NIOSH TRAINING PROGRAM GRANT FINAL PROGRESS REPORT

Project Period: 07/01/01- 06/30/06

Duke Occupational and Environmental Medicine Program
Duke University School of Medicine
Durham, NC 27710

Grant Number: T01-CCT420005-04

Project Director: Dennis Darcey, MD, MSPH

March 2007

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ABSTRACT

The goal of the Duke Occupational and Environmental Medicine Residency (OEMR) program is to train ethical, board-certified, occupational and environmental physicians who possess the knowledge and skills necessary to provide occupational and environmental health professional services in a wide variety of settings, including academia, public health agencies, corporate occupational health, and community based clinical occupational medicine. There is a critical need for residency trained board certified OEM physicians regionally, nationally and globally. This need has been well documented in the past and is reiterated in the most recent Institute of Medicine (IOM) Report, "Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel (2000)." This report cites the current state of training which provides only approximately 100 residency trained physicians a year, barely enough to replace retiring physicians.

The Duke Occupational and Environmental Medicine Residency Program (OEMR) is housed in the Division of Occupational and Environmental Medicine within the Department of Community and Family Medicine (CFM) at Duke University Medical Center. Established in 1966 CFM took an early leadership role in developing programs to improve the health of communities including working populations. Graduate medical education has been a key element in the mission of the Department and the OEMR Program is one of many graduate-training programs supported by CFM. In fact the OEMR program has been active in residency training for 20 years, graduating 40 physicians, many of whom have taken leadership roles in corporations, academic institutions, the military and Public Health Agencies regionally and nationally. Many graduates are also active in leadership positions including Greg Stave, MD, JD, MPH and Thomas Faulkner, MD, MPH who currently serve on the Board of Directors of the American College of Occupational and Environmental Medicine. The institution remains dedicated and committed to providing a quality education for professionals in occupational and environmental medicine.

The program is fully accredited by the Accreditation Council for Graduate Medical Education (ACGME). The School of Public Health at the University of North Carolina at Chapel Hill (UNC) provides academic programs to fulfill the Master's in Public Health degree. The UNC School of Public Health is accredited by the Council on Education for Public Health. The program has received NIOSH funding as a core program in the North Carolina Occupational Safety and Health Education and Research Center (NC OSHERC) from 1983 to 2000 and through a competitive five year Training Project Grant from 2001 through 2006. NIOSH funding has benefited the program by providing the resources to continue supporting the stipends and tuition of trainees, National Occupational Research Agenda (NORA) research projects, and administrative and faculty support.

The program is two-years in length with the first year devoted to academic training leading to the completion of the Master in Public Health degree including coursework in biostatistics, epidemiology, environmental science, toxicology, industrial hygiene, safety, health and behavioral science and health administration. The second "practicum" year involves supervised training in clinical occupational medicine, mentored research and interdisciplinary occupational health hazard assessment with other occupational health professionals. During the practicum year residents participate in rotations at an industrial

occupational health service, a comprehensive university hospital based employee health clinic at Duke Medical Center, a regional community based occupational health clinic, the NC State Department of Health, and government agencies including OSHA and NIOSH. Since the knowledge and skills necessary to practice preventive medicine and occupational and environmental medicine are acquired over the course of a career, lifelong learning skills are emphasized (see the Duke OEM web site http://dukeoccmed.mc.duke.edu/).

In addition to training OEM residents the Duke OEMR program will continue to provide interdisciplinary learning opportunities for all trainees in the NC OSHERC by offering on-campus and distant learning programs. The extensive outreach and continuing education offerings to the regional and national occupational health and safety community will be continued and expanded as the OEMR rejoins the NC OSHERC. NORA related research efforts are extensive with emphasis placed on projects that translate into practice and lead to improvements in occupational safety and health. The residency program has also been successful in attracting a diverse group of trainees over the project period including four out of ten residents representing minorities.

SIGNIFICANT FINDINGS

The OEMR program leadership including the program director, assistant director and RAC chairman has been stable over the last 5 years. There are no anticipated changes for the next 5-year funding cycle. The faculty and institutional support remains high and the collaborative efforts of the faculty both at Duke and UNC continue to expand. With the expansion of the Duke epidemiology research program faculty under the leadership of Dr. Dement enhanced opportunities for resident trainees are now available in addition to the wealth of research opportunities at the UNC School of public Health. This activity is reflected in the significant federal funding that has been secured for occupational health research in the Division of OEM. Duke faculty publications are extensive and many of these studies are collaborative efforts with other OEMR faculty and faculty from the NC OSHERC faculty in Epidemiology and Ergonomics.

The OEMR curriculum has been improved with the addition of an orientation program for new residents who participate in a week long Certificate Program in Occupational and Environmental Medicine originally designed for advanced Physician Assistants but available to physicians and occupational health nurses. The course is also available on video for other learner groups at UNC and other occupational health professionals. Over the last project period the addition of the Duke Faculty led didactic curriculum, enhanced journal club and seminar series have filled gaps in the academic MPH program at UNC. Interdisciplinary courses currently offered and planned at the UNC School of Public Health also enriched the academic experience. A number of additional practicum sites have been added over the last project period to enhance hands on learning in corporate medicine, clinical practice, government and labor.

The training program evaluation process has been greatly enhanced by implementing recommendations of the ACGME. The program director also receives guidance from the Duke Graduate Medical Office, the Department Educational Task Force, the ACGME Residency Advisory Committee and the national residency directors meeting. Some of the innovations resulting from these recommendations include the addition of detailed

ACGME learning objectives that are cross referenced in a matrix to ensure residents are accomplishing these objectives in both the academic and practicum years. More comprehensive resident and faculty program reviews can now be bench marked across all departmental educational programs.

Outreach activities to translate research and education into the practitioner environment have been very successful for workers in the construction, health care and cobalt production industries. Continuing education activities are provided in a number of venues including the internet with over 3,000 occupational health professionals around the globe enrolled in a daily forum discussing new and evolving occupational health issues and concerns. Over the project period continuing educational offerings have been provided to thousands of occupational health professionals in medicine, nursing, industrial hygiene, and safety. Additional medical school courses have been added to serve both Duke and UNC medical students and residents.

The OEMR program continues to attract excellent candidates for training and has been fortunate to enroll a high percentage of minority trainees. The program graduated 10 residents in the TPG project period. The passing rate on the American Board of Preventive Medicine Certification test for these graduates is 100%. Many have gone on to leadership positions in occupational and preventive medicine. A brief summary of the OEMR trainees over the project period is included below.

2006 Graduating Residents:

Marc-André R. Chimonas, MD, MPH

Degrees:	BA, Cornell University, 1995
	MD, Medical College of Georgia, 2000
	MPH, Loma Linda University School of Public Health, 2003
	CDC Epidemiologic Intelligence Service Physician, 2003-2005
NIOSH support:	Yes

Research: Airborne particulate matter from primarily geologic, non-industrial sources at levels below National Ambient Air Quality Standards is associated with outpatient visits for asthma and quick-relief medication prescriptions among children less then 20 years old enrolled in Medicaid in Anchorage, Alaska, accepted for publication in Environmental Research.

Amit R. Paliwal, MD, MPH, MBA

Degrees:	BA, University of California – Los Angeles, 1995
	MD, American University of the Caribbean, 1998
	MBA, University of La Verne, 2000
	MPH, University of California – Los Angeles, 2003
NIOSH support:	Yes

Research: Project with the CDC Preventive Services Task Force during rotation in Washington DC. Duke blood borne pathogen surveillance data project.

Program Graduates in the Last 4 years:

Robert W. Perkins, MD, MPH

Medical Director, Keyport Sub Group 9, Undersea Medical Officer, Naval Submarine Base, Bangor, WA

Degrees: BS, University of California – Riverside, 1992
MD, Uniformed Services University of the Health Sciences, 1998
MPH, University of North Carolina at Chapel Hill, 2001
NIOSH support: No

Master's Research Paper
"To Screen or Not to Screen: Markov Analysis of PPD Testing"

Publications

Perkins RW. "To Screen or Not to Screen: Markov Analysis of PPD Testing", abstract presented at the American College of Occupational and Environmental Medicine National Meeting, May 2002.

Vann R, Freiberger J, Uguccioni D, Reed WL, Perkins RW. "Association of the Clinical Presentation of DCI with treatment Outcomes", abstract presented at the 35th Annual Undersea and Hyperbaric Medical Society Meeting, June 2002.

Perkins R, Reed WL. "Decompression Illness in Report on Decompression Illness, Diving Fatalities, and Project Exploration", Divers Alert Network Publications, 2002.

Perkins RW, Fothergill D. "The Effect of Repetitive No-Decompression Dives on Human Bone Matrix, Abstract", presented at the 35th Annual Undersea and Hyperbaric Medicine Society Meeting, 2002.

Long R, Perkins RW, Fields L, Lappas, Reading J, Dear G, Moon R. "Emergency Physician's Knowledge of Acute Indication for Hyperbaric Oxygen Therapy", abstract presented at the 35th Annual Undersea and Hyperbaric Medicine Society Meeting, 2002.

Ward L. Reed, MD, MPH

Director, Naval Operational Medicine Institute, Hyperbaric Program, U.S. Navy, Pensacola, FL

Degrees: AB, Bowdoin College, 1987
MD, Boston University, 1991
MPH, University of North Carolina at Chapel Hill, 2001
NIOSH support: No

Master's Research Paper

"Descriptive Study of Injuries Reported through the Diver's Alert Network"

Publications

Reed WL. "Cost Effectiveness of Automatic External Defibrillators in the Workplace", abstract presented at the American College of Occupational and Environmental Medicine National Meeting, May 2002.

Darcey DJ, Alleman TL, Reed WL. "CDI-Duke Occupational Exposure Survey of the Global Cobalt Production Industry", report presented at the International Cobalt Development Institute Scientific Meeting in Chapel Hill, NC May 2003.

Vann R, Freiberger J, Uguccioni D, Reed WL, Perkins RW. "Association of the Clinical Presentation of DCI with treatment Outcomes", abstract presented at the 35th Annual Undersea and Hyperbaric Medical Society Meeting, June 2002.

Reed WL, Perkins RW. *"A Cost Effective Analysis of Diver Evacuation Strategies"*. Undersea and Hyperbaric Medicine, 2003, Supp.

Reed WL, Piantadosi CP, Freiberger JJ, et al. "*Epidemic Carbon Monoxide Poisoning as a Result of a Winter Storm".* Undersea and Hyperbaric Medicine, 2003, Supp.

Reed WL et al. *Report of Recreational Diving Accidents and Deaths, 2003.* Divers Alert Network, Durham NC, 2003.

Reed WL, Freiberger JJ, Vann R, et al. *"A Descriptive Analysis of a Recreational Diving Accident Database".* Undersea and Hyperbaric Medicine, 2002.

Reed WL et al. "*Report of Recreational Diving Accidents and Deaths, 2002."* Divers Alert Network, Durham NC, 2002

Reed WL et al. "Characteristics of Diagnostic Tests" in *Biostatistics and Epidemiology Secrets*. Elsevier, New York, 2005 (publication pending).

Perkins RW, Reed WL. "Decompression Illness in Report on Decompression Illness, Diving Fatalities, and Project Exploration", Divers Alert Network Publications, 2002.

Tony L Alleman, MD, MA, MPH

Medical Director and Owner, Occupational Health Clinics of South Louisiana, Lafayette, LA

Degrees: BS, University of Southwestern Louisiana, 1979
MD, Louisiana State University – Shreveport, 1982

MS, Louisiana State University – Shreveport, 1998
MPH, University of North Carolina at Chapel Hill, 2003

NIOSH Support: Yes

Master's Research Paper:
Evaluation of DOE Workers: Respiratory Surveillance Program

Publications:

Alleman TL, Darcey. DJ, Bronchiolitis Obliterans Organizing Pneumonia in a Spice Technician, *Journal of Occupational and Environmental Medicine*, 44(3): 3-4, 2002.

Darcey DJ, Alleman TL. "Occupational and Environmental Exposure to Asbestos" in *Pathology of Asbestos-Associated Disease*, 2nd edition, editors: VL Roggli, SD Greenberg, and TA Sporn (New York: Springer, 2004), Chapter 2.

James T, Lamar S, Alleman TL. "Simple Solutions Reduce MSD in Hospitals" in *Contemporary Ergonomics 2002*, editor: PT McCabe (London: Taylor & Francis, 2002).

Darcey DJ, Alleman TL, Reed WL. "*CDI-Duke Occupational Exposure Survey of the Global Cobalt Production Industry"*, report presented at the International Cobalt Development Institute Scientific Meeting, Chapel Hill, NC, May 2003.

Michael Jacobs, MD, MPH

Occupational Medicine Physician, Naval Hospital Great Lakes, Illinois

Degrees: BA, University of Pennsylvania, 1994
MD, Temple University, 1998
MPH, University of North Carolina at Chapel Hill, 2003
Selected to Delta Omega National Honor Society (Merit-based)

NIOSH Support: No

Master's Research Paper:
"An Evaluation of the Effectiveness of a Hearing Conservation Program"

Publications:

Dement JM, Pompeii LA, Østbye T, Epling CA, Lipscomb HJ, James TM, Jacobs MB, Jackson GW, Thomann W. "An Integrated Comprehensive Occupational Surveillance System for Health Care Workers", *American Journal of Industrial Medicine*, 45(6):528-538, 2004.

Jacobs MB, Dement JM. "Use of reference populations in a survival analysis to evaluate the effectiveness of hearing conservation programs", presented

as a poster at the Navy Occupational and Environmental Health conference, March, 2004.

Jacqueline P. Duncan, MB, BS, MPH

Director, Monitoring and Evaluation, National HIV/AIDS Program, Jamaica; Consultant Physician, Internal Medicine and Occupational Medicine Institute of the Caribbean

Degrees: MB, BS, University of West Indies, 1994
MPH, University of North Carolina at Chapel Hill, 2003
NIOSH Support: No

Master's Research Paper:
"Legislation and Compliance: A Survey of Cobalt Facilities"

Kirsten N. Bray, MD, MPH

Occupational and Family Medicine Physician, National Medical Clinic Gastonia, NC
Degrees: BS, University of Maryland, 1991
MD, Howard University, 1995
MPH, University of North Carolina at Chapel Hill, 2003

NIOSH Support: Yes

Master's Research Paper:
"Proposed Inflammatory Effects of Ozone and alpha Piene Products on Human Lung Cells"

Brian J. Caveney, MD, JD, MPH

Clinical Associate, Division of Occupational Medicine, Duke University Medical Center, Durham, NC
Degrees: BA, West Virginia University, 1995
JD, West Virginia University, 2001
MD, West Virginia University, 2002
MPH, University of North Carolina at Chapel Hill, 2004

NIOSH Support: Yes

Master's Research Paper:

"Blakeney Urgent Care and Occupational Medicine Center: Business Plan for Medical Practice in Suburban Charlotte, North Carolina."

Publications:

Caveney BJ. "Needle stick Safety", *Medical Trial Techniques Quarterly,* Fall 2004.

Caveney BJ. "Physician reluctance to adopt clinical decision support tools and e-prescription technology", *MD Consult Student Union,* 2004

Caveney BJ. peer reviewer for Carbon Monoxide Poisoning Chapter of British Medical Journal's *Clinical Evidence* publication, 2004.

Karen W. Rahn, MD, MEM

Clinical Associate, Occupational Medicine Physician for Department of Orthopedics, Duke University Medical Center.

Degrees: BS, Indiana University, 1987
MD, Duke University Medical Center, 1999
MEM, Duke University, 1995

NIOSH Support: Yes

Master's Research Paper
"Assessments and proposed Modifications of Current Methods of Formaldehyde Disposal at the National Institutes of Health, Bethesda, Maryland"

Translation of Research to the Practice Environment

Over the course of the project period a number of new research initiatives by faculty and residents have led to the identification of significant occupational health hazards and interventions to reduce those hazards.

Construction Industry

Faculty in the epidemiology group have made significant contributions to the understanding of injuries from pneumatic nail guns in construction (Dement, 2003; Lipscomb, 2003) including documentation of significant risk associated with contact trip triggering mechanisms. This work has been done over a number of years through collaborations with the United Brotherhood of Carpenters and Joiners and Homebuilders Associations in NC and Missouri. In response, the Carpenters' Joint Apprenticeship Training Program in St Louis Missouri added a nail gun-training component for entry-level apprentice carpenters. Findings were shared with the trade association, the International Staple and Nail Tool Association (ISANTA), and presented at national meetings focused on construction safety (Dement, 2002; Lipscomb et al, 2002, 2003). A voluntary ANSI standard change in 2003 now calls for the shipping of framing nailers with sequential triggers. However, contact triggers remain available and continued research (supported through the Center to Protect Workers' Rights NIOSH Cooperative

Agreement) focuses on evaluating training and the triggering mechanism changes in preventing injuries from these tools over the next 4 years.

Health Care Workers

Epidemiology and clinical faculty have also been, and continue to be, involved in a series of research projects focused on health care workers health and safety including translation of research to practice. The parent project for these efforts involved the development of a model surveillance system for health care workers at Duke University (Dement et al, 2004). Dr. Pompeii developed her career development award (NIOSH KO1) from this project focusing more specifically on issues related to return to work after back injury among nurses and nurse's aides. The surveillance system also provides data to support an additional research project designed to evaluate the effectiveness of mechanical lift equipment in prevention of patient handling injuries.

Cobalt Workers

Dennis Darcey, MD, MSPH and two resident trainees conducted an industry wide survey of health and safety practices, medical surveillance and environmental and biological monitoring to assist the Cobalt Development Scientific Advisory Committee in conducting a worker health risk assessment pertinent to upcoming regulatory requirements for the European Union. Eleven facilities in Europe and North America were surveyed. The results were variable, but air and urinary cobalt monitoring levels exceeded international occupational health limits at many facilities despite widespread use of respirators and safety training programs. Recommendations for occupational medicine physicians coordinating worker medical surveillance included increasing the level of environmental and biologic monitoring, standardizing and centralizing monitoring programs, installing more effective engineering controls to reduce worker exposures, and re-evaluating the effectiveness of worker training and respirator use.

References:

Dement JM, Pompeii LA, Østbye T, Epling CA, Lipscomb HJ, James TM, Jacobs MB, Jackson GW, Thomann W. "An Integrated Comprehensive Occupational Surveillance System for Health Care Workers", *American Journal of Industrial Medicine*, 45(6):528-538, 2004.

Dement JM, Lipscomb HJ, Li L, Epling CA, Desai T. "Surveillance of nail gun injuries among construction workers", Applied Occupational and Environmental Hygiene 18(5):1-10 (2003).

Dement JM. "Nail gun injuries in construction. Making Science Work for You: A Symposium for Safety Practitioners". National Safety Council Congress and Expo. Atlanta, Georgia. September 2001.

Lipscomb HJ. NIOSH RO1. Effectiveness of Mechanical Lift Equipment.

Darcey DJ, Alleman TL, Reed WL. "*CDI-Duke Occupational Exposure Survey of the Global Cobalt Production Industry*," report presented at the International Cobalt Development Institute Scientific Meeting, Chapel Hill, NC, May 2003.

Translation of Educational Activities to the Practice Environment

Duke faculty and residents participate in a number of educational outreach activities directed outward towards other institutions, business, government agencies and occupational health practitioners locally, nationally and globally. The Duke Occupational and Environmental Medicine Electronic Forum is a unique resource in the field of occupational medicine. Founded in 1993 by Duke OEM faculty member Dr. Gary Greenberg the list reaches nearly 3000 current subscribers located in more than 60 countries. The list serves occupational health professionals including physicians, nurses, industrial hygienists, government public health officials, industry groups and university researchers. The Occ-Env-Med Mail-list provides a forum for announcements, dissemination of text files and academic discussion. The forum is designed to allow presentation of clinical vignettes, synopses of new regulatory issues and reports of interesting items from publications elsewhere (both the medical and the non-medical journals). The list is supported by both the Association for Occupational and Environmental Clinics (AOEC) and the American College of Occupational & Environmental Medicine (ACOEM). In 2000, the ACOEM presented Dr. Greenberg its "Health Achievement Award", its annual recognition of a unique achievement in the field of occupational & environmental medicine. A new innovative project is currently in the planning stages to involve residents in outreach to the global occupational health community by establishing an “on call” service to answer questions and provide resources via the Internet to practitioners in less developed countries. The impact on the practitioner environment can be measured by the steady growth in enrollment since the inception of the list. Practitioners around the globe are now easily linked to share clinical insights and resources, particularly when addressing new and novel exposure related disease.

Another one of a kind, innovative program developed by Duke OEM faculty and the Physician Assistant Educational Training Program at Duke is the Annual Certificate Program in Occupational and Environmental Medicine designed for graduate physician assistants, nurse practitioners, and physicians. This program, jointly sponsored by the Duke PA Division and the Duke Occupational and Environmental Medicine Division in the Department of Community and Family Medicine, is an on-campus educational program featuring nationally-renowned experts in occupational and environmental medicine from Duke University, and other area universities (UNC, NC State) governmental agencies (NIEHS, EPA), and research centers (RTI, CIIT). This is a full-time, one-week program, which requires campus residence. The program includes traditional lecture presentations, seminars, patient cases, work site visits and computer analysis. The program is designed to meet the educational needs of PAs, NPs, and physicians who are currently employed in occupational medicine or in positions with a substantial occupational medicine component, or those who wish to transition into OEM employment or deepen their knowledge in this area. The didactic sessions are designed to meet practitioner needs and have an immediate impact on their professional practice.

Each year approximately 60-hours of seminars and journal club in occupational health are offered to occupational health professionals from central North Carolina. Lecturers and participants are invited from the research facilities at Research Triangle Institute, NIEHS, Chemical Industry Institute of Toxicology, and the EPA. Industrial hygienists, safety specialists, nurses and physicians also attend these seminars which often directly

impacts on their practice, particularly translating new and innovative approaches to occupational health problem solving. Duke faculty is also involved in consultation activities to industry, government, other universities and hospitals. Presentations and seminars by faculty have been made to medical societies, regional and national occupational medical association meetings, university and industry trainee groups, and regional and national symposia. Continuing Education Programs provided by OEM faculty over the last five years include the training of 6,575 occupational health professionals from medicine, nursing, safety, and industrial hygiene employed in industry, government and academia. The Annual Carolinas Occupational Medicine Conference is sponsored by the NC OSHERC.

Duke faculty members Darcey, Epling, and Lipscomb have served on the Board of Directors of the North Carolina Occupational Safety and Health project, a worker and union worker education and health and safety advocacy group. Residents and faculty have provided seminars at the Annual Safety and Health Meeting and coordinated occupational health screening clinics for undeserved workers that have an impact on worker education and empowerment when dealing with health and safety issues in the workplace. After some recent changes in the leadership of NCOSH a renewed effort at joint projects and outreach is being discussed to increase these activities for residents.

OEM Faculty have developed academic courses for Duke and UNC medical students and residents that may impact on their career choice as a physician and provide a skill set that can translate into their primary care practice. These electives are designed to enhance the student's basic science skills in several important areas related to occupational medicine: occupational injury and illness prevention, epidemiology, health management for employee populations, industrial toxicology, worksite wellness and prevention programs During a two to four week rotation, students complete readings related to occupational health, participate in clinical evaluations and prospective health planning, participate in lectures and seminars, learn to conduct computerized database searches concerning occupational hazards and industrial toxicology, and visit industrial sites as part of the experience. Students complete at least one project focused on an occupational hazard relevant to their experiences during the rotation.

PROGRAM NARRATIVE

1. Program Administration

There have been no changes in program leadership since 1998 when Dennis Darcey, MD, MSPH was appointed Program Director. Dr. Darcey is board certified in Occupational Medicine and holds a MSPH - Industrial Hygiene and MPH - Epidemiology from the UNC School of Public Health. He has been a Duke faculty member since 1990 involved in the clinical practice of occupational medicine, teaching, and research. He devotes approximately 30% of his time towards administration and teaching in the OEMR program. Dr. Darcey's research areas include occupational asthma, particularly diisocyanate induced asthma, solvent neuropathies, asbestos related lung disease, and heavy metal toxicity. Carol Epling, MD, MSPH, who is board certified in occupational medicine and internal medicine, serves as Associate Program Director for curriculum development. She devotes approximately 15% of her time to the OEMR program. Her current research areas are health disparities, repetitive motion injury in poultry workers, latex allergy, and occupational asthma.

Dr. Darcey obtains continuing advice regarding the operation of the program from the Residency Advisory Committee, through participation in the Duke Graduate Medical Education Committee, and the national Occupational Medicine and Preventive Medicine Residency Directors Committee affiliated with the American College of Occupational and Environmental Medicine. The program will also receive advice from the NC OSHERC Advisory Board. Dr. Darcey also serves on the Departmental Educational Task Force Committee that critically evaluates the effectiveness of all resident teaching efforts in the Department of Community and Family Medicine on an ongoing basis. Gregg Stave MD, MPH, JD, Director for Health Planning and Analysis for GlaxoSmithKline, continues to serve as Chairman of the Residency Advisory Committee (RAC). Since 1998, RAC membership has changed to reflect NIOSH site reviewer recommendations to include greater representation from industry and labor.

The OEMR program continues to receive support from the Duke Division of Occupational and Environmental Medicine Educational Fund that provides for administrative support, facilities, library resources, office space for residents, faculty and resident travel expenses and allocated teaching time for faculty. The Division Chief and the Departmental Chair serve on the RAC and both have been very supportive. Additional funding is received from practicum sites and scholarships for US Navy residents.

2. Program Faculty

All of the Duke faculty participating in teaching and mentoring resident trainees have their primary affiliation in the Division of Occupational and Environmental Medicine, Department of Community and Family Medicine at Duke University Medical Center. The breadth of the faculty expertise in occupational medicine, epidemiology, toxicology, industrial hygiene, biohazard science, ergonomics, and occupational mental health enriches the educational and research experiences and is a great strength of the program. Resident trainees also benefit from the diverse faculty at the UNC School of Public Health who teach and conduct research in biostatistics, epidemiology, toxicology, ergonomics, industrial hygiene, environmental science, health administration and social and behavioral medicine. During the academic year, faculty at both UNC and Duke

mentors resident trainees. Each resident has a faculty advisor at the UNC School of Public Health who serves as their research mentor on the Master's research project. A second faculty member from Duke serves as an advisor and reader of the research project. Residents plan, carry out, analyze, and write up a project of their choosing. The project may be on a topic chosen independently by the resident or it may be one done in close collaboration with a larger project led by a faculty member.

Over the course of the two-year program each resident trainee has a Duke OEM faculty advisor who works with the resident to design a unique educational plan, reviews the educational curriculum and performance evaluations including the American Board of Preventive Medicine pre board test to ensure adequate progress towards graduation. These mentors meet frequently at least monthly. OEM faculty at the Duke Employee Health and Wellness Center and the Duke Occupational Medicine Clinic directly supervise resident physicians engaged in all clinical activities. Plans for evaluation, treatment and recommendations for work restrictions are formulated by the resident and approved by the supervising faculty member. All resident clinical notes are reviewed and co-signed by OEM faculty and charts are subject to quality assurance review on a quarterly basis along with faculty charts. These reviews are compiled on a yearly basis and reported to the medical center for credential review. Written reports for complex medical - legal IME evaluations are prepared by the resident and thoroughly edited and signed by the responsible faculty member before release to the primary care physician and / or responsible worker's compensation representatives.

At Duke affiliated sites, a training letter of agreement is approved by the House Staff Office. This letter includes written procedures for each resident's supervision. When residents rotate through these sites, they are supervised by licensed preventive/occupational medicine physicians for all clinical activities and qualified health professionals for industrial hygiene, safety and ergonomic evaluations.

Faculty members at Duke, the UNC School of Public Health and North Carolina State Ergonomics Program cooperate, collaborate and interact closely with resident trainees and with each other as evidenced by the many joint publications, sponsored research and collaborative projects. Over the last project period Duke OEMR key faculty and residents have co-authored over 15 peer reviewed articles and served as the main authors of a joint publication: Physical and Biological Hazards of the Workplace. This is a 500-page reference book for practicing occupational health professionals edited by Duke OEMR graduate Greg Stave, MD, JD, MPH. Grant support for Duke faculty over the course of the project period illustrates many collaborative projects. For example, a large NIOSH sponsored project, "Surveillance Methods for Health Care and Related Workers," involves Duke faculty Dement, Lipscomb, Epling and Pompeii. Another NIH/NIEHS funded grant, "Work & Health Disparities Among Rural Women," involves collaboration between Duke researchers Lipscomb and Epling and UNC researchers Dana Loomis, PhD and Steve Wing, PhD who teach in the Epidemiology program of the NC OSHERC. Dr. Dement and Dr. Loomis also have joint projects funded by NIOSH, "Chrysotile: New Exposure Indices and Cancer Epidemiology," and collaborative research investigating lung disease in textile workers. Dr. Darcey, Dr. Stopford and resident trainee Dr. Alleman completed a multi year project for the Cobalt Development Institute evaluating environmental monitoring and biologic monitoring for the global cobalt production industry that was presented at their international meeting.

Duke Core Faculty:

Dennis J. Darcey, MD, MSPH, MPH
Assistant Clinical Professor
Director, Occupational and Environmental Medicine Residency Program
Medical Director, Duke Occupational Medicine Clinic
Certification: Preventive Medicine/Occupational Medicine, 1992
Special Interests: Clinical toxicology, biologic monitoring, occupational pulmonary disease, environmental hazard assessment

John M. Dement, PhD
Professor
Certification: Industrial Hygiene, Certification Number 1067, 1976.
Special Interests: Occupational environmental exposure, assessment for epidemiological studies including statistical modeling and dosimetry modeling.

Carol A. Epling, MD, MSPH
Assistant Consulting Professor
Certification: Internal Medicine 1992, Preventive Medicine/Occupational Medicine 1996.
Special Interests: Occupational pulmonary illness, building-related conditions and occupational injury and illness among construction workers and healthcare workers.

George W. Jackson, MD
Associate Clinical Professor
Director, Duke Employee Occupational Health and Wellness
Certification: Preventive Medicine, 1973
Special Interests: Substance Abuse, development and management of worker protection plans, Hospital employee health and wellness.

Tamara M. James, MA, CPE
Clinical Associate
Director, Duke University and Medical Center Ergonomics
Certification: Masters of Science in Human Factors Engineering 1990, Certified Professional Ergonomist, 1993
Special interests: office and manufacturing ergonomics, engineering controls, ADA issues

Hester J. Lipscomb, RN, PhD
Associate Professor
Certification: Registered Nurse, N.C. Board of Nursing, Certificate Number: 056273, 1975; BSN, 1975; MPH, 1980; PhD in Epidemiology, 1995
Special interests: Epidemiology of injuries in construction industry and health services research

Samuel D. Moon, MD, MPH
Associate Professor
Division Chief, Occupational and Environmental Medicine
Certification: Preventive Medicine/Occupational Medicine, 1993; Pain Medicine, 1994
Special Interests: Ergonomics, repetitive motion and cumulative trauma, chronic pain syndrome.

Lisa A. Pompeii, RN, PhD
Assistant Research Professor
Certification: Registered Nurse, Certified Occupational Health Nurse, MS Occupational Health Nursing 1995, PhD Epidemiology 2002
Special Interests: Occupational musculoskeletal; disorders, health disparities, health hazards in the poultry industry, injury research.

Woodhall Stopford, MD, MSPH
Assistant Clinical Professor
Certification: Internal Medicine, 1973; Preventive Medicine/Occupational Medicine 1983
Special Interests: Clinical toxicology, occupational asthma, heavy metals toxicity, toxic hazard risk assessment of arts and crafts materials, environmental hazard risk assessment, and biologic monitoring.

Wayne R. Thomann, DrPH
Assistant Clinical Professor
Director, Biohazard Science Master=s Program
Director, Duke Occupational and Environmental Safety Office
Special Interests: Hazardous materials management, indoor air quality, bioaerosol research, regulatory standards, and occupational health and safety program development

Supporting Faculty

Thomas O. Brock III, PhD, DABT
Clinical Associate
Certification: American Board of Toxicology, 1994
Special Interests: Toxicology, health risk assessment.

Gary N. Greenberg, MD, MPH
Assistant Clinical Professor
Certification: Internal Medicine, 1982; Preventative Medicine/Occupational Medicine, 1987
Special Interests: Diagnosis of toxic disease in individuals and groups, occupational health program management, computers in occupational medicine.

Judith C. Holder, MS, PhD
Assistant Clinical Professor
Director, Duke Occupational Mental Health Program
Certification: MS, 1985, PhD, 1995
Special Interests: Minority occupational stress and coping, prevention and wellness programs, organizational consultation, depression and anxiety disorder.

Adjunct Faculty:

John W. Cromer, Jr., MD, MS, MSPH
Medical Director of Occupational Health Services, Wilmington, NC
Certification: Preventive Medicine/Occupational Medicine, 1985
Special Interests: Hospital occupational health, health and safety for heavy industry

Rickey L. Langley, MD, MSPH
Medical Epidemiologist, Occupational and Environmental Epidemiology Section, NC Department of Health and Human Resources, Raleigh, NC
Certification: Internal Medicine, 1986; Preventive Medicine/Occupational Medicine, 1988
Special Interests: Occupational and Environmental Epidemiology

Gregg M. Stave, MD, JD, MPH
Director for Health Planning and Analysis, GlaxoSmithKline
Certification: Internal Medicine, 1988; Preventive Medicine/Occupational Medicine 1991
Special Interests: Biological hazards and medical-legal issues, hazards in the pharmaceutical industry, smoking cessation programs and corporate wellness programs.

3. CURRICULUM

Academic/Didactic

The first year of the program is primarily academic and the residents complete a Masters of Public Health (MPH) at the University of North Carolina School of Public Health. Based on the special interests and career goals of the resident, emphasis can be in public health leadership, industrial hygiene, epidemiology, or health policy and administration. To earn the MPH degree and meet ABPM board certification requirements students are required to take at least one course in all of the core disciplines of public health.

Biostatistics: BIOS 110: Principles of Statistical Inference or BIOS 135: Probability and Statistics, or BIOS 141 Quantitative Methods for Health Care Professionals or HPAA 144 Statistical Methods

Epidemiology: EPID 160: Principles of Epidemiology or EPID 168: Fundamentals of Epidemiology or PUBH 260 / EPID 170, Clinical Measurement and Evaluation or EPID 205 Clinical Epidemiology and Clinical Research

Health Policy and Administration: HPAA 220 Health Care in the United States or HPAA 240: Health Administration and Planning or HPAA 204: Management Principles and Practices or HPAA 180, Health Law or PUBH 240 Clinical Reasoning and Decision Making.

Environmental Health: ENVR 135: Industrial Toxicology, ENVR: 138: Health Hazards of Industrial Operations or ENVR 137: Occupational Safety and Ergonomics

Social and Behavioral Sciences: HPAA 138: Conflict Resolution and Negotiation for Managers or HPAA 185: Ethical Issues or HBHE 125: Injury as a Public Health Problem

The core courses not only teach the fundamentals necessary for a career in occupational/preventive medicine but also expose the student to an interdisciplinary group of teachers, researchers and students from other NC OSHERC core and allied programs in nursing, environmental science, epidemiology and safety and ergonomics. Emphasis is on interdisciplinary learning and collaboration. In addition OEMR residents are required to take PUBH 285, “Interdisciplinary Approaches to Occupational Health.” This course focuses on the team approach to providing occupational health services and

involves site visits to various industries. Students form interdisciplinary teams to problem solve around real world occupational health problems and develop joint projects and presentations. Trainees do a wide variety of joint class projects with other students from all of the core program areas. UNC Preventive Medicine residents and Robert Wood Johnson Fellows also take the same core courses. Many of these trainees bring years of experience in public health and are an additional asset to the academic training environment.

A N.O.R.A. Interdisciplinary Seminar Series is required to provide all OSHERC trainees with information on current research related to N.O.R.A. and interdisciplinary opportunities for research. In addition, ENVR 135: Industrial Toxicology is a three-credit interdisciplinary course designed for occupational medicine residents, occupational health nurses, and environmental science/industrial hygiene students that stresses the development of problem solving skills using a multidisciplinary approach from all of the core disciplines. The course is available on-line to distance learners.

Residents take additional electives based on their previous experience and future goals. They are guided in course selection by their resident advisor and the Residency Program Director. Courses must be approved prior to registration. Course selection is extensive and a full list of courses in the UNC School of Public Health Course Catalogue is available at the UNC School of Public Health web site, http://www.sph.unc.edu. Residents often complete their Master's research project requirement in the summer following their academic courses at UNC. Residents plan, carry out, analyze, and write up a project of their choosing. The academic program is designed so that the degree can be completed in one calendar year allowing the second year of the residency program to focus on clinical activities and additional research projects.

Research activities within the Duke Division of Occupational and Environmental Medicine have grown steadily during the past several years with leadership provided by John Dement, PhD who directs the epidemiology research group that includes researchers Hester Lipscomb, PhD and Lisa Pompeii, PhD. The clinical faculty are also involved in research efforts including Dr's Darcey, Epling, Moon, Stopford, and Jackson. Residents have the opportunity to work with members of the Epidemiology Research Group to develop additional research projects. Each resident participates in one major research project as well as several minor research projects pertinent to on-site practicum experiences. The resident is expected to play a major part in the design, conduct and evaluation of such projects. Projects at practicum sites include experiences in the programmatic approach to solving occupational health problems including ergonomic problems, health promotion programs and health hazard control. Trainees are expected to work closely with management, occupational nurses, industrial hygienists, ergonomic specialists and safety personnel in carrying out such projects. For example, recent graduate Michael Jacobs, MD, MPH conducted an evaluation of the effectiveness of the Duke Hearing Conservation Program that involved work with occupational health nurses, industrial hygienists, occupational medicine physicians, and line management. This project led to a report and presentation at the OEM Seminar Series and at the national ACOEM Meeting.

New residents also participate in a first year orientation program that includes a forty-hour course in Occupational Medicine for practicing occupational physician's assistants taught by core and supporting faculty in the Division of Occupational and Environmental

Medicine. In the second year, residents teach in the course.

Throughout both years of residency training, residents participate in a biweekly seminar/journal club given by Duke faculty and invited speakers covering topic areas emphasizing ACGME learning objectives in clinical occupational medicine, epidemiological studies of occupational and environmental disease, toxicology, health risk appraisal methods, occupational mental health, ethics, etc. A biweekly Duke didactic session emphasizes problem-based learning with faculty preceptors.

The MPH degree requires resident trainees to successfully complete all course requirements, comprehensive examinations and a research project. To assist the program director and RAC in evaluating resident progress in the program residents are also required to participate in the American College of Preventive Medicine (ABPM) In-Service Examination at the beginning of training and again after completing the academic year. This affords an opportunity to assess performance and modify learning activities to ensure readiness for the board examination. A score below the mean prompts additional remedial educational activities. Thus far all of the resident trainee graduates have passed the ABPM examinations on their first attempt.

Clinical/Practicum

The second year, or practicum year, is comprised of clinical activities, research projects and practical experiences. Flexibility is built into the program to allow for residents to focus in areas of interest relevant to their career goals. Residents are required to complete clinical training at the Duke Employee Occupational Health and Wellness Clinic, Duke Occupational Medicine Clinic in RTP, and Duke IME consult clinic. Practicum assignments may be longitudinal throughout the year or in blocks of a month or more depending on the rotation site (OSHA and NIOSH rotations up to 3 months). At least one public health agency rotation is required including the NC State Public Health Department, Federal OSHA, or NIOSH. Additional rotations include academic sports medicine and pulmonary medicine clinics at Duke, corporate occupational health departments (IBM, Blue Cross Blue Shield of NC, AW North Carolina), a regional community based occupational medicine clinic in Wilmington, NC and the N.C. Occupational Safety and Health Project NCOSH, a non-profit occupational health education and worker advocacy organization. Residents have participated as lecturers in the Annual NCOSH Safety Conference and attended free worker screening clinics. Ideally, each resident will participate in practicum experiences in a university medical center, regulatory agency, industry and labor. In addition, residents will be expected to complete at least one research project that leads to a written report and professional presentation at a DOEM seminar, local or national occupational health meetings. For example residents have presented the results of their research at:

American College of Occupational and Environmental Medicine National Meeting, May 2002

Reed WL. "Cost Effectiveness of Automatic External Defibrillators in the Workplace"
Perkins RW. "To Screen or Not to Screen: Markov Analysis of PPD Testing"

International Cobalt Development Institute Scientific Meeting, May 2003
Darcey D, Alleman T, "Global Cobalt Producers Environmental and Biological Monitoring Survey."

In the practicum year residents are also expected to participate in work site visits, ergonomic assessments and at least two projects evaluating an occupational health problem. Residents are also expected to participate and present at the two hour journal club / seminar biweekly and faculty didactic sessions biweekly. Representative practicum rotation descriptions are listed below with additional information describing additional practicum rotations available on the Duke OEM Residency web site, http://dukeoccmed.mc.duke.edu/programs/ residency.html.

Duke Employee Occupational Health and Wellness (EOHW)

Duke EOHW is responsible for health care delivery to over 22,000 employees at Duke University and the Medical Center. George Jackson, MD, supervises this rotation. Residents spend up to ten months in a longitudinal experience at this practicum site. The service is responsible for all placement and surveillance activities at the Duke Medical Center, (such as the implementing the blood borne pathogens standard and tuberculosis surveillance). There are a large number of research laboratories where highly toxic materials and radioactive agents are used. Duke's vivarium provides an example of health issues involved in animal care, particularly prevention of laboratory animal allergies and Herpes B Virus. Residents participate in projects with the industrial hygiene and safety staff learning principles of hazard investigation and worker protection including respirators. Experience in the diagnosis and management of musculoskeletal disorders is obtained in the EOHW clinic, which provides work-related injury and illness care for all Duke Employees. Residents attend weekly disability case management conferences attended by a multidisciplinary team of OEM faculty members, physical therapists, occupational health nurses, a social worker and a vocational rehabilitation specialist.

EOHW also employs counselors for its Employee Assistance Program. Residents may participate in weekly conferences with the staff. Duke EOHW manages a contracted health promotion program, Live for Life, which services Duke employees. Residents may choose a project regarding management of a wide variety of health promotional services provided to Duke University employees.

North Carolina Occupational and Environmental Epidemiology Section (OEES)

A physician epidemiologist, Rickey Langley, MD, MSPH, and certified industrial hygienist serve as onsite preceptors for resident projects. Residents are involved in longitudinal activities or block rotations within this Department. The primary educational objective of the practicum experience at OEES is to offer resident trainees an opportunity to actively participate in public health investigations of occupational and environmental health hazards that have statewide impact. Residents are involved in the initial assessment of a health hazard, planning and conducting an investigation, and preparing recommendations for action by the State Health Department. Secondary objectives include understanding occupational and environmental health statutes and regulations, and understanding the legal and ethical constraints when mediating between legitimate citizen health concerns vs. industry/economic interests. Residents also have an opportunity for hands on training in environmental monitoring techniques and interpretation of data generated from sampling results. Additional opportunities include designing epidemiologic studies and interpretation of occupational disease surveillance data. Resident projects include a written report that is reviewed by the onsite preceptor

and Duke faculty that may lead to publication. Resident health hazard evaluations have included evaluation of health risks to community residents living near a hazardous waste incinerator, health risks to community residents living near a polyurethane manufacturing plant, health of watermen living on the North Carolina coast exposed to pfeisteria, investigation of a cancer cluster in a wood-working plant, evaluation of teachers complaining of multiple chemical sensitivities that developed after exposure to sewer gas in a day care facility and indoor air quality assessments, particularly for mold related illness.

Occupational Health Services, Wilmington, NC

Dr. John Cromer, formerly a full-time faculty member at Duke OEM, directs this busy community based occupational health service in Wilmington, NC and serves as the resident preceptor. The OEM team consists of Dr. Cromer and a Duke OEMR graduate Amanda Trimpey, MD, MPH, as well as four nurses, an x-ray technician, an occupational health nurse and a physical therapist. A state of the art physical therapy and work hardening center are located near the clinic. Residents may spend 1-2 months at this practicum site. The service provides on-site medical care for Federal Paper Board Company, a large unionized paper manufacturing facility, and the local General Electric Aerospace division plant, that manufactures aircraft engines and nuclear reactor components. Services are provided both at the clinic and at the work site. Other clients include Corning Glass (manufacturing fiberoptic cables), American Crane (manufacturing and welding steel products), Interroll (manufacturing bearings and rollers), Bulk Lift (manufacturing bag house materials), Siemens (manufacturing circuit breakers), City of Wilmington (serving police, fire fighters, waste workers, etc.) and many other local industries.
Residents see patients for medical surveillance and injury care in the clinic as well as at onsite industrial clinics. Most of their time, however, is spent in addressing work-related concerns through site visits in association with company safety and industrial hygiene personnel.

Blue Cross/Blue Shield of North Carolina

Blue Cross/Blue Shield of North Carolina clinical practicum offers resident trainees the opportunity to participate in health promotion and prevention projects for the employee population and to participate in the provision of occupational health services at a corporate occupational health clinical facility that is staffed by one of the Duke occupational medicine faculty. The rotation provides residents with an opportunity to examine patients with work related illness and injuries and visit their work areas to observe job activities. Depending on the needs of the company and interests of residents, focused projects aimed at wellness, health promotion, chronic disease management, safety, ergonomics and other occupational health matters will be assigned during the rotation.

AW North Carolina

The AW clinical practicum offers resident trainees the opportunity to participate in the provision of occupational health services at a corporate occupational health clinical facility that is staffed by Duke occupational medicine faculty. AW North Carolina is a high

output assembly plant that manufactures Toyota Transmissions for the United States market. The rotation provides residents with an opportunity to examine patients with work related illness and injuries and visit their work areas to observe job activities. Depending on the needs of the company and interests of residents, focused projects aimed at improving health and safety, ergonomic, exposure monitoring and wellness are assigned during the rotation. These activities include ergonomic assessments for individual patients and work areas, chemical or noise hazard investigation in conjunction with plant safety personnel, workers comp clinical cases, OSHA, or EPA regulation review, and designing wellness and disease management programs (high blood pressure screening, health education, obesity and diabetes management).

Federal Occupational Health and Safety Administration, Washington DC

Detailed Goals and Objectives available at the residency web site.
http://www.osha.gov/dts/oom/index.html#Training%20Activities

Other Clinical and Consulting Experiences

Residents also spend one day per week participating in DOEM faculty consultations in the occupational and environmental medicine clinics serving clients from local industry. Primary care physicians, who suspect a possible occupational illness; attorneys and insurance companies refer patients. Many consultations concern toxic illness or involve the evaluation of workers with chronic musculoskeletal disorders. Residents gain familiarity with Medline and other occupational health databases by performing relevant literature searches. Presentation skills are honed in staff meetings where difficult cases are discussed. Diagnostic decision-making and writing skills are developed during faculty review of the final report written by the resident.

A multitude of other short-term and longitudinal experiences are available through faculty consultations and research. Examples include reproductive health evaluations and investigations of indoor air quality. Faculty provide national corporate medical consulting services to a large textile manufacturing company and a large chemical manufacturing company, offering opportunities for investigating exposure related health complaints and surveillance for work related illness. Clinical rotations are also available in sports medicine, pulmonary medicine and dermatology at Duke Medical Center, depending on resident interest and previous training.

Interdisciplinary Training

Duke faculty are involved in interdisciplinary training and research of students in other NC OSERC occupational health core program areas including environmental science / industrial hygiene, epidemiology, occupational health nursing and ergonomics. Sandy Stopford, MD, MSPH developed an interdisciplinary three hour UNC semester long course in Toxicology that is designed for occupational medicine residents, occupational health nurses, and environmental science / industrial hygiene students that stresses the development of problem solving skills using a multidisciplinary approach that involves the integration of specialists in all of the core disciplines. The course is available on-line to distance learners. Dr. Stopford also serves as a faculty advisor for students in the environmental Science / industrial hygiene programs of the NC OSHERC.

Projects at practicum sites include experiences in the programmatic approach to solving occupational health problems including ergonomics, toxic hazards, health promotion and health hazard controls. Trainees are expected to work closely with management, occupational health nurses, industrial hygienists, ergonomic specialists and safety personnel in carrying out such projects. An example of a resident project was the development of a Latex Surveillance System for Duke University Medical Center where the resident had to involve employees, line management, health administrators, nurses, industrial hygienists and physicians to plan, develop and implement an institution wide occupational health program.

Over the years many Duke faculty have participated as faculty in the NC OSHERC Winter and Summer Institutes and coordinated the Ergonomics course offering. Duke faculty and residents also participate as guest lecturers in a number of OSHERC related courses and seminars.

The Duke OEMR program is unusual in that it incorporates several disciplines including occupational health nursing, industrial hygiene, industrial epidemiology, biohazards, occupational mental health and occupational and environmental medicine within one division. It is expected that OEMR residents will have continued opportunities for interdisciplinary team interactions with other core program trainees as opportunities to participate in the division's hazard assessment and clinical toxicology activities expands with the addition of the occupational medicine program back into the NC OSHERC.

4. Training Program Evaluation

The OEMR program director, Dr. Darcey, works closely with the Residency Advisory Committee (RAC) and the Community and Family Medicine Educational Task Force (ETF) to develop and implement methods for evaluating the ongoing effectiveness and quality of the training program. The RAC meets twice a year and is charged with:

a. Reviewing resident projects and activities
b. Developing and promoting interdisciplinary education activities in the program
c. Reviewing the UNC academic curriculum, clinical and didactic curriculum
d. Reviewing graduate placement and performance on the ABPM specialty boards in Occupational Medicine
e. Reviewing alumni satisfaction with the training experience to prepare graduates for career opportunities
f. Reviewing the program curriculum to ensure that the ACGME goals and objectives are being met
g. Reviewing credentials of new faculty, practicum site medical supervisors
h. Assisting in obtaining new opportunities for resident training
i. Assisting in obtaining new opportunities for medical student training
j. Submitting an Annual Residency Program Review to the Dean of the Medical School and the Duke Office of Graduate Medical Education.

At each RAC meeting, new initiatives for expanding and modifying didactic and practicum opportunities are discussed with the residents. Residents present a review of their current experiences and make suggestions for improvement. The ETF meets quarterly and over the last few years a comprehensive Departmental wide educational quality and evaluation program has been implemented for all graduate medical education programs.

Formal program and faculty evaluation includes:

a. Anonymous annual faculty review of the program reviewed by the Department Chairman, Division Chief, RAC, Program Director and trainees. The results are used to direct changes in faculty teaching and are reviewed as part of the annual faculty evaluation with the Division Chief.

b. Anonymous annual trainee review of the program and faculty reviewed by the Department Chairman, Division Chief, RAC, Program Director and trainees. In addition a separate trainee evaluation of all UNC MPH courses is completed which is also reviewed by UNC faculty and program leadership who then make recommendations for changes in course content and trainee evaluation.

c. Graduate and Employer Survey to assess the adequacy of skills and professionalism of graduates reviewed by the Department Chairman, Division Chief, RAC, Program Director and trainees. Recommendations for changes in curriculum and emphasis in specialty areas of practice are solicited to improve the overall program.

Residents also evaluate each practicum rotation to assess the programmatic goals, objectives, and quality of the experience. These evaluations are reviewed by the Residency Program Director to ensure that the ACGME training goals and objectives are met and reviewed with the practicum supervisor and the RAC Chairman. The Residency Program Director has an "open door" policy and solicits resident ideas and feedback about their training experience.

Over the course of the last program period resident, faculty and RAC feedback from this process has led to a number of changes in the program including:

a. The addition of a biweekly resident / faculty didactic session
b. The addition of seminars in worker productivity
c. Resident scheduling of seminar speakers
d. Additional resident evaluation tools including the 360 assessment
e. Addition of more specific learning objectives and implementation of educational monitoring process that involves completion of a matrix that matches learning objectives to resident course work and practicum experiences to ensure coverage of the basic curriculum
f. Bench marking residency performance with other educational programs in the Department
g. The addition of many new training sites outside of Duke including Blue Cross/Blue Shield, IBM, Wilmington Occupational Health, AW of North Carolina, NIOSH, OSHA, BASF, North Carolina Department of Labor

5. Trainee Candidates

In order to be eligible for the OEM residency program, applicants must have successfully graduated from medical school and completed at least one year of clinical training in a residency program acceptable to the American Board of Preventive Medicine. Many

residents are already board eligible/certified in a primary care specialty and/or have had additional academic, research or clinical experiences to merit special consideration. In some cases resident candidates can be admitted into the practicum year if they have completed the Master's in Public Health degree at another institution. Prospective applicants are required to complete an application including an essay and provide records documenting past academic training and letters of recommendation. Application materials are reviewed by a faculty committee and qualified applicants are selected for interviews based on their previous grade point average, performance on medical licensing tests, additional academic or clinical training in the field of occupational medicine and letters of recommendation. Following the interviews, the selection committee is convened and applicants are rank ordered. Offers are generally extended during an informal match period in December, but admissions are potentially open throughout the year depending on the background of the resident and available funding for stipends.

Trainee recruitment has been enhanced with the addition of the Duke Occupational and Environmental Medicine Residency Web page on the Internet. The Web page is also home for the Duke Occupational and Environmental Medicine Electronic Forum a worldwide network of occupational health professionals and physicians. Many prospective candidates who are already practicing in the field are already members of the forum. The Association of Occupational and Environmental Clinics (AOEC) and the American College of Occupational and Environmental Medicine (ACOEM) support this web page. The OEMR program is also advertised as an opportunity for family medicine residents seeking further specialization in occupational medicine as an extension of their training in the Department of Community and Family Medicine. Although the programs are separately administered and accredited by the ACGME, residents can use up to six months of their training in occupational medicine toward their family medicine board certification. The OEMR also participates in the FREIDA Online service for medical students and residents. Medical students and residents use this web-based resource as an integral part of their residency selection process, allowing them to compare educational features across programs. The FREIDA Online homepage is accessed via the Internet over 80,000 times a week. In the past, recruitment has not been a problem in identifying prospective residents, but lack of stipend and tuition support has limited the number of residents who can be enrolled in the program. With added NIOSH support the program should be able to achieve a target goal of 4 residents per year

LIST OF FACULTY PUBLICATIONS

Dennis J. Darcey, MD

Refereed Articles:

1 Swinker M, Koltai D, Wilkins J, Hudnell K, Hall C, Darcey DJ, Robertson K, Schmechel D, Stopford W, Music S. "Estuary-associated Syndrome in North Carolina: an Occupational Prevalence Study", *Environmental Health Perspectives*, 109(1):21-6, 2001.

2. Alleman TL, Darcey DJ. "Bronchiolitis Obliterans Organizing Pneumonia in a Spice Technician", *Journal of Occupational and Environmental Medicine*, 44(3):3-4, 2002.

3. Darcey DJ, Lipscomb HJ, Epling CA, Pate W, Cherry P, Bernstein J. "Clinical Findings of Residents Near a Polyurethane Foam Manufacturing Plant", *Archives of Environmental Health*, 57:3, 239-246, 2002.

4. Mitchell CS, Moline J, Avery AN, Baker D, Blessman JE, Carson AI, Cosby O, Darcey DJ, Ducatman A, Emmett EA, Forst L, Gerr F, Gochfeld M, Guidotti TL, Harber P, Hu H, Hegmann KT, Kipen HM, Levin J, McGrail MP, Meyer JD, Mueller KL, Prince S, Rubin R, Schwerha JJ, Sprince NL, Taiwo O, Upfal M. "In response to the 2002, vol. 22, no. 4 article entitled 'The rise and fall of occupational medicine in the United States'", *American Journal of Preventive Medicine*, 23(4):307-309, 2002.

Chapters in Books:

1. Darcey DJ. "Prions: Creutzfelt Jacob Disease and Related Transmissible Spongioform Encephalopathies" in *Physical and Biological Hazards of the Workplace*, 2nd edition, editors: PH Wald and GM Stave (New York: Wiley-Interscience, 2002), Chapter 32, pp. 649-654.

2. Darcey DJ. "Rickettsiae and Chlamydia" in *Physical and Biological Hazards of the Workplace*, 2nd edition, editors: PH Wald and GM Stave (New York: Wiley-Interscience, 2002), Chapter 25, pp. 547-555.

3. Darcey DJ. "Rabies Virus" in *Physical and Biological Hazards of the Workplace*, 2nd edition, editors: PH Wald and GM Stave (New York: Wiley-Interscience, 2002), Chapter 21, pp .389-395.

4. Darcey DJ, Alleman TL. "Occupational and Environmental Exposure to Asbestos" in *Pathology of Asbestos-Associated Disease*, 2nd edition, editors: VL Roggli, SD Greenberg, and PC Pratt (New York: Springer, 2004), Chapter 2.

John M. Dement, PhD

Refereed Articles:

1. Dement JM, Welch LW, Bingham E, Scott J, Cameron B, Rice C, Quinn P, Ringen K. "Surveillance of Respiratory Diseases among Construction Workers at Department of Energy Work Sites", *American Journal of Industrial Medicine*, 43(6):559-573, 2003.

2. Dement JM, Lipscomb HJ, Li L, Epling CA, Desai T. "Nail Gun Injuries among Construction Workers", *Applied Occupational & Environmental Hygiene*, 18(5):374-383, 2003.

3. Lipscomb HJ, Dement JM, Li L. "Health Care Utilization of Carpenters with Substance Abuse Related Diagnoses", *American Journal of Industrial Medicine*, 43:120-131, 2003.

4. Lipscomb HJ, Dement JM, Li L. "Health Care Utilization of Families of Carpenters with Substance Abuse Related Diagnoses", *American Journal of Industrial Medicine*, 43:361-368, 2003.

5. Dement JM, Pompeii LA, Lipkus IM, Samsa GP. "Cancer Incidence among Union Carpenters in New Jersey", *Journal of Occupational & Environmental Medicine*, 45(10):1059-1067, 2003.

6. Lipscomb HJ, Dement JM, Li L, Nolan J, Patterson D. "Work-related Injuries in Residential & Drywall Carpentry from Active Surveillance", *Applied Occupational & Environmental Hygiene*, 18(6): 479-488, 2003.

7. Lipscomb HJ, Li L, Dement, JM. "Work-related Falls among Carpenters in Washington State before 7 after the Vertical Fall Arrest Standard", *American Journal of Industrial Medicine*, 44:157-165, 2003.

8. Lipscomb HJ, Dement JM, Nolan J, Patterson D, Li L. "Nail Gun Injuries in Residential Construction: Lessons from Active Injury Surveillance", *Injury Prevention*, 9(1):20-24, 2003.

9. Dement JM, Pompeii LA, Østbye T, Epling CA, Lipscomb HJ, James TM, Jacobs MB, Jackson GW, Thomann WR. "An Integrated Comprehensive Occupational Surveillance System for Health Care Workers", *American Journal of Industrial Medicine*, 45(6):528-538, 2004.

10. Lipkus IM, Skinner CS, Green LG, Dement JM, Samsa GP, Ransohoff D. "Modifying Attribution of Colorectal Cancer Risk", *Cancer Epidemiology, Biomarkers &*

Prevention, 13(4):560-566, 2004.

11. Welch L, Ringen K, Dement JM, Takaro T, McGowan W, Chen A, Quinn P. "Screening for Beryllium Disease among Construction Trade Workers at the Department of Energy Nuclear Sites", *American Journal of Industrial Medicine*, 46:207-218, 2004.

12. Dement JM, Epling CA, Pompeii LA, Østbye T, Hunt DL. "Blood and Body Fluid Exposure Risks among Health Care Workers: Results from the Duke Health and Safety Surveillance System", *American Journal of Industrial Medicine*, 46:637-648, 2004.

Carol A. Epling, MD

Refereed Articles:

1. Darcey DJ, Lipscomb HJ, Epling CA, Pate W, Cherry P, Bernstein J. "Clinical Findings of Residents near a Polyurethane Foam Manufacturing Plant", *Archives of Environmental Health*, 57:3, 239-246, 2003.

2. Dement JM, Lipscomb HJ, Li L, Epling CA, Desai T. "Nail Gun Injuries among Construction Workers", *Applied Occupational and Environmental Hygiene*, 18(5):1-10, 2003.

3. Dement JM, Lipscomb HJ, Li L, Epling CA, Desai T. "Surveillance of Nail Gun Injuries among Construction Workers", *Applied Occupational and Environmental Hygiene*, 18(5):1-10, 2003.

4. Dement JM, Pompeii LA, Østbye T, Epling CA, Lipscomb HJ, James TM, Jacobs MB, Jackson GW, Thomann WR. "An Integrated Comprehensive Occupational Surveillance System for Health Care Workers", *American Journal of Industrial Medicine*, 45:528-538, 2004.

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2. Epling CA, Langley RL. "Herpes B Virus" in *Physical and Biological Hazards of the Workplace*, 2nd edition, editors: PH Wald and GM Stave (New York: Wiley-

Interscience, 2002), Chapter 21, pp. 359-366.

3. Epling CA, Langley RL. "Simian Immunodeficiency Virus (SIV)" in *Physical and Biological Hazards of the Workplace*, 2nd edition, editors: PH Wald and GM Stave (New York: Wiley-Interscience, 2002), Chapter 21, pp. 400-402.

George W. Jackson, MD

Refereed Articles:

1. Dement JM, Pompeii LA, Østbye T, Epling CA, Lipscomb HJ, James TM, Jacobs MB, Jackson GW, Thomann W. "An Integrated Comprehensive Occupational Surveillance System for Health Care Workers", *American Journal of Industrial Medicine*, 45(6):528-538, 2004.

Tamara M. James, MA

Refereed Articles:

1. Dement JM, Pompeii LA, Østbye T, Epling CA, Lipscomb HJ, James TM, Jacobs MB, Jackson GW, Thomann WR. "An integrated Comprehensive Occupational Surveillance System for Health Care Workers", *American Journal of Industrial Medicine*, 45(6):528-538, 2004.

Hester J. Lipscomb, PhD

Refereed Articles:

1. Lipscomb HJ, Li L. "Injuries among Teens Employed in the Homebuilding Industry in North Carolina", *Injury Prevention*, 7(3):205-209, 2001.

2. Darcey DJ, Lipscomb HJ, Epling CA, Pate W, Cherry LP, Bernstein J. "Clinical Findings of Residents near a Polyurethane Foam Manufacturing Plant", *Archives of Environmental Health*, 57(3):239-246, 2002.

3. Lipscomb HJ, Moon SD, Li L, Pompeii LA, Kennedy MQ. "Evaluation of the North Country on the Job Network: A Model of Facilitated Care for Injured Workers in Rural Upstate New York", *Journal of Occupational & Environmental Medicine*, 44(3):246-257, 2002.

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5. Lipscomb HJ, Dement JM, Li L. "Health Care Utilization of Carpenters with Substance Abuse-related Diagnoses", *American Journal of Industrial Medicine*, 43(2):120-131, 2003.

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7. Lipscomb HJ, Dement JM, Nolan J, Patterson D, Li L. "Nail Gun Injuries in Residential Carpentry: Lessons from Active Injury Surveillance", *Injury Prevention*, 9(1):20-24, 2003.

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9. Lipscomb HJ, Dement JM, Li L, Nolan J, Patterson D. "Work-related Injuries in Residential and Drywall Carpentry", *Applied Occupational & Environmental Hygiene*, 18(6):479-488, 2003.

10. Kennedy MQ, Badger E, Pompeii LA, Lipscomb HJ. "The North Country on the Job Network: a Unique Role for Occupational Health Nurses in a Community Coalition", *AAOHN Journal*, 51(5):204-209, 2003.

11. Lipscomb HJ, Dement JM, Behlman R. "Direct Costs and Patterns of Injuries among Residential Carpenters, 1995-2000", *Journal of Occupational & Environmental Medicine*, 45(8):875-880, 2003.

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