

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 04-35

November 18, 2004

Agenda Item No.: 04-10-2

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal, number 2556-245, entitled "Effects of Woodsmoke on Cardiopulmonary Responses in Healthy and Susceptible Humans," has been submitted by the University of California, San Francisco;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Air Resources Board will fund this proposal for a total amount \$399,939; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

Proposal Number 2556-245, entitled "Effects of Woodsmoke on Cardiopulmonary Responses in Healthy and Susceptible Humans," submitted by the University of California, San Francisco, for a total amount not to exceed \$399,939.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

Proposal Number 2556-245, entitled "Effects of Woodsmoke on Cardiopulmonary Responses in Healthy and Susceptible Humans," submitted by the University of California, San Francisco, for a total amount not to exceed \$399,939.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed \$399,939.

I hereby certify that the above is a true
And correct copy of Resolution 04-35, as
Adopted by the Air Resources Board.

Lori Andreoni, Clerk of the Board

ATTACHMENT A

“Effects of Woodsmoke on Cardiopulmonary Responses in Healthy and Susceptible Humans”

Background

Woodsmoke is a major component of air pollution in some areas of California. Epidemiologic data show an association between woodsmoke exposure and adverse respiratory health effects, including asthma, as well as an association between particulate and gaseous air pollution and increased cardiovascular morbidity and mortality. However, the biological mechanisms mediating these effects are unknown, as there have been no investigations into biological mechanisms that could explain the cardiopulmonary effects associated with woodsmoke exposure in epidemiological studies. Since epidemiology can not establish causality, studies like this one are necessary to either validate or refute the existence of a causal relationship between woodsmoke exposure and adverse cardiopulmonary effects.

Several plausible mechanisms have been proposed that might explain the association of adverse cardiopulmonary outcomes with woodsmoke exposure. Reduced heart rate variability (HRV) is a well-known risk factor for cardiovascular morbidity and mortality. Pulmonary and/or systemic inflammation has also been proposed as a plausible mechanism.

Objective

The objective of this project is to determine: 1) the potential for different concentrations of wood-smoke to induce airway inflammation and HRV responses in humans; 2) the influence of asthma status on woodsmoke-induced changes in airway inflammation and HRV; and 3) the biological mechanisms controlling these responses.

Methods

The study will involve controlled exposure of 15 healthy and asthmatic subjects who will undergo 2-hour exposures with intermittent mild exercise to filtered air (control), 150 $\mu\text{g}/\text{m}^3$ woodsmoke, and 450 $\mu\text{g}/\text{m}^3$ woodsmoke. The investigation will focus on mediators of airway and systemic inflammation, components of the renin-angiotensin (system that regulates blood volume, arterial pressure, and cardiac vascular function), and blood coagulability that could plausibly influence HRV and mediate the effects reported in the epidemiologic literature.

Expected Results

The results of this study of biological mechanisms will either validate or refute epidemiological results that have associated adverse cardiopulmonary responses with woodsmoke exposure.

Significance to the Board

The results of this project will help fill an important data gap: a biological basis for epidemiologic findings that woodsmoke exposure can induce adverse cardiopulmonary effects. The results will provide critical support for possible future regulatory actions.

Contractor:

University of California, San Francisco

Contract Period:

42 months

Principal Investigator (PI):

Colin Solomon, Ph.D.

Contract Amount:

\$399,939

Basis for Indirect Cost Rate:

The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:

Dr. Solomon has been the PI on three previous ARB-funded research contracts. The quality of his work is excellent, and the results of his previous studies have contributed significantly to the scientific database on the responses of healthy and asthmatic adults to particulate matter, ozone, nitrogen dioxide, and rice straw smoke.

Prior Research Division Funding to UCSF:

Year	2003	2002	2001
Funding	\$497,990	\$0	\$0

BUDGET SUMMARY

University of California, San Francisco

“Effects of Woodsmoke on Cardiopulmonary Responses in Healthy and Susceptible Humans”

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$284,431	
2.	Subcontractors	\$ 0	
3.	Equipment	\$ 0	
4.	Travel and Subsistence	\$ 1,000	
5.	Electronic Data Processing	\$ 0	
6.	Reproduction/Publication	\$ 600	
7.	Mail and Phone	\$ 900	
8.	Supplies	\$ 28,500	
9.	Analyses	\$ 0	
10.	Miscellaneous	<u>\$ 48,150¹</u>	
	Total Direct Costs		\$363,581

INDIRECT COSTS

1.	Overhead	\$36,358	
2.	General and Administrative Expenses	\$ 0	
3.	Other Indirect Costs	\$ 0	
4.	Fee or Profit	<u>\$ 0</u>	
5.	Total Indirect Costs		<u>\$36,358</u>

TOTAL PROJECT COSTS

\$399,939

¹ This includes human subject payments and bronchoscopy fees to San Francisco General Hospital.