Report on 2009 Tobacco-Related Disease Research Program

December 2010

Legislative Report

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UNIVERSITY *of* CALIFORNIA

Annual Report
2009

from the University of California to the
California State Legislature on the progress of the
Tobacco-Related Disease Research Program,
established and administered by the University of California
pursuant to Proposition 99, The Tobacco Tax and Health Protection Act of 1988,
Senate Bill 1613 of 1989 and reauthorized pursuant to Assembly Bill 3487 of 1996

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UNIVERSITY OF CALIFORNIA

Report on 2009 Tobacco-Related Disease Research Program

Annual Report

EXECUTIVE SUMMARY

The Tobacco-Related Disease Research Program (TRDRP) is the research arm of California's leading tobacco research, education, and prevention programs. TRDRP's mission is to mitigate the economic and public health costs incurred by tobacco use in California by funding research on tobacco control policy, tobacco use, prevention and cessation, nicotine addiction, the effects of active and passive smoking, and all tobacco-related diseases and health effects including cancer, cardiovascular disease and pulmonary disease. The program emphasizes policy research designed to inform California's tobacco control efforts and research focused on tobacco use prevention and cessation in youth, young adults, and California's diverse communities. In the 20 years of its existence TRDRP has funded seminal work on issues such as environmental tobacco smoke and the tobacco industry, research which has informed the smoke-free tobacco control policies that are in place today. It also pioneered the use of awards for innovative research to encourage the exploration of new paradigms and ideas and introduced participatory research awards aimed at communities and schools. The program has continually supported the tobacco disease research infrastructure in California and its funded researchers have successfully leveraged millions of dollars of federal funding on the basis of their TRDRP-funded projects.

Although tobacco consumption in California is at an all-time low due to an effective, comprehensive state tobacco control program and the price of tobacco products, this downward trend has stalled. Furthermore, tobacco companies are making inroads in the young adult market which still has the highest smoking rate of any age group. Even if every individual in California stopped smoking today the existing disease burden would remain and millions would still be at risk of tobacco-related disease due to their smoking history. There is furthermore a growing appreciation of the lateral damage inflicted by the use of cigarettes as well: the city of San Francisco recently discovered that it spends an estimated $10.7 million a year removing discarded butts from gutters, drainpipes and sidewalks.

In 2009 TRDRP continued to carry out its mission in the midst of an operational re-organizational mandated by fiscal realities faced by the UC Office of the President. The Research Project Award mechanism was discontinued. In its place the program introduced the new California Award mechanism designed to address questions specific to tobacco-related disease or tobacco control issues in California. It also began to offer the Exploratory Developmental Research Award specifically designed to make California researchers more competitive at the federal level by providing them with the time and resources to generate preliminary data to be used to apply for larger federal grants. This re-structuring of its grant mechanisms allowed the program to distribute its funding revenues over as broad a range of investigators as possible. The program also for the first time increased the stipend offered to its postdoctoral fellows, making it more attractive and putting it more in line with NIH guidelines and economic reality.

In 2009, TRDRP awarded $ 15.7 million in 68 new core grants, 2 special policy initiative grants and 4 conference grants to scientists at 26 California non-profit research institutions.

The largest number of grant awards addressed the following Primary Research Areas

- Cardiovascular and Cerebrovascular Disease
- Chronic Obstructive Pulmonary Disease
- Development of Nicotine Dependence Treatments
- Lung Cancer
- Prevention and Cessation of Tobacco Use and Tobacco-Related Health Disparities in California's Diverse Populations
- Public Policy and Economics of Tobacco Use
- Secondhand Smoke and Outdoor Tobacco Smoke

Career Development grants were awarded in all areas relevant to tobacco-related disease and tobacco control.

In 2009 the program also launched its first Special Initiative which solicited applications from qualified investigators to answer specific questions facing tobacco policy-makers today. Identification of areas of need was a collaborative effort involving a meeting of TRDRP staff, academic researchers, the California Tobacco Control Section, the health voluntaries, tobacco control professionals, community advocates and representatives of the CDE. The area of most pressing need was identified as the impact of declining Proposition 99 revenues on tobacco-related control, education, and research efforts and the resultant impact on the prevalence and cost of smoking in California. A Request for Qualifications for this project was distributed state-wide. Applications were reviewed by a team of policy experts from outside of California. A team of investigators from UCSF headed by Dr. Stanton Glantz and another from UCSD headed by Dr. John Pierce were chosen to conduct a study of the Cost of Smoking in California. The program also entered early planning stages for special initiatives in thirdhand smoke and early lung cancer detection.

TRDRP also funded a special project grant to conduct a hazard assessment of cigarette butts on California beaches.

Within the past 2 years, 13 Cornelius Hopper Diversity Award Supplements were awarded to TRDRP-funded principal investigators to mentor and train individuals who wish to pursue careers in research on tobacco use and tobacco-related disease. The trainees are from groups underrepresented in the field of tobacco use or tobacco-related disease, and/or individuals who plan to work directly with underrepresented groups that are disproportionately impacted by tobacco use.

In 2009, 38 research grants were completed, representing cutting-edge science on tobacco-related disease and tobacco control policy and programs, particularly in those groups at highest risk for tobacco use and exposure to secondhand smoke. They include 4 on nicotine dependence, 7 on tobacco use prevention and cessation, 1 on tobacco control policy, 10 on cancer, 9 on heart and lung disease, and 7 on environmental tobacco smoke and effects of tobacco use on reproductive processes.

Among the research highlights of these completed grants are the following findings:

- Nicotine reduces symptoms in ADHD-afflicted individuals a finding which supports the self-medication hypothesis and suggests that that smoking cessation and prevention efforts in people with ADHD will need to address both the symptom-reducing and mood-enhancing effects of nicotine.

- Exploration of the neurological correlates of nicotine withdrawal identified several long-lasting behavioral and neurochemical adaptations that provide insights into factors that contribute to the high relapse rates of smokers.

- Studies in an animal model provided support for the hypothesis that nicotine acts as a gateway drug in adolescents but not adults, a finding which emphasizes the importance of tobacco prevention efforts directed at adolescents.

- Placement of health messages in TV shows, i.e., Education Entertainment, is an underutilized resource in tobacco control in large part because experts disagree as to the best approach. The best and worst strategies for smoking prevention in ninth graders using Entertainment Education approaches were identified.

- A stage-based schedule smoking intervention targeting Chinese American smokers at all stages of readiness to quit was developed and tested.

- Addressing economic inequality, creating no-tobacco vendor zones around schools, and improving family support systems were shown to be of great potential utility in preventing and reducing teen tobacco use.

- There is a strong relationship between alcohol consumption and smoking initiation among college students and higher levels of intoxication among occasional smokers was associated with the higher likelihood of smoking.

- Genetic markers for response to the smoking cessation aids bupropion, the nicotine patch and selegiline were identified.

- Random digit dialing techniques such those used in the California Adult Tobacco Survey and the California Health Interview Survey significantly underestimate smoking rates in black Californians.

- Receptivity to tobacco advertising as a young adolescent is a strong predictor of future established smoking in young adults, whether these adolescents came of age before or after the California Tobacco Control Campaign.

- The tobacco industry is attempting to expand the window of smoking initiation to the young adult population through promotional activity in bars and clubs; however young adults have the highest rate of successful quitting of any age group, a phenomenon that is strongly associated with the adoption of a smoke-free home.

- An improved chemoreadiosensitizing agent was developed that has superior cancer-killing properties without increased drug toxicity.

- The tumor-promoting effect of tobacco smoke depends on the induction of airway inflammation suggesting that anti-inflammatory drugs may help reduce the likelihood of developing lung cancer.

- Mice containing the human genes for the detoxification of tobacco smoke carcinogens were developed; the role of these detoxification mechanisms in the development of tobacco-smoke induced lung cancer can now be studied in unprecedented detail.

- Proteins are being developed that not only block a growth factor overproduced by lung cancer cells but which also converts that growth factor into an agent that kills cancer cells, the first step in developing a therapy that directly and selectively kills lung cancer cells.

- New cancer therapeutics were explored including 1) small molecules that inhibit oncogene transcription; 2) entities that target proteins that prevent cancer cell death thus rendering tumors resilient to treatment; and 3) natural products derived from the cats claw plant with anticancer properties.

- The mechanism of tobacco-induced cardiovascular disease through a nitric oxide pathway was elucidated.

- Reserveratrol, a compound in grapes and red wine, was found to increase tobacco-smoke detoxifying enzymes without the toxicity of the inducing compounds found in tobacco smoke such as acrolein.

- In utero exposure to nicotine affects fetal lung fibroblasts which in turn affect the function of cells critical for surfactant synthesis. The molecular profile and injury response of bone-marrow derived stem cells is also altered. This is the first clarification of the mechanism underlying the deleterious effects of maternal smoking, which include low birth weight, neonatal mortality, sudden infant death syndrome and poor long-term pulmonary outcome.

- The formation of new blood vessels is both a natural response and a therapeutic approach to the ischemia and resulting cell death characteristic of heart attack and stroke. Chronic exposure to nicotine not only exacerbates the ischemic response but also impairs the formation of new blood vessels that would otherwise re-establish blood supply to tissues deprived of oxygen.

- Sex differences exist in the inflammatory response elicited by nicotine through its effects on the immune system.

- Oxidation of a key protein component of HDL renders it dysfunctional in subjects, like smokers, with chronic inflammation. This is likely one of the causes of the increased incidence of atherosclerosis affecting smokers.

- Mainstream and secondhand smoke have differential effects on the genetic integrity and function of sperm and provide further evidence that male exposure to second-hand smoke, as well as direct cigarette smoke, may diminish a couple's chance for a successful pregnancy and the birth of a healthy baby.

- Prenatal exposure to chronic mild carbon monoxide (CO), a major component of cigarette smoke and the resulting oxidative stress during early prenatal development contributes to the loss of progenitor cells that, in turn, may contribute to injury or underdevelopment in the middle ear.

- Exposure to ETS leads to oxidation of two essential lung surfactant proteins that results in impaired surfactant function and likely, increases in the work of breathing.

- A history of prior ETS exposure alters the airway epithelium in a sex specific manner and that this in turn alters both epithelial injury and repair, research that has potential impact for women who smoke or are exposed to ETS, who take hormone replacement therapy and those who live in urban areas with high levels of air pollution.

- A novel survey using a personal digital assistant to measure SHS exposure was developed and compared with paper and pencil survey, saliva cotinine, and air monitor measures of SHS exposure.

Full abstracts of all grants that ended in 2009 can be found on-line at http://www.trdrp.org/

INTRODUCTION

The Tobacco-Related Disease Research Program (TRDRP) is the research arm of California's leading tobacco research, education, and prevention programs. TRDRP's mission is to mitigate the economic and public health costs incurred by tobacco use in California by funding research on tobacco control policy, tobacco use, prevention and cessation, nicotine addiction, the effects of active and passive smoking, and all tobacco-related diseases and health effects including cancer, cardiovascular disease and pulmonary disease. The program emphasizes policy research designed to inform California's tobacco control efforts and research focused on tobacco use prevention and cessation in youth, young adults, and California's diverse communities. In the 20 years of its existence TRDRP has funded seminal work on issues such as environmental tobacco smoke and the tobacco industry, research which has informed the smoke-free tobacco control policies that are in place today. It also pioneered the use of awards for innovative research to encourage the exploration of new paradigms and ideas and introduced participatory research awards aimed at communities and schools. The program has continually supported the tobacco disease research infrastructure in California and its funded researchers have successfully leveraged millions of dollars of federal funding on the basis of their TRDRP-funded projects.

Although tobacco consumption in California is at an all-time low due to an effective, comprehensive state tobacco control program and the price of tobacco products, this downward trend has stalled. Furthermore tobacco companies are making

inroads in the young adult market which still has the highest smoking rate of any age group[1]. Even if every individual in California stopped smoking today the existing disease burden would remain and millions would still be at risk of tobacco-related disease due to their smoking history. There is furthermore a growing appreciation of the lateral damage inflicted by the use of cigarettes as well: the city of San Francisco recently concluded that it spends an estimated $10.7 million a year removing discarded butts from gutters, drainpipes and sidewalks[2].

OVERVIEW

Mission

TRDRP's mission is to mitigate the impact of tobacco-related illness by funding research on tobacco use and tobacco-related disease. The program's goals are consistent with the broader mission of Proposition 99, which is to reduce the human and economic costs of tobacco use by reducing the incidence, prevalence, morbidity, and mortality of tobacco-related disease in California.

Goals

TRDRP strives to meet the needs of the research community, the tobacco control community, the health care community, policy makers, and the public by:

- Funding high-quality and innovative research that contributes to the understanding of tobacco use and tobacco-related illnesses and serves California's diverse populations.
- Serving as an information resource for tobacco issues through dissemination of research findings and sponsorship of conferences and symposia.
- Funding research that will lead to more effective disease treatments for California's smokers and former smokers.
- Funding research that will lead to more effective strategies for tobacco use prevention and cessation.

TRDRP strives to meet additional needs of the research community by:

- Providing opportunities to researchers to conduct high quality and innovative research that advances tobacco-related science.
- Helping to build the research infrastructure in California that is critical for comprehensive tobacco-related disease research, in part by encouraging investigators to pursue careers in tobacco research through career development grant awards.

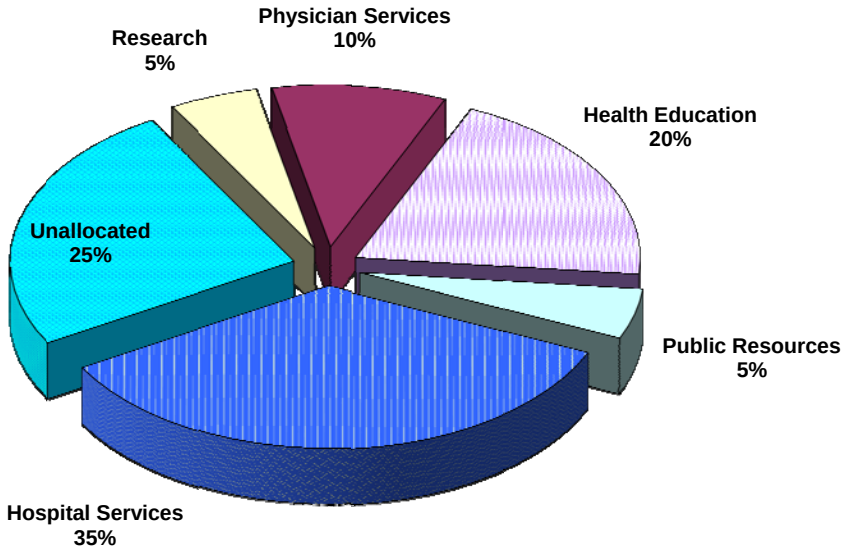
Program Administration

TRDRP was established as a result of the passage of Proposition 99 ("The Tobacco Tax and Health Protection Act of 1988") in November 1988. The proposition increased the tax on cigarettes by 25 cents per pack and raised the tax on other tobacco products an equivalent amount. The initiative created the Cigarette and Tobacco Products Surtax Fund, consisting of six accounts in which specific percentages of the revenue are deposited annually (see Figure 1): the Research Account (5 percent), the Health Education Account (20 percent), the Hospital Services Account (35 percent), the Physician Services Account (10 percent), the Public Resources Account (5 percent), and the Unallocated (or General Purposes) Account (25 percent). Collection of the tax began on January 1, 1989.

Proposition 99 specified that the revenues from the Research Account be used to fund research on tobacco-related disease in California. The California Legislature subsequently asked the University of California to establish and administer a research program to facilitate the elimination of smoking in California, and to report annually to the Legislature about the activities of the Program. TRDRP manages all fiscal and programmatic aspects of the tobacco research funding from the Cigarette and Tobacco Products Surtax Fund. As stipulated by the legislation, funding for administrative expenses is limited to five percent of the Research Account. Within the Office of the President at the University of California, TRDRP is housed within the Research Grants Program Office in the Office of Research and Graduate Studies.

[1] Ling, P.M., Neilands, T. B., and Glantz, S.A. 2009. Young adult smoking behavior. American J. Preventive Medicine, 36: 389-394.
[2] McKinley, J. 2009. Cost of Cigarette Litter May Fall on San Francisco's Smokers. New York Times. May 18.

Figure 1. Distribution of Tobacco Tax Revenue Specified by Proposition 99



REPORT ON 2009 ACTIVITIES

Completed Grants

In 2009, 38 research grants were completed, representing cutting-edge science on tobacco-related disease and tobacco control policy and programs, particularly in those groups at highest risk for tobacco use and exposure to secondhand smoke. They include 4 on nicotine dependence, 7 on tobacco use prevention and cessation, 1 on tobacco control policy, 10 on cancer, 9 on heart and lung disease, and 7 on environmental tobacco smoke and effects of tobacco use on reproductive processes. Full abstracts can be found at http://www.trdrp.org/

Nicotine Dependence

Nicotine & behavioral regulation in adult ADHD (14RT-0147H)
Gehricke, Jean-G.
University of California at Irvine

Neurobiological substrates of nicotine addiction (15RT-0022)
Markou, Athina
University of California, San Diego

Alpha 4* Nicotinic receptor in dopaminergic system (16FT-0066)
Xiao, Cheng
California Institute of Technology

Neural mechanisms underlying nicotine as a 'gateway' drug (16DT-0189)
McQuown, Susan C.
University of California, Irvine

Tobacco-Use Prevention and Cessation

Use of Entertainment Education on TV to Deter Youth Smoking (14RT-0142H)

Pechmann, Cornelia (Connie)
University of California, Irvine

A Stage-Based Scheduled Smoking Intervention for Chinese (14RT-0160H)
Tsoh, Janice Y.
University of California San Francisco

Pathways of How Socioeconomic Context Affects Teen Smoking (15FT-0002)
Mistry, Ritesh
University of California, Los Angeles

Social Smoking within College Drinking Environments (15IT-0027)
Reed, Mark B.
San Diego State University Research Foundation

Pharmacogenetic Predictors of Smoking Cessation (15RT-0113)
Murphy, Greer M., Jr.
Stanford University School of Medicine

Prevalence and Correlates of African-American Tobacco Use (15AT-1300H and 15AT-1301)
Roesch, Scott; Landrine, Hope; and Adams-Simms, Denise
San Diego State University Foundation & California Black Health Network

The Smoking Abstinence Questionnaire (16FT-0049)
Hendricks, Peter S.
University of California, San Francisco

Tobacco Control Policy

Use of Existing Data to Develop New Tobacco Control Strategies (15RT-0238)
Messer, Karen
University of California, San Diego

Cancer

Role of protein phosphatase 2A in lung cancer (14RT-0065)
Walter, Gernot F.
University of California, San Diego
Improved chemoradiotherapy of lung cancer (14RT-0177)
Yang, Li-Xi
California Pacific Medical Center Research Institute

NF-kB mediated inflammation in tobacco-induced lung cancer (15RT-0197)
Karin, Michael
University of California, San Diego

Activation and detoxification of lung cancer carcinogens (15RT-0251)
Tukey, Robert H.
University of California, San Diego

Fusion proteins that convert VEGF into a cell death factor (16IT-0009)
Quinn, Timothy P.
University of California San Francisco

Role of inflammation in lung carcinoma neovascularization (16FT-0052)
Schmid, Michael C., PhD
University of California, San Diego

Inhibition of MYC-activated gene expression by polyamides (16FT-0055)
Harki, Daniel A.
California Institute of Technology

Targeting anti-apoptotic Bcl-2 family members in lung cancer (16FT-0056)
Godoi, Paulo
Burnham Institute for Medical Research

Mechanism of DNA break repair in germline cells (16FT-0069)
Nimonkar, Amitabh V.
University of California

Synthesis of Apoptotic Spirooxindoles (16FT-0070)
Han, Xiaoqing
Beckman Research Institute of the City of Hope

Heart and Lung Disease

cGMP regulation of smooth muscle cell differentiation (14RT-0020)
Pilz, Renate B.
University of California, San Diego

Regulation of phase II genes by oxidation products (14RT-0059)
Forman, Henry J.
University of California at Merced

A Novel Approach To Prevent In Utero Nicotine Lung Injury (14RT-0073)
Rehan, Virender K.
Los Angeles Biomedical Research Institute at Harbor UCLA Medical Center

SHS Exacerbates Cerebral Ischemia: Endothelial Mechanisms (14RT-0169)
Cooke, John P
Stanford University

Sex differences in nicotine effects on inflammation (15RT-0032)
Green, Paul G.
University of California San Francisco

Nicotine-dependent recruitment of vascular progenitor cells (15RT-0034)
Stallcup, William B.
Burnham Institute for Medical Research, La Jolla, CA

Nicotine Disrupts PTHrP-Driven Paracrine Signaling Globally (15IT-0250)
Rehan, Virender K.
Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center

Effect of oxidation on rate of ApoA-I-HDL exchange (16FT-0054)
Cavigiolio, Giorgio
Children's Hospital Oakland Research Institute

NMR studies of the LDL receptor active conformation of apolipoprotein E (16DT-0195)
Hauser, Paul S
University of California, Berkeley

Environmental Tobacco Smoke & Effects of Tobacco Use on Reproductive Processes

Effects of tobacco-induced gamete damage on embryogenesis (13RT-0140A)
Marchetti, Francesco
Lawrence Berkeley National Laboratory

Mild carbon monoxide exposure impairs the inner ear (14RT-0043)
Lopez, Ivan A
University of California, Los Angeles

Neuronal oxidative stress from mild carbon monoxide exposure (14RT-0068)
Edmond, John
University of California, Los Angeles

Environmental Tobacco Smoke Effects on Lung Surfactant (14RT-0077)
Zasadzinski, Joseph A.
University of California, Santa Barbara

Effect of Smoke and Gender on Bronchiolar Injury and Repair (14RT-0132)
Van Winkle, Laura
University of California, Davis

Human Oocyte Development and PAH Exposure (14RT-0159A)
Reijo Pera, Renee A.
Stanford University
Modeling ETS Exposure and Dose Using PDA E-Diaries (15KT-0175)
Johnson-Kozlow, Marilyn
San Diego State University

TRDRP Coordination with California's Tobacco Control and Education Programs
During 2009, TRDRP staff continued to work with their counterparts from the DHS Tobacco Control Program and the CDE Safe and Healthy Kids Program Office to keep abreast of developments in their respective programs, avoid duplication of effort, share expertise, and provide input into the development of each program's goals.

The program launched its first Special Initiative which solicited applications from qualified investigators to answer specific questions facing tobacco policy-makers today. Identification of areas of need was a collaborative effort involving a stakeholder meeting consisting of TRDRP staff, academic researchers, the California Tobacco Control Section, the health voluntaries, tobacco control professionals, community advocates and representatives of the CDE. The area of most pressing need was identified as the impact of declining Proposition 99 revenues on tobacco-related control, education, and research efforts and the resultant impact on the prevalence and cost of smoking in California a Request for Qualifications for this project was distributed state-wide. Applications were reviewed by a team of policy experts from outside of California. A team of investigators from UCSF headed by Dr. Stanton Glantz and another from UCSD headed by Dr. John Pierce were chosen to conduct a study of the Cost of Smoking in California. The team produced an initial short-term research report for the stakeholders based primarily on their current published studies and methodologies. The report included the following: Aggregate Short-Term Estimates of the Effect of the California Tobacco Control Program; Estimates of Smoking Behavior over Time; and Estimates of Annual Costs for Diseases Known to Be Caused by Smoking in Different Groups. The results of the funded research will be available next year.

Other Special Initiatives

The program entered early planning stages for special initiatives in Thirdhand Smoke and Cigarette Butt Waste and Early Lung Cancer Detection. In a related action, TRDRP considered and approved a request by Dr. Thomas Novotny of the San Diego State University Research for $10,000 to conduct a hazard assessment of cigarette butts found on California beaches.

Dissemination of Research Findings
In accordance with state statutes, TRDRP regularly disseminates the findings of funded research in a number of ways. The knowledge gained from TRDRP-funded studies is helping to improve the effectiveness of the tobacco control programs supported by the Proposition 99 Health Education Account that are administered by the California Department of Public Health and the California Department of Education. Results of research on tobacco-related disease are also enhancing scientists' understanding of biological mechanisms underlying the cause of tobacco-related disease and pointing the direction to technologies for the earlier detection and more effective treatment of lung disease, heart disease, and cancer.

- **Conference Support**

TRDRP provided support to the following conferences judged to fall within its mission: Clearing the Air: An Institute for Policy Advocacy (American Nonsmokers' Rights Foundation); Society for Neuroscience Nicotinic Receptors meeting; UC Riverside Mini-Symposium in Tobacco-Related Disease Research; The Oxygen Club of California; and Tobacco-Related Health Disparities Committee (Society for Research on Nicotine and Tobacco).

- **Scientific Publications**

TRDRP-funded investigators have continued to actively disseminate findings from their research in scholarly publications and at scientific conferences. In 2009, funded investigators published their fundings in such peer-reviewed journals the *American Journal of Physiology, Anticancer Research, Biochemica et Biophysica Acta , Biochemical Journal , Cancer Detection and Prevention, Cancer Research, Ethnicity and Disease, Experimental Lung Research , Health Education Research, International Journal of Neuropsychopharmacology, Journal of Biological Chemistry, Journal of Immunology, Journal of Investigative Medicine, Journal of Lipid Research, Journal of Neurochemistry, Journal of Neuroscience, Journal of Stem Cells, Lung, Molecular Pharmacology, Nature, Neuropharmacology, Pediatric Pulmonology, Pediatric Research, Preventive Medicine, Proceedings of the National Academy of Sciences (US), Science , Toxicological Sciences, Vascular Medicine.*

- **Newsletter**

In 2009, TRDRP published one issue of its newsletter, *Burning Issues*, which contained articles on critical research topics in tobacco-related disease and tobacco use, and information about the program and notices of upcoming events. . The newsletters are available on TRDRP's Web site, http://www.trdrp.org/publications/Newsletters.asp.

- **Website**

Visitors to TRDRP's Website (www.trdrp.org) can search research grants, as well as view all program publications and announcements.

2008-2009 FUNDING CYCLE

- **Research Grants Awarded**

As part of its regular funding cycle in 2008-2009, The Scientific Advisory Committee recommended, and TRDRP funded, $15.7 million in 68 new grants to scientists at 26 California non-profit research institutions. Funds available for grants included the appropriation for that year as well as accumulated reserves that included funds recovered from grants that terminated early. Details of 2009 awards, including abstracts, can be found in TRDRP's website: http://www.trdrp.org/.

Consistent with the critical need to develop new researchers with an interest in tobacco-related diseases and issues, 35 (50%) of the new grant awards supported new investigators, postdoctoral fellows and dissertation students. Consistent with the program's mandate to support a broad range of innovative research in tobacco-related disease research, TRDRP awarded grants to study cancer, particularly lung cancer (18), cardiovascular diseases (11), pulmonary diseases (5), translational biomedical research (11), nicotine dependence (7), policy issues (3), and social and participatory research (13).

The TRDRP had revised its funding to include a new California Research Award mechanism. This grant mechanism is intended to support research projects that address questions specific to tobacco-related disease or tobacco control issues in California. These were:

- **California's Tobacco Control Program and Tobacco Use Trends** - Principal Investigator: Karen Messer, UCSD
- **Paternal Smoking and DNA Methylation in Childhood Leukemia** – Principal Investigator: Joseph Wiemels, UCSF

One Full Community-Academic Research Award and 1 Pilot School Academic Research Award were funded:

- **Youth-led Tobacco Prevention among CA Southeast Asians –** Principal Investigator: Juliet Lee, Pacific Institute for Research and Evaluation

- **Novel Strategies for School Based-Tobacco Prevention Efforts –** Principal Investogator: Bonnie Halpern-Felsher, UCSF

- **Award Types**
  - **California Research Awards** are designed to support research projects that address questions specific to tobacco-related disease or tobacco control issues in California.

  - **Exploratory Developmental Research Awards.** The purpose of these grants is to gather preliminary data or demonstrate proof-of-principle (i.e., pilot projects), or to conduct a research project within the specified limits of money and time. The ultimate goal of these awards is to provide the foundation for proposals for fully-developed research project awards from other funding programs.

  - **Research Career Development Awards.** TRDRP offers three award types that are aimed at enhancing the scientific infrastructure for t**obacco-related research in Ca**lifornia by supporting the development of careers in research. **New Investigator Awards** are aimed at encouraging newly independent investigators to conduct research on tobacco-related issues**. Postdoctoral Fellowship Awards** allow researchers early in their careers to receive training in tobacco-relevant disciplines. **Dissertation Research Awards** provide support for the dissertation research of doctoral candidates who wish to pursue tobacco-related research.

  - **Collaborative Research Awards. Community-Academic Research Awards (CARA)** are intended to stimulate and support collaborations between community-based organizations and university-based investigators to perform scientifically rigorous research into tobacco control issues important to California's diverse communities. **School-Academic Research Awards (SARA)** are intended to stimulate and support collaborations between schools and university-based investigators to perform scientifically rigorous research into tobacco control issues that: 1) are identified as important to schools in the state; 2) are likely to produce results that are meaningful to school-based prevention and intervention efforts; and 3) use methods that are relevant, culturally appropriate, and appropriate in terms defined and accepted by the schools. SARAs are jointly funded by the California Department of Education (CDE) and TRDRP.

- **Cornelius Hopper Diversity Award Supplements**

The Cornelius Hopper Diversity Award Supplements (CHDAS) are designed to encourage TRDRP-funded principal investigators to mentor individuals who wish to pursue careers in research on tobacco use and tobacco-related disease. Qualified applicants for the CHDAS are from groups that are underrepresented among researchers who investigate tobacco use or tobacco-related disease, and/or individuals who wish to work directly with underrepresented groups that are disproportionately impacted by tobacco use. In 2008, nine funded investigators received supplements and in 2009, four funded investigators received supplements to their TRDRP grants to support of such deserving individuals (see Tables 1 and 2).

Table 1. CHDAS awarded in 2008

Trainee	*Mentor*	*Institution*	*Grant title*

Trainee	*Mentor*	*Institution*	*Grant title*
Gutierrez-Reed, Navarre	Olfert, Ivan Mark	University of California, San Diego	Regulation of skeletal muscle angiogenesis in COPD
Romero, Sonia	Rehan, Virender	LA Biomedical Research Institute at Harbor-UCLA Medical	A novel approach to prevent in utero nicotine lung injury
Wen, Andrew	Tsoh, Janice Y.	University of California, San Francisco	A stage-based scheduled smoking intervention for Chinese
Tsoh, Janice Y.	Wood, Sabrina	University of California, San Francisco	A stage based schedule smoking intervention for Chinese
Waters Julie M.	Yerger, Valerie	University of California, San Francisco	African Americans: NRT or Alternative Medicine for Cessation
Corral, Irma	Roesch, Scott C.	San Diego State University	Prevalence and correlates of African-American tobacco use
Gonzalez, Lyndon	Allen, Bruce Jr.	Charles Drew University	Sociocultural determinants of menthol smoking among Blacks
Tedjasaputra, Vince	Richardson, Russell	University of California, San Diego	Oxidative stress and skeletal muscle dysfunction in COPD
Wankie, Che E.	Friis, Robert H.	California State University, Long Beach	Determinants of smoking prevalence among Cambodian Americans

Table 2. CHDAS Awarded in 2009

Trainee	*Mentor*	*Institution*	*Grant title*
Horta, Mariana	Green, Harold	RAND Corporation	Evaluating mechanisms of change in a smoking intervention
Galaviz, Vanessa	Matt, George	San Diego State University	Smoking Policies and Secondhand Smoke in Hotel Rooms
Patel, Arti S.	Narayanaswami, Vasanthy	Children's Hospital Oakland Research Institute	ApoE related effect of smoking in cardiovascular disease
Martin, Connie	Talbot, Prudence	University of California, Riverside	Use of stem cells to examine toxicity of cigarette smoke

Unsolicited Proposals

TRDRP considers unsolicited requests (conference awards) to support research-related activities that build research infrastructure, disseminate research findings, or stimulate new research directions. In order to qualify for funding, the planned activities must be directly related to one or more of TRDRP's Priority Research Areas. The activity must primarily take place in California, involve California investigators, and include, where applicable, discussants and speakers funded by TRDRP.

Support can be requested for scientific conferences to assess tobacco's impact on California's population; or to allow tobacco investigators to evaluate, in a timely manner, new and breaking trends in tobacco control or tobacco-related disease research. Unsolicited requests may be submitted at any time. Requests are evaluated expeditiously by ad-hoc peer review when appropriate. The TRDRP Scientific Advisory Committee makes recommendations regarding funding. These opportunities are

limited in number, scope, cost, and duration. In 2009, TRDRP awarded $26,000 in four conference awards. The dollar amounts and the number of grants awarded by year are displayed in Table 3.

Table 3. Conference Awards Awarded by Year, 1993-2009

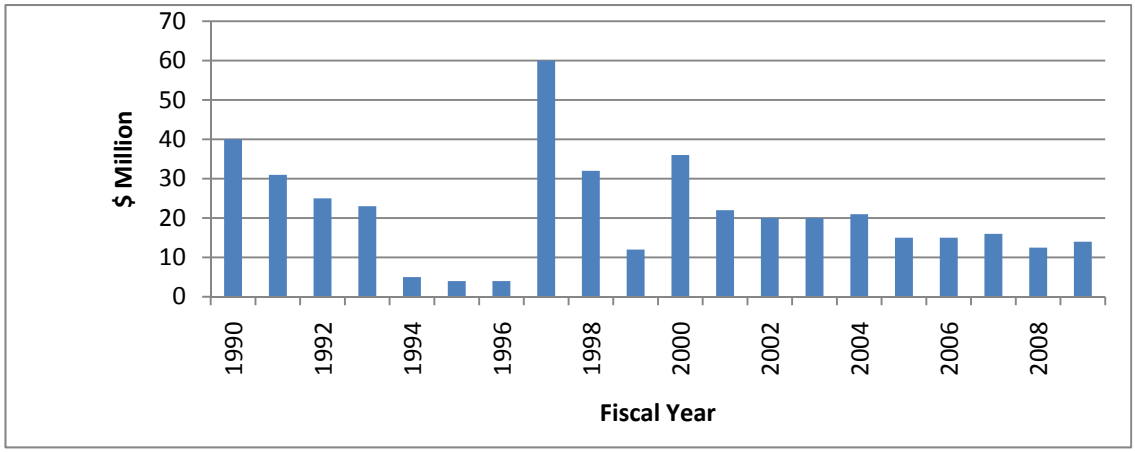
Year	Number of Awards	Amount ($)
1993	1	$40,000.00
1997	3	$142,633.00
1998	3	$178,192.00
1999	1	$10,000.00
2001	1	$11,257.00
2002	1	$1,500.00
2003	4	$19,890.00
2004	3	$29,500.00
2005	4	$27,500.00
2006	1	$5,000.00
2007	8	$46,500.00
2008	0	$0.00
2009	4	$26,000.00
Total	**34**	**$537,972.00**

HISTORY

Appropriations

The sole source of TRDRP funds is the revenue from the tobacco surtax that was established when California voters passed Proposition 99 in 1988. Proposition 99 specified that five percent of this tax revenue be deposited in the Research Account and that it be used exclusively for research on tobacco-related disease. Tobacco sales in California have steadily declined since the Proposition 99 tobacco excise surtax went into effect in 1989. Between 1990-91 and 2004-05, TRDRP resources declined from $26.9 million to $14.3 million annually. Appropriations from the Research Account to the University of California have shown large fluctuations – from $40.3 million in 1990 to $3.65 million in 1995 to $60.4 million in 1997 (see Figure 2).

Figure 2: Appropriations to TRDRP from Proposition 99 Research Account, 1990-2009



Starting in 2000-2001, the amount appropriated from the Research Account to the California Department of Health Services was increased from approximately $1.7 million to approximately $5 million annually. During the first ten years of Prop. 99-funded programs, the annual appropriation to DHS remained at approximately 6 percent of available funds (i.e., revenue, interest, and Proposition 10 backfill), regardless of the amount appropriated to UC. For example, in 1999-2000 it was 7.5 percent. Starting in 2000-2001, however, the DHS appropriation was increased to more than $5 million which is now 24 percent of the total available.

Grants Awarded

Since its inception in 1989 through 2009, TRDRP awarded $ 388 million in 1,278 grants to approximately 871 scientists at 81 California institutions. The grants awarded constituted 35.7 percent of the applications received. The dollar amounts and number of grants awarded by subject area are displayed in Table 4.

Table 4. Award Totals by Subject Area, 1989-2009

Subject Area	*Number of Awards*	*Amount ($)*
Cancer	249	$66,779,628
Cardiovascular Disease	159	$48,938,967
Epidemiology (through 2006)	149	$58,341,303
General Biomedical Science	153	$37,793,676
Nicotine Dependence	142	$39,124,857
Public Health/Policy	124	$34,439,498
Pulmonary Disease	151	$42,409,764
Social/Participatory	151	$60,908,918
Total	**1,278**	**$388,437,762**

Evaluation of Research Grant Applications

Research grant proposals submitted in response to TRDRP's Call for Applications are first screened for relevance to the program's mission. Relevant proposals are assigned to a committee of peer reviewers who are experts in the scientific discipline and subject matter of the proposed research (these committees are known as "study sections"). Peer reviewers are drawn from outside California to minimize actual and apparent conflicts of interest with the applicants. Each study section evaluates applications for their scientific merit. Following state statutes, the evaluation procedure is modeled on the one used by the National Institutes of Health. The study sections' merit ratings are transmitted to TRDRP's Scientific Advisory Committee (see below). The committee uses the scientific merit ratings together with the degree to which a proposal is responsive to funding priorities to make funding recommendations. The awards recommended for funding by the Scientific Advisory Committee represent important and innovative research that promises to advance knowledge needed to improve

tobacco control; tobacco use prevention and cessation; protection from secondhand smoke; and prevention, treatment, and diagnosis of tobacco-related disease.

SCIENTIFIC ADVISORY COMMITTEE

In accordance with enabling legislation, a Scientific Advisory Committee advises the University on the administration of TRDRP. Members, who represent major California organizations involved in health research, are appointed to three-year terms, are not compensated, and may not receive TRDRP funding while serving on the committee (see Table 3). The committee is charged with recommending the strategic objectives and priorities of TRDRP and with making final recommendations on grants to be funded based on the established priorities and the scientific merit of the proposals as determined by peer review.

Table 5. Scientific Advisory Committee Roster, 2009

CHAIR	***REPRESENTING***	***TERM***
Randall S. Stafford, M.D., Ph.D. Associate Professor of Medicine Stanford Prevention Research Center Stanford University Medical School Hoover pavilion, Room N229 211 Quarry Road Stanford California 94305-5705	*Independent research university*	2008-2011
VICE-CHAIR		
Lawrence W. Green, Dr.P.H. Adjunct Professor Department of Epidemiology and Biostatistics University of California, San Francisco Box 0981, 185 Berry Street 6611 San Francisco, CA 94143-0981	*Social/Behavioral Science*	2006-2009
Marilyn Newhoff, Ph.D. Dean, College of Health and Human Services San Diego State University 5500 Campanile Drive, M/C 4124, ED-154B San Diego, CA 92182-4124	*Tobacco-Related Disease Research Institute*	2007-2010
MEMBERS		2008-2011
Serena Chen, B.A., M.S. Regional Director, Policy & Tobacco Programs, East Bay American Lung Association of California 1900 Powell Street, Suite 800 Emeryville, CA 94608	*American Lung Association of the East Bay*	2009-2012
Sara Courtneidge, Ph.D. Professor The Burnham Institute for Medical research 10901 North Torrey Pines Road La Jolla, CA 92037	*Biomedical Research*	2008-2011
David Cowling, Ph.D. CDIC/California Tobacco Control Program MS 7206 P.O. Box 997377 Sacramento, CA 95899-7377	*California Department of Public Health*	2008-2011

Frederic Grannis, M.D. Associate Professor and Staff Surgeon Thoracic Surgery City of Hope National Medical Center 1500 East Duarte Road Duarte, CA 91010	*Lung Cancer Alliance*	2008-2011
Fredric B. Kraemer, M.D. Professor of Medicine Division of Endocrinology Stanford University Medical Center Stanford, CA 94305-5103	*American Heart Association, Western States Affiliate*	2005-2008
Paul Murata, MD, MSPH Medical Institute of Little Company of Mary 20911 Earl Street, Suite 400 Torrance, CA 90503	*American Cancer Society, California Division*	2005-2008
Geraldine V. Padilla, Ph.D. Professor & Associate Dean for Research UCSF School of Nursing 2 Koret Way, Room N339 San Francisco, CA 94143-0604	*Professional medical or health organization*	2008-2011
Statice Wilmore, B.S. Tobacco Control Program Coordinator II City of Pasadena Public Health Department Health Promotion & Policy Development Division 1845 North Fair Oaks Avenue, Room 1131 Pasadena, CA 91103	*Community-Based Provider*	2009-2012

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