## *DANIEL LOUIS COSTA*

# Curriculum Vitae

**(Updated September 2016)**

**DATE OF BIRTH:**

**PLACE OF BIRTH:** Fall River, Massachusetts

**CITIZENSHIP:** United States

**MARITAL STATUS:** Married (Maryanne G. Boundy)
Children (Nathaniel, Elisabeth, Johanna, Meredith, Daniel)

**BUSINESS ADDRESS:** Mail-drop D143-01
EPA/ORD Research Facility
Research Triangle Park, NC 27711
FEDEX address: 4930 Page Rd. / Durham, NC 27703
(919) 541-2532
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costadl40@gmail.com

**HOME ADDRESS:** 311 Avalon Ct
Chapel Hill, NC 27514

**EDUCATION:**

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| 1977 | Sc.D. Physiology (Toxicology-Occupational Health) Harvard University, School of Public Health, Boston, MA. (Thesis: The Physical-Chemical and Physiological Effects of Oil Mists and Sulfur Dioxide). |
| 1973 | M.S. Physiology (Toxicology), Harvard University, School of Public Health, Boston, MA. |
| 1973 | M.S. Environmental Sciences, Rutgers, The State University of New Jersey, New Brunswick, NJ. (Thesis: Occupational Exposures to Oil Mists). |
| 1970 | B.S. Biology, Chemistry (*cum laude*); Providence College, Providence, RI. |

**CERTIFICATION:**

American Board of Toxicology, Certification No. 065, 1980; Recertified 1985; 1990; 1995; 2000; 2005, 2010.

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| American Board of Toxicology, Board of Directors | 1990-1994 |
| President | 1993-94 |
| Secretary | 1991-92 |
| 1982/87 Recertification, Chair | 1991-92 |
| Recertification 1985/90/95/2000/2005/2010/2015 | Active |

**CHRONOLOGY OF PROFESSIONAL EXPERIENCE:**

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|---|---|---|
| National Program Director for Air, Climate & Energy Research | 4/12 - Present | Off of Res and Development<br>USEPA,<br>Research Triangle Park, NC 27711 |
| Interim National Program Director for Air, Climate & Energy Research | 4/10 – 3/12 | Off of Res and Development<br>USEPA,<br>Research Triangle Park, NC 27711 |
| National Program Director for Clean Air Research | 1/05 – 4/10 | Off of Res and Development<br>USEPA,<br>Research Triangle Park, NC 27711 |
| National PM Program Manager (Detail) | 1/02-12/02 | Off of Res and Development<br>USEPA,<br>Research Triangle Park, NC 27711 |
| Branch Chief | 6/87-1/05 | Pulmonary Toxicology Branch<br>Experimental Toxicology Division<br>USEPA, NHEERL<br>Research Triangle Park, NC 27711 |
| Research Physiologist | 4/85-Present | Experimental Toxicology Division<br>USEPA, NHEERL<br>Research Triangle Park, NC 27711 |
| Adjunct Associate Professor<br>Adjunct Professor | 1994-1999<br>1999-Present | Dept. Environ. Sci. & Engin.<br>School of Public Health<br>Curriculum in Toxicology<br>School of Medicine (Joint Appt.)<br>University of North Carolina<br>Chapel Hill, NC 27515 |
| Adjunct Professor (Term) | 1996-2005 | Biology Dept.<br>North Carolina Central University<br>Durham, NC. |
| Consultant Physiologist<br>Adjunct Instructor | 1996 (Jan - April)<br>1981-1985 | Chapel Hill, NC<br>Pharmacology Department<br>SUNY-Stony Brook<br>Stony Brook, NY 11794 |
| Full Scientist<br>Associate Scientist<br>Assistant Scientist<br>Research Associate | 10/83-3/85<br>10/80-9/83<br>9/79-9/80<br>6/77-9/79 | Medical Department<br>Brookhaven National Laboratory<br>Upton, NY 11973 |
| Research Assistant | 6/76-6/77 | Dept. of Physiology<br>Harvard School of Public Health<br>Boston, MA 02115 |
| Consulting Industrial Hygienist<br>Laboratory Assistant in Genetics | 1975-1985<br>9/1969-6/1970 | Boston, MA; Stony Brook, NY<br>Providence College<br>Providence, RI |

**RELATED EXPERIENCE (Teaching):**

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| Topic Area Lecturer | 1991-Present | ENV430 Toxicology Survey Course<br>TOX707 Toxicology Curriculum<br>EPID 786 Environ. Epidemiology<br>UNC School of Public Health<br>Chapel Hill, NC 27515 |
| Topic Area Lecturer | 2002-Present | Grad. Environ. Toxicology<br>Dept. of Pharmacology<br>ENV 537 Environ Health |

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| | | Nicholas School<br>Duke University<br>Durham, NC |
| Instructor: Short Course: Pulmonary Function Testing in Rodents | 1991 (October) | Comparative Respiratory Society<br>Michigan State University<br>East Lansing, MI |
| Course Director: Advanced Toxicology | 1984 (Fall) | Pathology Department<br>SUNY - Stony Brook<br>Stony Brook, NY 11794 |
| Graduate Program Steering Committee | 1982-1985 | Pharmacology Department<br>SUNY - Stony Brook<br>Stony Brook, NY 11794 |
| Course Instructor: Physiology | 1981-1983<br>(Fall semesters) | Nursing Program<br>SUNY - Stony Brook<br>Stony Brook, NY 11794 |
| Guest Lecturer in Toxicology | 1975 (Spring & Fall) | Industrial Hygiene Review<br>Harvard School of Public Health<br>& Northeastern University<br>Boston, MA |
| Faculty Council (Student Representative) | 1975-1976 | Harvard School of Public Health<br>Boston, MA |
| Course Instructor: Principles of Public Health | 1975 & 1976<br>(Fall semesters) | North Shore Community College<br>Beverly, MA |

**PROFESSIONAL SCIENTIFIC SOCIETIES:**

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|---|---|
| American Men and Women of Science | Active |
| Sigma Xi – (Executive Council of UNC Chapter – 2000-pres) | |
| Society of Toxicology | |
| NC Chapter Society of Toxicology | |
| American Thoracic Society | |
| (Environ. Occup. Health Assembly) | |
| -Program Committee | 1988-1991 |
| -Officer Selection Committee | 1991-1992 |
| -Officer Selection Committee (Chair) | 1993 |
| -Long Range Planning Committee | 1992-1995 |
| -Long Range Planning Committee (Chair) | 1994-1995 |
| -Nominating Committee: Chair | 2005; 2008 |
| -Program Committee | 2012 |
| Society of Toxicology | |
| (Inhalation and Respiratory Toxicology Specialty Section) | |
| -Awards Chair | 1994 |
| - President | 1996 |
| - Nominating Committee | 1997; 2001; 2004; 2008 |
| (Cardiovascular Toxicology Specialty Section) | |

**AWARDS:**

1990 ***Level III* Scientific and Technological Achievement Awards *(STAA)***: Tepper et al. (1989) – Unattenuated Structural and biochemical Alterations in the Rat Lung during Functional Adaptation to Ozone: Am. Rev. Respir. Dis. 140:493-501, 1989.

1992 ***Honorable Mention STAA***: Wiester et al. (1991) - Ventilatory Responses in the Rat in Response to Chronic Ozone:

1996 ***Level II STAA***: Pritchard et al. (1996) - Oxidant Generation and Lung Injury after particulate Air Pollutant Increases with the Concentrations of Associated Metals

***Level II STAA***: Ghio et al. (1996) - Humic-like Substances in Air Pollution Particulates Correlate with Concentrations of Transition Metals and Oxidant Generation

1999 ***Level III STAA***: Kodavanti, U.P., Hauser, R., Christian, D.C., Meng, Z.H., McGee, J., Ledbetter, A., Richards, J., and Costa, D.L. Pulmonary responses to oil fly ash particles in the rat differ by virtue of their specific soluble metals. Toxicol. Sciences 43:204-212, 1998.

1999 ***Level III STAA***: Kodavanti, U.P. and Costa, D.L. Animal Models to Study for Pollutant Effects. *Air Pollution and Health.* Eds. S.T. Holgate, J.M. Samet, H.L. Koren, R. L. Maynard. Academic Press, NY. pp. 165-197, 1999.

1999 ***SOT Inhalation Specialty Section Paper of the Year***: Kodavanti UP, Hauser R, Christian DC, Meng ZH, McGee J, Ledbetter A, Richards J, and Costa, DL Pulmonary responses to oil fly ash particles in the rat differ by virtue of their specific soluble metals. *Toxicol. Sci.* 43:204-212, 1998.

2000 ***STAA - Honorable Mention***. Awarded for its comprehensive and critical evaluation of the parallelisms between in vivo and in vitro investigations on ozone-induced pulmonary health effects.

2000 ***Level III STAA:*** Costa DL, Dreher KL, Jaskot R, Richards J., Su WY, Biologic Plausibility of Metals as a Likely Causal Constituent in the Adverse Responses Observed in Healthy and Compromised Subjects. (series of papers)

2002 ***Level I STAA***: Costa DL, Dye J, Lehmann JR, Ghio A, Devlin R. Effects of Air Pollution Particles from Utah Valley on Humans and Animals (series of papers)

2003 ***Inhalation Specialty Section (SOT):*** Career Achievement Award

2003 ***Special Commemorative Award for September 11 Activities:*** Toxicological Studies of World Trade Center Particulate Matter in Mice

2003 ***SOT Paper of the Year Award:*** Kodavanti, U.P., Moyer, C., Ledbetter, A.D., Sschladweiler, M.C., Costa, D.L., Hauser, R., Christiani, D.C., and Nyska, A. Inhaled environmental combustion particles cause myocardial injury in the Wistar Kyoto rat. *Toxicol. Sci.* 71: 237-245, 2003.

2005 ***Amer. Assoc. for Aerosol Research****:* Featured Invited Plenary Speaker

2006 ***Level I STAA***: Kodavanti UP, Costa DL. et al. Novel Insights from Ambient Particle concentrator Studies: Physiochemistry vs. susceptibility

2006 ***STAA - Honorable Mention***. Nadadur S. and Costa DL. Efforts in the Development of Biomarkers of Acute Ozone Toxicity using gene Expression Profiling.

2008 ***STAA - Honorable Mention***. Kodavanti UP….Costa DL. The Spontaneously Hypertensive Rat: An Experimental Model of Sulfur Dioxide-Induced Airways Disease. *Tox Sci*, 94(1):193-205, 2006

2009 ***STAA - Honorable Mention.*** Kodavanti UP….Costa DL. The Role of Inhaled Particulate Matter-Associated Zinc in Cardiac Injury [1) The Role of Particulate Matter-Associated Zinc in Cardiac Injury in Rats Environmental Health Perspectives, 116(1):13-20 (2008); (2) Systemic Imbalance of Essential Metals and Cardiac Gene Expression in Rats Following Acute Pulmonary Zinc Exposure Journal of Toxicology and Environmental Health, 69(22):2011–2032 (2006)

2009 ***SOT Inhalation and Resp. Specialty Section Paper of the Year*** – 2009

2010 ***STAA – Honorable Mention***. [A series of publications] Farraj A…. Costa DL New Paradigm Based on Altered Compensatory Responses to Inform Assessments of Cardiac Risk from Air Pollutants.

2010 ***STAA – Honorable Mention***. Nadadur S…. Costa DL. Endothelial Effects of Emission Source Particles: Acute Toxic Response Gene Expression Profiles, 23(1):67-77 (2009)

2012 **SOT Inhalation and Respiratory Specialty Section Paper of the Year Award**: Hazari MS, Haykal-Coates N, Winsett DW, Krantz QT, King C, Costa DL, Farraj AK.TRPA1 and sympathetic activation contribute to increased risk of triggered cardiac arrhythmias in hypertensive rats exposed to diesel exhaust. *Environ. Health Perspect 2011.* 119:951-957.

2013 **SOT Inhalation & Respiratory Specialty Section Paper of the Year Award**: Carll AP, Lust RM, Hazari MS, Perez CM, Krantz QT, King C, Winsett DW, Cascio WE, Costa DL, Farraj AK. Diesel Exhaust Inhalation Increases Cardiac Output, Bradyarrhythmias, and Parasympathetic Tone in Aged Heart Failure-Prone Rats. *Toxicol. Sci.* 2013; 131(2):583-95.

2014 **SOT CV Tox Specialty Section Impact Award**; Carll AP, Hazari MS, Perez CM, Krantz QT, King C, Haykal-Coates N, Cascio WE, Costa DL, Farraj AK **2013**. An Autonomic Link between Inhaled Diesel Exhaust and Impaired Cardiac Performance: Insight from Treadmill and Dobutamine Challenges in Heart Failure-Prone Rats. *Toxicol. Sci.* 35(2):425-36.

2016 **Assembly on Environmental and Occupational Public Health *(ATS):*** Val Vallyathan Senior Investigator Award

## Institutional and Performance Awards

1989 **Special Achievement** (NHEERL/ETD)
1995 **Bronze Metal** for Commendable Service: Fuel Additives Health Effects Testing Rule
1996 **Bronze Medal** for Commendable Service as an author to the AQCD for Ozone
1994-2002 **Special Achievement** (NHEERL/ETD)
1997 **Bronze Medal** for Commendable Service in support of TSCA Section 4 Enforceable Consent Agreement for Hazardous Air Pollutants (Phenol)

2000-2003 **Special Achievement**
2002 **Commemorative Award for September 11 Research Activities**
2002 **NHEERL Achievement**: Integrated Synthesis Chapter for PM AQCD.

2002 **Bronze Medal** for Commendable Service to Special Olympics of Orange County
2003 **Bronze Medal** for senior authorship of ORD 5-Year PM Accomplishments Report
2003 **Gold Metal** in recognition of outstanding achievements as a member of the National Health and Environmental Effects Research Laboratory in establishing and implementing an integrated research program to define the potential health threat of ambient PM on the American public.
2004 **Bronze Medal** for Commendable Service PM AQCD Team
2009 **Bronze Medal** for Commendable Service – Innovations in air Pollution Epidemiology Team
2010 **Bronze Medal** for Commendable Service – Combustion Emission Toxicity Team
2010 **Bronze Medal** for Commendable Service for PM Research Centers Synthesis Paper
2010 ***ORD Teamwork Award*** – ORD Transformation Task Team for demonstrating integrated multidisciplinary teamwork in recommending how ORD can transform the way in which it selects and solves problems for EPA
2012 **Bronze Medal** for Commendable Service for ORD Budget and Program Structure Implementation Team
2012 **Exceptional/Outstanding ORD Technical Assistance to the Regions or Program Offices**: Diesel Exhaust Studies Team
2014 **Bronze Medal** for Commendable Service – So. Oxidant Aerosol Study Leadership and Vision Team
2006-2015 **Special Achievement** (IOAA)

**AIR, CLIMATE & ENERGY (ACE)** ***PROGRAM VISION***

The primary focus of my efforts over the last year or so as National Program Director for the ACE Program is to integrate and leverage the major elements the Clean Air Research Program, which I formerly led, with the growing Global Climate Program and the nascent Energy Program (consisting mainly of biofuel research and energy modeling). As reformulated under ORD's "Path Forward" theme, the ACE program will capitalize on the many strengths and successful track-record of the Clean Air Program, which has always focused on air pollution issues, but must now do so with the full realization of the emerging 21$^{st}$ challenges of climate change and the evolving energy landscape. Clearly, these arenas interplay and are interdependent. Any research endeavor must engage systems thinking if the challenges posed by in real world air quality-energy choices are to have minimal impacts and sustain public health and environmental quality. These choices are not limited to air but impose on water quality and availability, food adequacy, and land use as well. The vision of the ACE Program is to provide cutting-edge scientific information and tools to support EPA's strategic goals to protect and improve air quality and take action on climate

change. Our goal is to get out in front of problems and avoid them through solid empirical, field and theoretical science including socioeconomics. Only with a comprehensive and systematic approach can society sustain its quality and maintain opportunities for growth and improvement.

**PERSONAL RESEARCH INTERESTS:**
My primary career research interests have always focused on the potential for air pollutants to adversely affect health and how we might reduce the risk of adverse outcomes through physicochemical and biologic mechanistic understanding of how air pollutants impact health. Most of my work has utilized animal models of both healthy and susceptible human populations – with emphasis on pre-existent cardiac or pulmonary disease. This work utilizes both physiological and cellular approaches to develop and characterize the models, as well as to dissect the mechanisms by which pollutants induce or exacerbate injury or disease. Among the animal models of interest are rat models of: fibrosis, pulmonary and systemic hypertension, emphysema, bronchitis, congestive heart failure, and airway hyperreactivity (asthma). Most recently, my interest has been directed to the investigation of neural pathways from the respiratory tract associated with irritant reflexes that may impact cardiac as well as respiratory function. We have revealed previously unappreciated priming mechanisms involving exposure to air pollutants that sensitize rodents (and likely people) responsiveness to subsequent normal daily changes that are under homeostatic control but now unveiled potentially life-threatening cardiac arrhythmias.

**RESEARCH IN PROGRESS:**
- Investigation of inflammatory and neurosensory mechanisms associated with airway response and the development of cardiopulmonary dysfunction and reactive airways disease related to air pollutants.
- Development of cardiopulmonary disease models for the evaluation of susceptibility factors in response to air pollutants. Correlation of cardiac and pulmonary cellular, biochemical and functional end points in progressive lung disease.
- Development of cardiac and pulmonary function tests in rodents for the assessment of disease.

**EPA AND OTHER COMMITTEE / CONSULTANT APPOINTMENTS:**

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|---|---|
| HERL Indoor Air Research Program (Combustion Subcommittee Chair) | 1986 |
| HERL Cincinnati Water Program Review Team | 1987 |
| HERL Reorganization Sub-Committee (Structure) (Roles & Responsibilities for Scientific Staff) | 1987 |
| HERL Indoor Air Health Coordinator | 1987-88 |
| HERL Air Health Coordinator | 1987-88 |
| ECAO Addendum to AQCD for Ozone - Extended Exposure Health Effects (Contributor & Reviewer) | 1988 |
| HERL Promotion Review Board | 1989-1991 |
| Acting Division Director (ETD/HERL) Coordinated transition for the incoming Director) | 7/89-12/89 |
| ECAO Superfund Haz/Waste Workshop for Region Communication | 1989(April) |
| ECAO NAPAP Workshop and document review | 1989 |
| CASAC Briefing: Chronic Ozone Research in ORD (Washington, DC) | 1989 (Oct.) |
| Committee to Evaluate Sponsored Primate Research in Heath Effects of Chlorinated Drinking Water (Chair) | 1989 (May) |
| ECAO Ozone Research Needs Committee (Contributor & Reviewer) | 1990-1991 |
| Briefings to Eric Bretthauer (AA/ORD) on Humidifier-Related Health Effects (Washington, DC) | 1989 (Sept); 1990 (Mar) |
| ECAO Inhalation RfC Committee on Extrapolation Methodology for Inhaled Chemicals (ad hoc) | 1990-Present |
| RIHRA Topic IV - Disciplinary Coordinator (Pulmonary) | 1990 |
| NIEHS/EPA Workshop and ORD Report: Pulmonary Chair on Fuels and Fuel Additives (MMT) | 1991 |
| OTA Workshop on Identifying and Controlling Pulmonary Toxicants | 1991 (Sept.) |

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| OAQPS Probabilistic Assess. of Chronic $O_3$ Health Effects (Expert Testimony) | 1993 |
| OAQPS Briefing on Interpretation of Bronchoalveolar Lavage Endpoints | 1994 (Aug.) |
| CASAC Briefing: Extrapolation of Ozone Health Effects (Chapel Hill) | 1994 (Dec.) |
| NCEA AQCD for Ozone (Author & Reviewer) | 1994-1996 |
| NCEA Ozone Research Needs Committee (Contributor & Reviewer) | 1997 |
| NCEA Reviewer AQCD for Particulate Matter | 1994-1996 |
| Technical Contributor to TSCA Sect. 4 Enforceable Consent Decree on Hazardous Pollutants (phenol) | 1994 |
| ORD Advisory Team on MMT Study & Exposure Guidelines/Protocol for Ethyl Corp. | 1995-Present |
| Workshop ORD Advisory Team on MTBE Fuel Additive Proposal and White Paper by Amer. Petr. Instit. | 1995-1996 |
| NCEA / ORD Inhalation Guidelines Technical Advisor for New Chemicals | 1996 |
| NCEA PM Research Needs Committee (Contributor & Reviewer) | 1996-1997 |
| ORD PM National Strategy Workshop (Coordinator & Chair: Toxicology Section) | 1997 (Nov.) |
| National Jewish Environmental Center for Asthma Research (SAC) | 1997-2003 |
| Amer. Chemistry Council (Resp.TIP member) | 1999-2002 |
| California Air Resources Board – Susceptibility (SAC) | 2002-2004 |
| EPA Center Advisory Team (ex officio member) | 1999-Present |
| University of Rochester PM Center (SAC) | 2000-2008 |
| New York University PM Center (SAC) | 2000-2005 |
| San Joaquin Valley Aerosol Health Effects Center (SAC) | 2006-2008 |
| MESA-Air Univ Wash Center | 2004-Pesent |
| Harvard University PM Center (SAC) | 2000-Present |
| Univ Wash Clean Air Center | 2009-Present |
| Emory GT Clean Air Center | 2009-Present |
| Mich State (GLACIER) Clean Air Center | 2009-Present |
| CIIT Centers for Health Research (SAC) | 2002- 2005 |
| National Environmental Respiratory Center / ITRI (SAC) | 2003-2007 |
| IARC Evaluation of Carcinogenic Risks to Humans Vol 93: Carbon black, titanium dioxide and non-asbestiform talc | 2006 |
| Environmental Biomarkers Initiative – Pacific NW Laboratory (Battelle) (SAC) | 2004-2006 |
| ORD Transformation Task Force | 2009 |
| Committee on Environment and Natural Resources (AQ Res Subcom – co-chair) | 2009-pres |
| Health Canada [Healthy Environ & Consumer Safety] (Ottawa, Cn) | 2012 |

**GRANT AND DOCUMENT REVIEWS:**

| | |
|---|---|
| Ad hoc Reviewer of HEI Proposals & Reports | 1989-2003 |
| USEPA Grant Review Board/Study Section | 1989-1993 |
| Center for Indoor Air - ad hoc | 1989-1997 |
| American Institute of Biological Sciences Review Board (supporting Air Force, Army) | 1989-Present |
| California Air Resources Board (ad hoc) | 1990/99; 2001 |
| California Air Resources Board | 2000 - 2012 |
| NIEHS Study Section on Start-up Grants | 1996 |
| EPA Integrated Science Documents for NAAQS | 1986-Present |
| NCEA ad hoc Reviewer Internal Documents (toxic chemicals.) | 1991-Present |
| WHO Air Quality Documents (ad hoc) | 1993-1996 |
| RIVM (Netherlands) ad hoc PM program review | 1998; 2001 |
| Phillip Morris External Grants Program | 2000 – 2008 |
| Medical Research Council (UK) – Invited | 2013/2014 |

**EDITORIAL BOARDS:**

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|---|---|
| Inhalation Toxicology | 1989-1999 |
| Associate Editor | 2014-pres |
| J. Aerosol Medicine | 1986-1993 |
| Intern'l J Hygiene and Environmental Health | 1999-Present |
| Cardiovascular Toxicology | 2002-2008 |
| Experimental & Toxicologic Pathology | 2004-Present |
| Air Quality, Atmosphere and Health | 2007-Present |
| Particle & Fibre Toxicology | 2010-present |

**JOURNAL REVIEWS (ongoing):**

Amer. J. Physiology
Fundamental and Applied Toxicology
Experimental Lung Research
Environmental Health Perspectives
Toxicologic Sciences
Toxicology and Applied Pharmacology
American Journal of Respiratory and Critical Care Medicine
American Journal of Respiratory Cell and Molecular Biology
Inhalation Toxicology
Internat'l J Hygiene and Environmental Health
J. American Industrial Hygiene Association
J. Aerosol Medicine
J. Air Waste Manag. Assoc.
J. Applied Physiology / Lung Cell Mol Physiology
J. Leukocyte Biology
Current Respiratory Medicine Reviews
Cardiovascular Toxicology
Chemosphere
Experimental & Toxicologic Pathology
Air Quality, Atmosphere and Health
Particle & Fibre Toxicology

**ADVISORY COMMITTEES:**

| | |
|---|---|
| American Chemistry Council /CIIT | 1999-2005 |
| National Jewish Environmental Center | 1997-2001 |
| California Air Resources Board Grant Review Committee | 1999-2000 |
| Pacific Northwest Laboratory – Environ. Biol. Instit. | 2004-2006 |
| National Exposure Research Center (NERC) (Lovelace Inhalation Respiratory Research Institute) | 2003-2006 |
| EPA PM (now Clean Air) Research Center (SAC) – *ex officio* as NPD | 2000-Present |
| UNC Center for Environmental Medicine, Asthma and Lung Biology | 2009, 2013 |
| Health Canada - Sci Advisory Team (US Representative) for Air Pollution Res Prog | 2012 |
| MRC – MCMB and PHE Assessment of Ctr Envir and health; Imperial College | 2013 |

**RESEARCH SUPPORT (funding years):**

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| DOE: base funds (Brookhaven Nat'l Lab) (1977-1985) | Health effects of byproducts of energy generation |
| NTP (Brookhaven Nat'l Lab) (1980-1985) | Relationship of lung function to structure in rats after toxic insult. |
| Department of the Army (1987-1991) | Pulmonary toxicity and antigenicity of red and violet anthraquinone dyes. |
| USEPA: base Branch Air program funds (1985-2004) | Pulmonary toxicology of air pollutants (~$3-4M/yr) |

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| EPA/ ORD Special Environ. Equity Awards (1990) | (1) Study of mite and cockroach allergy interactions with oxidants (MJ Selgrade: coinvestigator)<br>(2) VOC sensitivity of sickled blood (MJ Wiester: coinvestigator) – [100K each from the AA] |
| Internal RFP Competitive Funds (1994-1996) | Pilot studies on the health effects of PM |
| Internal RFP Competitive Funds (1995-1997) | Exposure scenarios and their influence on the development and maintenance of tolerance |
| Internal RFP Competitive Funds (1997-1999) | Pulmonary toxicity of Utah Valley PM: Are empirical indices of adverse health effects coherent with the epidemiology? |
| Internal RFP Competitive Funds (1999-2002) | Autonomic interactions between pulmonary and cardiac responses to irritants and PM (Renewed 2003) |
| USEPA: NTP Res. lab supplement (2012-pres) | Neurophysiologic AOP of air pollutants (~$30K/yr) |

## SELECTED INVITED ACADEMIC AND WORKSHOP SEMINARS:

Medical College of Virginia (Charlottesville VA) - 1976
Colorado Sate University, School of Veterinary Medicine (Fort Collins CO) - 1976
University of California at Irvine - 1977
Inhalation Toxicology Research Institute (Lovelace, NM) - 1977
State University of New York at Stony Brook - 1981, 1982, 1989
New York University, Environmental Health Institute (Tuxedo NY) – 1976, 1983, 1988, 1995
NIEHS (Res Tri Pk NC) - 1984
Chemical Industry Institute of Toxicology (Res Tri Pk NC) - 1984
University of Michigan - 1984
Robert Wood Medical College, Rutgers University (New Brunswick NJ) - 1984
Mount Sinai Medical School (New York NY) - 1985
North Carolina State University Toxicology Program (Raleigh NC) - 1985
North Carolina State University School of Veterinary Medicine (Raleigh NC) - 1994
University of Cincinnati - 1987, 1997
RIVM/Netherlands (Biltoven) - 1987
U.S.E.P.A., Washington, DC, - Committee to Address "Other Than Lifetime Exposures" - 1988
Dupont Corp; Division of Life Sciences - 1988
East Tennessee State University (Johnson City TN) - 1992
Yale University (New Haven CT) - 1995
Duke University (Durham NC) – 1997; 2002; 2005; 2009
Workshop on Air pollution in Japan – (Tokyo JP) – 1999
National Center for the Environment: Research Center (Tscuba, Japan) - 1999
University of Washington (Seattle WA) - 2000
Michigan State University (East Lansing MI) – 2001
Intern'l Union Against TB and Lung Disease - 2001
NIEHS Cardiovascular Workshop (Res Tri Pk NC) - 2002
Nat'l Research Council Review of PM (NAS) (Washington DC) – 2002
Safety Pharmacology Society (St Paul MN – Keynote Speaker) - 2002
AIRNET (European Union Conference on Air Pollution) (London UK) - 2002
DOE (Valuing Externalities) (Arlington VA) – 2003
Gulf Coast SOT (Galveston, TX) - 2003
Electric Power Research Institute (Air Quality Council Meeting - San Antonio) – 2003
Nat'l Sci Foundation (Nanotechnology Grand Challenge in the Environment – Washington DC) - 2003
Environmental Cardiology (Louisville TN) – 2004
NIEHS Workshop Environmental Influences on the Induction and Incidence of Asthma - 2004
Am. Assoc. Aerosol Res. Annual Meeting (Austin TX - Keynote speaker) – 2005

Env. Occup. Sci. & Health Institute – Rutgers University (Piscataway NJ) – 2005
Electric Power Research Institute (Organics Meeting) (Palo Alto CA) – 2005
Intern'l Symposium on the Toxicology of Inhaled Mixtures (Barcelona, Spain) - 2005
Intern'l Inhalation Symposium (INIS) on Airborne particulate matter (Hannover, Germany) – 2006
HEI Annual Meeting (invited EPA and science speaker) – 2005, 2006; 2009
SOT Symposium Invitation (Regulating Mixed Atmospheres – San Diego CA) – 2006
Intern'l Symposium on Alternative Inhalation Test Methods – Invited Chair (Berlin, Germany) - 2007
Safety Pharmacology Society – Continuing Ed – (Edinburgh, Scotland) – 2007
Health Canada (Ottawa CN) – 2008
NCSU Air Pollution and Cardiopulmonary Health (Invited seminar – Oct 2008)
Duke University Inter'l and Global Public Health Workshop (Durham NC) – 2009
StatoilHydro Norwegian workshop on C Capture Risks – 2009
*NorCal SOT: Environmental and Regulatory Issues for Incidental and Engineered Nanoparticles.* (San Francisco, CA *Keynote lecture* – Oct 2009)
University of North Carolina Guest Seminar Air Modeling and Health – (Chapel Hill NC) – 2010
Intern'l CMAS Modeling Symposium (Session chair and speaker) – (Chapel Hill NC) – 2010
Harmonization of Human Exposure Study chamber workshop: Air Pollution Regulation – Contributions of Human Chamber Exposure Studies NIEHS (Research Triangle Park, NC 2010)
Am. Assoc. Aerosol Res. – Air Poll. & Health: Source to Outcome – (San Diego CA) – (Keynote speaker) – 2010
SOT Continuing Education (Comparative Respiratory of the Normal Lung) (Salt Lake city UT) – 2010
SOT Continuing Education (History of NAAQS; Communication Skills) (Washington DC) – 2011
Intern'l Global Atmos Chem:Atmos. Chem. & Health (HEI Colloquium) – (Boston, MA) - 2011
ETH Conference on Combustion Generated Nanoparticles – Meeting Summary (Zurich, June 2012)
ATS 2012 *Overview by the Environmental Protection Agency on Recent Action and the Agency's Research Program – Noontime featured Program*
University of British Columbia Guest: How Health Science "Stacked-up" to Clear the Air (Vancouver, Feb 2013)
Canadian Thoracic Society Symposium: *Air Quality and Health Workshop Ultrafine Particles*. Ambient Ultrafine PM: Bridging Science and Policy – What more do we need to know? (Vancouver, Feb 2013)
ATS 2013 – Environmental change and Global Public Heath (co-chair special session with K. Pinkerton) – presentation *The Role of Regulatory Decision Making in Mitigating the Impacts of Environmental and Climate Changes in Public Health*
UNC Student Retreat (Keynote) – Cleaning the Air: The melding of social mores and innovative science in the evolution of policy – (Jan 2013 Chapel Hill, NC)
Intern'l society of Aerosols in Medicine – Keynote: PM Health Update: Where We Are and Where We Go from Here? (April, 2013 Chapel Hill NC)
Korean Society of Toxicology Overview of Air Pollution Impacts on Health: Where We Go from Here? (Seoul, SK – Oct 2013)
King's college, London – 20th Anniversary Celebration Keynote: The Confluence of Air Quality, Health and Climate Change: A Challenge to Air Scientists…and Everyone Else (London June 2014)
CMAS Keynote Speaker – Air Quality: Advancing Health Science with Models (Oct 2014)
Health Effects of Fine Particles from Vehicle Emission: Ambient PM: A Foundation of Science for Informed Policy (Washington, DC, April 2014)
VERGE – Innovations in Air Quality Sensors (San Francisco, CA, Oct 2015)

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47. Gordon T and Costa DL. Air Pollution Chapter 28 *Casarett & Doull's Toxicology: The Basic Science of Poisons*, Ed: Curtis Klaassen, McGraw Hill, NY 2013. (2013).
48. Tepper JS and Costa DL, Practical Lung function in Comparative respiratory physiology of the normal lung. Chapter 17, pp 305-551. In: *Comparative Biology of the Normal Lung*. Book ed. Parent, R. Elsevier, Philadelphia, PA (2015)
49. Sacks J, Fann N, Owens EO, Costa DL. Air Pollution Regulatory Science Chapter 15 pp403-436. In *Air Pollution and Health Effects* (series – Molecular and Integrative Toxicology) Nadadur S and Hollingsworth JW [Eds] Springer-Verlag, London Ltd. (2015).
50. Kodavanti UP, and Costa DL [Editors] Air Pollutant Susceptibility and Contributing Risk Factors *Inhal Toxicol* Volume 27, Supplement 1, 2015
51. Farraj AK, Hazari MS, and Costa DL. Pulmonary Toxicology. Chapter 23 pp. 519-538 In: *Mammalian Toxicology*. Ed: MB Abou-Donia. Wiley Online Library. http://onlinelibrary.wiley.com/book/10.1002/9781118683484

**BOOKS EDITED:**

1. Tice, R.R., Costa, D.L., and Schaich, K.M. (eds.). *Genotoxic Effects of Airborne Agents*, Vol. 25, Environ. Sci. Res., Plenum Press, NY, 1982.
2. Costa, D.L. (ed.) Susceptibility and Risk: Proceedings of the 3rd Annual NHEERL Symposium. *Environ. Toxicol. Pharmacol*. Volume 4, 1997.
3. Foster, W.M. and Costa, D. L. (editors) *Air Pollutants and the Respiratory Tract*: *Lung Biology in Health and Disease*, series – Claude Lenfant (exec ed.) Vol. 204, Taylor and Francis, Boca Raton.
4. Tepper JS and Costa DL. [Section Editors]: Comparative Respiratory biology of the Normal Lung – Chapters 12-17. In: *Comparative Biology of the Normal Lung*. Book ed. Parent, R. Elsevier, Philadelphia, PA (2015)

**OTHER REPORTS (MAJOR CONTRIBUTION):**

1. Kutzman, R.S. (Project Manager). Sixty-two exposure-day study in Fischer-344 rats exposed to three concentrations of ozone. BNL Report No. 29084 to The National Toxicology Program / NIEHS, Feb, 1981.

2. Kutzman, R.S. (Project Manager). A subchronic inhalation study in Fischer-344 rats exposed to 0, 0.4, 1.4, or 4.0 ppm acrolein. BNL Report No. 30222 to The National Toxicology Program / NIEHS, Oct, 1981.
3. Kutzman, R.S. (Project Manager). A study in Fischer-344 rats subchronically exposed to 0, 0.5, 1.5, or 5.0 ppm chlorine. BNL Report No.32710 to The National Toxicology Program / NIEHS, Feb 1983.
4. Kutzman, R.S. (Project Manager). A study in Fischer-344 rats exposed to silica dust for 3 months at concentrations of 0, 2, 10, or 20 mg/$m^3$. BNL Report No.33927 to The National Toxicology Program / NIEHS, Nov, 1983.
5. Kutzman, R.S. (Project Manager). A study in Fischer-344 rats exposed to silica dust for 6 months at concentrations of 0, 2, 10, or 20 mg/$m^3$. BNL Report No.34617 to The National Toxicology Program / NIEHS, Feb, 1984.
6. Kutzman, R.S. (Project Manager). A study in Fischer-344 rats exposed to silica dust for 3 months at concentrations of 0, 2, 10, or 20 mg/$m^3$, and then maintained for 6 months prior to assessment. BNL Report No.35735 to The National Toxicology Program / NIEHS, Nov, 1984.
7. Kutzman, R.S. (Project Manager). A study of Fischer-344 rats subchronically exposed to 0, 0.3, 1.0, and 2.0 mg/$m^3$ cadmium (as cadmium chloride aerosol). BNL Report No. 36048 to The National Toxicology Program / NIEHS, Dec, 1984.
8. Kutzman, R.S. (Project Manager). A study of Fischer-344 rats and B6C3F1 mice exposed to cobalt and/or tungsten carbide dusts for 3 months. BNL Report No.37570 to The National Toxicology Program / NIEHS, Feb, 1986.

**INVITED SYMPOSIA:**

The use of pulmonary function tests in toxicological research. Symposium on Lung Toxicity, Annual Meeting of the Society of Toxicology (March 1984).

Fibrosis and emphysema: Factors in response to air pollution. Proceedings of 15th Annual Conference on Environmental Toxicology, pp. 23-35 (Oct. 1985).

Repeated exposure to ozone ($O_3$ ) and chronic lung disease: Recent animal data. Proceedings of the Air Pollution Control Assoc. 88-122.3 (June 1988).

Inhalation Toxicity of Red and Violet Anthraquinone Dyes. International Symposium on Smokes and Obscurants - USARML sponsored meeting at Johns Hopkins Center of High Energy Physics, Baltimore, MD. (April 1989).

Review of current animal toxicity data. Symposium on the Health Effects of Air Pollution, Annual Meeting of the American Thoracic Society (May 1989).

Pulmonary and extrapulmonary effects in rats exposed chronically to a diurnal pattern of $O_3$ for 18 months. Symposium: Does chronic exposure to ozone pose a health risk? Annual Meeting of the American Thoracic Society (May 1989).

Symposium Organizer: Does chronic exposure to ozone pose a health risk? Annual Meeting of the American Thoracic Society: Boston, MA: Co-Chaired with Dr. David Bates, Univ. Brit. Colum.(May 1989).

Pulmonary function studies in the rat addressing concentration versus time relationships of ozone ($O_3$). Proceedings of 3rd U.S.-Dutch International Symposium: Atmospheric Ozone Research and its Policy Implications (June 1989).

Does Ozone Exposure Lead to Lung Disease? Air Waste Management Association: International Symposium on Tropospheric Ozone and the Environment, Glendale, CA (March 1990).

Is Ozone ($O_3$) Injury Cumulative Over Several Hours of Exposure? Air Waste Management Association: International Symposium on Tropospheric Ozone and the Environment II. Atlanta, GA. (October 1991).

Influence of Exposure Pattern on Biological Responses: Injury and Repair. NIH Strategic Workshop on Pulmonary Research in the 1990's. National Heart, Lung, and Blood Institute, Washington, DC (May 1991).

Patterns of Exposure and Relationship to Response. Electric Power Research Institute sponsored symposium: Reconciling Laboratory Acid Aerosol Exposures with Real-World Environmental Sciences, Burlington, VT (Aug. 1991).

Predictive value of animal studies of air pollutants: Concrete extrapolation or leap of faith? Keynote Address: Annual Meeting of the Society for Occupational and Environmental Health, Washington, DC (March 1991).

Methods for lung function assessment in small mammals. 10th Annual Meeting of the Comparative Respiratory Society, Lansing, MI (Oct. 1991).

EPA's carpet caper: The intersection of science, politics, and alchemy. RTP Chapter of the Society for Risk Analysis, Res. Tri. Pk., NC (Oct. 1992).

Carpet toxicity in the mouse bioassay ASTM 981E. Toxicology Forum: Session on Indoor Air - Aspen, CO (June 1993).

Surface complexed iron ($Fe^{+3}$) on particles: Its role in the induction of lung inflammation and hyperreactivity. Colloquium on Particulate Air Pollution and Human Mortality and Morbidity, Irvine, CA (Jan. 1994).

Are particle surface reactions a plausible mechanism? Symposium on: Morbidity and Mortality from Acute Increases in Urban Particulate: Signal, Noise, or Indirect Association? Annual Meeting of the Society of Toxicology, Baltimore, MD (March, 1995).

Pulmonary and cardiovascular effects of particulate matter. Symposium on Particulate Matter - Science and Regulatory Perspectives. Capital Area Chapt. SOT/Inhalation Specialty Section . Bethesda, MD (April 1996).

PM Health Effects Task Force. Animal studies of PM toxicity. Amer. Petrol. Inst., Washington, DC (June. 1996)

Bioavailable transition metals in particulate matter mediate cardiopulmonary injury in healthy and compromised animal models. 6th Intern'l. Meeting on the Toxicology of Natural and Man-made Fibrous and Non-fibrous Particles. Lake Placid, NY (Sept. 1996).

Air pollution: An attack on the lung - an international problem. Annual Meeting of the International Union Against Tuberculosis and Lung Disease. Paris, FR (Oct . 1996).

Particulate Matter and Health: What the Animals are Telling Us. 6th Intern. Inhalation Symp. on Relationships Between Respiratory Disease and Exposure to Air Pollution , Hannover, GR (Feb. 1997)

Animal models of susceptibility: Utility in PM studies. HEI Strategy Workshop, Washington DC (Nov. 1997).

The influence of gender, strain and age on the response of animal models to air pollutants. Symposium on Animal Models for Toxicological Research. Annual Meeting of the Society of Toxicology (March 1997).

Coherent response models of ozone injury in humans and rodent models. Annual Meeting of the Society for Risk Analysis, Washington DC (Dec.1997).

Symposium summary: Short-term tests for predicting respiratory tract toxicity of inhaled particulates. Annual Meeting of the Society of Toxicology, Seattle, WA (March 1998).

Models of Chronic Obstructive Lung Disease. Annual Meeting of the Society of Toxicology, New Orleans, LA (March 1999).

Particulate Matter and Disease: The intersection cardiac, pulmonary, and vascular diseases. 7th International Inhalation symposium: relationships between acute and chronic effects of air pollutants. Hannover, Germany Feb. 22-25, 1999.

Who is susceptible to particulate matter and why? Perspective of a Toxicologist. 3rd Colloquium on Particulate Matter and Human Health. Durham, NC. June 4-6, 1999.

The toxicology of ambient particulate matter: Links to the epidemiology. Japan society for Atmospheric Environment. Tokyo, Japan. July 6-7, 1999.

$PM_{10}$ to $PM_{25}$: Cardiopulmonary interactions - A perspective. 7th International Symposium on Particle Toxicology, Maastricht, Netherlands, October 12-15, 1999.

The toxicology of ambient particulate matter: Is there a role for metals? Biology of Air Pollution Meeting, London, United Kingdom, October 1999.

The interaction of PM with the lung. Royal Society of Medicine Symposium on Ultrafine Particles in the Atmosphere, London, United Kingdom, March 2000.

Why do people die from air pollution? World 2000 Congress on Lung Health, Global Respiratory Problems: Air Pollution Symposium, Florence, Italy, September 2000.

Rodent models of susceptibility: What is their place in inhalation toxicology? International Symposium: Susceptibility Factors for Respiratory Diseases, Santa Fe, New Mexico, October 2000.

Animal models of cardiopulmonary disease: Their relevance to the assessment of human risk. International Conference on Environmental and Occupational Respiratory Diseases, Lucknow, India, October 2000.

Animal models of susceptibility: Their utility in studies of air pollution. Air Pollution Effects in the Elderly, Pisa, Italy, March 2001.

Particulate air pollutants (PM): Are oxidant products the primary toxicants? Society for Free Radical Research, Rome, Italy, June 2001.

The scientific basis for US PM standard setting - overall view and progress in toxicological evidence. 1st Annual AIRNET Meeting, London, UK, December 2002.

Toxic responses of the lung to inhaled pollutants: Benefits and limitations of lung-disease models – Eurotox, Budapest, Hungary, Sept, 2002.
The physiology and pathophysiology of the respiratory system – Safety Pharmacology Society, Philadelphia, PA, Sept. 2002.
The Health Effects of Particulate Matter: -Hazardous Characteristics- *What do we know about causality?* NRC Special Update Meeting – Seattle, WA, May 2002.
Workshop Chair: Introduction: Concepts of Susceptibility in the PM Context - 4th Colloquium on Particulate Matter Pittsburgh, PA. April 2003.
Evidence for PM Sources and Types Causing Premature Mortality – Workshop on Externalities: DOE National Energy Technology Laboratory, McLean, VA – Aug 2003.
Particulate Matter and Health: What We Know and What We Need to Know – EPRI Air Quality Regional Meeting, San Antonio, TX, Sept. 2003.
Air Pollution and the heart: What is the evidence? - Gulf Coast SOT, Galveston, TX, Oct. 2003.
Experimental Assessment of the Toxicological Assessment of Inhaled Mixtures on the Respiratory System: Feasibility and Limitations, (Co-chair), Barcelona, Spain April, 2005.
Commentary on AWMA feature article entitled: Health effects of fine particulate air pollution: lines that connect. June, 2005.
Air pollution mixtures and health – the animal data. Intern'l Symposium on the Toxicology of Inhaled Mixtures (Barcelona, Spain) – 2005
Carbonaceous PM and PM toxicity - Electric Power Research Institute (Organics Meeting) (Palo Alto CA) – 2005
SOT Symposium Invitation (Regulating Mixed Atmospheres – San Diego CA) – 2006
The role of metals in PM toxicity - Intern'l Inhalation Symposium (INIS) on Airborne Particulate Matter (Hannover, Germany) – 2006
HEI Annual Meeting – A story for metals in PM toxicity – Chicago, 2006.
Intern'l Symposium on Alternative Inhal. Test Methods. (Chairman)– Berlin, Germany. May, 2007.
Workshop: Phosgene-induced pulmonary toxicity revisited: (cross govt, academia, industry), February, 2007.
Safety Pharmacology Society – Continuing Ed "Cardiac-Respiratory Interactions in Disease and Toxic Stress"– Edinburgh, Scotland – Sept, 2007; Madison WI, Oct, 2008
Duke University Medical School– Airway Biology Seminar Series – Cardiopulmonary Dysfunction in Air Pollution Sept, 2008
National Air Quality Conference – key note speaker on AQ-Health, Portland OR, 2008
Coordinating Res Council – Near Road Air Toxics Research - Phoenix AZ, 2008
Environ. Ctrs for Arab Towns - Keynote speaker; neurobiology of irritants (Dubai, UAE 2008)
PM is a global issue - Duke University Inter'l and Global Public Health Workshop (Durham NC) – 2009
Linking health outcomes to air quality monitoring data: Status and future directions - National Ambient Air Monitoring Conference (Nashville TN) – 2009
HAPS issues associated with C capture methods - StatoilHydro Norwegian workshop on C Capture Risks – 2009
Inter'l CMAS Modeling Symposium (Session chair and speaker) – (Chapel Hill NC) – 2010
SOT Continuing Education (Comparative Respiratory of the Normal Lung) (Salt Lake city UT) – 2010
SOT Continuing Education (History of NAAQS; Communication Skills) (Washington DC) – 2011
ETH-Conference on Combustion Generated Nanoparticles, Zurich (June 2012)
Institute for Heart-Lung Health, Univ. British Columbia, (Vancouver, BC) (Feb 2013)
2013 Air Quality and Health Workshop on Ultrafine Particles - BCLA (Vancouver) (Feb 2013)
Health Effects Ultrafine Particles and Vehicular Emissions – NAS/IOM (Washington DC) (Apr 2014)

**ABSTRACTS (not listed)**

**STUDENT MENTORING AND RELATED ACCOMPLISHMENTS:**

**1. Students Advised**

Audrey Guild BNL Summer Student, 1978.

| | |
|---|---|
| Kimberly Dew | Research Rotation from SUNY-SB, Pathology, fall, 1978. |
| James Jefferson | Jackson State University, Semester Student, 1980. |
| Robert Norman | Research Rotation from SUNY-SB, Pathology, fall, 1980. |
| Michael Chaskes | SUNY-Buffalo, Summer Student, 1980 and 1981. |
| Derrick Tartt | Semester Student, 1981; Summer Student, 1981. |
| Scott Schafrank | University of Rochester, Summer Student, 1981. |
| Hillary Hahn | Research Rotation from SUNY-SB, Pharmacology, fall 1981. |
| Michael Schofflin | Research Rotation from SUNY-SB, Pharmacology, fall 1982. |
| Stephanie Davis | Summer graduate student/independent study, 1983. |
| Azeez Aileru | NCCU Masters student, "Mechanisms of $o_3$-induced hypothermia and bradycardia in the rat", 1989-1990. |
| Kyung Lee Ph.D. | UNC Post doctoral fellow, "Virus-Induced Airway Hyperreactivity in the Rat," 1989-1991. |
| Edward Fendick | Duke, Ph.D. thesis committee, "Redox reactions in loblolly pine needles in response to ozone." 1992-1994 |
| Willie J. McKinney | NCCU student; MS "The role of lung repair in determining chronic disease often acute injury to the lung by $CdCl_2$." 1991-1993 |
| Willie J. McKinney, MS | UNC Ph.D. student: "Attenuation of ozone induced pulmonary cellularity and permeability: The role of Il-6 and the acute phase response"1993-1998 (Ph.D.) |
| Janice Dye, DVM, Ph.D | UNC Postdoctoral Fellow, "Chronic airway hyperreactivity in virus infected neonatal rats." 1990-1992 |
| Lanisha Frazier | Virginia Tech (Summer Student), 1993. |
| Urmila Kodavanti Ph.D. | UNC Postdoctoral Fellow "The role of Vitamin C in $O_3$-induced pulmonary fibrosis in the guinea pig." 1991-1993. |
| Sarah Gardner, DVM Ph.D. | UNC Postdoctoral Fellow "Impact of PM on lung diffusionary processes" 1996-1998. |
| William Burke | NCCU Masters student, Animal model of hypoxia induced pulmonary hypertension - Impacts of PM on health (incomplete). |
| Mathew J. Campen, | UNC Ph.D. thesis Committee, *Cardiopulmonary toxicity of particulate matter air pollution-associated transition metals in rodents.* Dissertation. University of North Carolina Press, Chapel Hill, N.C. 2000 (Ph.D.). |
| John Stanek, Ph.D. | NCSU Post doc. "Autonomic control of cardiopulmonary responses to irritants in the guinea pig" 1999-2002 |
| Paivi Salvo | UNC Ph*.D. thesis Committee,* "Epidemiological impact of air pollution on rural Chinese" 2001-2004. |
| Srikanth Nadadur, Ph.D. | R-authority Federal Post Doc; Genomic approaches to air pollution (2002 – 2005) |
| Lindsay Wickers | *Cardiopulmonary toxicity of particulate matter air pollution-associated transition metals in genetic rodents.* MS student. University of North Carolina Press, Chapel Hill, N.C. 2000 – MS; 2006 Ph.D. |
| Alex Carll | UNC MS student (ESE*) Development of a rat model of congestive heart failure (2006-2007)*; co-mentor Ph.D *The Influence of Autonomic Imbalance on Diesel Exhaust-Induced Cardiac Dysfunction*. Dissertation. University of North Carolina Press, Chapel Hill, N.C. 2013 (Ph.D.). |
| Mehdi Hazari Ph.D. | UNC Post Doc Tox Curriculum Neurogenic pathways for pollutant-induced cardiopulmonary dysfunction |
| Grace Wallenborn | UNC Ph.D. Thesis Committee, *The role of metals in pm-induced toxicity: cardiovascular effects of zinc.* Dissertation; University of North Carolina Press, Chapel Hill, N.C. 2009 (Ph.D.). |
| Justin Callaway | UNC MS student (BBSP - Toxicology), summer rotation, 2009 |
| Jennifer Griggs | UNC MS student (BBSP - Toxicology), winter rotation, 2009 |
| Christina (Lamb) Perez | UNC MS student (BBSP - Toxicology), fall rotation, 2009 MS; Ph.D.Thesis Committee, *The Role of Hypoxia in Air Pollutant Induced Cardiovascular* |

| | |
|---|---|
| | *Dysfunction* Dissertation. University of North Carolina Press, Chapel Hill, N.C. 2013 (Ph.D.). |
| Nicole Kurhanewitz | Thesis Committee. *The Role of TRPA1 and Autonomic Imbalance in the Cardiac Response to Air Pollution*. Dissertation. University of North Carolina Press, Chapel Hill, N.C. 2016 (Ph.D.). |
| Maiko Arashiro | UNC Ph.D. Thesis Committee (2017) *Linking secondary oxidant aerosol formation and health outcomes* |
| Drew Day | Duke Ph.D. Thesis Committee (2017) *PM2.5, Ozone, and the Air Pollution Mixture: Linking Exposure to Various Adverse Cardiopulmonary Pathophysiologic Pathways* |

**2. Misc. Consulting Activities**

Industrial Hygienics, Inc., NY, 1977-1978.
DOD - 1981-1983 - Program Evaluator
Ebasco, Inc., NY - 1983, 1984 - state implementation program.
Roth Assoc., MD - 1984, 1985 - document preparation.
U.S. Army Biomedical - 1979-1981 - program reviewer.
Intercardia Pharmaceuticals - 1996 - consulting physiologist

**3. Civic and Other Activities**

Recreation Coach Basketball and Baseball 1985-1994
AAU Girls Basketball Coach 1993-1996
Phillips Middle School Booster Club –Member 1987-1998; President 1992-1994
East Chapel Hill High School Athletics Association - President 1996-1997
Chapel Hill Parks and Recreation Commission - 1994-2000 (Chair 1998-99)
Orange County Task Force on Soccer Field 2000-2001
Special Olympics Coach for Basketball 2000-present; Softball 2000-2003.
Special Olympics Coach for Softball 2000-2003.
Recreation & Middle / High School-ball Basketball Referee (NW Tri Assoc., NCHSAA) – 1998-pres