Legislature is considering AB 805 (Chu). This bill would require employers to provide, among other things, paid rest breaks of at least 10 minutes each hour on days with a maximum temperature of 95°F. (Depending on conditions, this requirement would apply also on some days with a maximum temperature of 90°F.)

California's highly productive and diverse agricultural industry entails unavoidable exposure to heat. The challenge for the agriculture community, and the state as a whole, is to develop and implement standards that will reflect our understanding of heat illness and effectively prevent its occurrence.

For more information about protecting workers from heat stress, visit www.dir.ca.gov on the Web.



WCAHS Ergonomics Co-Investigator John Miles Retires From UC

After nearly 30 years of service as a faculty member in the UC Davis Department of Biological and Agricultural Engineering, Professor John Miles retired on November 30. As co-director of the UC Agricultural Ergonomics Research Center, and co-investigator for WCAHS since its inception in 1990, Professor Miles has led an interdisciplinary team of researchers focusing on occupational ergonomics with an emphasis on creative ways to reduce skeletal muscular disorders in farm workers. Miles and his team have developed a national reputation as the foremost group of researchers in occupational ergonomics. Their work has influenced national occupational safety groups such as NIOSH to reorganize research priorities in ergonomics.



Miles received his master's degree in agricultural engineering from UC Davis in 1967. He went on to earn his

Ph.D. in the same discipline in 1971 from Cornell University in Ithaca, N.Y., serving in the U.S. Army from 1971 to 1973. After retiring from the U.S. Army as captain, Miles was recruited by the University of Arizona where he served from 1973 to 1976 as an assistant professor. Miles returned to Davis in 1976 after being appointed as assistant professor and assistant agricultural engineer in the University of California, Davis, Experiment Station, where he worked on forest engineering problems. His work varied from planting trees to managing brush fields, to soil compaction, to logging systems. He holds a patent on a forestry vehicle that provides power for a variety of tools that were designed to assist in reforestation and management of young stands conifers.

Some of his forest work was related to safety, but mostly it was related to improved forest practice. For example, Miles conducted field safety training on techniques to prevent large cable logging machines from overturning and causing injury to an 8- to 10-member crew.

Says Miles, "My move to ergonomics was due to an insistent request from the citrus industry to do something to 'civilize' the practice of picking citrus—something we are still trying to do, and with studies currently running, I think we have a chance to actually modify practices for the benefit of all."

Miles plans to continue working with the Agricultural Ergonomics Research Center on the Tree Fruit Harvest Project. He says, "I will consider working on new projects the group may address. I also hope to do a limited amount of consulting related to Agricultural Ergonomics issues."

Miles and his wife, Cynthia, own a cattle ranch in Amador County which consumes much of their time these days. Their first major project will be to build a new home on the ranch property.

"None of my ancestors have ever really retired—they just stopped doing some jobs and took on others. I anticipate that I will do the same," said Miles with a grin.

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county agricultural commissioners, and the Division of Labor Standards Enforcement of the California Department of Industrial Relations, as well as creating an independent public oversight review board.

- Reduce the number of farm laborer families in poverty by eliminating the agricultural exemption from overtime pay requirements that affect all other industries; enforcing labor code regulations for tools and travel time; raising the state minimum wage to \$8 per hour.
- Implement a new program to expand and strengthen the public health workforce that serves farm families and hired farm laborers.
- Expand the state's commitment

to housing for unaccompanied male farm laborers by increasing long-term funding commitments and related measures.

- Focus attention on the health and safety impact of agriculture's increased reliance on labor contractors, especially through increased disclosure requirements.
- Initiate a substantial new effort to provide basic information to farm laborers about their rights and responsibilities under California and U.S. law.

With labor demand increasing but the number of farmers and ranchers in the state plummeting, farmers have come to increasingly rely on year-round workers whom they hire directly and obtain short-term or temporary labor through intermediaries, such as labor contractors.

"It's well documented that these farm workers suffer high rates of fatal and nonfatal work-related injuries and illnesses, but 70 percent of laborers hired to work on perishable crops in California lack any form of medical insurance," said Villarejo.

Schenker says that he hopes their proposed policy initiatives will bring new attention to these issues and stimulate discussion among California legislators about how best to address the health and safety problems that farm laborers face every day.

A downloadable copy of the report is posted on the Web site of the Program on Access to Care of the California Policy Research Center at www.ucop.edu/cprc/cpac.html.

Save the Date

September 20-22, 2006

Health and Safety in Western Agriculture— Research to Practice (r2p)



Asilomar Conference Grounds, Pacific Grove, California

Sponsored by:

Western Center for Agricultural Health and Safety; Pacific Northwest Agricultural Safety and Health Center; Center for Occupational and Environmental Health; and National Institute for Occupational Safety and Health

Information:

For more information, e-mail agcenter@ucdavis.edu

or visit www.agcenter.ucdavis.edu on the Web

Keynote Speakers:

John Howard, Ph.D., Director, National Institute for Occupational Safety and Health, Washington, DC. “From Research to Practice (r2p)—the New NIOSH Initiative”

John Snider, M.S., M.P.H., Community Health Director, Monterey County Health Department. “R2p in Monterey County and the Impact on its Agricultural Populations’ Health”

Overview:

Five sessions with diverse focus areas and speakers include:

- Challenges and Opportunities of r2p
- Policy and Behavior Implications of r2p
- Agrochemicals and Respiratory—r2p Issues
- Community-Based r2p
- Agricultural Engineering—r2p and Innovation

Field Trips:

Steinbeck Museum Tour
Salinas Farm Tour



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for Agricultural
Health and Safety**

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CALENDAR

February 6, 2006

3201 Hart Hall, David Risling Conference Room
UC Davis Campus, 4:00–5:00 p.m.

Jerry Gillespie, D.V.M., Ph.D.

Director, Western Institute for Food Safety and Security
The Dangers of Agroterrorism: Strategies for Preparedness

March 6, 2006

3201 Hart Hall, David Risling Conference Room
UC Davis Campus, 4:00–5:00 p.m.

Stephen J. Reynolds, Ph.D., C.I.H.

Professor and Director, Center for Agricultural Health and Safety,
Colorado State University
Endotoxin and Organic Dust Lung Disease

April 3, 2006

3201 Hart Hall, David Risling Conference Room
UC Davis Campus, 4:00–5:00 p.m.

Beverlie Milone

Health and Safety Manager,
Fetzer Vineyards
Creating a Culture of Safety

May 1, 2006

3201 Hart Hall, David Risling Conference Room
UC Davis Campus, 4:00–5:00 p.m.

Frank Mitloehner, Ph.D.

Air Quality Extension Specialist,
UC Davis Department of Animal Science
Health and Safety in Large Dairies

September 20-22, 2006

Health & Safety in Western Agriculture—Research to Practice (r2p)
Asilomar Conference Grounds, Pacific Grove, CA (see Page 5)

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